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Additional 3



Additional online 3 content exclusively for members

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Suleka Deevi (left) and Jessica Melfi (right, with daughter Francesca) birding together in West Virginia. See p. 9 for more. Photo by © Jeffrey A. Gordon.

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Conservation & Community

Get a roomful of birders—or, better, a field trip full of birders—all together, and the conversation inevitably turns, sooner or later, to bird conservation. In this issue of Birding, we focus on the diverse ways in which the birding community is proactively and effectively engaging the cause of bird conservation.

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Ruby-crowned Kinglet. See article, p. 34. Photo by © Christopher McCreedy

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DesertAvicaching

Citizen Science, Technology, Conservation

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nterstate 10 stretches through the desolate Mojave and Colorado deserts of southern California. Although the landscape appears unforgiving at first glance, if you stop and look long enough, you will see the desert is full of life.

So-called aridlands, including southern California deserts, are among the most threatened ecosystems in the Western Hemisphere. Climate change, energy development, and urban growth all contribute to the decline of this habitat. Species such as Bendire's and LeConte's thrashers are some of the fastest-declining populations in the ecosystem. Others, like the Loggerhead Shrike, Verdin, and Rock Wren, have lost more than half of their breeding populations over the past 40 years (Berlanga et al. 2010). In fact, Iknayan and Beissinger (2018) found that, with the exception of the Common Raven, virtually every bird species in the Mojave Desert has declined.

eBird observations of common resident species indicate that desert habitats in the southwestern U. S. are consistently underbirded. With the exception of migrant traps (bodies of water or well-vegetated oases surrounded by otherwise relatively inhospitable habitat) that attract large numbers of birds during mi-

gration, we know remarkably little about bird use of the surrounding desert.

This region also faces intense pressure from development. Large solar and wind energy farms are on the increase. Metropolises like Palm Desert, Las Vegas, and Phoenix are growing. Along with all of this, demand for increasingly scarce

The **LeConte's Thrasher**, much sought by birders, has never been especially common within its limited range in the southwestern U. S. and northwestern Mexico. The species appears to be in sustained decline at the present time, and basic population monitoring is essential for developing effective conservation strategies. *Desert National Wildlife Range, Nevada; Apr. 2017. Photo by* © *Jennifer Tobin–Great Basin Bird Observatory.*

water, as well as climate change and associated higher temperatures and drought conditions, make conservation an urgent need. How can this harsh landscape continue to provide habitat for birds, other wildlife, and people in the face of such mounting pressure? That is the question of the day.

The Sonoran Joint Venture (SJV) is a binational partnership that works to conserve the extraordinary birds and habitats of the southwestern U. S. and northwestern Mexico. The SJV region comprises all or parts of nine states in the U. S. and Mexico, and encompasses the Mojave and Colorado deserts of southern California, an area under pressure from alternative energy development. Over the past several years, the SJV and its partners have been working to better understand the issue.

Kerry Ross, the overall winner of the 2018 desert avicaching contest, pauses in San Bernardino County, California, looking east over the Lucerne Valley. Ross uploaded 148 eBird checklists and documented the occurrence of 95 bird species. *Photo courtesy of Kerry Ross*. Alternative energy development, such as solar, holds great potential, but it also impacts birds, habitat, and water. Both the conservation community and the alternative energy community must be aware of these impacts. SJV partners wanted to know: How and where do these efforts affect birds?—and which species of birds, and at what scale? Lacking answers to these questions, we did not know how to recommend more sustainable development or mitigation.

What's more, we didn't have the capacity either the people or the money—to adequately monitor birds in the area. We were caught between a rock and a hard place. We had to know more to move forward, but we didn't have the resources to do so.

Enter avicaching.

