



NEST MONITORING MANUAL

www.nestwatch.org



YELLOW WARBLERS BY JIM JACOBSON

Created by



CORNELL LAB of
ORNITHOLOGY

In collaboration with



Smithsonian
Migratory Bird Center

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We are especially grateful to the thousands of nest monitors who have volunteered to monitor, record, and submit their valuable observations to various nest programs including the Cornell Lab of Ornithology's Nest Record Card Program and The Birdhouse Network.

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Some material in the NestWatch Nest Monitoring Manual has been adapted from the Ontario Nest Record Scheme Handbook and the British Trust for Ornithology Nest Record Scheme Handbook.

Nest Monitoring Manual

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Introduction

NestWatch is a nest-monitoring project developed by the Cornell Lab of Ornithology in collaboration with the Smithsonian Migratory Bird Center, and funded by the National Science Foundation.

Global environmental monitoring must include monitoring of plants and animals if we wish to understand the causes of and solutions for species declines. As a result, the need for large, continentwide databases tracking survival and reproductive success of a wide range of species is increasing. NestWatch aims to provide a unified nest-monitoring scheme to track reproductive success for all North American breeding birds.

NestWatch teaches people about bird breeding biology and engages them in collecting and submitting nest records. Such records include information about nest site location, habitat, species, and number of eggs, young, and fledglings. “Citizen scientists” submit their nest records to our online database where their observations are compiled with those of other participants in a continentwide effort to better understand and manage the impacts of environmental change on bird populations.



Eastern Bluebird nestling.

For decades, citizen scientists have enjoyed monitoring and recording nests via the Cornell Lab of Ornithology’s Nest Record Card Program, but until now, most nest data have been stored on paper forms that are not widely accessible. These historic data, as well as data from

The Birdhouse Network, will be entered into the NestWatch database. Once fully populated, the database will house nearly 400,000 nest records spanning more than 40 years and 500 species. The ability to collect large amounts of data over time and space is the single greatest power of the citizen-science method of data

collection. These long-term data sets become more valuable each year and are vital to scientists studying and predicting the effects of climate and land-use changes on birds. Because these impacts may vary with latitude, weather conditions, and habitat, it is important to study them on continental or even global scales. Public collaboration takes this effort far beyond what teams of professional researchers can achieve on their own.

We invite people of all ages who are interested in the natural world to help monitor the success of nesting birds and better understand the threats they face. Your valuable nest observations will be permanently stored as legacy data along with hundreds of thousands of other nesting records. When combined, these data will provide a wealth of information about breeding birds and the factors that influence their success across different landscapes.

How to Participate in NestWatch <www.nestwatch.org>

1 Create a NestWatch Account

Go to www.nestwatch.org and create an account. If you already have an account for NestWatch, NestCams, CamClickr, Project FeederWatch or any other Lab of Ornithology project, please use your existing account.

2 Get Certified to Monitor Nests

Review the NestWatch Code of Conduct (see page 6) to learn how to monitor nests without causing harm to birds. After registering for an account you will be prompted to take the nest monitor's certification quiz, which is based on the NestWatch Code of Conduct.

3 Look for an Active Nest

Prior to searching for a nest, we recommend familiarizing yourself with the nesting cycle of birds (see page 25). You can also visit our Focal Species online. These species were selected because you are very likely to encounter them in your backyards and neighborhoods. Other helpful information is found here:

- Tips for finding nests (see page 9)
- Behavior Cues for Finding Nests (see page 10)
- You also can find additional Nest Monitoring "How Tos" online.

4 Monitor Nests and Collect Data

This is the really fun part! Once you are a certified nest monitor and have found an active nest (a nest under construction or containing at least one egg) you can begin collecting breeding data. Each time you visit a nest, write down your observations on a NestWatch data sheet (see sample page 15) and use a new data sheet for each new nest.

Your nest visit schedule should closely follow the NestWatch Protocol for monitoring nests (see page 12).

5 Enter Your Data

Log in to your account and begin by registering the locations of your nest site and their descriptions. Next you can enter your breeding data for each nest. You will find it easiest to enter your data as you go rather than waiting until the end of the nesting season.

Data entry tutorials are available online to help you with this process.

6 See Your Data

As one of thousands of citizen scientists across North America you are now a member of the world's largest research team. Take a look at the data you entered on a map and compare them with other participant's data. You can also download the data you enter for your own records. Tutorials and descriptions on how to use the "Explore Data" tools are available online.

**For more information
and resources, visit
www.nestwatch.org**

Frequently Asked Questions

Q: Who can participate in NestWatch?

A: Anyone! Our participants are people of all ages throughout North America who care about the natural world. They range from families with children to retired adults and professional biologists who monitor nesting birds in backyards, parks, green spaces, and public lands. There is no charge to participate in the program.

Q: How do I join NestWatch?

A: Go to www.nestwatch.org. If you are not already registered, please click on the link “Create an account” and fill out the required contact information. You will need to create a user name and password. Shortly after you register, you will receive an email confirming your registration and containing your user name and password information.

Q: What do I need to participate?

A: The most important requirements are a bit of time, an interest in birds, an eye for detail, a pen, a clipboard, and data sheets. In addition, binoculars and a field guide to birds and/or bird nests may be helpful. To report data, you will need Internet access.

Q: How do I participate?

A: There are two easy ways to monitor bird nests for NestWatch.

- Work individually or in groups to monitor nests during the breeding season and collect information on the location, habitat, species, number of eggs, and number of young in each of the nests you monitor. You'll submit your nest records online.
- Get involved with one of our partner sites and, with the guidance of a trained leader, collect information on the location, habitat, species, number of eggs, and number of young in each nest. Nest records are submitted online. See page 28 for links to our partner sites.

Q: Can I be a NestWatcher as part of a community or group?

A: Absolutely! In fact, many people work with friends, family, and neighbors to monitor large nest-box trails or conduct surveys for state-sponsored Breeding Bird Atlases. We encourage individuals new to nest monitoring to get involved with one of our partner sites. These sites are located throughout North America and occasionally hold workshops to get people started in the rewarding activity of nest monitoring.

Q: What species do you want data for?

A: We will accept data on ALL North American breeding birds. However, we have a list of Focal Species which were chosen based on many factors including migratory status, nest type, and range. The Focal Species are commonly found in rural, suburban, and even urban neighborhoods, making them easily accessible for nest monitoring.

Focal Species

American Goldfinch	Mountain Bluebird
American Robin	Mourning Dove
American Kestrel	Northern Cardinal
Barn Swallow	Northern Mockingbird
Black-capped Chickadee	Red-winged Blackbird
Blue Jay	Say's Phoebe
Carolina Chickadee	Song Sparrow
Eastern Bluebird	Tree Swallow
Eastern Phoebe	Violet-green Swallow
Gray Catbird	Western Bluebird
House Finch	Western Scrub Jay
House Wren	Brown-headed Cowbird
Lesser Goldfinch	(brood parasite)

Q: Is there a certain form I should use to collect nesting data?

A: YES! At our web site you will find the **Multiple Nest Visits data sheet**. This form allows you to enter information about the location, nest substrate, habitat characteristics, and observations of nesting progress during each visit. The Multiple Nest Visits data sheet is intended for use in the field. It mirrors the web-based form, making it easy for you to transfer your data online. See pages 14–15 for complete instructions on filling out this form.

Q: How often should I visit a nest?

