

Listening to Nature's Divas

Research reveals that female songbirds commonly sing. Find out how you can help make their voices heard.

magine stepping into your backyard one morning in spring to find a Song Sparrow singing persistently while vigorously chasing a second Song Sparrow whenever it comes near. What is going on? Most observers would confidently conclude that they were watching a male bird stake his territorial claim.

If you were Margaret Morse Nice, however, you would not have made this assumption. Instead, you would have looked closely before drawing any conclusions. In fact, the pioneering ornithologist described this exact observation in her 1943 classic, *Studies in the Life History of the Song Sparrow*, and because she was observing a color-banded population of birds, she knew that the singing bird was a female she had labeled K56. Nice reported that this female Song Sparrow sang loudly and persistently between February

26 and March 25, 1932. It might have been tempting to label K56's behavior as anomalous, but K56 was one of several female Song Sparrows that Nice recorded singing vigorously.

What were these females doing? Were they exhibiting abnormal, "male-like" behavior? Our view is that those birds were exhibiting perfectly appropriate "female-like" behavior. We now know that female birds of many species regularly sing. So ornithologists and birders must stop assuming that a singing bird is a male. Instead, we need to start asking, "Was that singing bird a male or a female?"

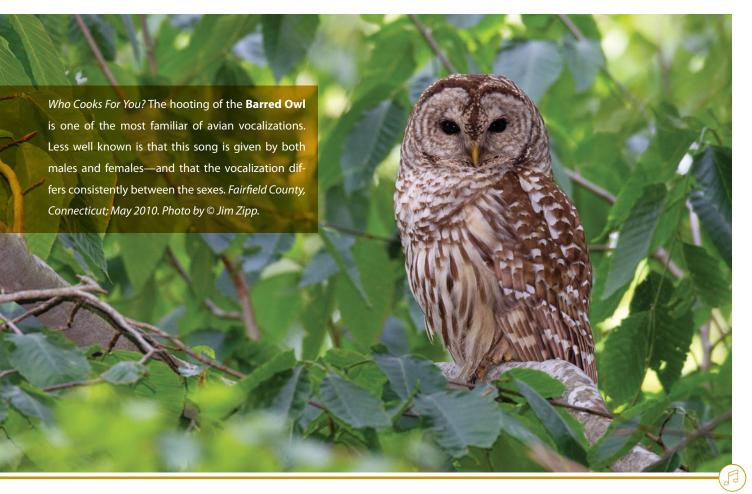
In the ABA Area, we have at least 120 songbird species in which females are known to sing. That's close to half of all common oscines in North America north of Mexico, and that number is surely an underestimate because of the pervasive assumption that only males sing.

The diversity of female song is astounding. In some North American species, females sing frequently, while in others females sing only occasionally. In

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some species, female song sounds like male song, while in others it is entirely distinct. Moreover, researchers now have good evidence that song likely existed in the female ancestors of all songbirds (see tinyurl.com/Odom-et-al). This means that, among species in which males sing but females do not, female song is absent because females in some lineages stopped singing, not because only male ancestors started singing. So, to understand how songbirds got their sweet songs in the first place, we have to study song in both males and females.

Researchers are working to reveal how and why songbirds of both sexes developed their diverse and intricate songs, but we're struggling. We need more data—especially observational reports and recordings of female song. Because female song is simply not described for most species, we lack a good understanding of it. To address this problem, we are calling on everyone with an interest in bird song to help us document this understudied behavior.

Some Background: He Sings, She Sings

Among North American songbirds, there is no question that, in many species, males sing more than females, and this pat-

tern holds across most temperate-zone regions of the world. Nevertheless, there has been a longstanding recognition that female song is present and highly functional in many species worldwide. Margaret Morse Nice named over 50 species with female song in her 1943 monograph, and she suggested that the ancestor of all modern bird species likely had both singing males and singing females—a hypothesis that took 70 years to confirm. Ideas about the evolution and importance of female song are not new, but they have been ignored for far too long.

