FOCUS ON CITIZEN SCIENCE · VOLUME 18, NO. 1

NestWatch Digest

NESTING SEASON 2021

The Cornell Lab of Ornithology

Cheers to you!

Spring is here and with it comes blue-sky days that carry hopeful birdsong. This past year was almost as unpredictable as the one before, but we made it through, thanks to you. In 2021, we received 31,270 nest attempts from 36 countries. We also fulfilled six external requests for data, and welcomed five new chapters into the fold, including our first in Latin America. Additionally, we bulk-uploaded 3,291 nest records in 2021, permanently archiving data that were vulnerable to loss.

Our NestWatch mobile app got a major upgrade in 2021, adding new features such as dark mode, lifetime and annual personal stats, improved ways to sort and search your nest site list, and better handling of offline data entry. We're thrilled that these improvements were accompanied by a 25% increase in the number of nests submitted on the mobile app platform!

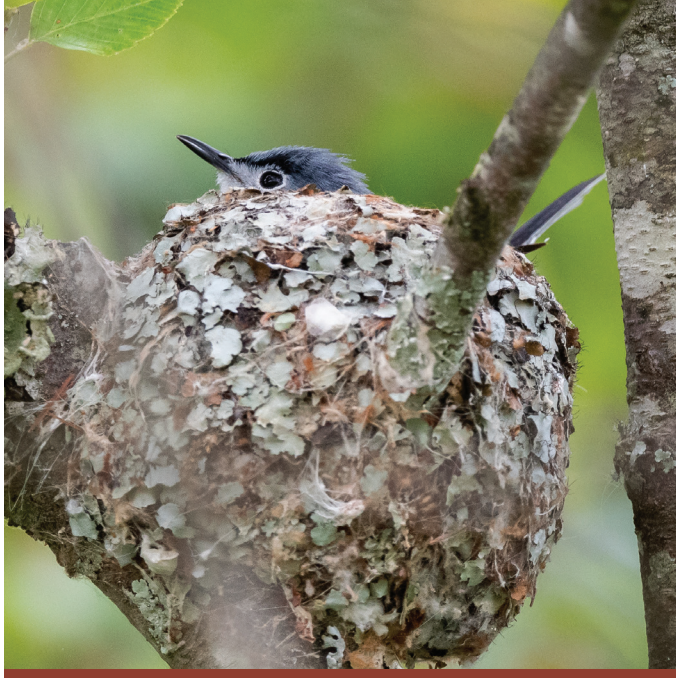
This annual report is a look back at data highlights from the previous nesting season, and a celebration of what we have accomplished, thanks to your contributions. In 2021, we used NestWatch data to publish one of the largest studies on the effects of supplemental feeding on cavity-nesting birds (see page 14). Other regional explorations are featured starting on page 8. Please enjoy reflecting on the prior year as we look forward to another nesting season.

With gratitude,

Robyn Bailey

Robyn Bailey
NestWatch Project Leader

Cover: American Oystercatcher by Patti Constance; *Below:* Brown-crested Flycatchers by Paul Pruitt



Blue-gray Gnatcatcher by Larry D Tipton

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.**

NestWatch Staff

Robyn Bailey
Project Leader and Editor

Holly Grant
Project Assistant

David Bonter and Mya Thompson
Co-Directors of
Engagement in Science and Nature

Tina Phillips
Assistant Director of
Engagement in Science and Nature

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

159 Sapsucker Woods Road
Ithaca, NY 14850
1-800-843-BIRD
nestwatch@cornell.edu • **nestwatch.org**

Should we be encouraging birds to nest on buildings?

BY ROBYN BAILEY, PROJECT LEADER

This past summer, while working from home, I enjoyed watching a pair of American Robins nest on a ledge of my home just underneath an overhang. It was a good location, one fairly hidden from view and protected from rain. I monitored it with binoculars until, one rainy day in late May, the nestlings finally fledged. Over the years, several robins have nested around my home and garage with varying degrees of success. I wondered, "Is this tendency to nest on homes and buildings adaptive?"

Protection from predators

There are several hypotheses we could form in addressing this question, the first being that perhaps nesting on buildings where people live, work, and recreate affords some level of protection from predators. After all, it would not be very common for a bobcat or a raccoon to associate with people. On the other hand, hazards like pet cats or too much human disturbance could negate the benefits of hiding in plain sight.

Shelter from weather

Another benefit that might attract birds to nest on buildings is that they can provide shelter from rain, snow, or intense heat. By offering protection from the elements, our buildings may enable birds to start nesting earlier, continue later, and/or be more successful.

Investigating with NestWatch data

To explore this question, I looked at two species that commonly nest on buildings across most of the United States and Canada: Mourning Doves and American Robins. Combining all years of data, I asked "What percent of nests succeed when built on a human-made structure (e.g., building, nest shelf, hanging plant, etc.) versus when they are built in natural vegetation (e.g., shrub, tree branch, ground, cliff, etc.)." The answer was a slight improvement in nest outcomes for both species, but Mourning Doves seemed to benefit more. In the table below are percentages of nests that succeeded on built substrates versus natural vegetation substrates. By nesting on buildings, Mourning Doves increased their nest success by 5.2%; the difference for American Robins was less than 1%.

	% Successful	
	Built	Vegetation
Mourning Dove (n=707 nests)	32.0	26.7
American Robin (n=2,607 nests)	31.5	30.8

With evidence for a positive effect of nesting on buildings, why not **put up a nest shelf** for these species? Give nesting birds space, and try not to disturb them. Place the nest shelf in an area that is more convenient to you and safer for birds (e.g., not over your front door, close to an overhang).

Some caveats

People are probably more likely to find and monitor nests near their houses than in, say, a remote woodlot. So there may be a bit of "(sub)urban" bias in this sample; however, this sample did include slightly more nests in natural vegetation (all categories combined) than nests on built structures (as defined above), and it is likely that most of the nests in natural vegetation were near homes or buildings. Even so, if we are deciding whether to encourage a robin or dove in a backyard or courtyard to nest on our building, rather than in adjacent vegetation, this analysis can yield some insights. Finally, as a reminder, it is illegal to destroy or remove a native bird's nest simply because it is in a location that is inconvenient to you, such as right over your front door. In such situations, do your best to cohabitate with birds and consider putting up a nest shelf in a better spot.

