FOCUS ON CITIZEN SCIENCE • VOLUME 16, NO. 1

NestWatch Digest

NESTING SEASON 2019

The Cornell Lab of Ornithology

You did it again!

Welcome to our annual report showcasing research highlights and data stories from the 2019 nesting season. The previous year was our biggest season yet, with 27,737 nests entered plus an additional 9,852 bulk-uploaded historical nest records. We were pleased to see a 10% increase in international submissions, after opening up the mobile app to global species in 2019!

New last year, we added a photo upload tool to our mobile and web-based data entry. In its first year, we received 8,400 photos which are linked to location and breeding details. We also fulfilled 11 external requests for data as part of our ongoing commitment to making your data available to any researcher who requests it. Sharing your data broadens its impact, as you can see from the research summaries presented in this edition of the *NestWatch Digest*.

We also launched a new online-only initiative called Nest Quest Go!, a transcription project designed to recapture nest record data that were languishing in our filing cabinets. See our article on page four to learn more about how to participate in this project without ever leaving your couch! These and many other exciting new developments are what make NestWatch a leading data collection platform for all things related to nesting birds. But it is YOU, the participants, who make it the valuable long-term scientific resource that it continues to be. Each and every nest contributed is unique and adds something informative to the database (see the back page for evidence)!

With gratitude,

Robyn Bailey
NestWatch Project Leader

Cover: Northern Saw-Whet Owl by Maureen Hills Urbat
Below: Tree Swallow by Laura Frazier

American Robin by Jessica McConahay

Focus on Citizen Science is a publication highlighting the contributions of citizen scientists. This issue, *NestWatch Digest*, is brought to you by NestWatch, a research and education project of the Cornell Lab of Ornithology. The NestWatch project is made possible by the efforts and support of thousands of citizen scientists. This document has accessibility features for those with visual impairments; for assistance contact **nestwatch@cornell.edu**.

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Join NestWatch!

Anyone, anywhere, who finds a nest is welcome to join. Help scientists monitor nesting birds while you support bird conservation in your own community. To join, visit **NestWatch.org** and get certified as a nest monitor. Certification is free and ensures that nest monitoring activities follow our code of conduct designed to protect birds and their nests.

The Cornell Lab of Ornithology

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Drought and Eastern Bluebirds

Not just a western problem

**BY DR. RENEÉ CARLETON,
PROFESSOR OF BIOLOGY, BERRY COLLEGE**

We often think about drought as a problem afflicting western North America, but drought also impacts eastern states. Reduced or complete lack of rainfall for weeks or months can result in thirsty lawns, dying crops and other vegetation, and tough times for many animals. A critical reduction in those valuable resources for breeding birds is an obvious consequence.

Recent and recurring droughts here in Georgia prompted us to investigate how drought affects Eastern Bluebird reproductive success. My students and I maintain 40 nest boxes on our Berry College campus, so we had a small dataset available. But Eastern Bluebirds breed throughout most of the eastern half of North America, where droughts are unpredictable in occurrence and duration. In order to see how drought affects birds across the entire breeding range, we needed more data. NestWatch to the rescue! Thanks to the dedication of citizen scientists from more than 35 states and 3 Canadian provinces, NestWatch provided us with more than 26,000 Eastern Bluebird nesting observations spanning seven years.

My colleagues and I examined drought impacts not only during the nesting period (egg laying through expected fledging date), but also impacts when drought conditions were in place 30 days and 60 days prior to clutch initiation. In other words, we wanted to see if there were critical periods in which drought affected reproduction. We also wanted to find out if drought severity played a role. We combined North American Drought Monitor drought severity data and a vegetation greenness index with NestWatch data to evaluate drought effects at each nest box location during individual nesting periods.

Eastern Bluebird by Laura Finazzo

Effects of Drought

We found that drought conditions, regardless of severity, did not affect clutch size. So, even though clutch sizes of Eastern Bluebirds typically decrease as the breeding season progresses, drought conditions present during laying (or up to 60 days before laying) do not result in females laying fewer eggs. However, we found that drought does have negative impacts on the hatchability of those eggs and the survival of nestlings. The number of eggs hatching and nestlings successfully fledging decreased with increasing drought severity. We also found that drought occurring 30 and 60 days prior to the expected hatching and fledging dates also decreased reproductive success. In other words, when drought occurs during incubation and when pairs are feeding their broods, Eastern Bluebird parents produce fewer surviving offspring and this gets worse as it gets drier.

Of course, there is more to this story than we explored. For example, how does drought actually cause the decrease we found in hatching success and nestling survival? The exact mechanism is unknown due to the large scale of our study. For instance, does drought eliminate much needed food, such as insects or other prey, or does it possibly increase embryo mortality?

Thanks to You

Fortunately, Eastern Bluebird populations are in good shape, thanks in part to the nest boxes we provide; but what about other species of birds, especially those in decline? Adequate food resources and habitat are critical for the survival and reproductive success of breeding birds. The more we know about factors that negatively impact these resources, the better we can predict the consequences on birds that rely on them. And while we can't control drought occurrence, we can continue to examine its effects on birds. Thanks to NestWatch, the contributing citizen scientists who monitor nesting birds, and supporters of the Cornell Lab and ornithological research, scientists like myself can further understand the impact of environment on bird population health. Without your efforts, this research wouldn't be possible. Good work!

Reference: Carleton, R. E., J. H. Graham, A. Lee, Z. P. Taylor, and J. F. Carleton. 2019. Reproductive success of Eastern Bluebirds (*Sialia sialis*) varies with the timing and severity of drought. *PLoS ONE* 14(8): e0214266. **https://doi.org/10.1371/journal.pone.0214266**

Nest Quest Go!