Across the globe, female song is most common in tropical and subtropical areas. This pattern likely exists due to both evolutionary history and the natural history of individual species. We know that female song is ancestral in songbirds, and many of the oldest lineages within this group live in the tropics and subtropics. Additionally, tropical species are frequently non-migratory and monogamous, creating a situation in which males and females have similar patterns of behavior throughout the year. When males and females have similar territorial and breeding biology, they seem to more often retain the ancestral trait of song in both sexes. (On an evolutionarily related note, they also frequently look alike.) Males and females



in many of these species use song in similar ways. For example, both sexes of Australian Magpie-Larks sing to defend territories, often combining their songs into a "duet." Males and females of many Neotropical wren species also sing duets, with the partners using song to announce their presence and involvement in the social partnership. Among species in which females do more of the territorial defense than males, we even see a shift toward more frequent and more elaborate female song. In the Stripe-headed Sparrow of Central America, for example, females typically lead the charge against intruders and sing more aggressively than males. And in pairs of Venezuelan Troupials, females also take a dominant role, producing most of the songs sung during the day.

In the ABA Area, some of the more well-known female singers include Northern Cardinals and House Wrens, but these are not the only common backyard divas. Song Sparrow females sing, as we have noted, and so do the females of certain species of sparrows, chickadees, blackbirds, orioles, kinglets, grosbeaks, tanagers, and others. For some of these groups, such as cardinals, orioles, blackbirds, and tanagers, observations of female song are relatively easy to make because males and females have distinctive plumage. It can be much more difficult to identify female song in monomorphic species in which the sexes look alike. Many of the existing reports and recordings of female song in monomorphic species come from researchers studying color-banded populations, as Margaret Morse Nice did. Such studies have revealed that female Black-capped Chickadees sing a fee-beeee song like that of their male partners, and that some Dark-eyed Junco females sing a song similar in form to male song.

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Our research projects have also revealed variation in female song behavior: Lauryn is studying a colorbanded population of Canyon Wrens to investigate why females sing a unique song type not produced by males, and Karan is studying male and female song in a color-banded population of Venezuelan Troupials in Puerto Rico. Karan's work has shown that females sing more day songs than males in this species. Of course, most birds in the world are not conveniently color-banded, so in practice it is challenging to identify the sex of a singing bird in a monomorphic species. Knowing that so many females do sing, however, makes us wonder how many female troubadours are going unrecognized. How often is female song present in monomorphic species but mistakenly recorded and labeled as male song?

A Clarification: When is a Song a Song?

Avian vocalizations are often classified as either "songs" or "calls." It is generally agreed that, in most bird species, males and females produce similar types and numbers of calls, which usually have consistent structure and function across individuals. Examples include stereotyped alarm calls, begging calls, and contact calls. In contrast, songs are more variable and more difficult to define. Most definitions recognize that songs are typically longer and more complex (and perhaps more melodious) than calls, but if you were to ask 10 different ornithologists to define bird "song," you would likely get 10 different answers (see tinyurl.com/Spector-Bird-Song). Some might say that songs are the learned vocalizations of songbirds within the group of oscine passerines. Others might say that songs are the broadcast vocalizations given by males when defending a territory or attracting a mate. This first definition, however, doesn't recognize the fascinating complex vocalizations given by non-songbirds, and the second excludes females.

For our purposes of studying female and male song, we generally define song as any long, complex vocalization given by birds, especially during resource defense or mate-attraction situations. This definition might sound overly vague, but it allows us to study singing behavior across all kinds of birds without biasing our thinking regarding what song "should" sound like. This definition also separates songs from calls in a way that encourages investigation of the more varied and intriguingly complex vocalizations of birds.

