ROBIN'S DAY: A FAMILY TRADITION BECOMES CITIZEN SCIENCE

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Citizen Science, the engagement of the general public or amateur scientists to collect scientific data, has been shown to be a useful tool to supplement and enhance data acquisition by professionals (see Devictor et al. 2010). Whether engaging wildlife enthusiasts to map the spatial distribution of Chacma baboons in the anthropogenic landscapes of South Africa (Pédarros et al. 2020) or using hunter questionnaires to monitor the demographics of migratory quail in Spain (Nadal et al. 2020), studies such as these are able to gather data that would be too logistically difficult, impossible (without time travel!) or expensive to collect by researchers themselves. Devictor and colleagues (2010) particularly advocate for the importance of citizen science programs for biogeography research, as these data must be collected over large spatial and/or temporal scales. In addition to the utility of this method of data collection, there is the added benefit that engaging the public directly in conservation efforts likely increases their feeling of connection to nature and the scientific process.

Global Climate Change (GCC) is the biggest current threat to most wildlife species (IPCC 2014) and understanding its effect on the distribution and migratory patterns of animals is critical to stem the resultant loss of species. Changes in range distributions in response to GCC have been widely documented (Chen et al. 2011). In addition to spatial shifts, temporal shifts in emergence and migration of animal species are expected and have been documented as phenology adjusts to changes in temperature-related triggers (Parmesan 2007, Kovach et al. 2013, Matthysen et al. 2011). Documenting phenological shifts is important to species conservation, as trophic mismatches may be occurring across taxa (Saino et al. 2011, Jones et al. 2010). However, the magnitude of response to climate change differs profoundly for different species (Ovaskainen et al. 2013). The drivers of this variability are not well understood and so work in this area will benefit from more local data on individual species' responses to climate change over long time

periods. Migratory species are particularly of interest, as they are likely to be responsive to changes in temperature, if their migration is timed to seasonality. Long-term data sets of single species' spring arrival times are rare, but data like this is especially suited to citizen science, especially for charismatic species such as birds. Here, we present a forty-three-year continuous dataset of spring arrival times of the American Robin (*Turdus migratorius*) to a town in Western New York (Penfield). These data were collected as part of a family tradition, which is described in detail below.

METHODS

Data collection--Richard Blazey—engineer, inventor, gadget and bird enthusiast and father to three children—began what would become an important annual family tradition back in 1976 a few years after his youngest was born. Robin's Day is marked by the first confirmed sighting of an American Robin in the back yard of the Blazey family, who reside in Penfield, Monroe County, New York. In Western New York, winters are long and any signs of spring are met with great joy (and no small amount of relief!). But in the Blazey household, the first returning robin of the year might also bring a bit of cash and an excuse for a party. Beginning after Christmas, a can of loose change is kept in their house and coins tossed in as they are found in pockets at the end of the day, ultimately becoming the prize money given to the family member who has guessed the closest date to the arrival of the first robin of the season (see photo, p. 52). Bets are placed when the collection can is brought out and dutifully put onto the calendar. On the day of the first robin sighting, a cake is baked and served (see photo, p. 52), the winner announced and awarded their cash—usually $10 to $20—and the family celebrates this harbinger of spring.

The Blazeys have been celebrating the holiday for forty-three years, with family participants now spanning generations and coasts. And still, the cakes are made, celebrations had and money distributed. What perhaps distinguishes this from just a quaint family tradition is the plaques that Mr. Blazey has kept to commemorate the winners and dates of arrival of their rosy-chested feathered friend. Dates from these plaques were extracted and entered into a spreadsheet for analysis.

Data analysis--We performed a simple linear regression with arrival date and year to ascertain if any patterns were present. In addition, we extracted temperature data from the nearest meteorological station (at Greater Rochester International Airport) for the period November through February and calculated the four-month 'midwinter' average prior to each years' competition. We then regressed arrival day against mid-winter temperature to further investigate if temperature was, in fact, an important predictor of arrival day.

RESULTS AND DISCUSSION

A simple linear regression (Fig. 1) is highly significant ($p = 0.00078$), with a slope of –0.34 days per year. This means that robins have been arriving, on average one day earlier every three years. The trend only explains 24% of the yearly variation, but that is not unexpected (and illustrates the difference between 'climate' and 'weather').

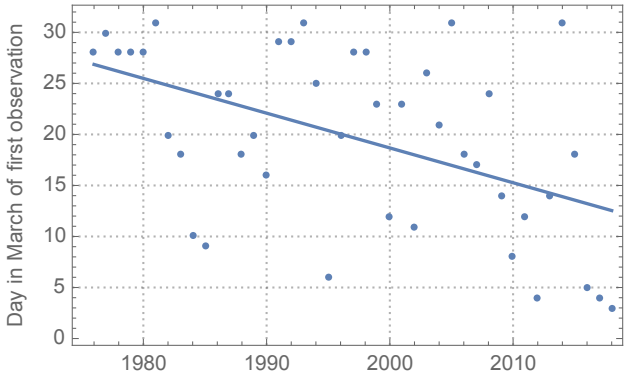

Figure 1: Spring arrival dates of American Robins at a Penfield, Monroe County, NY home, from 1976-2019.