Mourning Doves by Julie Ibarra

Nest Quest Go!

By the numbers

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

The Nest Quest Go! project endeavors to digitize, transcribe, and integrate more than 300,000 historical nest records from the North American Nest Record Card collection into the NestWatch database. Nest Quest Go! uses the Zooniverse platform to crowdsource nest record card transcription, and we organize these cards into individual "projects." With the help of thousands of Zooniverse users, and a team of students and volunteers, we are making incredible progress.

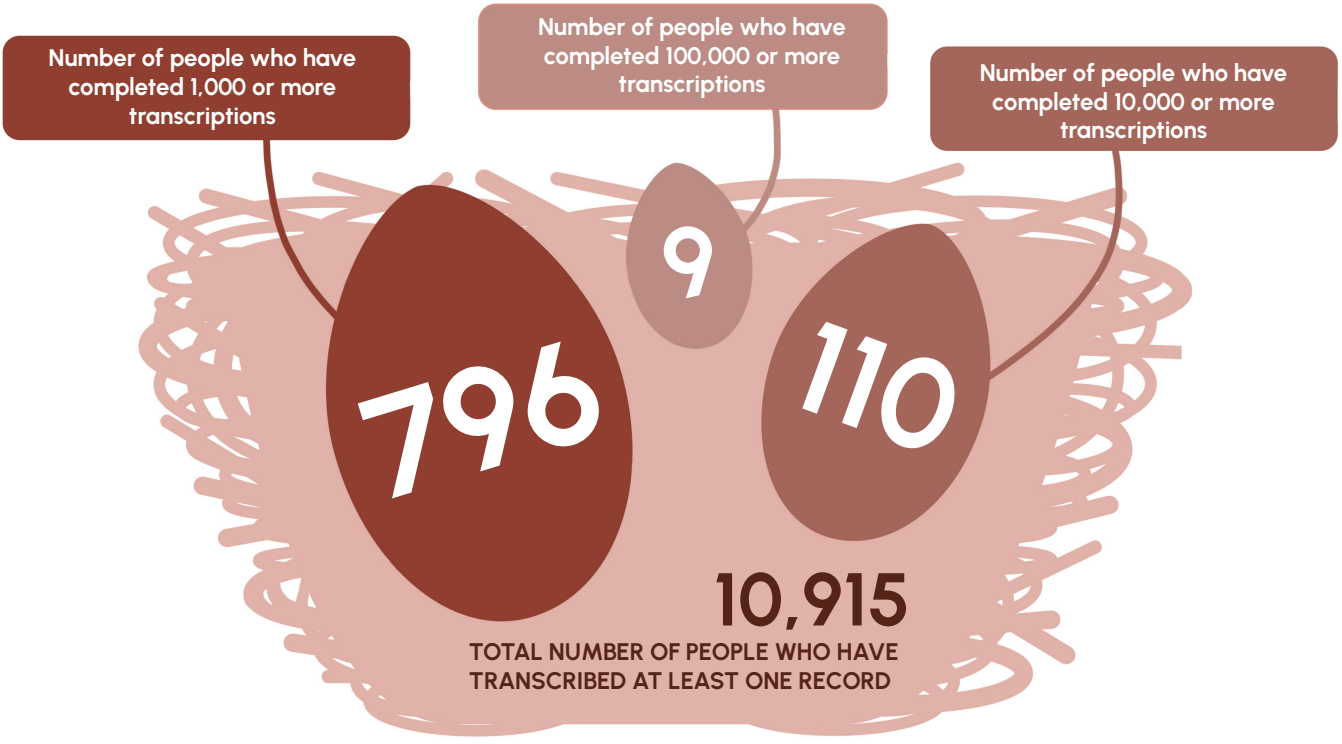
As the transcription activity in Zooniverse continues to grow, our filing cabinets become more sparse! We have had another productive year with the launch of 11 Nest Quest Go! projects. Two of those completed projects were some of our largest, consisting of 11,342 Red-winged Blackbird cards and 11,766 Mourning Dove cards. There were 40,571 total cards transcribed in 2021, which equals more than 111 cards transcribed per day, on average. We also made strides in processing the data from Zooniverse so it can be added to our NestWatch database. While continuing to keep projects running in Zooniverse, we will prioritize beginning to make data available for researchers to use via NestWatch in 2022.

Killdeer by Shirley Donald

The Killdeer dataset was one of the 11 new Nest Quest Go! projects that were launched in 2021.

The graphic below shows the total number of unique participants who have transcribed at least one section of a card, as well as the breakdown of the number of participants who have completed more than 1,000, 10,000, and 100,000 transcriptions during their time with Nest Quest Go! Note: Each nest record card is transcribed multiple times to ensure accuracy.

It's all about the transcribers:



Nest Quest GO!

Good Words

"I suffer from anxiety, but I like to feel like I can contribute. Nest Quest Go! and projects in Zooniverse allow me to feel a part of something bigger from the comfort of my home."