By the numbers

BY BECCA RODOMSKY-BISH, NEST QUEST GO! PROJECT LEADER

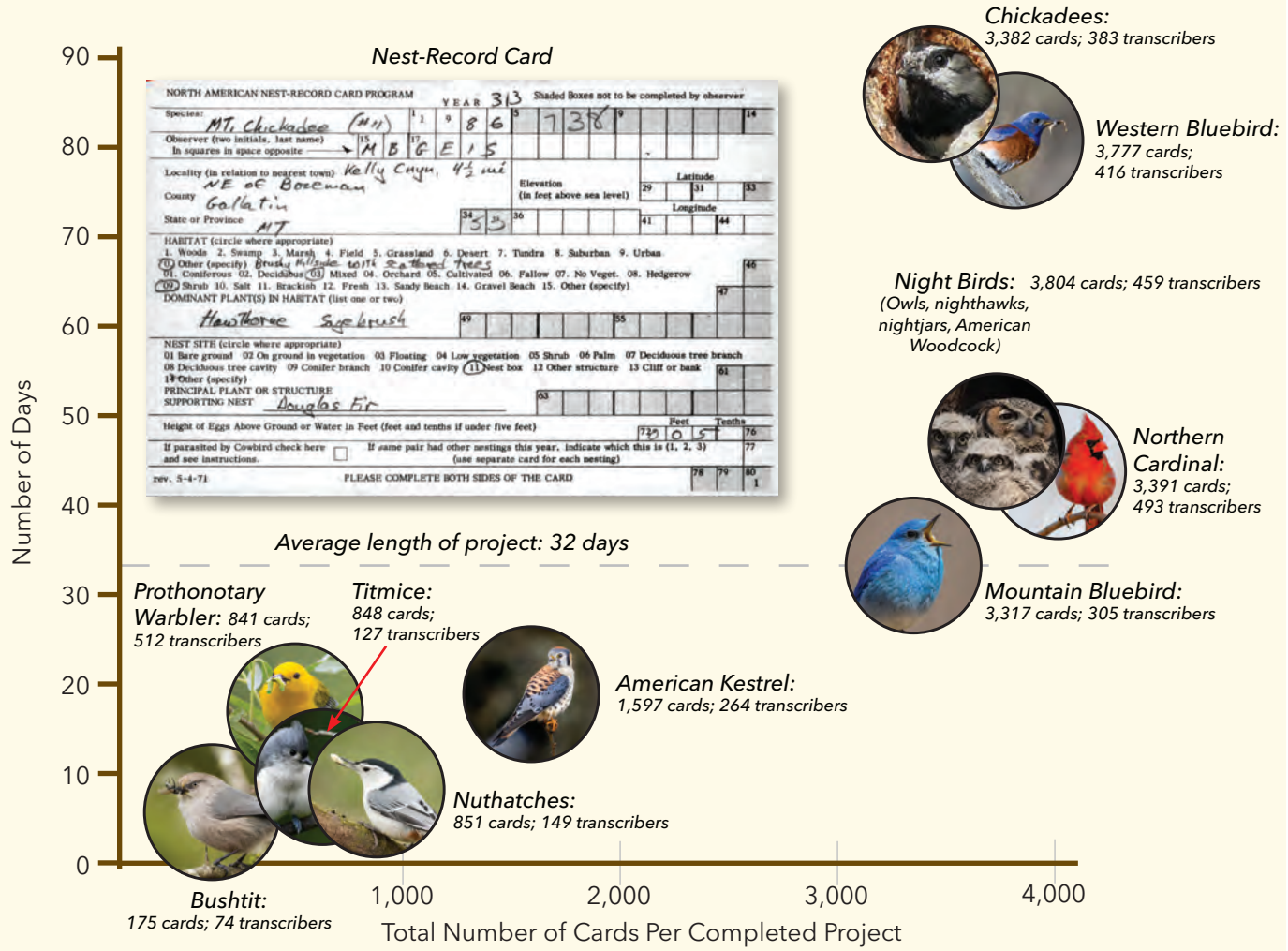
A year ago we announced in ***NestWatch Digest*** that we were working on digitizing, transcribing, and integrating into the NestWatch database more than 300,000 nest records from our North American Nest-Record Card collection.

This endeavor, coined **Nest Quest Go!**, has been utilizing the power of the crowd in **Zooniverse** to make these data come to life. With the help of thousands of Zooniverse users, and a team of students and volunteers, we are making incredible progress. Learn the latest news and consider joining us.

Completed Project Analysis

Below is a summary of the 10 projects we've completed in Zooniverse from July 22, 2019 to March 1, 2020 and the number of days it took to complete the projects. The average project completion rate dropped drastically in November when we changed the format of the questions, added more smartphone-friendly options, and tried to minimize the amount of time projects overlapped in Zooniverse. The projects went from an average of 50 days to just 32 days to complete!

Projects Completed by Nest Quest Go!, July 22, 2019–March 1, 2020



Photos (bottom left to top right): Bushtit by Michael Porter/Birdshare; White-breasted Nuthatch Linda Petersen, GBBC; Tufted Titmouse by Deborah Bifulco/Birdshare; Prothonotary Warbler by Ronald Zigler/Birdshare; American Kestrel by Brian Rockwell/Birdshare; Mountain Bluebird by Joe Chowaniec/Birdshare; Great Horned Owl by Larry Keller/Birdshare; Northern Cardinal by Deborah Bifulco, GBBC; Western Bluebird by Rick Brumble/Birdshare; Mountain Chickadee by Mike Wisnicki/Birdshare. Photos used with permission.

Nest Quest GO!

Once cards are scanned, we build projects so that Zooniverse users across the world can help us transcribe the card data. These projects have been well received, and we've already been able to complete 10 projects in less than a year. We are continuing to grow our volunteer participation in Zooniverse to shorten the time it takes to make these data available to researchers. Our goal is to upload the first completed projects into the NestWatch database in 2020. At the same time, we will continue to make more projects available for transcription in Zooniverse.

Transcription Progress

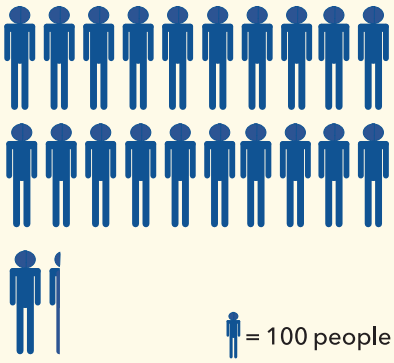
10 projects launched in Zooniverse

339

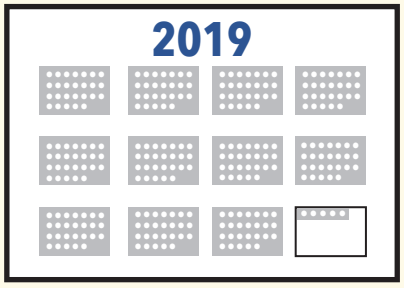
days of active projects

&

2,158 people transcribed data



8,136 volunteer hours



That's more than 11 months of transcription!

With Gratitude

Becca Rodomsky-Bish

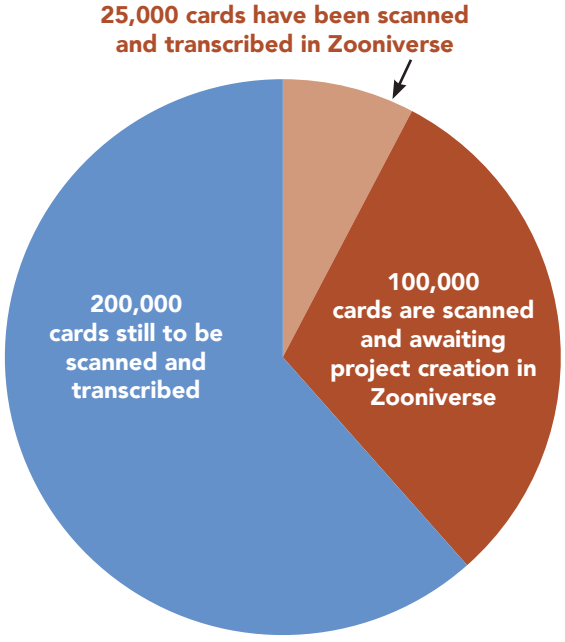
Holly Faulkner

A few of our students (left) and volunteers (right) hard at work, sorting nest-record cards!

Before we can add nest-record cards to a project on Zooniverse, the physical cards must be sorted, organized, stamped, and scanned. This process moves faster with the help of a dedicated team here at the Cornell Lab of Ornithology, which consists of hard-working students and volunteers. Special thanks go to: Beverly Stockard, Dawna Badie, Deb Fyler, Diana Hackett, Grace Ogden, Joy Pojim, Liz Chartier, Lynn Bertoia, Nick Thomas, Pamela R. Smith, Turner Wilson, and Rachael Ashdown.

We Need Your Help!

You can help too, by transcribing our scanned cards in Zooniverse. Visit **bit.ly/NestQuestGo** or download the Zooniverse app, and start transcribing today!



Help Transcribe Nest Cards

Overnight Conditions Affect Mom's Morning Routine

BY ROBYN BAILEY, PROJECT LEADER

Did you know that incubating birds burn energy warming their eggs all night long, when temperatures are at their lowest? This usually results in an energy deficit in the morning—hungry moms need to replenish their calories as soon as is feasible once the sun is up.

Tracking the energetic "cost" of incubating eggs is difficult, but one way to study this is to insert small data loggers (called iButtons) into nest material and track the temperature in the nest over time. The information received can tell scientists when birds are on their eggs (caring for young) or off the eggs (caring for themselves), painting a picture of daily incubation patterns.

Researchers recently published a new study on how this energy deficit affects behavior using data from participants in a special study on Eastern Bluebirds from 2004–2006. Under the direction of researchers, volunteers from across the eastern United States inserted iButtons into bluebird nests during the incubation period, and added a second iButton near the nest box ceiling to record ambient temperature. After three days of recording, the iButtons were removed and the data downloaded and sent to NestWatch (known then as The Birdhouse Network).