As field biologists, both of us have personal ex-



perience studying a wide variety of songs given by male and female birds, including some nontraditional songs. Lauryn spent five years studying California Towhees in Carmel Valley, California. In this species, males establish a territory and begin to sing a mate-attraction song that sounds a bit like the repeated tink tink tink of a spoon quickly tapping a tin cup. Once that male finds a mate, he stops singing this song entirely and his most frequently given vocalizations become a quick tink call and a "squeal" sound. His mate never sings the tin cup song, but gives both of the other two vocalizations, and whenever one of them begins the squeal sound, the second joins it to form a duet. This squeal duet might not be classified as a typical song by some observers, but it offers an interesting example of a complex vocalization that can provide insight into how partners communicate. Lauryn's research showed that pairs of towhees mate for life and use these squeal duets to coordinate behaviors that require teamwork, such as cooperatively defending a territory or working together to feed chicks.

Resources for Researching and Observing Female Song

INFORMATION AND COMMUNITY:

- Website: femalebirdsong.org
- Xeno-Canto Facebook group: facebook.com/xenocanto
- · Macaulay Library Facebook group: facebook.com/macaulaylibrary
- Birds of North American Online: birdsna.org

REPORTING OBSERVATIONS OF FEMALE SONG:

- · eBird: ebird.org
- iNaturalist: inaturalist.org
- · Observation.org: observation.org

ARCHIVING RECORDINGS OF FEMALE SONG:

- eBird/Macaulay Library media upload tool: ebird.org
- Xeno-Canto: xeno-canto.org

INCLUDE WITH YOUR OBSERVATIONS AND RECORDINGS:

- · Sex of the bird
- How you determined the sex of the bird
- The phrase: "Contributed for the female bird song project: femalebirdsong.org"



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Karan has also conducted in-depth fieldwork on a species with atypical female song behavior, the Barred Owl. Some might say that Barred Owls do not "sing" because they do not learn their calls. However, both female and male Barred Owls produce a range of extravagant, sexually distinct sounds. The difference between female and male Barred Owl calls can be distinguished even by the untrained ear: the male gives a truncated hoo-ah, whereas the female boasts an emphatic, higher-pitched hoo-ahhhhh at the end of her calls. Moreover, female and male Barred Owls each play their own part in a boisterous combination of hoots and cackles, which form a duet. Unbeknownst to many a startled camper, the cackling "gurgle" calls in this duet are carried out by the male, while the female maintains the bass line with a consistent series of low hoots.

Studies like ours, along with the excellent research of our colleagues around the world, have provided insight into female song form and function in many species. The diversity of female singing behaviors in a few groups points to the importance of documenting female song more widely. Our next challenge is to tackle big questions about how female song evolves and varies across a taxonomic and geographic breadth of species.

How to Participate: Get Your Recorders Ready!

For all of us who study female song, the major barrier to conducting broadscale research is a lack of data regarding the prevalence, form, and function of complex female vocalizations. We believe that the best way to overcome this barrier is to spread the word among ornithologists and birders that female birds do sing. Female birds sing in every country on Earth, and they often do so in important and meaningful ways. Some female birds also may sing in anomalous and nonfunctional ways. How can we distinguish these situations and measure the evolutionary history and consequences of female song among all species? We have to start by documenting it.

Excellent resources exist for the documentation of female song in many species, including sound libraries that have amassed recordings of nearly every extant bird species—and a few extinct ones, as well. Researchers can use these resources for various studies, including looking for evidence of female song in many groups. The best evidence comes from recordings that are clearly labeled as female song, with documentation on how the singer was identified as a female. This type of documentation is critical because recordings don't preserve any physical evidence that can be used to verify the sex of the singer. Recordists, therefore, have a heavy responsibility to ensure that all recordings come with accurate and complete data.