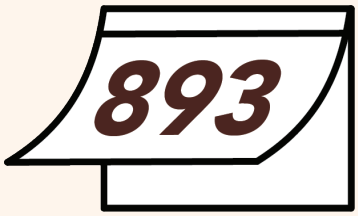
-Anonymous Zooniverse User

Red-winged Blackbird by Micah Grove

Transcription Progress 2019 - 2021

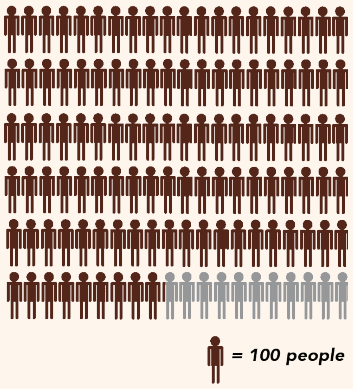
35 projects launched in Zooniverse

893 days of transcription

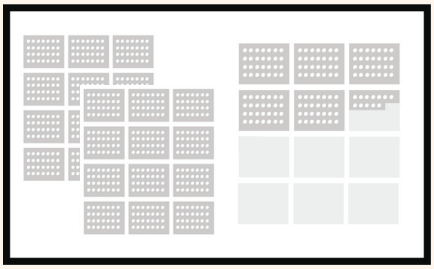


&

10,915 people transcribed data



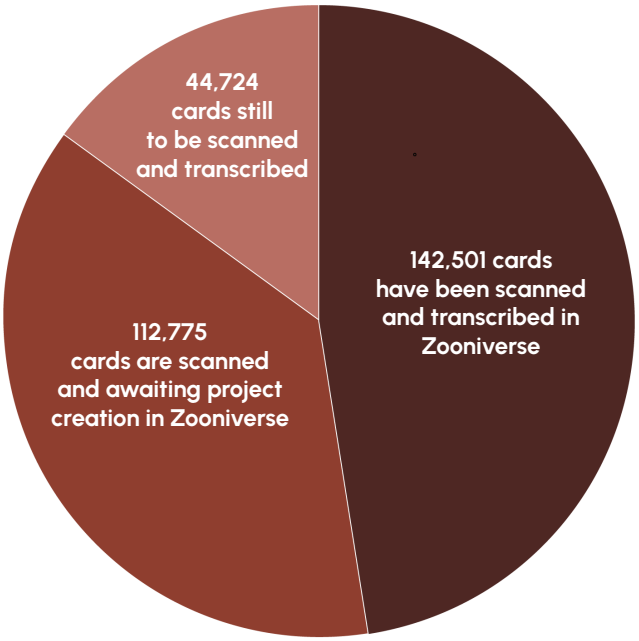
21,432 volunteer hours



That's more than 2 years and 5 months of effort!

We need your help!

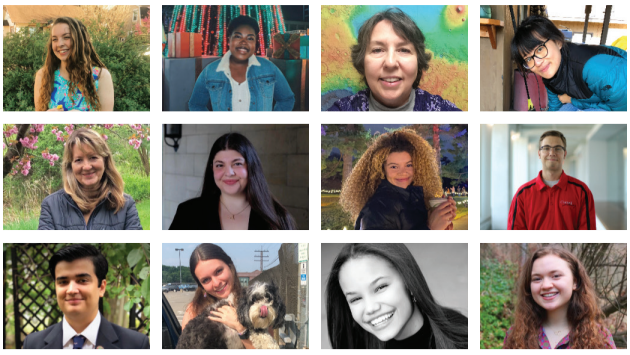
You can help too, by transcribing our scanned cards in Zooniverse. Visit the **Nest Quest Go! project** on Zooniverse.org or download the Zooniverse app, and start transcribing today!



Help Transcribe Nest Cards

Thanks a bunch

Over the past two and a half years the success of Nest Quest Go! is due in large part to a group of devoted Cornell students and volunteers. Pictured left to right beginning with the top row: Grace Ogden, Joy Pojim, Pamela R. Smith, and Susana Zeng. Second row includes: Lynn Bertoia, Dawna Badie, Jewel Alston, and Nick Thomas. Pictured in the third row are: Christian Geramita, Clara Hewson, Alessandra Farmer, and Sophia Mathews. Not pictured, but integral to the work are: Beverly Stockard, Deb Fyler, Fenya Bartram, Liz Chartier, Rachael Ashdown, Sena Awoonor, and Turner Wilson. Thank you all for bringing your talents and energy to this project.



Do higher nest boxes for owls mean better nesting success?

BY HOLLY GRANT, PROJECT ASSISTANT

As nest monitors, we all want what's best for the birds—and as many successful nests as possible. For nest box landlords, this means making sure nest boxes are in good condition, the appropriate shape and dimensions, cleaned regularly, and installed in the right habitat at a suitable height.

For uncommonly-observed species like owls, some research is available, albeit sparse, regarding the preferences and effectiveness of different nest box features. For example, one study showed that Eastern Screech-Owls prefer large cavities with small entrance holes (Gehlbach 1994). As you might guess, different habitats and geographic locations can factor into the preferences of local populations. Another study done with Barn Owls in Napa Valley, California, showed their preference for nest boxes placed in grassland habitat (Wendt and Johnson 2017). But why do birds have these preferences? Could it be that certain nest sites are chosen because they have characteristics which allow for better nesting success? And can we, as nest box landlords, influence nest survival by adjusting variables such as nest box height and the addition of protective guards to keep out predators?

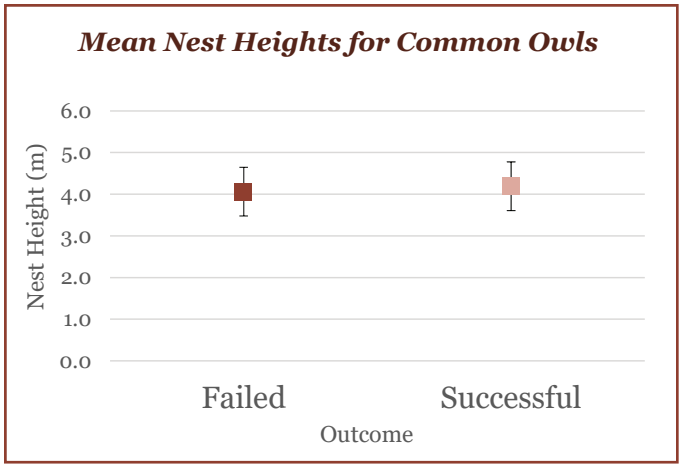
Western Screech-Owl by Rose F.

Recommendations for nest box installation heights attempt to mimic natural nest heights, which vary widely even among members of the same species. People may be limited by the tools available to them (e.g., ladder height, post/pole height, nest site accessibility), and hanging and checking a nest box at great heights can be dangerous or impractical enough to require professional help. On our website, we suggest that nest boxes should be hung at different heights for different owl species. While these suggestions are based on studies which consider observations of natural cavity heights, we decided to use NestWatch data to explore whether nest height has an effect on owl nesting success.