N. John Schmitt

The red arrows indicate the placement of two iButton devices.

What did we learn?

- Incubating birds left their nest early to go get breakfast following cold nights, probably because they spent more energy warming eggs on cold nights than on warm nights.
- Southern birds took longer morning breaks than birds nesting in the north. Similarly, birds everywhere took longer morning breaks when the preceding night was warmer.
- Night length varied from 6 to 10 hours across the breeding range and season. Birds experiencing longer nights took longer breaks in the morning, likely because they had lost more energy overnight and needed more time to refuel.
- There is a direct trade-off between the female's morning absence and the cooling of the nest, and this study helps us see the costs for females to maintain their own health versus that of their eggs.

From the moment birds awake, they must make thousands of small decisions that may seem inconsequential to humans but which may directly affect their survival or that of their eggs. How early to rise? How long to stay off the nest? The answer to both questions depends on the time of year and latitude. In this study, data revealed that each minute spent away from the nest resulted in an estimated 0.25° C drop, such that a four-minute break is equivalent to a 1° C (1.8° F) loss of heat. Birds with lower nighttime energy stress (i.e., shorter, warmer nights) can afford to spend more time on the nest before shuffling off to find food.

Female bluebirds prioritized the survival of their offspring when times were tough (long, cold nights), but when times were easier, they could spare a bit more time for self care. Eastern Bluebirds spend about 61% of their incubation days sitting on eggs. If you'd like to help bluebirds have more time for self care, try supplementing their diet with mealworms first thing in the morning (away from the box), and maintain nest boxes so they're warm and dry. And don't forget to enter your data into NestWatch to help scientists continue to study the breeding habits of birds. Study co-author Caren Cooper at North Carolina State University stated, "Studies over large geographical areas, like this one made possible by NestWatch, can reveal findings that experimental studies at just one location may miss. Thanks to everyone who participated in this special study!"

Reference: Nord, A. and C. B. Cooper. 2019. Night conditions affect morning incubation behaviour differently across a latitudinal gradient. *Ibis*. **https://doi.org/10.1111/ibi.12804**

Regional Roundup

Highlights from the 2019 season

BY ROBYN BAILEY, PROJECT LEADER

The 2019 nesting season was our biggest year yet. Participants reported 27,737 nest attempts by 277 species across the world. In the pages that follow, you'll find data summaries from the U.S. and Canada; however, we also received data on 146 nests of 76 species from an additional 29 countries in 2019. Excellent work, NestWatchers!

Note that for calculations of nesting success, we can only use nests for which the nest fate was reported. We defined nesting success as the percentage of nests fledging at least one young. We only report results for species having a minimum of 10 nests with known outcomes per year. We used only successful nests to estimate average number of fledglings as a measure of productivity; therefore, average number of fledglings may exceed average clutch size in our regional tables. The "change" column indicates how 2019 nesting success was different from the previous 10-year average (2009–2018). This can help you interpret whether 2019 was a "good year" or a "bad year" for a species in your region, but it's not necessarily an indication of a long-term trend. One arrow signifies a change of 5–10%, and two arrows signify a change of more than 10%. No arrow is given for changes less than 5%, and an asterisk (*) indicates insufficient data for a region.

Baya Weaver by Ajay Asjok, India

2019 NestWatch Season Totals

27,737 NEST ATTEMPTS
2,220 PARTICIPANTS
277 SPECIES
90,694 EGGS
59,363 FLEDGLINGS

International

We received data for a total of 146 nests from countries outside of the United States and Canada in 2019! Bermuda submitted a record of 32 nests to NestWatch. Following Bermuda were Indonesia and India, tied with 21 nests each, the Czech Republic with 18 nests, and Mexico with 8 nests.

TOP 3 COUNTRIES OUTSIDE OF U.S. AND CANADA*

BERMUDA INDIA INDONESIA

* Not to Scale

Hawaii

Reports from Hawaii included two nests in 2019, one each by a Common Myna and Common Waxbill.

Alaska and Northern Canada

The number of nests reported from Alaska and Northern Canada increased by 35% to 70 nests in 2019. We had enough data on Tree Swallows in this region (n = 62) to report that the average clutch size was 5.3 eggs, average fledglings was 4.9, and nesting success rate was 95.2%, a large increase from 70.0% in 2018. We would love to have more nests from this high-latitude region to help address very interesting ecological questions about short nesting seasons with longer daylight hours.

ALASKA AND NORTHERN CANADA: 70 NESTS

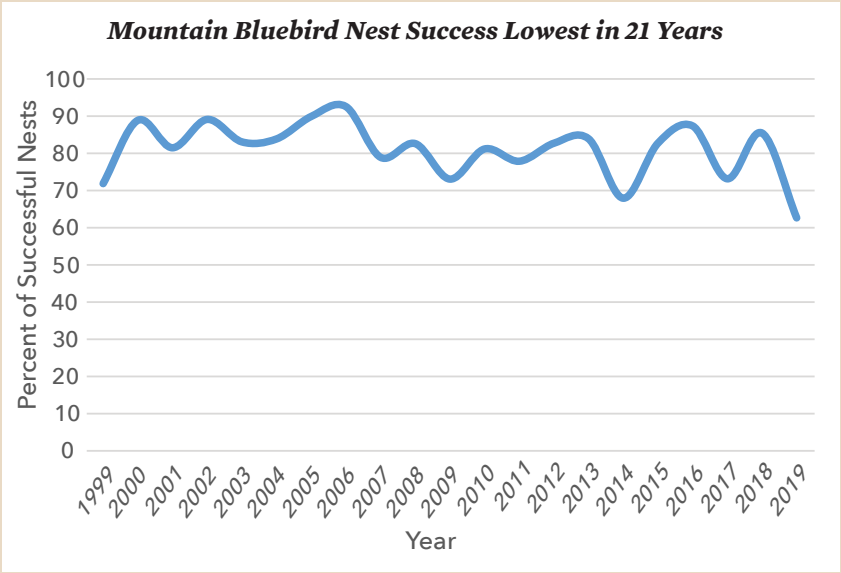
Rank	*Species*	*2019 Total nests reported*
1	Tree Swallow	62
2	American Robin	2
2	Black-capped Chickadee	2
2	Chestnut-backed Chickadee	2
3	Red Phalarope	1
3	Red-necked Phalarope	1

Southwest Region

Mountain Bluebird by Mark Fuller

Tree Swallows topped the list of most-reported species for the third year in a row. Although nest success was 10% lower than usual, nearly 72% of nests were successful. Violet-green Swallows, although never reported in as high a number as Tree Swallows, fared better with 87.4% of nests being successful. Ash-throated Flycatchers are a species for which we are actively seeking nest photos (**see our request here**), and we were pleased to see that they enjoyed relatively high nest success at 80% in 2019. We hope to see more reports of this species in 2020.

In 2019, NestWatchers reported the lowest nesting success for Mountain Bluebirds in 21 years, with 62.6% of nests succeeding. The most common cause of nest failure in 2019 was eggs failing to hatch (46%) followed by all young being found dead in or near the nest (34%). Deaths of eggs and nestlings suggest weather related nest failures rather than predation, which accounted for only about 20% of losses. After reviewing 21 years of data, we don't see a persistent downward trend, so here's hoping that 2019 was simply a bad year and things will rebound for these beautiful birds. Chestnut-backed Chickadees also had a notably low year for nesting success, but unlike Mountain Bluebirds, these losses were largely attributed to predators (41% of failures).



The proportion of Mountain Bluebird nests that succeeded reached a 20-year low in 2019. Nests with unknown outcomes were excluded.