A: There is no set standard for how often to visit a nest; however, too many nest visits can lead to nest abandonment by the parents and too few visits can result in data that are difficult to analyze and interpret. As a general rule, we recommend 8–10 visits to a nest (during a typical songbird nesting cycle). If you check nests every 4–5 days, this will add up to roughly 8–10 visits. We strongly encourage a minimum of three visits (one visit in the beginning, middle, and end) so we can meaningfully interpret your observations. Please review the protocol on page 12 for more information.

Q: Can I monitor nest boxes?

A: YES! The effects of providing nest boxes for cavity-nesting birds are not well understood and more data are needed to address this issue. Additionally, nest boxes are a great way for beginners to get started with nest monitoring.

Q: Should I report nest failures?

A: YES! In addition to knowing when nests succeed (at least one young fledges from the nest), we also need to know when they fail (no young fledge from the nest). If you can't report all your active nests, please report a random sample of your nests, where successful and failed nest attempts have the same potential to be reported.

Q: Do you want historic data?

A: YES! We hope that in the near future the database will be able to accept all your old historic paper records, so hold on to them for a little bit longer!



T. POWELL

Carolina Chickadee nestlings.

Q: How do I enter my nesting observations online?

A: First go to www.nestwatch.org and create your NestWatch account, then click on the “My Nests” tab along the top of the screen to enter the database. See page 19 for guidelines on submitting data or visit the “Instructions” section online for help.

Q: How do I see my data?

A: Several online tools are available to make it easy to manage and organize your nesting records. In addition, data visualization features will allow users to view, download, and explore nest data submitted from anywhere in North America. Visit the “Explore Data” tab online to get started!



C. GRIFFIN

A Pileated Woodpecker feeds its fledgling.

Q: What if I don't have access to nests in the field? Can I still participate?

A: YES! Internet visitors can still enjoy and monitor nesting birds through our online NestCams at www.nestcams.org. Cameras, placed near nests, send real-time images of birds throughout their nesting cycle to our web site. CamClickr, a new online project will allow Internet visitors to classify images captured through the web cams and help us answer interesting questions about breeding behavior.

Q: What questions are researchers hoping to answer?

A: With the data gathered and reported by citizen scientists, researchers around the world will have access to an incredibly powerful data set that will grow each year, including nearly 400,000 nest records from most of North America's breeding birds. Below are some of the critical questions that citizen-science data can answer. More details about each of these scientific goals are available online.

- How do breeding parameters such as clutch size, nesting success, and daily nest survival vary across time and space?
- Does nest monitoring impact nesting success?
- Can conservationists use nesting data to detect changes in the environment?
- What factors limit breeding success in areas from rural to urban?
- Can people modify backyard habitat to affect breeding birds?

Q: What can participants hope to learn by participating in NestWatch?

A: NestWatch was developed in part to increase public understanding of science and to teach people about the breeding biology of birds. We hope participation will result in greater understanding of how science is conducted and contribute to knowledge of the breeding behaviors of birds. We further hope that participants will develop their nest-monitoring skills and learn how human impacts on the landscape can greatly affect nesting birds.



A House Wren nest and eggs.

Q: Why is nest monitoring important?

A: As a NestWatch collaborator, your nest observations become part of a continentwide database that will allow us to better understand and manage the impacts of environmental change on bird populations. In addition:

- Studies of nesting birds can increase our understanding of population ecology, conservation biology, and behavioral ecology.
- Because nesting birds often compete intensely for a limited number of suitable breeding sites, many species are decreasing in number.
- The biological effects on bird populations of providing and monitoring nest boxes are not well known.
- Nest monitoring increases our connection to and appreciation for birds and the natural world.

**For more information
and resources, visit
www.nestwatch.org**

Nest Monitor's Code of Conduct

Observations of nests should never jeopardize the well being of birds. Observers must exercise extreme caution and responsibility to ensure the safety of birds, nests, and nest contents.

The Nest Monitor's Code of Conduct is intended to help nest monitors minimize disturbance to a bird's nest while observing nests and recording data. Careful observation of nests can minimize or eliminate the three potential risks that all nest monitors must be careful to avoid:

- Accidental harm to a nest
- Parental abandonment of a nest
- Depredation of a nest

1. Learn about the nesting cycle of birds

Birds are diverse and fascinating creatures! Make the most of your NestWatch experience by understanding a bit about their nesting behaviors. Appendix D provides a brief and general overview about avian nesting cycles. More information about breeding birds can be found at our web site.

2. Plan and prepare for nest visits

Make a plan to conduct observations of nests every four or five days, following as closely as possible the NestWatch protocol (see page 12). The first time you encounter an active nest, accurately record its location to avoid long searches on subsequent visits. Prepare materials such as field data sheets, notebooks, cameras, GPS units, etc., beforehand to minimize time spent in the immediate vicinity of the nest. Clipboards are an excellent way to keep your data sheets handy.

3. Choose appropriate times to visit nests

As a general rule you should AVOID nest monitoring during certain times:

- **Do not check in the morning.** Check nests in the afternoon, since most birds lay their eggs in the morning. Eggs and young nestlings get cold more quickly if left alone in the morning.
- **Avoid checking nests during the first few days of incubation.** If necessary, observe nests from a

Quick Guide to Code of Conduct

1. Learn about the nesting cycle of birds
2. Plan and prepare for nest visits
3. Choose appropriate times to visit nests
4. Search carefully
5. Approach nests with care
6. Minimize disturbance at the nest
7. Do not handle birds or eggs*
8. Don't leave a dead-end trail
9. Respect private land
10. Understand the Migratory Bird Treaty Act

**It is illegal under the Migratory Bird Treaty Act to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued by federal and, in some cases, state agencies.*

distance and approach only when the bird leaves the nest.

- **Do not approach nests when young are close to fledging.** When the young are disturbed during this stage, they may leave the nest prematurely (see box on page 13.) Young that fledge prematurely usually do not stay in the nest despite attempts to return them. If on your previous nest visit, the nestlings were nearly fully feathered, you should monitor the nest from a distance, using binoculars, if possible.
- **Avoid checking nests during bad weather.** If the weather is cold, damp, or rainy, postpone checking the nest until another day, as this can be very stressful for birds.
- **Do not check nests at or after dusk,** when females may be returning to the nest for the night. The exception to this would be owls, which typically leave the nest at dusk.

4. Search carefully

It is critically important that monitors avoid damaging known nest sites, whether in nest boxes or out in the open. Nests that have yet to be discovered are particularly vulnerable. When searching for nests, move slowly through dense foliage, being careful not to dislodge any nests. Many birds such as Killdeer, Ovenbirds, Bobolinks, and waterbirds nest on the ground in nests that are difficult to see, so tread lightly and be cautious around potential ground nest sites.

5. Approach nests with care

Avoid leaving tracks that can direct predators to nests. Nest predators are everywhere—on the ground, in vegetation, and in the air—and many are smart enough to watch you! Be careful that predators such



K. A. SMITH

A Western Grebe nest constructed with and among floating vegetation can only be reached by water.

as cats, crows, and jays are not following you. Minimize damaging or trampling of vegetation that could expose a nest to wind, rain, or predators.