Barred Owls by Linda May

Hunting for answers

To address these questions, we looked at nesting records for five species of cavity-nesting owls: Barn Owls, Barred Owls, Northern Saw-whet Owls, and both Eastern and Western Screech-Owls. We used all records from nest boxes (no natural cavity nests) and pooled all years together. We examined whether height of the nest box alone influenced nest outcome, and took into account the presence of a predator guard, latitude, longitude, and the interaction of height and predator guard presence.



Nest heights were not significantly different for successful versus failed nests of common cavity-nesting owls in this study (n=93).

What did the data show?

- The nest box heights ranged from 5.9–65.6ft (1.8–20.0m), with an average height of 13.8ft (4.2m).
- We detected no statistically significant effect of nest box height on breeding outcome (success or failure).
- Predator guards did not have a significant effect on nest outcome for these owls, regardless of whether they were installed on lower or higher nest boxes.

Soaring onward

Sometimes results can be surprising! We used 93 nest attempts from the NestWatch database which met our criteria. With more data submitted in the future these results might shift.

For now, our advice to owl box landlords is that you don't need to risk injury to install boxes as high as possible. Don't go too low though either—when young owls fledge their nests, they cannot fly well and therefore stick to perching and fluttering to nearby branches over the following weeks as their wings grow stronger. Reasonably high nest boxes also allow a better chance for fledglings to remain in the upper branches of trees, should they fall—a fledgling on the ground is much more susceptible to predators compared to one that simply fell to a lower branch.

At least for the species we explored, hanging boxes at around 12-15 feet, which is on the lower end of their recommended range, is sufficient for successful breeding. Monitors should also consider installing the box near branches that give the fledglings a place to steady themselves after leaving the box. For owls, we recommend cleaning nest boxes and adding a layer of fresh wood shavings to the box prior to each breeding season.

Have you experienced different results with the owls in your area? Please report your findings to us, and be sure to fill in every data field that you can—your data helps to improve our suggestions and guidance for nest box landlords. The more data that is submitted along with your nest records, the more studies they can inform! We thank all NestWatchers for their efforts and encourage anyone who already has, or wants to build, nest boxes for owls to continue to monitor those nests and report to NestWatch.

References:

Gehlbach, F. R. 1994. Nest-box versus natural-cavity nests of the Eastern Screech-Owl: An exploratory study. *Journal of Raptor Research* 28(3): 154–157.

Wendt, C. A. and Johnson, M. D. 2017. Multi-scale analysis of barn owl nest box selection on Napa Valley vineyards. *Agriculture, Ecosystems & Environment* 247: 75–83.

Northern Saw-whet Owl by Randy Lauff

Regional Roundup

Highlights from the 2021 season

BY ROBYN BAILEY, PROJECT LEADER

In 2021, participants reported 31,270 nest attempts by 272 species. In the pages that follow, you'll find data summaries from the U.S. and Canada; however, we also received data on 188 nests of 95 species from an additional 34 countries in 2021. Great job, NestWatchers!

Note that for calculations of nesting success in this report, we 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 2021 nesting success was different from the previous 10-year average (2011–2020). This can help you interpret whether 2021 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.

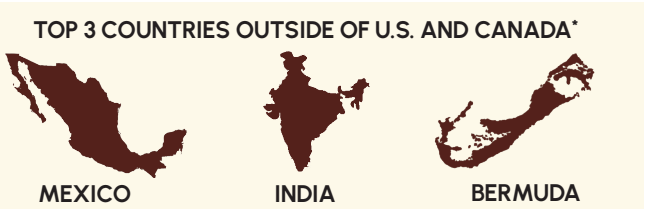
Indian Paradise-Flycatcher by Manish Panchal

2021 NestWatch Season Totals

31,270	NEST ATTEMPTS
2,742	PARTICIPANTS
272	SPECIES
99,684	EGGS
67,858	FLEDGLINGS

International

We received data for a total of 188 nests from 34 countries outside of the United States and Canada in 2021. Mexico submitted 26 nests to NestWatch. After Mexico, the top countries were India with 25 nests, Bermuda and Great Britain each with 14 nests, and Germany with 13 nests reported.



Hawaii

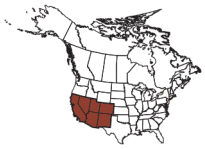
We did not receive reports from Hawaii in 2021. If you live in Hawaii and find nesting birds, please share your observations!

Alaska and Northern Canada

The number of nests reported from Alaska and Northern Canada increased to 102 nests in 2021. We had enough data on Tree Swallows in this region (n=66) to report that the average clutch size was 5.1 eggs, average number of fledglings was 4.1, and nesting success rate was 82.5% (up from 74.1% in 2020). The northernmost nest of 2021 was—for the second year in a row—a Boreal Owl nest reported by Jeanette Moore in Alaska. It fledged two young!

ALASKA AND NORTHERN CANADA: 102 NESTS

Rank	*Species*	*2021 Total nests reported*
1	Tree Swallow	66
2	Barn Swallow	30
3	American Robin	1
3	Black-capped Chickadee	1
3	Violet-green Swallow	1
3	Common Raven	1
3	Boreal Owl	1
3	Common Redpoll	1



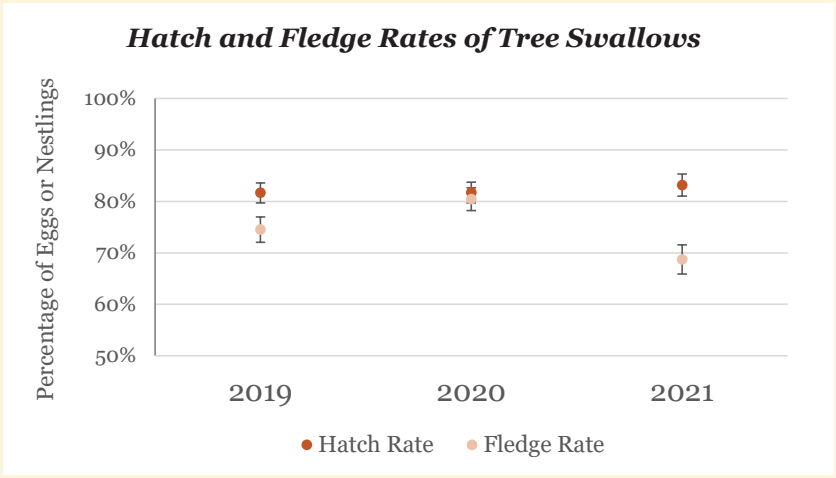
Southwest Region

In the southwestern region, House Finches and Chestnut-backed Chickadees had slightly elevated nesting success in 2021, despite a very warm season. Most other top-10 species had a success rate very near their 10-year average.