TOP-10 LIST: 4,071 NESTS REPORTED FOR ALL SPECIES

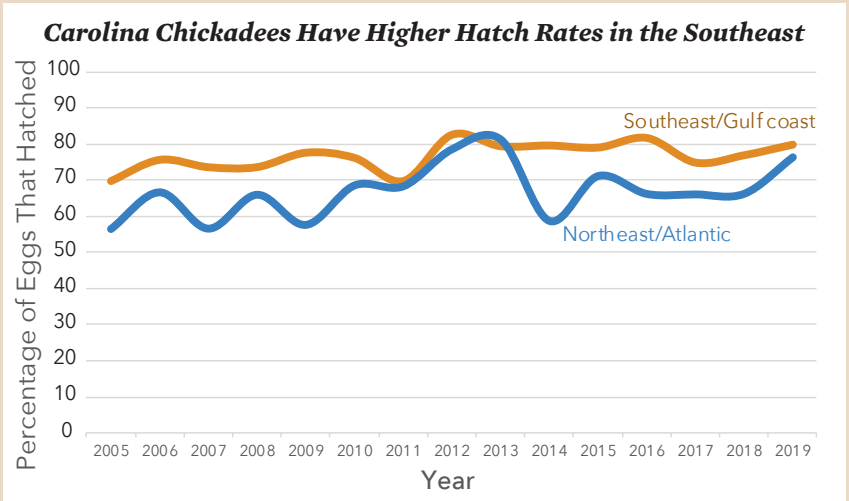
Rank	*Species*	*2019 Total nests reported*	*2019 Average clutch size*	*2019 Average fledglings*	*2019 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Tree Swallow	1,244	4.9	4.1	71.9	82.1	↓↓
2	Western Bluebird	974	4.7	4.0	71.3	80.3	↓
3	Mountain Bluebird	657	4.9	4.4	62.6	79.4	↓↓
4	Dark-eyed Junco	154	3.8	1.8	73.8	*	
5	House Wren	152	6.0	5.4	86.2	80.5	↑
6	Violet-green Swallow	110	4.5	4.0	87.4	80.9	↑
7	Red-tailed Hawk	61	*	*	93.1	87.3	↑
8	Oak Titmouse	54	6.2	5.6	71.7	79.9	↓
9	Chestnut-backed Chickadee	49	6.2	6.1	63.0	82.4	↓↓
10	Ash-throated Flycatcher	48	4.5	4.4	80.0	81.9	

*Insufficient data

Southeast and Gulf Coast Region

In the Southeast and Gulf Coast region, Carolina Wren, Bewick's Wren, Tree Swallow and Tufted Titmouse all enjoyed high nesting success (>80%). House Wrens in this region had a better-than-average year in 2019 with 78% of nests succeeding. Eastern Bluebird was again the most popular species reported, and they experienced a fairly normal year in terms of nest success rate. Unfortunately, Wood Duck and Black-crested Titmouse had a lower-than-average year in terms of nest success (62.1% and 73.6%, respectively).

We noticed that Carolina Chickadees had better nesting success in this region than in the Northeast region, which might be expected because their range is primarily more southerly. However, when we looked into why this might be, we saw that hatching rates were consistently higher in the Southeast and Gulf Coast region, whereas rates of young fledging (once hatched) were very similar. The species only penetrates the southern edge of the Northeast region, and one possible explanation for decreased hatching rates in the north is that hybridization with Black-capped Chickadees could reduce hatching success (this has been suggested in the literature, but we cannot yet test this with NestWatch data). Another explanation could be that Carolina Chickadees are limited by spring temperatures farther north.



Carolina Chickadees had better hatching rates in the Southeast & Gulf Coast region than they did in the Northeast region. After reviewing 15 years of data, we can see that hatch rate varies over time and ranges from 70–80% in the Southeast.

Robyn Newman

An adult Carolina Chickadee feeds its recently fledged young.

TOP-10 LIST: 5,629 NESTS REPORTED FOR ALL SPECIES

Rank	*Species*	*2019 Total nests reported*	*2019 Average clutch size*	*2019 Average fledglings*	*2019 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Eastern Bluebird	3,623	4.4	3.8	79.6	75.1	
2	Carolina Chickadee	374	5.2	4.8	75.7	74.7	
3	Carolina Wren	279	4.8	4.5	81.0	78.4	
4	Bewick's Wren	166	5.7	5.2	85.3	78.5	▲
5	Tree Swallow	111	4.7	4.3	86.9	77.5	▲
6	Wood Duck	99	12.1	12.6	62.1	84.5	▼▼
7	Black-crested Titmouse	91	5.6	4.9	73.6	85.9	▼▼
8	House Wren	86	5.3	4.2	78.4	65.4	▲▲
9	Tufted Titmouse	77	5.1	4.5	80.0	81.2	
10	Prothonotary Warbler	63	*	*	70.0	*	

*Insufficient data

Northwest Region

Great Gray Owl by Natalie Reinhart

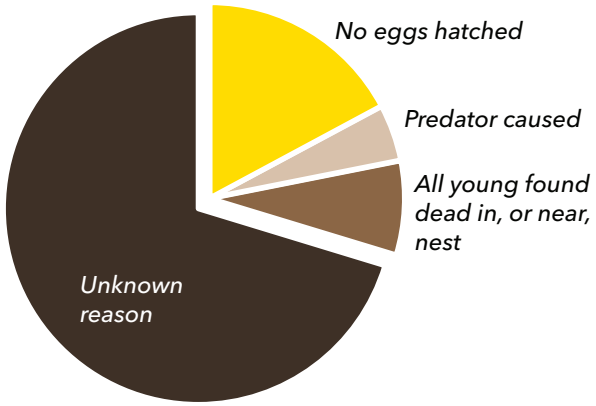
Tree Swallows were the most-reported species in the Northwest in 2019; however, their nesting success was nearly 19% less than the 10-year average. Mountain Bluebirds, House Wrens, and American Robins had particularly high nest success (all >84%) in 2019.

The first two Great Gray Owl nests ever submitted to NestWatch were contributed in 2019 from the Northwest region. These majestic owls are very elusive; few people ever get to see them, let alone find a nest! If you're lucky enough to live within the breeding range of this giant owl, you can **construct a nesting platform** for them.

Violet-green Swallows are declining in North America so we explored reasons why their nests were failing in the Northwest. We found that most nest failure could be attributed to eggs failing to hatch, when the reason was known (17.2% of all failures). This was also true for the Southwest region (23.5% of all failures). Future research might focus on nest box designs that could improve hatching rates (e.g., are boxes overheating?); however, it's also possible that this is a natural factor limiting populations over which we have little control.

Violet-green Swallow by Christine Haines

Reasons Given for Violet-green Swallow Nest Failures



Given declines in the Violet-green Swallow population, we wondered what sources of nest failure were most common. Eggs failing to hatch is the largest known cause of nest failure, although in most cases the reason for failure was unknown (n = 64, all years combined).