6. Minimize disturbance at the nest

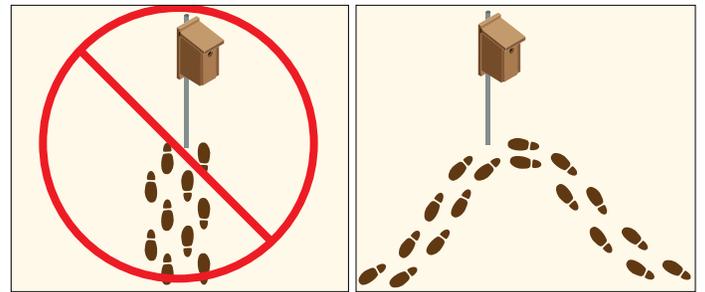
It is important not to startle a bird as you approach the nest; this may cause it to accidentally knock out eggs or young when it flies off. Before approaching the nest, try to see if a parent is sitting on it. Whenever possible, wait a few minutes to see if the bird leaves on its own. This is the ideal time to check a nest. Nest boxes should be tapped first, and then tapped again when open to allow the parent to slip away before you stare directly into the box. If the bird is to be flushed, give it ample time to slip off quietly by tapping branches during your approach. If a sitting bird does not leave before you look in, do not force it off the nest. Remember to keep each visit brief, and wait until you are at least 10 meters from the nest before recording your field notes.

7. Do not handle birds or eggs

Do not handle young birds or eggs without proper permits. Eggs can be easily cracked or small nestlings injured, and both can be chilled if left unattended by parents. Small nestlings are remarkably helpless and may not be able to crawl back into the nest cup if displaced, even in a nest box. Adults should always supervise children monitoring nests. If you wish to band birds or handle the nest contents you need to possess the proper federal and/or state or provincial permits.

8. Don't leave a dead-end trail

Whenever possible, take a different route away from the nest site than the route you took to reach it. Walking to the nest and back leaves a dead-end trail that can lead predators directly to the nest. Make a loop to and from the nest if possible. This is most important for nests that are fewer than eight feet off the ground.



To avoid leaving a dead end trail that may lead predators directly to a nest, approach a nest by one path and leave it by another.

9. Respect private land

If you wish to search private land for nests, first gain permission from the landowner. Explain your purpose; many landowners will probably be interested to know more about what you are doing and what birds are nesting on their property. Treat landowners and their property with respect, and follow any special requests they make.

10. Understand the Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act it is illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued by federal and, in some cases, state agencies.

Nest-Monitoring Risks

Abandonment

If you find a nest with eggs and no parents, verify whether the nest is indeed abandoned. Prior to incubation, birds may leave their eggs unattended for most of the day. During incubation, adults may leave the nest for periods of up to 15 minutes to feed. Although many songbirds begin incubating on the day the last egg is laid or the day before, there are exceptions.



A Tufted Titmouse nest and eggs.

For example, Tree Swallows may wait up to a week to start incubating a clutch of eggs. A nest such as this may only appear to be abandoned.

R e m e m b e r that it is illegal to

remove any materials from an active nest.

Threats of predation, harsh weather, or infestations of insects can cause the parents to leave. Frequent or aggressive disturbances from humans also can cause nest desertion, and care should be taken to eliminate this possibility. Certain species are more prone to deserting nests than others. Also, young breeders are typically more sensitive than experienced pairs, though individual birds vary greatly in the degree to which they will tolerate nest inspection.

Please remember:

- Do not assume a nest is abandoned just because you don't see or hear an adult bird in the vicinity, even for long periods of time.
- Do not try to hand-raise eggs or young that appear abandoned. Raising wild birds is very difficult and illegal without appropriate permits.
- Contact a local wildlife rehabilitator if you find injured birds.

Two-Week Rule

The eggs of most birds will remain viable for up to two weeks after being laid even before they are incubated, so as a rule of thumb, you should wait at least two weeks after the expected hatch date before concluding that a nest is abandoned.

Predation

Nest predation by crows, jays, chipmunks, weasels, squirrels, skunks, raccoons, snakes, small rodents, cats, and birds of prey is a common cause of nest failure. Observers often fear that increased predation may result from the observer leaving a track or scent-trail to nests. However, a two-year investigation by the British Trust for Ornithology showed that nests visited frequently had similar success rates as nests left undisturbed between laying and fledging. Predation in the absence of human involvement has also been demonstrated by searches of completely undisturbed areas late in the season. Such findings are consistent with the normal high annual mortality of songbirds. However, you should still do your best to minimize unwanted attention to the nest.

If you are monitoring nest boxes in predator-prone areas, we recommend outfitting them with predator guards. Common predators of nest boxes include raccoons, snakes, cats, and squirrels. Information on predator guards can be found at our online resource center, www.nestinginfo.org.



Hooded Merganser eggs in a nest box are vulnerable to any predator that can get through the entrance hole.

Tips for Finding and Monitoring Nests

Patience and good observation skills will go a long way toward finding nests. Once you find one, minimize disturbance to the nest site and surrounding area.

Before searching for nests

- Please read and understand the Code of Conduct for Nest Monitoring (page 6).
- Read the NestWatch Protocol for Monitoring Nests (page 12), which specifies when to collect information needed to determine daily nest survival.
- Get certified to monitor nests.
- Print out the Multiple Nest Visits data sheet from our web site to determine what to record in the field.
- Recognize behavioral cues of breeding birds (see page 10).

Practice First

If you are going to monitor an open-cup nest, you should hone your ability to check nest contents with a “walking by” glance. To practice, first create a fake nest (e.g., a pile of grass, a cupcake holder, etc.) and fake eggs (e.g., marbles, rocks, clay balls). Ask a friend to put the nest with fake eggs in a nearby tree or bush, when you are not looking. Then walk the area slowly and, without stopping, try to find the nest and its contents. With practice, you can learn to see all the necessary details during a few seconds as you walk by. Keep your eyes open for details such as recently cracked eggs or the presence of nest parasites.

When to look for nests

Generally in North America, birds nest between March and August. In warmer climates, the nesting season may begin as early as February; in cooler climates nesting may not begin until late May or June.

Because most songbirds feed their young insects, nesting is closely tied to insect abundance. Resident birds, or those that do not migrate in the winter, usually begin nesting earlier than non-resident or migratory birds, which may have traveled great distances to reach their breeding grounds.



An American Robin chick begs for food.

If possible, during fall and winter, look for old nests in trees that have yet to regain their leaves. Many birds will come back to the same nest site year after year.

Where to look

You can find nests in nearly all habitats across the continent. However, NestWatch has created a list of Focal Species that were chosen for their tendency to nest in areas where people also live. The Focal Species (see page 3) include common birds such as American Robin, Eastern Phoebe, Mourning Dove, Tree Swallow, and Eastern, Western, and Mountain bluebirds. For those species that don't nest in cavities or nest boxes, look for clumps of nest material in shrubs and trees, being careful to gently part vegetation and not to dislodge nesting material.

After you locate a nest

The first time you find a nest, note its location carefully so that you can easily find it again later. If you find a nest in a spot that may be difficult to relocate, look around and try to memorize some visual landmarks. We do NOT recommend placing any type of flagging within 20 meters of a nest. Instead, draw a picture in a field notebook, recording compass bearings and distances from landmarks. Record additional information about nest contents on the field data sheet. To keep each visit brief, prepare equipment beforehand

(e.g. data sheets, notebook, camera, and GPS unit). A sturdy stick is worth carrying, and is useful for:

- parting foliage to view a nest
- leaning on to inspect a nest without disturbing the immediate surroundings
- rustling foliage to warn a nesting bird of your approach, enabling it to leave the nest.

Use mirrors or binoculars to monitor nests from a distance

If the nest is too high, you might have to use a mirror to see into it. Attach a small mirror (e.g., a bicycle or mechanic’s mirror) to the end of a pole and position the contents in the reflection.