Nest monitors belonging to the California Bluebird Recovery Program noted an especially high rate of loss among Tree Swallow nests in 2021. They wondered if this was a pattern seen elsewhere, perhaps caused by higher-than-normal temperatures. We ran the numbers regionally and noted that while hatch rate (the percentage of eggs laid that hatched) was good (83.1%), the fledge rate (the percentage of hatched young that fledged) was lower than it had been in recent years (68.7%; see graph below). The percentage of nests that fledged at least one young was 70.7%, about 10.5% lower than the 10-year average.

House Finches by Paula T.

Tree Swallows by Charlie Rendeo



While percentage of Tree Swallow eggs hatching was consistent with the prior two years, the percentage of nestlings fledging decreased noticeably as compared to the same years. (Excludes nests where clutch size and live young seen were zero.)

SOUTHWEST TOP-10 LIST: 3,624 NESTS REPORTED FOR ALL SPECIES

Rank	Species	2021 Total nests reported	2021 Average clutch size	2021 Average fledg-lings	2021 Average nesting success (%)	Previous 10-year average success (%)	Change from previous
1	Tree Swallow	1,001	4.8	3.9	70.7	81.2	▼▼
2	Western Bluebird	748	4.8	4.1	78.9	78.4	
3	Mountain Bluebird	477	4.9	4.5	76.3	78.1	
4	House Wren	149	5.8	5.5	84.4	82.6	
5	Violet-green Swallow	113	4.0	3.3	76.9	81.6	
6	Dark-eyed Junco	163	3.4	1.6	80.3	*	
7	Red-tailed Hawk	96	*	*	*	77.4	
8	Oak Titmouse	70	5.8	5.5	80.7	77.8	
9	House Finch	59	4.5	4.5	72.4	66.3	▲
10	Chestnut-backed Chickadee	57	6.0	5.3	87.0	79.0	▲

*Insufficient data

Southeast and Gulf Coast Region

In the winter of 2021, the southeastern region experienced a historic February cold snap. While other regions also experienced this frigid weather, it was of interest to NestWatchers because birds can begin nesting in February (and to a lesser extent January) in southern states like Texas, Louisiana, Arkansas, and Florida. While we may never know how many individual birds were lost to the severe weather, we looked into the NestWatch data to search for clues about how nests were impacted.

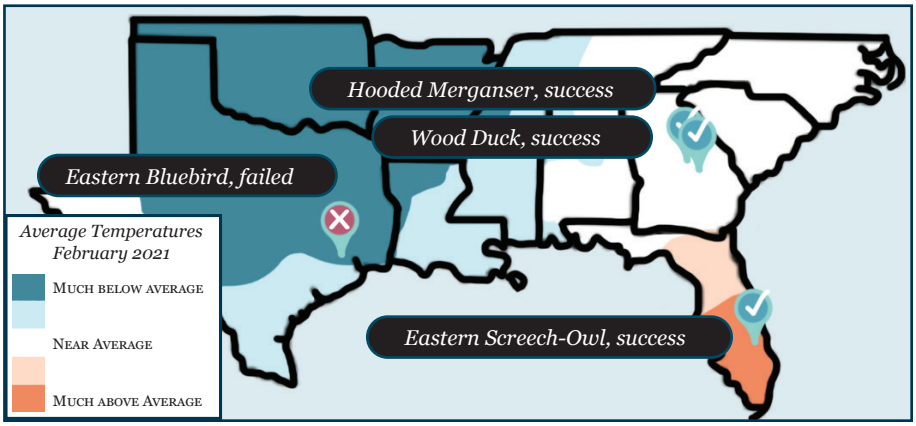
NestWatcher Larry Streib of Texas reported an Eastern Bluebird nest begun in January of 2021 which failed due to the record-setting winter storm. Otherwise, our data do not reflect any elevated numbers of nests that failed—perhaps owing to the fact that not many nests were initiated at that time in mid-February.

Happily, most species in the top-10 list were above or near their long-term average in terms of nest success. Only Wood Ducks and Northern Cardinals experienced a lower-than-average year in terms of nest success (at 70.6% and 39.4% respectively).

Ralph Tanner

Missy Juntunen

This Wood Duck nest in Georgia (above) was successfully incubated through the cold snap, fledging 13 ducklings on March 19, 2021. Below, an Eastern Screech-Owl nest in Florida also succeeded with two young fledged, despite the weather.



Four confirmed nests were reported to NestWatch which had eggs or young during the winter storm occurring February 10-19, 2021. Temperature data source: NOAA.

SOUTHEAST TOP-10 LIST: 6,111 NESTS REPORTED FOR ALL SPECIES

Rank	Species	2021 Total nests reported	2021 Average clutch size	2021 Average fledglings	2021 Average nesting success (%)	Previous 10-year average success (%)	Change from previous
1	Eastern Bluebird	3,879	4.4	3.8	82.0	76.2	▲
2	Carolina Chickadee	521	5.3	4.8	80.2	74.4	▲
3	Carolina Wren	290	4.6	4.2	76.6	79.5	
4	Bewick's Wren	164	5.5	5.0	76.9	81.6	
5	Black-crested Titmouse	155	5.6	5.0	84.3	84.2	
6	Tree Swallow	134	5.1	4.4	79.4	79.4	
7	Tufted Titmouse	90	5.3	4.6	78.8	80.5	
8	Barn Swallow	68	3.9	3.7	81.3	80.4	
9	Wood Duck	65	13.8	14.7	70.6	82.3	▼▼
9	Northern Cardinal	65	3.0	2.2	39.4	46.3	▼