TOP-10 LIST: 1,139 NESTS REPORTED FOR ALL SPECIES

Rank	*Species*	*2019 Total nests reported*	*2019 Average clutch size*	*2019 Average fledglings*	*2019 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Tree Swallow	454	5.7	4.6	61.3	80.1	▼▼
2	Western Bluebird	194	5.2	4.3	76.9	69.4	▲
3	Mountain Bluebird	121	5.3	4.9	86.6	80.2	▲
4	House Wren	114	6.7	5.9	84.1	81.1	
5	American Robin	36	3.8	3.0	88.9	76.4	▲▲
6	Violet-green Swallow	27	4.9	3.6	78.9	86.1	▼
7	Black-capped Chickadee	24	*	*	*	86.0	
8	Mountain Chickadee	15	6.7	*	69.2	80.3	▼▼
9	Dark-eyed Junco	14	*	*	*	*	
10	Great Horned Owl	11	*	*	*	*	

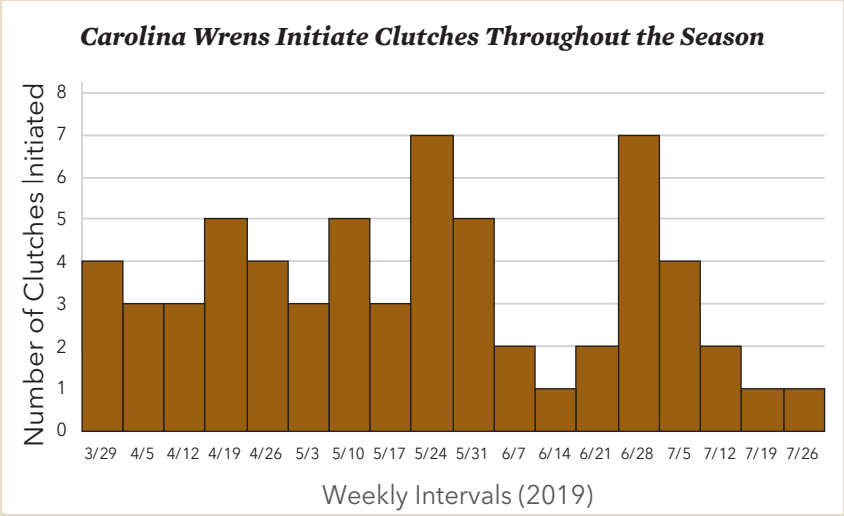
*Insufficient data

Northeast Region

Carolina Wren by Gary Mueller

NestWatchers in the Northeast reported on 15,512 nests, including Tree Swallows, Eastern Bluebirds, and House Wrens, among others, all of which were fairly close to their 10-year average in terms of nest success. Purple Martins and Carolina Chickadees enjoyed slightly elevated nesting success in 2019. Non-native House Sparrows and European Starlings were managed intensely to reduce nesting success to just 4.6% and 8.1% respectively.

Carolina Wrens have been expanding their range northward since the 1980s. In Ithaca, New York, where the Lab of Ornithology is located, their numbers have tripled since the 1980s. Researchers speculate that three factors might be contributing to this range expansion: milder winters, regeneration of eastern forests, and human-provided supplemental food. Locally, we noticed the wrens nesting three or four times in one season, so we looked at nests across the region wondering if Ithaca's wrens were just extra productive, or if other participants were seeing this as well. In the graph below, we can see that Carolina Wrens were laying eggs from March 29 until August 1, a span of 126 days. We can also see multiple peaks, suggesting an ongoing effort rather than a single synchronized peak of egg laying. The clutch initiation dates shown here also exhibit a longer nesting season than what is reported in the older literature.



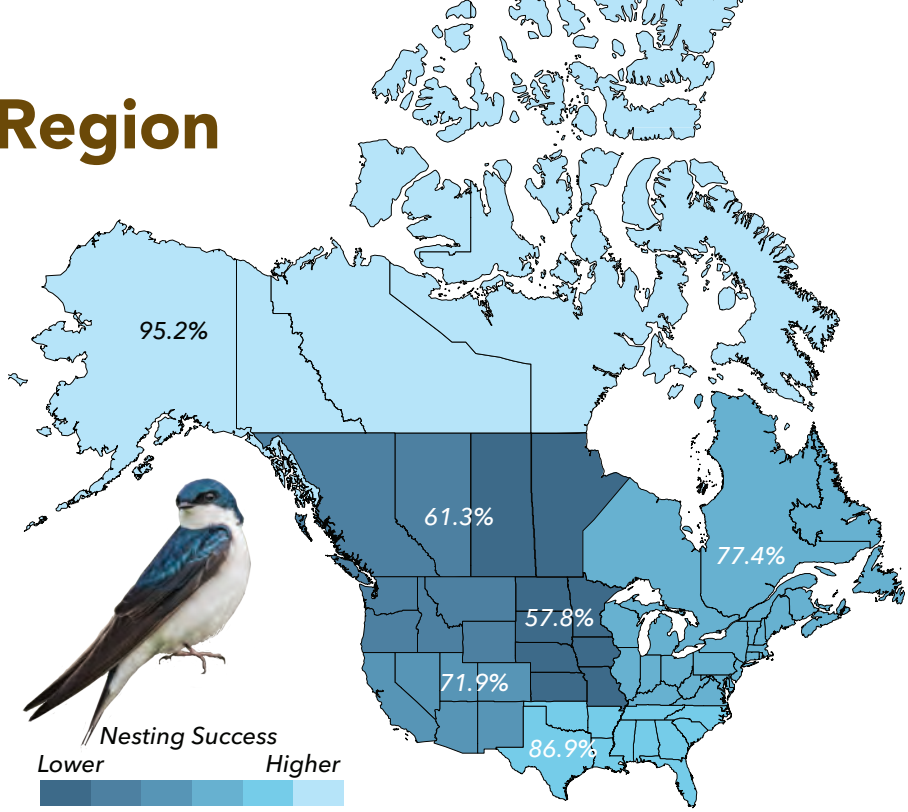
Carolina Wrens in the Northeast initiated clutches throughout the 18-week season (n = 62 nests with known egg-laying dates). The multiple peaks indicate that Carolina Wrens in this region are multi-brooded, laying three or four clutches a year.

TOP-10 LIST: 15,512 NESTS REPORTED FOR ALL SPECIES

Rank	*Species*	*2019 Total nests reported*	*2019 Average clutch size*	*2019 Average fledglings*	*2019 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Tree Swallow	4,700	5.0	4.4	77.4	77.4	
2	Eastern Bluebird	4,580	4.3	3.9	75.0	77.4	
3	House Wren	2,290	5.4	5.1	76.5	75.1	
4	House Sparrow	1,138	3.5	3.2	4.6	4.8	
5	Purple Martin	649	5.0	4.4	90.3	83.1	▲
6	American Robin	324	3.4	3.0	63.2	65.1	
7	Black-capped Chickadee	264	5.9	5.3	65.2	67.9	
8	Carolina Chickadee	159	5.6	4.9	68.9	61.6	▲
9	European Starling	149	4.0	3.6	8.1	13.2	
10	Carolina Wren	136	4.4	3.9	74.7	74.9	

Central Region

Purple Martins and Eastern Phoebes had excellent nesting success in 2019 (both at 90%). Black-capped Chickadees had a good year, with nearly 85% of nests succeeding. However, similar to 2018, House Wren nesting success was lower than usual with 61.5%. Tree Swallows were well below their average, and the lowest among the regions, with just 57.8% of nests succeeding (see map at right).



Tree Swallow by Laura Frazier

Down from 84% in 2018, Tree Swallows experienced just 57.8% of nests succeeding in 2019. This was the lowest among all the regions (n = 6,797 total nests, all regions). This result was influenced by high failure rates in South Dakota and Minnesota in 2019.