If a nest is so out of reach that you can’t monitor it safely, you can still collect valuable information by observing activity through binoculars. You may not be able to get an exact count of eggs or young, but you can determine if the nest is active and whether

the parents have eggs or nestlings by observing their behavior.

Be efficient and thorough

Check the nest quickly. On average, nest visits should take less than one minute. Count the eggs/nestlings and then leave the immediate area to record your data. Remember, if you miss a day or can’t get an exact count, it’s okay. Safety of the birds should be your first priority!



NORTHERN CARDINAL EGGS BY T. GREENWOOD

Using a mirror to see a nest that is more than 5 feet off the ground.

Behavioral Cues for Finding Nests

If we listen and observe carefully, we can witness a variety of behavioral cues that birds use to communicate with one another during each phase of the breeding season.

Courtship phase

- Singing males are often trying to attract a mate or defend a breeding territory. This is usually a good indication of nearby nesting.
- Food offering, also known as allofeeding, occurs when a bird (usually the male) feeds or appears to feed another adult bird.
- If you see copulation, females are probably building a nest or laying eggs.



Singing



Food offering



Copulating

- Nudging and preening of one bird by another often accompany courtship and help maintain the pair bond.



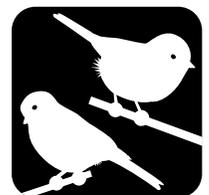
Nudging and preening

Nest building phase

- Not all birds build nests, but for those that do, the nest building stage can be very obvious because adults make frequent flights to the nest site carrying nest material. Female songbirds typically build the nests, so follow females when possible.
- If you observe a bird carrying nest material, try to follow it from a distance to avoid interrupting its flight. This is an ideal time to find a nest because the adult will be making frequent visits to the nest site.
- During nest building, males may follow their mate closely. Called “mate guarding,” this tactic deters the female from mating with other males.



Nest building



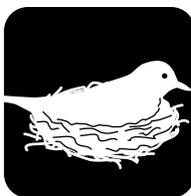
Mate guarding

Egg-laying phase

- This is the most difficult stage for finding nests because the female may visit the nest only once per day, usually in the early morning. However, if you see only the male and you have previously observed nest building, keep watching him. He will probably lead you to the female and, in some cases, will join her as she comes off the nest.

Incubation phase

- Look for birds that suddenly vanish during quick bouts off the nest to forage, followed by long flights back to the nest.
- Listen for birds giving call or chip notes that may alert their mate that they are off the nest. If she chips frantically, you are probably close to the nest. Search quickly and thoroughly, but leave the area if the bird is visibly agitated.
- Look and listen for males that may be either guarding a nest while a female forages or feeding an incubating female.



Nestling phase

- This is the easiest time to find an active nest because both parents make frequent trips to the nest with food and young birds can often be heard begging. If you spot an adult bird with food in its beak, it is probably on its way to a nest with young. Follow the bird at a safe distance of about 20–30 feet to locate the nest.
- In an effort to keep nests clean, parent birds are often seen removing fecal sacs from the nests. Fecal sacs are small deposits of excrement produced by young birds.



Bewick's Wrens hatching.

NestWatch Protocol for Monitoring Nests

Understanding the timing of the nesting cycle makes daily nest visits unnecessary. The protocol described below is intended to gather the most meaningful data without causing unnecessary disturbance to the birds. Although it may be tempting to visit nests more often than suggested, please try to keep disturbances at the nesting area to a minimum.

Nest Building *(one visit, if possible)*

If you are fortunate enough to find an active nest while it is being built, be sure to record the status of the nest on the Multiple Nest Visits data sheet (see page 15 for a sample).

Egg Laying Period *(one or two visits)*

Make at least one visit during egg laying, preferably in the afternoon. If you find a nest with eggs, go back three days later to determine if the number of eggs has changed. This will help determine the first egg date and the egg laying rate. Knowing the first egg date is critically important for our analyses and is easy to determine if you visit during the egg laying period.

For songbirds, the typical laying period lasts between three and eight days, with eggs laid one per day, usually early in the morning. Here is a simple way to determine the first egg date. Suppose you checked a nest on May 10 and it contains two eggs. You visit the same nest again on May 13 and discover

MAY						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

If you monitor nests during egg-laying, you can determine first egg dates for songbirds by counting backward one egg per day.

Quick Guide to NestWatch Protocol

- We recommend 8–10 nest visits spread out over the course of the nesting attempt. As a general rule, if you check nests every 4–5 days, you will be closely following the protocol below.
- If you can't follow the protocol exactly, do your best to visit nests at least three times—once in the beginning, once in the middle, and once at the end of each nest attempt.
- This protocol applies whether you are monitoring nest boxes or nests in natural vegetation.

er four eggs. Counting backward one egg per day, we know the first egg was laid on May 9. The second egg was laid on May 10, the third on May 11, and the fourth and last egg on May 12.

When possible during nest checks, wait for the female to leave the nest rather than flushing her off. Record on your data sheet the number of eggs, if known, along with any adult activity you observed.

Incubation Period *(two visits)*

Make two visits, preferably in the afternoon. We suggest one visit at the middle and one at the end of incubation to determine complete clutch size and whether eggs have been lost. Most songbirds begin incubating on the day before the last egg is laid and will typically incubate eggs for 11 to 14 days. Record the number of eggs, if known, along with any adult activity you observed, on your data sheet.

Hatching Period *(one visit)*

Visit once at or just after hatching to pinpoint the timing of hatching and determine the number of hatched eggs. Most songbird eggs hatch within 24–48 hours of each other. If you see adults carrying food, this is a good sign that eggs have hatched. Check the nest contents and record the number of eggs, observed adult activity, and status of young on your data sheet.

Nestling Period (*two visits*)

Visit once when young are thought to be between four and six days old to determine their development and survivorship. Visit again three or four days later to get an estimate of the number of young likely to fledge.

Do not open nest boxes or disturb nests with fully feathered young, as this can cause premature fledging (see box at right). Once the young are fully feathered, you can check the nest from a distance with binoculars to determine if the parents are still actively feeding the young.



Carolina Wren nestlings.

Typical songbird nesting periods last approximately two to three weeks. On your data sheet, record your observations for number of eggs (if any), observed adult activity, and status of the young on your data sheet.

Fledging Period (*one visit*)

Visit once to determine success or failure of nests. Do not open nest boxes or disturb nests that have fully feathered young, as this can cause premature fledging. Most songbirds fledge within one to two days of each other.

Check the nest from a distance and look around for the adults. If they go to the nest carrying food, the young have not yet fledged. If they go somewhere else, it is likely they are feeding the young in nearby vegetation.

If you are certain the young have fledged, check the nest and make sure it looks intact, i.e., flattened, and in some cases covered in fecal matter. If it appears disheveled or depredated, describe what you see on your data sheet and look for any signs of the nestlings (feathers, body parts, bones) in the area surrounding the nest site.

If you suspect predation has occurred, try to determine the predator by looking around the nest site for clues. If adults are still present, continue monitoring their activity since they may try to nest again. On the data sheet, record the outcome, estimated number of fledged young, and additional comments for the nest attempt on the data sheet.

Premature fledging

Before they are fully feathered and ready to fledge, the young of many species instinctively scatter from the nest when a potential predator approaches. If this happens during a nest check, gather the birds quickly and keep them together (in the dark if possible). Replace them gently but firmly in the nest cup, the smallest on top, and covered with a hand or tissue. Withdraw the cover smoothly after giving time for the nestlings to settle. This is most successful if you can keep yourself out of sight. If they leave again, it's best to let them be and allow the parents to round up the young.