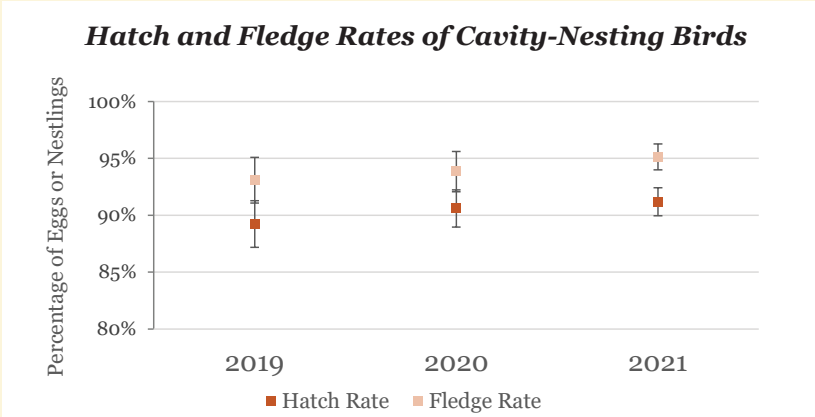
Northwest Region

The extreme heat wave experienced in the region from June 27–July 4, 2021, led many NestWatchers to ask us if this would negatively impact nesting birds, particularly those in nest boxes where heat might build up. To answer this question, we compared hatch rates (the percentage of eggs laid that hatched) and fledge rates (the percentage of hatched young that fledged) during the heat wave time period across three years. The results are clear: birds with an active nest during the heat wave time period (June 27–July 4) in 2021, fared no worse than birds during that same time period in the previous two years (see graph below).

Individually, Mountain Bluebirds in the region had a higher-than-average nesting success rate, whereas American Robins and Violet-green Swallows had a lower-than-average nesting success rate. Black-capped Chickadees fared the best overall, with 86.4% of nests succeeding.

Nuttall's Woodpecker by Lee-Hong Chang

Mountain Bluebird by Amber Rogers



Cavity-nesting birds in the Northwest did not differ in hatch rate or fledge rate across the past 3 years (n=1,223 nests, multiple species combined). Excludes nests which fledged before June 26, and those with first-egg dates on or after July 5 (i.e., those not in the "heat wave" time period).

NORTHWEST TOP-10 LIST: 2,048 NESTS REPORTED FOR ALL SPECIES

Rank	Species	2021 Total nests reported	2021 Average clutch size	2021 Average fledglings	2021 Average nesting success (%)	Previous 10-year average success (%)	Change from previous
1	Tree Swallow	917	5.7	5.1	81.4	75.9	▲
2	Mountain Bluebird	455	5.3	4.7	79.2	67.7	▲▲
3	Western Bluebird	148	5.3	4.6	74.5	69.3	▲
4	House Wren	84	6.6	6.3	83.9	81.2	
5	House Sparrow	65	4.4	*	1.6	14.8	▼▼
6	American Robin	50	*	*	63.6	75.4	▼▼
7	Black-capped Chickadee	44	5.9	4.9	86.4	80.1	▲
8	Violet-green Swallow	39	4.2	3.2	66.7	82.3	▼▼
9	Chestnut-backed Chickadee	31	5.8	5.0	83.3	*	
10	Dark-eyed Junco	21	4.1	*	42.1	*	

*Insufficient data

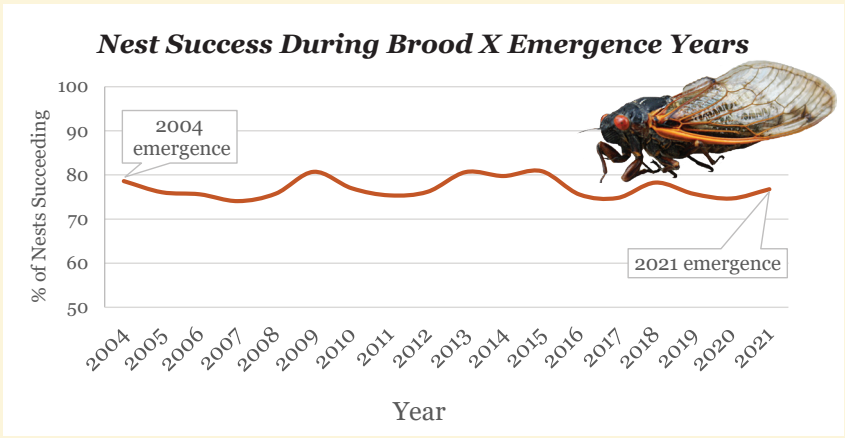
Northeast Region

Northern Flicker by Janet Heintz

NestWatchers in the Northeast wondered if the massive 17-year emergence of periodical cicadas (the generation known as Brood X emerged in 2021) would bolster nesting success of birds that were able to eat them. We pooled 13 species of birds that are known or suspected to prey on periodical cicadas, and looked at the percentage of nests succeeding in emergence years (2004, 2021) versus non-emergence years (2005–2020) to see if peaks in success corresponded with cicada emergences. We did not see peaks in 2004 or 2021, suggesting that other factors may have been more important for nest success than prey availability (see graph below).

Among the region's top-10 species, only the American Kestrel seemed to have a lower-than-usual rate of nest success (70.1%). NestWatchers in the region reported 18,073 total nests—the most ever and a wide margin of growth over the prior year. We're thrilled to see this growth!