Tree Swallows by Gary Mueller

Purple Martins by Kim Caruso

TOP-10 LIST: 1,168 NESTS REPORTED FOR ALL SPECIES

Rank	*Species*	*2019 Total nests reported*	*2019 Average clutch size*	*2019 Average fledglings*	*2019 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Eastern Bluebird	545	4.5	4.1	71.7	78.6	↓
2	Tree Swallow	225	5.6	4.8	57.8	79.0	↓↓
3	House Wren	79	5.6	5.1	61.5	75.1	↓↓
4	Purple Martin	42	4.9	4.4	90.0	92.0	
5	Black-capped Chickadee	38	5.5	5.0	84.6	67.1	↑↑
6	House Sparrow	34	4.0	*	7.4	5.4	
7	American Robin	32	3.8	2.8	71.4	74.5	
8	Barn Swallow	28	4.5	3.9	79.2	83.6	
9	Carolina Wren	23	4.7	*	43.8	*	
10	Eastern Phoebe	17	*	*	90.0	80.1	↑

*Insufficient data

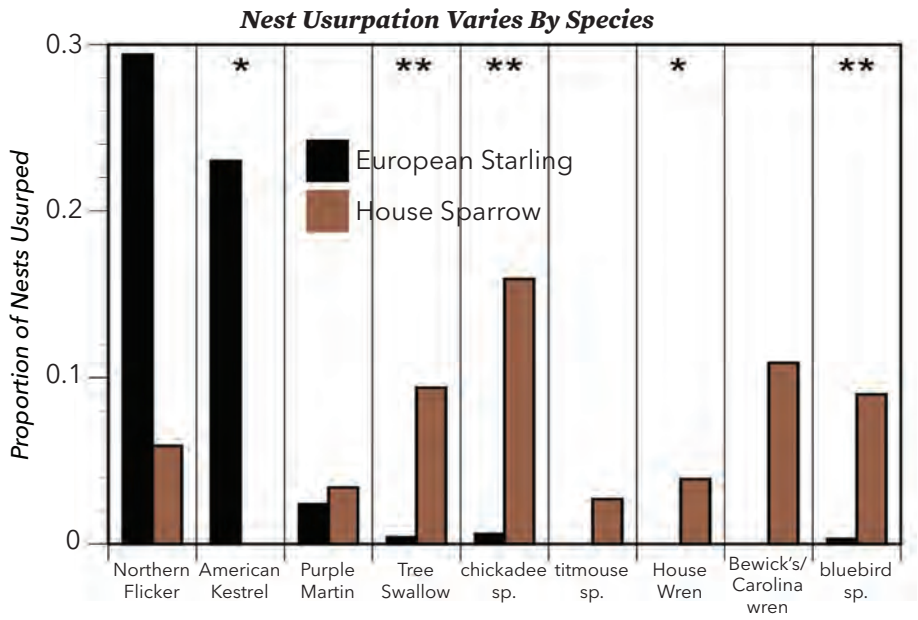
How Are People Managing Invasive Birds At Nest Boxes?

BY ROBYN BAILEY, PROJECT LEADER

In 2018, NestWatch circulated a survey to investigate how many people had experience with non-native birds in their nest boxes. We were interested in finding out peoples' knowledge of House Sparrows and European Starlings, and their attitudes towards managing them, especially if people encountered these non-native birds in the nest boxes they monitor. We are pleased to report that the findings have now been published (Bailey *et al.* 2020).

Witnessing Competition

We received 871 fully completed surveys from NestWatchers and other people who monitor nest boxes. Nearly one-third of the respondents (30.3%) reported having witnessed a House Sparrow or European Starling usurping the nest of a native bird in 2018. In this context, usurping means to take over an active nest, causing it to fail. The people who witnessed this reported varying levels of competition by species. The two species which were most impacted by this competition were Northern Flicker (35.3%) and American Kestrel (23.0%), both of which are experiencing widespread population declines. In our study, sample size was small for Northern Flickers, but another study of natural cavity nests found that European Starlings were the largest source of nest failure for flickers (Tomasevic & Marzluff 2017). Multiple sources of evidence suggest that competition from invasive species is a problem for flickers in both natural nest sites and nest boxes (at least in urban populations where starlings are most abundant). American Kestrels can sometimes outcompete starlings for nest cavities (McClure *et al.* 2015), but our data revealed that kestrels are not always the winner. Unfortunately, it is not yet possible to exclude starlings from boxes made for Northern Flickers and American Kestrels because starlings are similar in size to these two vulnerable species.



Proportion of nest attempts by native host species usurped by non-native European Starlings and House Sparrows. Asterisks(*) above columns indicate that House Sparrows and European Starlings usurped nests at statistically different levels; no asterisks indicate similar levels of impact from starlings and sparrows. Nest samples: n = 19 Northern Flickers; n = 81 American Kestrels; n = 412 Purple Martins; n = 1,468 Tree Swallows; n = 164 chickadees; n = 37 titmice; n = 439 House Wrens; n = 46 Bewick's/Carolina Wrens; and n = 3,156 bluebirds.

Chickadees (all species combined) were the third most-impacted species, with 16.5% of their nests usurped. Because they do not migrate, and because they are smaller in body size, chickadees may be in direct conflict with House Sparrows as these species seek out the same size nest cavity at the same time of year. For bluebirds (all species combined), 9.3% of nests were usurped, predominately by House Sparrows (starlings not being able to fit in standard bluebird boxes). We suspect that the usurpation rate is lower for bluebirds because more people are proactively managing for bluebird species, which are beloved and iconic.

Management Behaviors

Slightly more than a third of our survey respondents reported that they did not manage for invasive species in 2018 (36.9%). But of those who did, eviction and repelling techniques were the most popular (e.g., removing nests, removing eggs, reducing entrance hole sizes, using Sparrow Spookers, etc.). Of those who managed their nest boxes actively (as opposed to preemptively), 33.4% were willing to trap and euthanize invasive species. Because removing nests and eggs may actually increase nest site takeovers if sparrows simply relocate to the nearest occupied box, this finding highlights the need to develop more effective non-lethal management techniques.

Our data reflect that the biggest difference between nest monitors who manage against House Sparrows and European Starlings (using any technique) and those who don't, comes down to whether or not they witnessed the failure of a nest that was taken over by either a starling or a sparrow. That is, those who experienced a takeover were 9.6 times more likely to manage than those who did not witness this in 2018. Additionally, the higher the respondent ranked the overall threat of non-native species to native birds, the more likely they were to manage invasive species. Interestingly, NestWatch participants were nearly twice as likely to take management action as non-participants. Gender, age, number of nest boxes, and number of years' experience did not influence whether or not people managed their nest boxes to avoid usurpation by non-native species.

Zoe Ahn

Nest monitors may choose from several methods of managing invasive species, from removing nests and eggs, such as the House Sparrow egg above, to euthanasia.

Key Takeaways

- Although our results only reflect nests in boxes and cannot speak to natural nests, competition from non-native species was evident across nine species groups: Northern Flicker, American Kestrel, Purple Martin, Tree Swallow, chickadees, titmice, House Wren, Bewick's/Carolina Wren, and bluebirds.
- Nest box monitors are engaged in a variety of management tasks that can support the nesting success of native birds. Non-lethal techniques are more popular and need to be evaluated for their long-term efficacy.
- NestWatch staff have updated the data-entry site to better record when a nest has been taken over by another species. Participants will now see a new outcome option, and have the ability to specify which species has taken over an active nest (including instances where native birds have taken over another native species' nest).

NestWatch staff would like to thank all of the respondents who shared their experiences with us through the survey. Your responses give valuable insight into the social aspects of current ecological issues. Thank you!

European Starling by Bryan Pollard

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Bailey R. L., H. A. Faulkner-Grant, V. Y. Martin, T. B. Phillips, and D. N. Bonter. 2020. Nest usurpation by non-native birds and the role of people in nest box management. *Conservation Science and Practice 2020:* e185. **https://doi.org/10.1111/csp2.185**

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Tomasevic J. A., and J. M. Marzluff. 2017. Cavity nesting birds along an urban-wildland gradient: is human facilitation structuring the bird community? *Urban Ecosystems* 20: 435–448. **https://doi.org/10.1007/s11252-016-0605-6**

A Slick Solution to House Sparrows in Nest Boxes

BY FACUNDO FERNANDEZ-DUQUE, CORNELL CLASS OF 2018

As we learned in the article starting on page 14, House Sparrows frequently outcompete and may physically hurt native birds. Nationwide, this can have a big impact and cause the birds we love to decline in numbers. So, what can we do to deter House Sparrows and help our local birds?