Geocaching is an outdoor activity in which people use GPS devices to navigate to sites around the world. Hidden at designated coordinates are "geocaches," usually small, waterproof containers with a logbook and often a trinket left by a previous geocacher. The goal is to visit as many geocaches as you can across the globe, seeking out new adventures and treasures. Avicaching, created by the Cornell Lab of Ornithology in 2016, is simply eBird + geocaching: searching specific locations to spot as many birds as possible. With geocaching,



The **Costa's Hummingbird** is widespread in the Mojave Desert biome of the southwestern U. S. and northwestern Mexico, but basic population data for this and other desert bird species are lacking. What to do? By harnessing the power of eBird and the expertise of citizen scientists, a novel "desert avicaching" project has advanced our understanding of bird populations in this region. *Tinajas Altas Mountains, Arizona; Feb.* 2019. Photo by © Christopher McCreedy.

people go to specific sites to find small treasures. With avicaching, eBird hotspots are the locations, and birds are the treasures.

Avicaching is more than just a game. The data collected by avicachers fill knowledge gaps, and help guide management and conservation decisions. Birders go to designated eBird hotspots, follow specific bird-observa-



Recently fledged **LeConte's Thrashers** check out the "saltbush sea" of southern Nevada. The landscape is bleak, but the birdlife is rich. *Tule Springs Fossil Beds National Monument, Nevada; Apr. 2017. Photo by* © *Jennifer Tobin–Great Basin Bird Observatory.*

tion protocols, and submit their checklists. The result? Avicachers get a fun new game to play while birding, and eBird collects valuable data to help monitor and protect birds.

In fall 2015, the SJV Science Working Group met in Tucson, Arizona. During a breakout session, our small group discussed the potential impacts of solar energy development on birds. We talked about the broad-scale monitoring required to get a handle on the issue, and lamented the lack of adequate funding and personnel for such an ambitious undertaking.

Could eBirders help us answer our conservation questions? For about an hour we workshopped the idea of using Cornell Lab's avicaching game. Six months later, Point Blue Conservation Science submitted a modest proposal to the SJV's Awards Program to fund a pilot season of what we called "desert avicaching." The review committee financed the proposal, and we were off and running.

With the help of state eBird hotspot editors in California and Nevada, we created 91 avicaches. Some were existing eBird hotspots that had fewer than three checklists submitted by birders. Others were new hotspots that we created based on their habitat and proximity to solar



energy development. We added sites to test the effectiveness of modeling for identifying desert thrasher habitat, to better support conservation efforts for these rapidly declining birds.

From Feb. 1 to June 15, 2018, we invited birders to play our 2018 desert avicaching game. We developed a website with guidelines for creating eligible checklists, submitted from a desert avicaching hotspot before 10:00 a.m. or after 7:00 p.m., at least 20 minutes and up to 60 minutes long, and covering one mile or less. That's it!

In addition to the rules, the desert avicaching website (sonoranjv.org/avicaching) included a map (reproduced on p. 34) of potential sites to This map shows the number of presumed migrant individuals per minute of observation at desert avicaching locations in 2018. Horned Larks are excluded because their occasionally large counts obscure results from other species. Map by © Dennis Jongsomjit.

visit. The map could be accessed from mobile devices and was linked to eBird, so birders could navigate easily to each hotspot and use the eBird app to submit their checklists.

Players visited avicaches and uploaded their checklists to eBird. Thanks to some

Striped Butte, in Death Valley National Park, has birds—but it is chronically underbirded. The desert avicaching initiative encourages birders to seek out and document the birdlife at undersampled sites like this. Photo by © Geoff Geupel.





This map shows the distribution of avicaching sites in southern California and Nevada. Hotspots were divided into geographic regions (shown by color) to encourage birders to visit multiple avicaches in the same general area. *Map by* © *Jennie Duberstein*.

back-end programming magic by eBird staff at the Cornell Lab, our website tabulated scores in real time, which allowed avicachers to see their standings on a leaderboard hosted on the eBird website. Each complete checklist counted as one point. With generous donors, including the ABA, top avicachers were eligible to win prizes, ranging from hats and T-shirts to magazine subscriptions, digiscoping adapters, and optics.