Blue Jay and Cicada by Barry Feddema

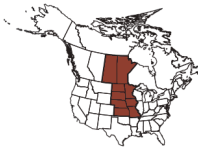


Cicada by Alabama Extension | Flickr CCo

*Brood X periodical cicadas (*Magicicada sp.*) emerge in the eastern states every 17 years, providing a spectacle for humans and a buffet for birds. Comparing emergence years (2004, 2021) to non-emergence years (2005-2020), however, reveals no correlation with nest success (n=43,215 nests). We thank Dr. Gene Kritsky for sharing a map of cicada sightings from the Cicada Safari citizen-science project which was used to refine this analysis.*

NORTHEAST TOP-10 LIST: 18,073 NESTS REPORTED FOR ALL SPECIES

Rank	*Species*	*2021 Total nests reported*	*2021 Average clutch size*	*2021 Average fledglings*	*2021 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Eastern Bluebird	5,604	4.4	4.0	76.3	77.0	
2	Tree Swallow	5,060	5.0	4.4	76.6	76.3	
3	House Wren	2,505	5.5	5.0	80.6	76.6	
4	House Sparrow	1,393	3.6	3.6	6.9	5.4	
5	Purple Martin	716	4.9	4.2	89.8	84.4	▲
6	American Robin	432	3.4	3.0	61.1	62.4	
7	Black-capped Chickadee	328	6.0	5.5	64.0	67.1	
8	American Kestrel	302	4.7	4.1	70.1	80.7	▼▼
9	Carolina Chickadee	260	5.5	5.0	60.4	62.2	
10	Carolina Wren	152	4.4	4.1	74.7	75.6	



Central Region

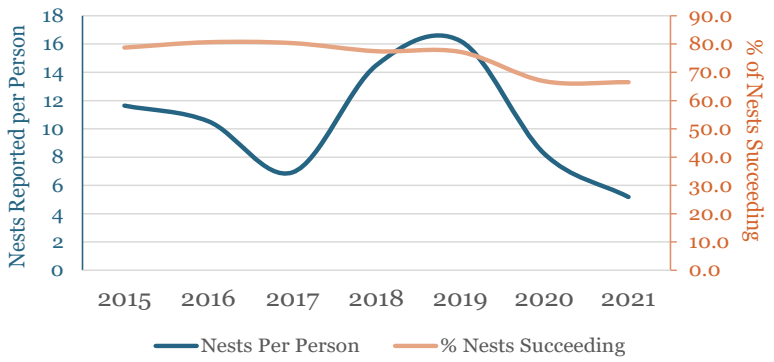
Phil Weiss of Friends of the Bluebirds in southwestern Manitoba wrote to ask if others were seeing a reduction in Eastern Bluebird nests similar to what monitors witnessed in his organization in 2021. Indeed, NestWatch saw a 55% reduction in the number of Eastern Bluebird nests reported in the region compared to 2020, and lower numbers of bluebird nests per contributor. Looking back over the previous 7 years, we see that nest success has also dipped below 67% for the past 2 years (see graph below).

In more positive news, Tree Swallows and Purple Martins had a particularly good year in terms of nest success with both species seeing >90% of nests fledging at least one young. Black-capped Chickadees also had a better-than-average year with 88.1% of nests managing to fledge, a marked improvement over 2020 (60.6%).

Carolina Chickadee by Sheri Douse

Red-winged Blackbirds by Ted Ossege

Are People Reporting Fewer Eastern Bluebird Nests?



In the central region in 2021, NestWatchers reported 5 Eastern Bluebird nests per contributor, down from a peak of 16 per contributor in 2019. Both years had similar numbers of participants contributing observations of bluebirds, suggesting that there were indeed fewer Eastern Bluebirds nesting in 2021.

CENTRAL TOP-10 LIST: 1,124 NESTS REPORTED FOR ALL SPECIES

Rank	*Species*	*2021 Total nests reported*	*2021 Average clutch size*	*2021 Average fledglings*	*2021 Average nesting success (%)*	*Previous 10-year average success (%)*	*Change from previous*
1	Tree Swallow	309	5.8	5.1	90.7	78.4	▲▲
2	Eastern Bluebird	254	4.4	4.1	66.5	76.7	▼▼
3	House Wren	131	5.0	5.1	76.7	74.9	
4	Purple Martin	117	4.9	4.1	98.0	92.4	▲
5	Black-capped Chickadee	63	5.9	5.1	88.1	71.4	▲▲
6	House Sparrow	39	3.2	*	9.7	6.2	
7	American Robin	34	3.6	2.7	68.8	73.0	
8	Carolina Chickadee	29	5.0	5.2	73.7	*	
9	House Finch	26	*	*	53.8	*	
10	Barn Swallow	15	4.9	4.1	78.6	80.3	

*Insufficient data

Does supplemental feeding help nesting birds?

BY ROBYN BAILEY, PROJECT LEADER

Wild bird feeding is one of North America's largest undirected ornithological "experiments," one in which many of us willingly participate because it is a simple way to nurture our backyard birds. In the United States, more than 59 million people feed birds around the home (U.S. Department of the Interior et al. 2018). Beginning in 2014, NestWatch organized one of the largest studies of supplemental feeding of breeding birds, simply by asking participants to report whether or not they offered supplemental food to nesting bluebirds and chickadees (all species).

After delving into the data collected from 2014–2019, we were able to analyze 24,528 nest records of Eastern Bluebirds, Black-capped Chickadees, and Carolina Chickadees submitted by citizen scientists from Alaska to Florida. We sought to answer the question about how feeding wild birds impacts their reproductive success on this grand scale.

In this recently published study (Bailey and Bonter 2021), Eastern Bluebirds were considered supplemented if they were offered insect larvae (e.g., mealworms or waxworms), whereas the chickadees were considered supplemented if they were provided seeds, suet, insect larvae, or fruit. NestWatchers also reported when they made food available (i.e., before eggs were laid, when eggs were present, and/or when nestlings were present) so that we could determine if a nest was supplemented during the relevant time period.

Timing of egg-laying

Our analysis revealed that Eastern Bluebirds with access to additional food laid eggs nearly six days earlier than those without; however, chickadees did not lay eggs any earlier when they were offered food. Laying eggs earlier could be an advantage for bluebirds if it allows them to produce an additional clutch later in the season. However, there is a risk that they could nest too early and encounter lethally cold weather in the early spring (Pinkowski 1977). We are not sure why chickadees didn't nest any earlier when food was available, but it's possible that they rely on other cues to decide when to lay eggs.