One might ask what the evidence is that this is the result of climate change. We extracted from the nearest meteorological station (at Greater Rochester International Airport) temperature data for the period November through February and calculated the four-month 'midwinter' average prior to each year's competition. There is good evidence ($p = 0.061$) that winter temperatures have indeed been rising overall, by about one degree every 27.5 years. Even then, the fact that robin arrivals have been getting earlier and temperatures have been rising might still be coincidence. However, regressing arrival day against mid-winter temperature (Fig. 2) confirms that temperature is a significant ($p = 0.00031$) and important predictor of arrival day, and supports our hypothesis that the Blazeys' annual family competition secretly signaled the approaching global catastrophe that is climate change.

This is certainly not the first dataset to document phenological shifts in bird migration correlated with increasing winter temperatures (e.g., Marra et al. 2005, Moller et al. 2008, Jonzen et al. 2006, Balbontin et al. 2009), but few species in North American have data from such a long time series from a single location and many rely on indirect methods such as remote sensing due to lack of observational data (Horton et al. 2020). Horton and colleagues (2020) suggest that large scale studies are lacking due to limitations in access to appropriate data. Still, the

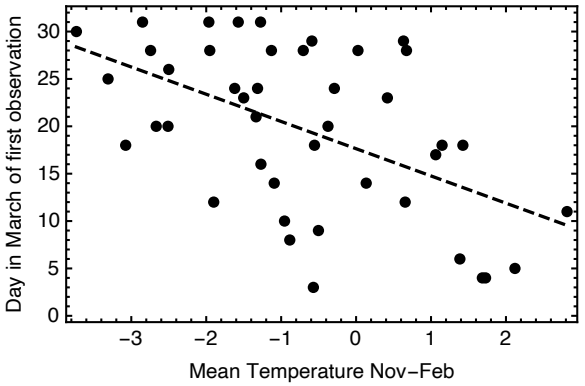

Figure 2: Spring arrival of American Robins in western NYS is associated with average temperature in the preceding winter.

significance of this analysis is less about the single additional data point it provides, but rather in how these data were collected. Garcia-del-Amo and colleagues have written about the importance and utility of involving local residents particularly in climate research (2020). The more eyes that are watching for changes in phenology, the more likely they will be documented! Imagine if more families in zones of migration instituted these fun family traditions, documenting the first arrival of whichever species they choose year after year? Such data would be a boon to phenological research. A reason to celebrate for families and scientists alike – bring on the cake and coins!

Postcript. It is with great sadness that we must report that Richard N. Blazey passed away on June 1st, 2019 after a short battle with pancreatic cancer. This paper is a tribute to his ingenuity, his love of birds, and most importantly, his love for family.

ACKNOWLEDGMENTS

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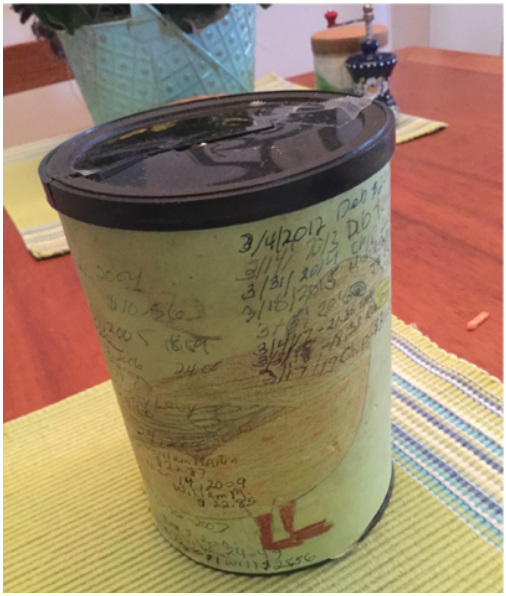

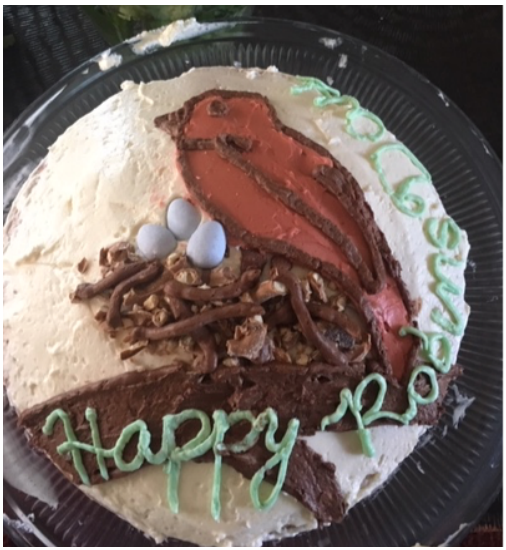

Top: The Robin's Day collection can used to keep loose change ("the winnings") and record arrival predictions of family members, kept in the Blazey home in Penfield, Monroe County, NY. Drawing by Christy Blazey, age 7. Photo © Jackie Blazey.
Bottom: A Robin's Day cake, baked each year to celebrate the arrival of American Robins at the Blazey home in Penfield, Monroe County, NY. This cake was created by daughter Deb Blazey-Martin & family at her home in Boston, MA. Photo © Deb Blazey-Martin. See article pp. 2-7 in this issue.