During the game, 72 birders contributed 409 checklists with data on 142 species from underbirded, and in some cases unbirded, areas. These checklists included 350 hours of volunteer time (including shared checklists). We estimate that avicachers contributed more than 500 hours of their time and \$2,000–3,000 in mileage to travel to and from survey desert avicaching locations.

Observers identified 102 bird species that were likely migrants and more than 16,000 individual birds. The Horned Lark—a local breeder in the desert, but not generally believed to nest at most avicaching sites—was by far the most commonly observed species, with more than 6,300 detected.

The most exciting part of all? We are working

from these birding observations to better understand the birds using desert habitat and to help inform alternative energy development mitigation decisions. This is citizen science at its best.

Not including Horned Larks, avicachers recorded up to eight migrating individuals per minute of observation at desert avicaching sites in 2018 (see map, p. 37). Birders visiting sites in the Antelope Valley across the western Mojave Desert reported the highest rates of migrating birds. We chose most of these locations because of their proximity to planned or operating solar facilities. In addition, many bird species observed as part of desert avicaching were different from those observed in direct deaths at solar facilities. We need more study, but our results so far suggest that avicaching—and, more to the point, eBirders—can provide important data to help us mitigate the impacts of solar energy development on migratory birds.

Besides giving us a better understanding of the impacts of solar energy development on migrating birds, desert avicaching helped us test models to predict desert thrasher habitat, including finding

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The **Phainopepla** is well known for its wanderings across the desert landscape. The Sonoran Joint Venture monitors and recommends conservation strategies for populations of this and other species in the region. *Sabino Canyon, Arizona; Jan. 2019. Photo by* © *Christopher McCreedy.*

DESERT AVICACHING

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four new spots for LeConte's Thrasher. As a result, the Desert Thrasher Working Group has more information about places that could support conservation of this group of birds.

While finding thrashers in unexpected spots was good, *not* finding thrashers in expected spots was also useful. For example, we had multiple hotspots in Kern County where Bendire's Thrasher had occurred historically. As part of the Desert Thrasher Working Group's effort, biologists planned to survey these sites. The negative data provided by eBirders through desert avicaching allowed Point Blue to save time and crew resources, and instead survey other areas that otherwise would not have been monitored.

SJV partners have just scratched the surface of the desert avicaching data. We will continue to conduct more in-depth analyses to understand how to support conservation of desert birds. In addition, all of these data are now stored at eBird and at the Borderlands Avian Data Center (borderlandsbirds.org), and are available for anyone who has an interest. Data will be used for, among other things, eBird's science products. If you've seen eBird's fantastic animated maps showing bird distribution and abundance, you have experienced the usefulness of these products: ebird.org/news/stem0717.

What's next? The conservation community is excited about the potential of avicaching. With funding, possible future uses in the SJV region include asking birders to help monitor the impacts of restoration efforts on desert river systems, along with continuing and expanding our current desert avicaching game. Regardless of the focus, it is safe to say that birders play an important role in the conservation of birds they love.

Acknowledgments

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The Mojave and Sonoran deserts are famous for their specialized permanent resident bird species, but hordes of migrants, like this **Ruby-crowned Kinglet**, also visit arid environments. Quantifying the occurrence of migrants across the region has been a gratifying success of the desert avicaching project. *Rose Canyon Lake, Arizona; Apr. 2018. Photo by* © *Christopher McCreedy*.



The proliferation of alternative energy farms across the Colorado and Mojave desert biomes has uncertain but likely negative impacts on resident species like the **Ladder-backed Woodpecker**. Avian conservation biologists need basic data on the occurrence of birds in affected areas. *Patagonia Lake State Park, Arizona; Mar. 2018. Photo by* © *Christopher McCreedy.*

ing this project. We are indebted to the following companies and organizations for donating prizes for desert avicaching: American Birding Association, Athlon Optics, BirdsEye Nature Apps, Point Blue Conservation Science, Wild Wings Backyard Nature, and Phone Skope. Finally, we thank the many birders who played the desert avicaching game, without whom none of this would have been possible.

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