If you want to help document female song, there are a number of things you can do. First, look closely at every singing bird you see and make an informed

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How To Record and Upload

- Macaulay Library, tips for field recording: macaulaylibrary.org/field-recording
- eBird, instructions for editing and uploading sounds: tinyurl.com/ebird-best-audio
- Xeno-Canto, frequently asked questions: tinyurl.com/Xeno-Canto-FAQ
- Xeno-Canto, tips for uploading valuable recordings: tinyurl.com/Xeno-Canto-Value
- The ABA Blog, Birding Editor Ted Floyd on how to get started with recording: tinyurl.com/Record-Birdsong-1
- The ABA Blog, Birding Editor Ted Floyd on how to edit recordings: tinyurl.com/Record-Birdsong-2

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judgment about whether that bird is a male or a female. In some dimorphic species, this can be an easy call, but in others it may be difficult or impossible. For example, many warbler species are sexually dimorphic, but not diagnostically so. Among Wilson's Warblers, a young male may be indistinguishable from a female in appearance, and older females often show "male-like" traits. Similarly, American Robin females are typically paler than males, but that trend does not guarantee that the paler bird in any given pair is the female. In general, if you're not sure of the sex of a singing bird, you should consider it an unknown. If you have a strong hunch that it is one sex or the other, document how you determined that. Often your determination may be based on appearance (color, pattern, size, or shape), but sometimes it may be based on behavior. If you saw a pair of birds working together to feed chicks in a nest and both were singing, you would probably be justified in concluding that one of those two was a female. Similarly, if you watched an incubating bird sing from the nest, and you were confident that only females of that species incubate, you could reasonably infer that you were hearing female song. By documenting how you sexed a bird, you validate your identification and you provide some confidence in your observation to others who may use your data later.

When you find a singing female, report it! This can be done in a number of ways. The most complete reports include recordings of the song, but observations on their own are valuable, as well. For observations (field notes, with or without digital media), eBird is a great place to archive your data. In eBird, click "Add details" next to the species to add a description of your observation. Include sex, how you sexed the singer, and "female bird song" somewhere in your notes. Additional online databases for submitting observations include iNaturalist and Observation.org. Whichever platform you choose, we recommend submitting to large, managed databases, so that your contribution is easily searched for and permanently archived.

Recordings of female song can be collected with simple equipment and stored for free through multiple public services. Sound files can be easily uploaded and archived through Xeno-Canto or through the eBird media upload tool, which stores all contributed files at the Cornell Lab of Ornithology's Macaulay Library. If you use the eBird/Macaulay Library platform, it will automatically link your eBird observations with your media file, creating a record that includes both types of information. Xeno-Canto and eBird/Macaulay offer user-friendly uploading platforms, and their existing collections can

be searched or browsed. Both of these outlets ask users to tag their sound files with information including the sound type (call or song), species, and sex of the singer. We advise filling in the sex field for every recording, whether it be male, female, or unknown. Information on how you sexed the singer should be added to the notes or remarks. In general, the more information you can provide, the better—because listeners and researchers rely on these metadata.

Are you interested in knowing more about female bird song and the status of our efforts to increase awareness and documentation of female bird song? Visit our website: femalebirdsong.org. We have a large citizen science project to encourage documentation of female bird song, and we need all the help we can get! It is easy to participate: Simply include the phrase "Contributed for the female bird song project: femalebirdsong.org" in your notes when you submit a recording or observation of female song to eBird/Macaulay Library or Xeno-Canto. Adding this phrase provides important, searchable context, while allowing you and us to track your contributions to the project.

What happens to all of these archived data? Rest assured, people will use the sound files that you upload! Both of us have written research papers that analyzed sound files obtained from sound libraries to supplement our own field data. Researchers are very appreciative of the donations to these resources because they make much of our work possible and all of our work better. We strongly believe that researchers can't do comprehensive studies on the songs of female birds worldwide without the help of citizen scientists. Therefore, we hope that you will join us in this endeavor by looking and listening closely, and by sharing what you learn. Perhaps, like Margaret Morse Nice, you will be the first to document a singing female of a common species in your own backyard.

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