Post-Fledging Period (*one visit*)

Visit the nest one last time after you are certain that all the young have fledged to determine if any unhatched eggs or dead young remain. Record additional comments for the nest attempt on the data sheet.



A recently fledged Eastern Bluebird.

Additional Attempts

Birds that raise more than one brood per season may nest again nearby. If possible, try to keep monitoring nests to the end of the season, July or August. If you find another active nest, please follow the same protocol. Use a separate data sheet for each new nest attempt.



Eastern Screech-Owl chicks, still in their down, peek out of their nest box.

Collecting NestWatch Data in the Field

Collecting data using the Multiple Nest Visits data sheet involves reporting exactly what you see each time you monitor a nest. If you check a nest five times in one season, then you report five visits for that nest. Multiple Nest Visits data provide a chronological record of observations, making it possible to calculate estimates of daily nest survival. These estimates can help identify critical time periods of high or low nest survival.

We need to know the location of the nest, the species, and the contents of the nest when you visit. The more details you can provide, the better we can understand the threats facing breeding birds.



B. PARFITT

Checking nest boxes.

**Contact us at
nestwatch@cornell.edu
If...**

- **If you find a rare bird nesting.**
- **If you find a nest and can't identify the species. Before contacting us, please use a field guide to nests and eggs to determine the host species. If you still can't identify the species, email the NestWatch staff with the following information: the precise location, habitat, description of the nest, and nest contents.**
- **If you can photograph the nest without disturbing it, please include a photo attachment. You may want to hold a quarter next to the nest for scale.**

Data Collection Guidelines

- Record location, habitat, and nest observations on the Multiple Nest Visits data sheet.
- If you need more space on the data sheet to record nest visits, begin another data sheet and include the nest site name.
- If the same species uses exactly the same location more than once in the same season, use a separate data sheet but specify that the location is identical to a previous attempt.
- Report all active nests (i.e., with at least one egg or those actively under construction) that you visit, even if they fail to fledge young. We need your help in learning about why nesting attempts fail as much as why they are successful.
- If you are certain that eggs or young are present, but you can't get an exact count, record "X" to indicate at least one egg or young is present, but exact number is unknown.
- If nest contents are not visible, enter "U" for unknown.
- We recommend making 8–10 visits for each nest attempt, if possible.
- For meaningful reporting, a minimum of three visits is encouraged.
- Report each visit to the online database as the season progresses or at the end of the season, whichever you prefer.

Multiple Nest Visits Data Sheet

This form is for your records — use it to locate and describe your nest site and record up to 10 visits to a nest. Use a separate form for each nest monitored and each new nest attempt. See keys on the next page for explanation of codes and fields. If response is “Other” enter “OT”; for “Unknown” enter “U.”

Year 2008 Species Tree Swallow

1. Nest Site Location (see key on next page)

Nest Site Name: Box 1A

Nest Location (nearest street address OR lat/long):
123 Hickory Street

OR

Latitude N _____

Longitude W - _____

Zip Code 14850

2. Description (see key on next page)

Nest is located (circle one): IN ON UNDER

Substrate Nest box

Habitat within one meter Human modified

Habitat within 100 meters Human modified

Habitat modifier backyard

Elevation (specify ft. or m.) 550 ft.

Height above ground (ft. or m.) 4.8 ft.

Cavity orientation NE

Cavity opening width (specify in. or cm.) 1.5 in.

3. BREEDING DATA *For columns C, D, E, and J, enter “X” if eggs or young are present, but exact number is unknown. Enter “U” for unknown.

Visits	Date/Time		Host Species*			Status/Activity Codes			Details (Optional)			
	A. Month / Day (1-12) / (1-31)	B. Time (am/pm)	C.* # of Eggs	D.* # Live Young	E.* # Dead Young	F. Nest Status	G. Adult Activity	H. Young Status	I. Mgmt. Activity	J. Cowbird Evidence	K. Observer Initials	L. Comments below
Ex	5 / 4	4 pm	0	0	0	CN	AA	—	No	IE 0 0	MS	
1	5 / 8	2 pm	2	0	0	CN	VA	—	No	0 0 0	MS	
2	5 / 12	3 pm	5	0	0	CN	AA	—	No	0 0 0	MS	
3	5 / 17	4 pm	5	0	0	CN	VA	—	No	0 0 0	MS	
4	5 / 22	1 pm	X	X	0	CN	RA	—	No	0 0 0	MS	
5	5 / 26	4 pm	1	4	0	CN	VA	HY	No	0 0 0	MS	
6	6 / 1	5 pm	1	4	0	CN	VA	DY	No	0 0 0	MS	
7	6 / 8	4 pm	X	X	0	CN	FA	FY	No	0 0 0	MS	
8	6 / 6	2 pm	1	0	0	CN	VA	YY	No	0 0 0	MS	
9	6 / 20	6 pm	1	0	0	CN	NO	NO	EM	0 0 0	MS	
10	/											

4. NEST ATTEMPT SUMMARY Fill in the information below after the nest attempt is complete.

IMPORTANT DATES

First Egg Date	<u>5/7/08</u>
Estimated Hatch Date	<u>5/25/08</u>
Estimated Fledge Date	<u>unknown</u>

TOTALS

No. of visits	Clutch size	No. Unhatched eggs	No. live young	No. fledged
<u>9</u>	<u>5</u>	<u>1</u>	<u>4</u>	<u>4</u>

COMMENTS: May 22- I could not see because the female remained on the nest during my nest check.
JUNE 8 - Checked box from a distance, but could tell young still in the nest.

 Site Name Box 1A

PLEASE TRANSFER DATA ONLINE AT www.nestwatch.org. THANK YOU!

Explanation of Codes for Multiple Nest Visit Data Sheet

1. Nest Site Location

Each time you visit the nest, record the date and time and any pertinent information about the nest contents and progress of the nesting attempt.

Year—Indicate the four-digit year in which this nest attempt occurred. If the nest attempt spans December and January, indicate the year that the attempt began.

Species—Please take care to identify the host species correctly. Consult a field guide or contact the NestWatch staff if necessary.

Nest Site Name—Use a unique name or number for each nest site you monitor. This will help you manage your nest sites online.

Nest Location—Enter information about the nest location either by providing the closest street address, city, and state *or* by entering latitude and longitude (decimal degrees or degrees, minutes, seconds) which can be found via our new online Google maps tool.

ZIP Code—Provide a ZIP or postal code where the nest is located.

2. Nest Site Description

Please provide as much information about each nest's site description and habitat as possible. You only need to do this once for each nest, but you can edit this information online if the description changes.

Nest Substrate—This describes the position of the nest (in, on, or under) relative to the surface on which the nest is built. For example, it can be in a nest box, on a tree branch, under a bridge, etc. Note: this is a required field in the online database. See page 20 for images of nest substrate types.

Immediate Habitat Within One Meter—This refers to the immediate habitat within one meter of where the nest resides. Draw an imaginary circle (1 meter in diameter) around the nest and determine the habitat type. See page 20 for habitat descriptions and images.

Dominant Habitat Within 100 meters—This is the dominant landscape type within 100 meters of the

nest, and the likely area where the bird is foraging. Scan the area surrounding the nest (an area about the size of a football field) and determine which habitat type is most dominant. See page 20 for habitat descriptions and images.

Habitat Modifier—If you selected “human modified” for the immediate or dominant habitat type, please describe the type of modification (e.g., yard, airport, campground, power line, etc.). See page 20 for habitat descriptions and images.