In the past, people have tried many things to stop House Sparrows, including alterations to nest box design, nest destruction, egg removal, egg swapping, and even euthanizing the adults. Unfortunately, each technique has its drawbacks. Box design alterations have proven ineffective as House Sparrows tend to be very flexible in their selection of nest boxes. More direct control methods, such as nest and clutch destruction, may seem like a good idea but can actually backfire and hurt the native birds. House Sparrows that have their nest or eggs destroyed frequently may abandon the nest box and take over a different (occupied) one. Since they are dominant over most of the native cavity nesters, this usually means they will destroy and remove anything in the box (including incubating female bluebirds—see the photo below). Finally, some nest box owners do trap and destroy the adult House Sparrows. Although this certainly has the most direct impact, recent surveys suggest that a majority of nest box monitors are not euthanizing birds (Larson *et al.* 2016; Bailey *et al.* 2020).

FACUNDO FERNANDEZ-DUQUE

Adult Eastern Bluebird killed by a House Sparrow.

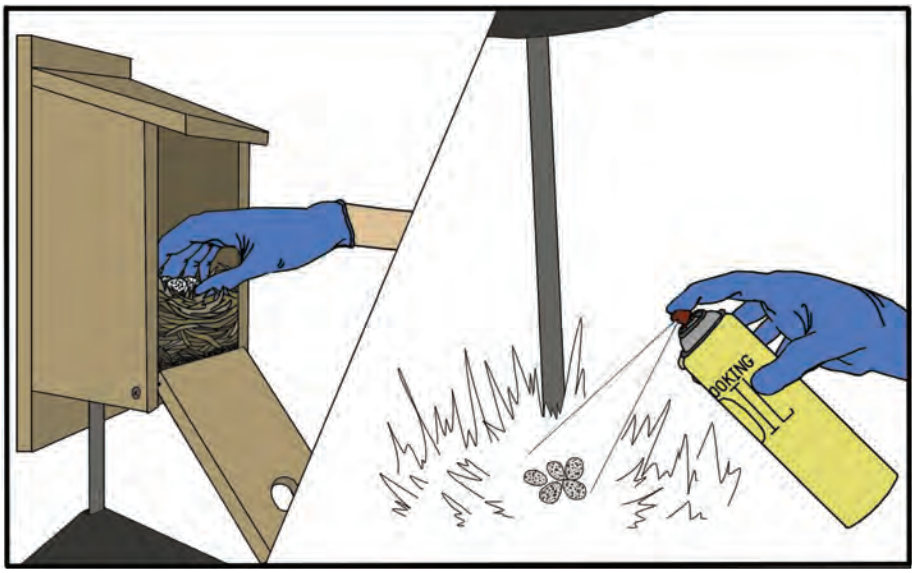
As a young ornithologist and nature enthusiast, I felt a need to limit the damage done by invasive species. Therefore, I sought to find a more cost-effective and easier option that would still allow me to help my local feathered friends. Working with professionals from NestWatch, we designed a study to test the effectiveness of a method usually applied to larger birds: egg oiling. This technique is commonly used on larger birds (e.g., geese, gulls) that are overpopulated or considered a pest. Egg oiling involves the application of a natural oil (usually vegetable, canola, or mineral oil) to a clutch of eggs early in the incubation process. The oil halts the egg development by creating a barrier for oxygen exchange. As a result, the adults continue to incubate the clutch without producing any young. Using this technique for several years may decrease the population because there are no new chicks to replace the adults. However, to the best of our knowledge, there have been no studies to determine if this can be applied to small cavity-nesting birds. Given that sprayable vegetable oil is readily available and very cheap, we designed a study to see if this could be a cost-effective, easy, and public-friendly House Sparrow management method.

KARL FLIRIS

House Sparrows will nest in holes of buildings and other structures, and will compete for nest boxes with our native species.

In the summer of 2018, we monitored roughly 80 nest boxes in Ithaca and Lansing, New York, for signs of House Sparrow activity. When a House Sparrow started a clutch in one of the nest boxes, it was assigned as either control (not oiled) or treatment (oiled with sprayable vegetable oil from the local grocery store). We wanted to see how vegetable oil could affect the number of House Sparrow eggs that hatched, the number of chicks fledged, the incubation time, and the number of re-nesting attempts by the adults. We oiled 44 clutches

Continued on page 18



Holly Faulkner

To oil eggs, place them on the ground and spray for about two seconds. Then return them to the nest box, close the door, and leave the area.

Egg Oiling FAQs

1. I think I have House Sparrows in my nest box, but they're never in the box when I check it. How can I confirm it's them?

It's absolutely crucial to know which species is nesting in your box before considering oiling. Luckily, cavity nesting birds have very distinct nests which allows us to identify the bird even when the adults aren't around. There are many helpful online resources to identify birds' nests, and NestWatch has created a handy **pocket guide** for less than $10. You'll especially want to focus on learning the eggs and nests of native birds with similar-looking eggs (e.g., wrens, chickadees, nuthatches, and titmice).

2. I oiled the eggs, but three weeks later they laid more eggs in with the old ones. What should I do?

Once the second clutch is complete, you can take all the eggs out and oil them all; this will prevent any of them from "slipping through" and hatching.

3. I have been oiling for half the summer, and the House Sparrows are still there. What should I do?

Egg oiling doesn't immediately get rid of the House Sparrows in your box; the idea is to reduce their presence in the long run. This study only tested the effectiveness of oil on the eggs, but we did not test whether it would cause a decline in House Sparrow populations in the long term. There are several factors that could render egg oiling ineffective at reducing House Sparrow populations: House Sparrows could be coming in from a different population or they could be nesting in other places nearby (e.g., buildings, natural cavities, traffic lights, etc.), allowing the population to remain stable. In either case, we hope that after a couple of seasons of nest failure, they will learn that our nest boxes are not good places to reproduce and leave them for the native birds.

4. Does the oil damage the feathers of the birds?

House Sparrows might get a bit of non-toxic oil on their belly feathers as they incubate oiled eggs, but there aren't any studies that have looked at this yet. However, our primary concern is to protect the native birds and from this study and previous experiences, the oil we applied is unlikely to have a negative effect on the feathers of any native birds that might happen to enter a sparrow-occupied nest box. We apply a minuscule amount of oil (roughly 0.8 mL) that coats the outside of the egg with a thin layer—not enough to drip off. This is also done on the ground rather than in the nest material. On the off chance that a native species were to enter a treated nest box, it would be unlikely to come into contact with the eggs, and much less likely sit on them.

A slick solution to House Sparrows in nest boxes, cont'd

of House Sparrow eggs by carefully removing the eggs from the nest, placing them together on the ground at the foot of the nest box, spraying the clutch for 2 seconds and returning the eggs to the nest.

Of those 44 nests, none of the eggs hatched, which also meant that no young fledged from those nests. The time spent incubating, measured by monitoring activity and testing the warmth of the eggs, was almost twice as long for eggs that were oiled than for eggs that weren't oiled (19 days rather than 10 days). In an extreme case, one female House Sparrow incubated the oiled eggs for 44 days! This study showed that oiling eggs was successful at preventing eggs from hatching, preventing any chicks from fledging, and doubling the time spent incubating (Fernandez-Duque *et al.* 2019). These preliminary results point to sprayable vegetable oil as a promising House Sparrow management tool. However, this was only one season of study with one population, so more work still needs to be done to conclusively state that this method works everywhere. That's where readers can help by sharing their experiences!

Egg oiling could harm native birds, so we recommend that it only be used by knowledgeable people. To help you deploy this method safely and efficiently, check out the FAQs on page 17.