Eastern Bluebirds by Cheri Hollis

Clutch size

Eastern Bluebirds and both species of chickadees held steady in their clutch size, even with additional food on offer. Other factors were more strongly correlated with clutch size, such as latitude, longitude, and how late in the breeding season the eggs were laid. For example, Black-capped Chickadee clutch sizes increased from south to north, whereas Eastern Bluebird clutch sizes decreased. Both Carolina Chickadees and Eastern Bluebirds increased their clutch sizes from east to west. Our three focal species tended to lay smaller clutches later in the season. For Eastern Bluebirds with access to extra food, there was a small increase in clutch size for those late clutches,

suggesting that supplementation can reduce this downward trend in clutch size as the season progresses. However, because both chickadee species rarely lay a second clutch, they essentially put all of their eggs in one basket.

Nest survival

This analysis took into account the presence or absence of predator guards, which are correlated with increased nest survival (Bailey and Bonter 2017). For an average Eastern Bluebird nest with a predator guard, nest survival was improved by about 5% overall when food was available. Our results suggested that for nests which make it to the nestling period, feeding bluebirds may be particularly helpful in the earlier part of the breeding season, when nestlings may be vulnerable to early spring cool weather. Nevertheless, unsupplemented Eastern Bluebirds still had very high nest success, suggesting that they survive quite well in nest boxes with predator guards even without human-provided food. Black-capped and Carolina Chickadees, on the other hand, did not have higher nest survival when



HYPOTHESES	Black-capped Chickadee	Carolina Chickadee	Eastern Bluebird
	BIRDS WITH ACCESS TO SUPPLEMENTAL FOOD		
Earlier Nesting	✗	✗	✓
Increased Clutch Size	✗	✗	✗
Increased Survival of Nests	✗	✗	✓

Black-capped Chickadee by Paul Ostrum, Carolina Chickadee by Bob Vuxinic, Eastern Bluebird by Mike Western

supplemental food was available. This suggests that other factors (e.g., predators, competitors) may impact chickadee nest survival more than food availability.

Nestling mass

Because NestWatchers are not able to handle nestlings without special permits, we also undertook a concurrent study in Tompkins County, New York, to investigate whether supplemental feeding of 10g of mealworms per nest per day increased nestling mass of Eastern Bluebirds and Black-capped Chickadees (Dzielski et al. 2021). This was a smaller study involving just two years of data, but the results were nevertheless consistent with the findings from the national study.

From the smaller study in Upstate New York, we found that Eastern Bluebirds produced nestlings which were 5.2% heavier as they approached fledging age when given extra food. Previous research on songbirds suggests that first year survival is better for relatively heavy fledglings than for lean fledglings, suggesting that bluebird nestlings with access to supplemental food may have better prospects in life. Black-capped Chickadees, once again, did not benefit even though we provided live mealworms at nest boxes. We were unable to investigate Carolina Chickadees because they do not nest in Upstate New York.

Black-capped Chickadee by Laura Finazzo

In all four reproductive measures studied, no improvements (or detriments) were seen for chickadees which had access to human-provided food.

Lessons learned

Bluebirds and chickadees are among the most likely species to be supplemented with both food and nesting cavities in North America, so it makes sense that we would examine these species using our citizen-science platform. We did not expect the results to differ so much between the chickadees and the bluebirds, but we can speculate as to why they did. Eastern

Does supplemental feeding help nesting birds?, cont'd

Bluebirds have a more limited diet, eating primarily insects and fruit. Chickadees of both species exploit a wider variety of foods, and therefore may not be as sensitive to food shortages during the breeding season. However, our results do not imply that you should stop feeding chickadees. Indeed, surplus food may help them in the nonbreeding season (Brittingham and Temple 1988).

In our continent-wide sample, we found that 10% of Eastern Bluebird nests were supplemented, as compared to 29% of Carolina Chickadee nests and 37% of Black-capped Chickadee nests. While offering insect larvae may not be as mainstream as seeds, it is certainly gaining popularity among bluebird enthusiasts. We are happy to be able to offer some insight into this growing hobby, and we thank every NestWatcher who contributed data to this study. If you would like a copy of the recent papers, please send an email to nestwatch@cornell.edu.

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A sense of purpose and hope

BY NESTWATCH STAFF

In 2020, when so many plans shifted, researchers at the Lab wondered if citizen science would become a lower priority for stressed families, or if the educational opportunities and calming power of nature would be welcomed even more. So they turned to people like you to find out what role, if any, birdwatching and citizen science played in helping people cope during the pandemic. Your answers humbled and moved us as we read your responses to the survey. Here are just a few ways that staying connected to nature helped NestWatchers feel normal.

"Being out in nature saved my sanity! I put up bird feeders and a bluebird nesting box and saw three clutches fledge. There was something extremely comforting about observing nature's ageless cycle(s) amid all the COVID uncertainty. I've never appreciated the outdoors as much! Following the bluebird cycle of eggs to hatchlings to fledglings gave me something positive and life affirming to focus on every day. The whole bluebird family still visits my yard daily to feed and bathe in the birdbath. Their beauty is endlessly uplifting." —Georgia

"NestWatch was a godsend for me. The twice weekly visits to my boxes gave me something to look forward to in the early days when we were in a stay-at-home order. Watching the eggs and growing young birds was a joy during a stressful time." —Massachusetts

"Watching the birds, photographing their development and having three nests managed by one bluebird couple was just amazing. It took our minds off of being isolated and opened a new world." —North Carolina

"Over the summer, monitoring nest boxes and watching birds was a welcome respite from screens, screens, and more screens! I have developed a strange interest in all of the critters in my home/yard, including insects. I've enjoyed watching birds out my window." —Kentucky

KAREN MEYER

HANNAH MUEGGE

"Watching birds and entering data into NestWatch and eBird for research has been a defining role for who I am. A retired RN whose family have died, I feel my current purpose in life is to care for our planet."
—Texas

"A bird had a nest on my windowsill and watching the eggs hatch and the babies fledge was a comforting reminder that life will go on and things will get better. It also provided a social activity where I could watch and then discuss what I saw with friends and family."
—Virginia

"I signed up for project NestWatch for the first time, and it gave me more of a sense of purpose, like I was doing something productive, when I was stuck at home."
—Minnesota

Common Loon by Charlie Renideo

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