Elevation—This is the measure of altitude above sea level. Elevation should be rounded to nearest whole meter or foot.

Height Above Ground—Measure the height of the bottom of the nest from the ground. For nests on the ground, please record zero. For nest boxes, record the height to the bottom of the entrance hole. Your measurements can be rounded to the nearest 100th (2 decimal places). This facilitates recording inches e.g., 10 ft. 1 inch = 10.08 ft. In this case 1/12th of a foot can be calculated as follows: 1 divided by 12 = 0.08.

Cavity Orientation—For a natural cavity or nest box, record the direction (N, S, E, W, NE, NW, SE, SW) that a nest hole entrance faces, if known.

Cavity Width—For a natural cavity or nest box, record the diameter of the entrance to the nest. Your measurements can be rounded to the nearest 1000th (3 decimal places). This facilitates recording 1/8ths of inches, e.g. 2 1/8 in = 2.125 in. In this case 1/8th of an inch can be calculated as follows: 1 divided by 8 = 0.125.

You can print out the data sheet from www.nestwatch.org. Use a separate data sheet for each nest attempt.

Exact Counts of Eggs or Young

If you are certain that eggs or young are present, but you can't get an exact count, record "X" to indicate that at least one egg or young is present, but that the exact number is unknown. If nest contents are not visible, enter "U" for unknown.

3. Breeding Data

The letters below correspond to the column codes on the Multiple Nest Visits data sheet.

A. Date — Enter the month and day each time the nest was monitored.

B. Time — Record the approximate time that a nest was monitored; round the time to the nearest hour.

Host Species (columns C–E)

Provide information about the number of eggs and young for the species that built the nest.

C. # of Eggs — The highest number of host eggs counted (not parasitic eggs) for each nest visit.

D. # of Live Young — The highest number of host live young counted for each nest visit.

E. # of Dead Young — The highest number of dead young (not including young of Cowbirds) for each nest visit.

Report All Nests

Be sure to report all active nests you visit, even if they fail to fledge young. We need your help in learning about why nesting attempts fail as much as why they are successful.



S. J. MARSH

A Bald Eagle on its nest.

Status/Activity Codes (columns F–I)

Describe the status of the nests, adult activity, and stage of development of the young birds. Additional information can be included in the comments section.

F. Nest Status — Choose a code (see page 23) to describe the condition of the nest every time you visit.

G. Adult Activity — Choose a code (see page 23) to describe the activity of adults seen or heard near the nest.

H. Young Status — Choose a code (see page 24) to describe the developmental stage of the young birds each time you visit the nest.

I. Management Activity — Choose a code (see page 24) to describe any action taken at the nest (such as banding young or cleaning a nest box) during the visit.

Details, Optional (columns J–L)

Additional information regarding cowbird parasitism and observers can be included here.

J. Cowbird Evidence — Cowbirds lay their eggs in the nests of other birds (see next page). Please provide information about the number of cowbird eggs and number of live and dead cowbird young (if any).

K. Observer Initials — Optional, but helpful if you are tracking who did the monitoring.

L. Comments — Provide additional information about a nest visit or the outcome of a nest attempt.

The Last Nest Visit

It is critically important that you try to monitor each nest attempt through to the end. Even if you can't monitor as often as the protocol suggests, you should try to visit at the end of each nesting attempt so that we may know the outcome for each nest.

Brood Parasites: Brown-headed Cowbirds



M. WHITMAN

*Brown-headed Cowbird egg
in a Veery nest.*

Brown-headed Cowbirds are brood parasites, that is, they do not build nests, incubate eggs, and care for young. Instead, the female deposits as many as 40 eggs per year in nests that belong to other bird species. More than 100 other species have provided host nests for cowbird eggs. The female cowbird finds these nests by watching patiently from an observation post. She typically chooses a nest with eggs smaller than her own and lays a single egg quickly at dawn once the host has also started laying eggs. Brown-headed Cowbird young do not evict their nest-mates, although the female cowbird may remove and sometimes eat eggs from the host nest. However, cowbird nestlings typically out-compete their smaller nest mates for food.



J. HOWLE

*A female Brown-headed
Cowbird.*

4. Summarizing a Nest Attempt

In addition to reporting Multiple Nest Visits, participants should summarize each nest attempt. A Nest Summary provides a snapshot of the timing of key events (e.g., first egg dates, hatch date, fledge date) and numbers of eggs, young, and fledglings for each nest attempt.

Nest Summaries

Nest Summaries are optional but the data provided online can be exported into Excel spreadsheets or as a .pdf document for your records.

Important Dates

Egg Laying Start Date—Estimate the month and day that the female laid the first egg.

Hatch Date—Estimate the month and day that the first egg hatched.

Fledging Start Date—Estimate the month and day that the first young fledged from this nest.

Totals

Total Visits to this Nest Attempt—Record the total number of times you actively checked this nest. Estimates are okay.

Clutch Size—Record the maximum number of host eggs counted in the nest.

Number of Unhatched Eggs—Record the maximum number of eggs that failed to hatch for this nest attempt.

Total Number of Young—Record the number of live young of host species in the nest.

Number of Fledged Young—Record total number of young that fledged (left the nest) for this nest attempt.

Submitting Data Online at www.nestwatch.org

- If you have previously created a user name for The Birdhouse Network, NestWatch, eBird or for any other online project with the Cornell Lab of Ornithology, please enter your existing user name and password. You can request a user name/password reminder email by clicking on “Forgot your user name or password?” on our web site at www.nestwatch.org. If you haven’t participated in an online Lab project before, you should create a new account.
- After logging in to your NestWatch account, click the “My Nests” tab. Complete instructions are provided online for entering your data.
- You can edit or delete information for up to one year after it is entered. Once the data are in our system for more than one year, you will need to contact us to change any historic data.
- You can begin entering data online any time after you begin monitoring. There is no need to wait until the end of the nesting season.
- Be sure to check the online Instructions section for in-depth tutorials and Frequently Asked Questions about data entry.

If You Have Historic Data

If you have historic data to enter, please email us at nestwatch@cornell.edu.

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Appendices

APPENDIX A: Nest Substrate Types

Images below represent the types of surfaces that nests may be **in, on, or under**



Snag or dead tree cavity



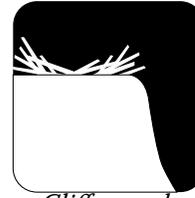
Live tree cavity



Nest box or birdhouse



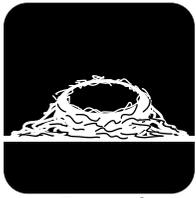
Building or dwelling



Cliff or rock



Post, pole, or platform



Ground



Floating vegetation



Live tree branch



Dead tree branch



Bush, shrub, or cattails



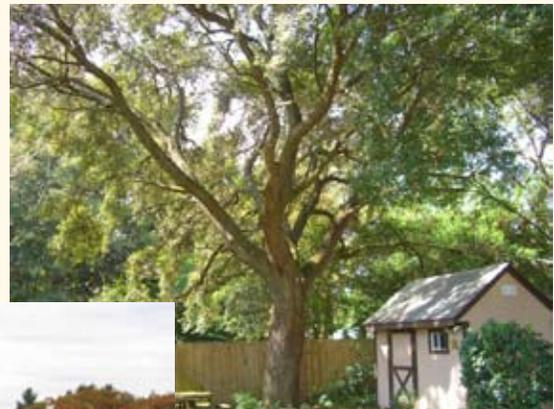
Vine/tangle

APPENDIX B: Habitat Description Codes

When describing your nest site, enter descriptions for immediate habitat type within 1 meter of the nest and for the dominant habitat type within 100 meters of the nest. If habitat type is human modified, describe the type of modification from the list below.