NestWatch's recent survey of nest box monitors revealed that only 0.1% of people who manage invasive species in their nest boxes were doing so by addling (vigorously shaking) or oiling the eggs to prevent hatching and then returning the eggs to the nest box. This was the least-used management strategy, whereas the majority of monitors were removing nests and eggs of invasive species (Bailey *et al.* 2020). If you've found that removing nests and eggs only causes your House Sparrows to take over a nearby box, then egg oiling might be a solution for you. Share your experiences with egg oiling and any questions you may have with NestWatch staff by emailing nestwatch@cornell.edu.

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Bailey R. L., H. A. Faulkner-Grant, V. Y. Martin, T. B. Phillips, and D. N. Bonter. 2020. Nest usurpation by non-native birds and the role of people in nest box management. *Conservation Science and Practice* 2020: e185. **https://doi.org/10.1111/csp2.185**

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Nearly 3 billion birds have been lost since the 1970s.

A recent study published in *Science* (Rosenberg *et al.* 2019) showed that nearly three billion birds in North America have disappeared since the 1970s. Nearly 40 years of data from long-term citizen science databases contributed to this finding. Wondering how you can help your local feathered friends? Engage in these seven simple actions to help **#BringBirdsBack**. Print and cut out the second half of this page to help you keep track!

Learn more at birds.cornell.edu/home/bring-birds-back

Rosenberg, K. V., A. M. Dokter, P. J. Blancher, J. R. Sauer, A. C. Smith, P. A. Smith, ... & P. P. Marra. 2019. Decline of the North American avifauna. *Science* 366 (6461): 120-124. https://doi.org/10.1126/science.aaw1313

1. Make windows safer, day and night.

2. Keep cats indoors.

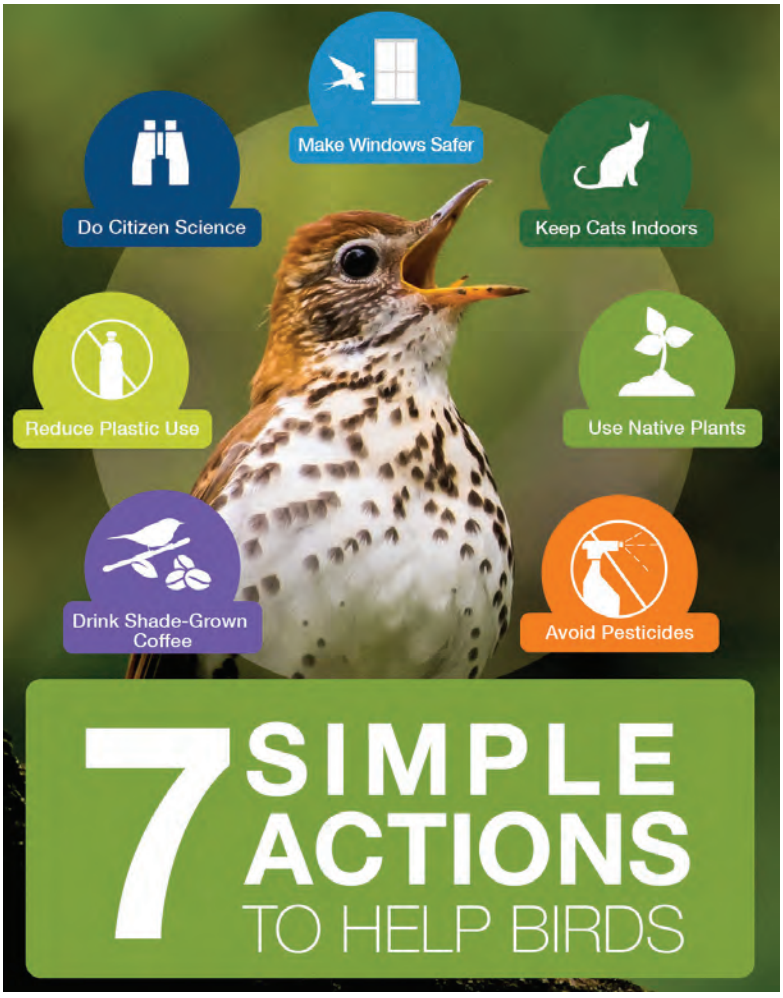
3. Reduce lawn by planting native species.

4. Avoid pesticides.

5. Drink coffee that's good for birds.

6. Protect our planet from plastic.

7. Watch birds, share what you see.



Wood Thrush by John Petruzzi/Macaulay Library

I'm Helping Birds!

- ☐ Make Windows Safe
- ☐ Keep Cats Indoors
- ☐ Less Lawn, Plant Natives
- ☐ Avoid Pesticides
- ☐ Drink Shade-Grown Coffee
- ☐ Use Less Plastic
- ☐ Watch Birds, Share What You See

Find out more: bit.ly/7-simple-actions

The Cornell Lab of Ornithology

Your photos have value!

Public gallery submissions lead to fascinating discoveries

BY HOLLY FAULKNER, PROJECT ASSISTANT

Our Participant Photos gallery is full of the everyday sightings from our participants. NestWatching is rewarding in that it gives us a glimpse into the often more secretive parts of a bird's life cycle, and by monitoring nests, we are able to develop a sense of what's normal–and what's not! Some spectacular reports have come to us from the photo gallery over the years, and we'd like to share a couple of stand-out submissions below.

One of the most interesting photos we've received was this photograph (top right) from James Funk showing House Finches reusing an old Barn Swallow nest—a rare nesting behavior that has been observed only a handful of times. The photo was recently cited in published research (Gaskins 2019) in which the author hypothesizes that the increasing overlap in range between these two species over the last century, and their similarities in nest placement and structure likely contributed to this behavior.

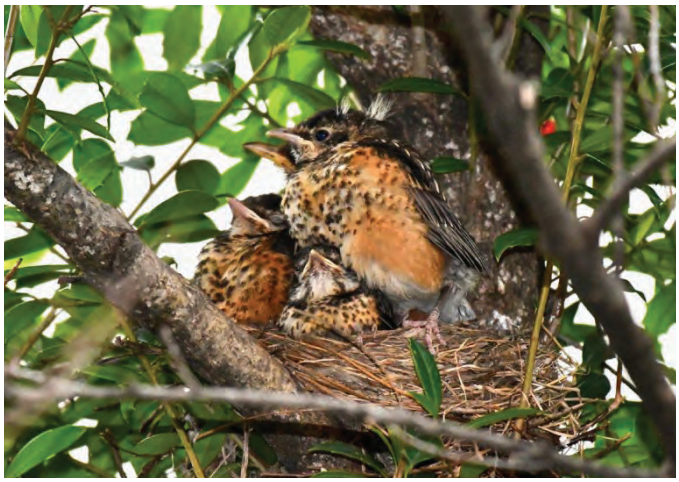
In June 2019, our gallery received a photo of a Tree Swallow nest (center right), featuring an albino nestling. In further talks with NestWatcher Edie Wieder, who submitted this image, we were able to determine that the bird was indeed albino (missing melanin pigment), and not simply exhibiting a pigment loss of another kind. You can **read more about this discovery** on the NestWatch blog.

Our Participant Photos gallery also featured photos submitted by Greg Harber showing an American Robin nesting in November 2019 in Alabama. This robin in particular went on to build a second nest later in December in which eggs hatched on December 27, and fledged successfully on January 10, 2020. Using the photo and the dates provided in the caption, we were able to confirm this to be the latest active American Robin nest ever reported to NestWatch!

These examples and many more make our photo gallery fascinating and valuable. We encourage all participants to continue to submit your photos, and especially to attach photos to each of your reported nest visits so that we can grow this collection of visible data and begin to add depth to all of your observations.

James Funk

Edie Wieder



Greg Harber

Reference: Gaskins, Leo. 2019. Notes: A House Finch's successful use of a Barn Swallow nest. *Western Birds*. 50: 176-177. **https://doi.org/10.21199/WB50.3.4**.

Submit your photos to NestWatch.org/connect/participant-photos