Human Modified (habitats include):

- Yards and residential areas
- Public park/green space
- Roadside
- Golf course
- Landfill/gravel pit/strip mine
- Cemetery
- Industrial/commercial center area
- Utility corridor
- School/campus/church/hospital
- Airport
- Campground
- Christmas tree farm
- Orchard/vineyard
- Recently clear cut area
- Recently burned area



S. WRIGHT

Yards and residential areas



MICHAEL BRADFORD

Golf course

Agricultural Area

Includes cropland, pasture, and tree plantations—vegetative cover dedicated to the systematic production of food, feed, fiber, livestock, and other goods.



V. PILLAR

Agricultural

Woodland Forest

Dominated by deciduous and/or coniferous trees, generally with a distinct canopy, though it can have some open areas.



J. FAZIER

Woodland

Natural Grassland/Prairie

Grassland and savanna including all native prairies, aspen parklands, and other natural grasslands. Precipitation is highly variable but usually very seasonal. Areas are dominated by grasses and forbs, but may include scattered shrubs or trees.



T. LINDENBAUM

Grassland

Chaparral/Shrubland

Chaparral and shrubland are characterized by long, hot, dry summers and cool, wet winters. Although the habitat is globally rare, it features an extraordinary biodiversity of animal and plant species uniquely adapted to the stressful conditions of long, hot summers with little rain. Most plants are dependent on fire disturbance for their persistence.



D. BARON

Chaparral

Desert Scrub

Deserts and xeric shrubland vary greatly in the amount of annual rainfall they receive (usually less than 250 cm or 10 inches) and in temperature (some become quite cold in winter), but evaporation typically exceeds rainfall in these regions. A rich array of woody-stemmed shrub and plant communities can occur under these extreme conditions, many of which are transitory, reflecting the seasonality of available water.



L. DUGGER

Desert scrub

Freshwater

Freshwater habitats include lakes, rivers, creeks, streams and some marshes, swamps, and ponds.



R. BOURN

Lake

Saltwater

Saltwater habitats have significant amounts of dissolved salts including oceans, tidal flats, and some bays, marshes, swamps, and ponds.



S. MOUTRIENUS

Saltwater marsh

Tundra

Alpine tundra can occur at high altitude (above sub-alpine forest treeline) at any latitude. Alpine tundra lacks trees, but does not usually have permafrost, and alpine soils are generally better drained than arctic permafrost soils.

Arctic tundra occurs in the far Northern Hemisphere and usually refers only to the areas where the subsoil is permanently frozen for much of the year, making it impossible for trees to grow. Bare and sometimes rocky land can only support low-growing plants such as mosses, heaths, and lichen. Rising summer temperatures melt the top permafrost layer, but because the ground below remains frozen, seasonal lakes, bogs, and marshes form. Precipitation (falling mostly as snow) is desert-like, with only about 15–25 cm (6–10 inches) annually.



W. SEEMAN

Tundra

Beach

Sand, gravel, pebbles, and shells along the shoreline of a body of water.



E. MASSENER

Beach

APPENDIX C: Status/Activity Codes

Nest Status Codes (column F)

The codes below correspond to nest status codes on the Multiple Nest Visits data sheet.

NO = No nest. Cavity, nest box, or platform with no nest present or for species that do not build any nest.

AN = Another bird nest, same site. If you see a new bird nest built on top of an old one from the current season, treat this as a new nest attempt and begin a new form. Describe additional details in the comments section.

CN = Complete nest. Nest appears structurally complete, with an obvious nest cup.



Complete nest

DN = Damaged nest. Nest appears disheveled and/or torn apart.



Damaged nest

FN = Flattened nest with fecal matter. This is evidence that nestlings were present—their weight flattened the nest and they left fecal droppings behind.



Flattened nest

IN = Incomplete nest. Evidence of nesting material; nest building appears to be in process, but not quite finished.



Incomplete nest

NN = Non-avian nest Evidence of a nest that was not built by a bird (e.g., wasp, mouse, or squirrel) in nest boxes or cavities. Describe details in the comments section.

RN = Nest removed, remover unknown. An active nest disappears for an unknown reason. Do not use this code if you know the reason for the removal of the nest (i.e., monitor, predator, blown out of tree, etc.).

Adult Activity Codes (column G)

The codes below correspond to adult activity status on the Multiple Nest Visits data sheet.

NO = No adults seen or heard. During your nest check, you did not see or hear any adults near the nest.

AA = At/on, then flushed from nest. During a nest check, an adult flies out from the vicinity of the nest or nest box.

BA = Building nest or carrying nest material. An adult carries nest material to the nest site or sits on the nest while building it.

DA = Dead adult(s). Dead adult bird found at or near the nest site.

FA = Feeding young at nest. A parent carries food to the nest or drops food into the open mouths of nestlings.

RA = Remained on the nest. During a nest check, the adult remained on the nest or in the nest box.

VA = Vicinity of the nest. During a nest check, parents are seen or heard in the vicinity of the nest or nest box.

Young Status Codes (column H)

The codes below correspond to young status codes on the Multiple Nest Visits data sheet.

NO = No young, presumed dead.

FY = Fully feathered young.

The tail feathers are short and most body feathers are visible, little or no skin visible. Nestlings are well feathered and look ready to leave the nest (whether or not they can fly).



Fully feathered young

HY = Hatching young. A chick is emerging or has just emerged from an egg.



Hatching young

NY = Naked young. Altricial nestlings with little or no down or feathers.



Naked young

PY = Partially feathered.

Outermost flight feathers on the wing are emerging, encased within a pointed sheath, OR feathers have broken through the sheath and have a stubby brush-like appearance, OR the flight feathers appear fully grown but tail feathers and body feathers are not yet complete. Some skin is visible.



Partially feathered

VY = Vocal young, heard only. Young in the nest were heard but not seen.

YY = Young presumed or known to have fledged. You have strong evidence that the young have fledged (left) the nest. If known, record the date when the first young left the nest.

Management Codes (column I)

The codes below correspond to management status codes on the Multiple Nest Visits data sheet.

NO = No management activity. No human management activities were conducted for this visit.

AM = Avian competitor nest/eggs/young removed. Indicates that you are discouraging the nesting attempts of House Sparrows or European Starlings, two nonnative species that are not federally protected under the Migratory Bird Treaty Act.

BM = Banded adults or young at nest. Indicates that you banded adults or young at this nest. Note: banding birds requires a special permit.

EM = Unhatched host eggs removed. Indicates that you removed host eggs that never hatched.

NM = Nest box management. Activities include cleaning out nest boxes, plugging or unplugging nest boxes, or removing inactive nest of the host species from a nest box.

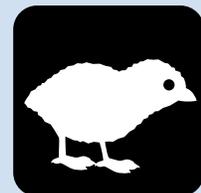
PM = Pest management (e.g., wasps, ants, mice, etc.). Non-avian competitors such as wasp nests or other pests were removed. Please remember to use nontoxic pest control methods.

Altricial vs. Precocial Young

Most songbirds are altricial, i.e., nestlings are generally helpless, immobile, naked, and blind with eyes closed after hatching. The young of precocial young such as geese, are covered in down, can move around, and have their eyes open after hatching.



Altricial young at hatching



Precocial young at hatching

APPENDIX D: Overview of the Nesting Cycle

More than 700 bird species breed in North America, and the variations in their behaviors are fascinating and complex. Different species find mates, build nests, lay eggs, and raise their young in incredibly different ways. This overview is a generalization of avian nesting cycles. For more information about nesting cycles of individual birds, please visit our online resource center at www.nestinginfo.org.

Finding a place to breed



A male Song Sparrow sings to establish his territory.

Throughout the year, day length is the cue that tells most birds what season it is, triggering physiological changes such as the readiness to migrate or to breed. Most birds, especially those in temperate regions, must time their breeding activities so they will be feeding their nestlings when food is most abundant.

Well before nestlings arrive, however, birds need to select a breeding territory. Resident species may keep a territory throughout the winter or look for a new one in spring. Migratory birds begin looking for and defending a territory or nest site as soon as they arrive in spring. Good territories provide nest sites, reliable food sources, and protection from predators.

Choosing a mate

While territories are being claimed, males and females also try to attract mates. Males often try to advertise their ability and their vigor by exhibiting bright breeding plumage and by singing, drumming, or calling.

Most bird species form a pair bond with the male and female staying together throughout the breeding season. It was once thought that nearly 90 percent of all birds were monogamous, but new evidence using DNA profiling has revealed that strict

monogamy is not so common. Many birds may have a single social mate who helps raise the young, but they may actually have mated with additional partners. DNA analysis shows that even birds that presumably “mate for life,” such as bluebirds and Bald Eagles, may not always be faithful. The nestlings in one nest actually may have been fathered by different males!



A male Greater Sage Grouse during a courtship display.

Some birds are polygamous, forming social bonds with more than one bird of the opposite sex. Sometimes males have more than one mate at the same time (polygyny). Less commonly, females may have social bonds with more than one male (polyandry).

In most bird species, the female chooses her mate. This is one reason why males are often the “showier” or more colorful sex. Besides physical appearance, females also may assess factors such as nest site quality, vocal behavior, age, courtship displays, and the male’s ability to provide food resources.

Nest building

Nests provide a safe place for the eggs and young. Bird nests are extremely diverse, although each species typically has a characteristic nest style. Some birds do not make a nest and simply lay eggs in a scrape in the ground or other substrate. Other birds may make nests from natu-



An Eastern Bluebird brings nest materials to its chosen nest box.

ral materials such as grasses, leaves, mud, lichen, fur, and dung, or man-made materials such as paper, plastic, trash, yarn, and even barbed wire! Nests can be found almost anywhere—on the ground, in trees, in burrows, on the sides of cliffs, in and/or on man-made structures, etc. Females typically build the nest, but sometimes both parents or just the male will build it.

Copulation and egg formation

During the breeding season, hormonal changes cause the internal testes of males to swell to more than 1,000 times their normal size, and the ovaries and oviduct of females to increase in size in preparation for egg fertilization



American Kestrels mating.

and egg development. During copulation, the male's cloaca contacts and ejects sperm into the cloaca of the female. The sperm travel to the oviduct where they can be stored for long periods in sperm storage tubules. If all goes well, the sperm penetrate through the wall of the ovum (egg) and fertilization takes place. During the first stage of embryonic development, known as the blastocyst stage, the egg shell develops. Ovulation and laying take about 24 hours, so females produce at most a single egg per day.

Egg laying



Tree Swallow eggs and nest.

two or three eggs. Waterfowl such as Wood Ducks can lay up to 15 eggs in one nesting attempt. Clutch size can also vary widely within a species depend-

The number of eggs a female lays in one nesting attempt (also known as clutch size) varies widely depending on the species. For example, many tropical birds have clutches of only

ing on food and calcium availability, latitude, age of female, seasonal timing, weather, and time of year. The size, shape, color, and texture of bird eggs are also extremely variable.

Incubation

Birds incubate their eggs to keep them at the proper temperature to ensure normal development. Female songbirds usually begin incubation after they have finished laying all the eggs so that they will hatch at approximately the same time. Other birds, such as herons, cranes, cormorants, and raptors (eagles, hawks, and owls) begin incubating as soon as the first egg is laid, and the eggs may hatch on different days. In some species both the male and female incubate eggs. Incubation time varies depending on the species, but typically, the larger the bird, the longer the incubation period.



A female hummingbird incubates her eggs.

Hatching

Songbirds and most seabirds have altricial young — the newly hatched birds are blind, naked, and helpless. They remain in the nest where the parent can feed them and brood them,



Tree Swallows hatching.

sitting on them to keep them warm. Immediately after hatching, altricial birds can do little more than open their mouths to beg for food. Their mouths are often very bright and patterned. For a long time, scientists thought this helped guide parents to place food; it may also provide information on chick identity, health, and quality.

Unlike altricial birds, precocial birds such as ducks and many shorebirds are born fully feathered, mobile, and with eyes open. Incubation periods are

longer for precocial birds than altricial birds, allowing for increased embryonic development in the egg, and therefore they have enhanced motor and sensory functions at hatching.

Feeding the young

For the first week of life, most altricial birds cannot control their own body temperature—similar to reptiles and other cold-blooded animals—and must be constantly brooded (kept warm) by the parents. Usually, by the end of the first week, their eyes are open and their feathers are beginning to emerge. During these first 10 days, nestlings experience remarkable growth—some are able to double their body weight several times!

To keep up with demand, parents must supply food for themselves and their young. This is an extremely dangerous time for the parents who are constantly foraging for food, and for the young, whose noisy cries for food may attract predators. After two to three weeks, most songbirds are usually ready to leave the nest. Other birds, such as birds of prey, may stay in the nest for as long as 8 to 10 weeks.

In contrast, precocial birds such as ducks and many shorebirds spend hardly any time in the nest and are often seen wandering in search of food alongside their parents hours after hatching. Most precocial birds gain the ability to fly within a few weeks to a few months after hatching.



A Clark's Grebe carries its precocial chick safely on its back only minutes after hatching.

Leaving the nest

After leaving the nest, or fledging, the young birds typically remain close to parents for a short period of time. During this time, young birds must learn to survive on their own and are very vulnerable to predators and starvation. Most birds nest only once per year, but some species can nest up to four or even five times in one breeding season.



A pair of Tree Swallow nestlings prepare to fledge.



A female Yellow Warbler delivers a meal to her nestlings.

Surviving on Their Own

After fledging the nest, young birds (juveniles) are faced with surviving on their own. The first year is the toughest, as evidenced by the fact that in nearly all birds species, more than half of first year birds die. For birds that do make it to adulthood however, the odds of surviving another year improve greatly.



A juvenile Bald Eagle learns to survive on its own.

T. JACOBSON

K. A. SMITH

C. GARFIS

T. DE GOUTIERE

APPENDIX E: Online Resources

NestWatch

www.nestwatch.org

Nestwatcher's Resource Center

www.nestinginfo.org

NestCams

www.nestcams.org

Cornell Lab of Ornithology

www.birds.cornell.edu

All About Birds

www.birds.cornell.edu/AllAboutBirds

Birds of North America Online

www.bna.birds.cornell.edu/bna

Cornell Citizen Science

www.birds.cornell.edu/LabPrograms/CitSci

Smithsonian Migratory Bird Center

www.nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/

North Carolina Museum of Natural Sciences at Prairie Ridge

www.naturalsciences.org/prairieridge/

Urban Ecology Center

www.urbanecologycenter.org

Lee & Rose Warner Nature Center

www.warnernaturecenter.org



Need more help?
As always, you can contact us at
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