



CONSERVATION

# Billions of North American birds have vanished

Even common birds are in steep decline, spurring hunt for causes

By Elizabeth Pennisi

North America's birds are disappearing from the skies at a rate that's shocking even to ornithologists. Since the 1970s, the continent has lost 3 billion birds, nearly 30% of the total, and even common birds such as sparrows and blackbirds are in decline, U.S. and Canadian researchers report this week online in *Science*. "It's staggering," says first author Ken Rosenberg, a conservation scientist at the Cornell University Laboratory of Ornithology. The findings raise fears that some familiar species could go the way of the passenger pigeon, a species once so abundant that its extinction in the early 1900s seemed unthinkable.

The results, from the most comprehensive inventory ever done of North American birds, point to ecosystems in disarray because of habitat loss and other factors that have yet to be pinned down, researchers say. Yet ecologist Paul Ehrlich at Stanford University in Palo Alto, California, who has been warning about shrinking plant and animal populations for decades, sees some hope in this new jolt of bad news: "It might stir needed action in light of the public interest in our feathered friends."

In past decades, Ehrlich and others have documented the decline of particular bird groups, including migratory songbirds. But 5 years ago, Rosenberg; Peter Marra, a conservation biologist

now at Georgetown University in Washington, D.C.; and their colleagues decided to take a broader look at what is happening in North America's skies. They first turned to the North American Breeding Bird Survey, an annual spring census carried out by volunteers across Canada and the United States, which has amassed decades of data about 420 bird species. The team also drew on the Audu-

bon Christmas Bird Count for data on about 55 species found in boreal forests and the Arctic tundra, and on the International Shorebird Survey for trends in shorebirds such as sandpipers and plovers. Aerial surveys of water bodies, swamps, and marshes filled out the picture for waterfowl. All together, they studied 529 bird species, about three-quarters of all species in North America, accounting for more than 90% of the entire bird population.

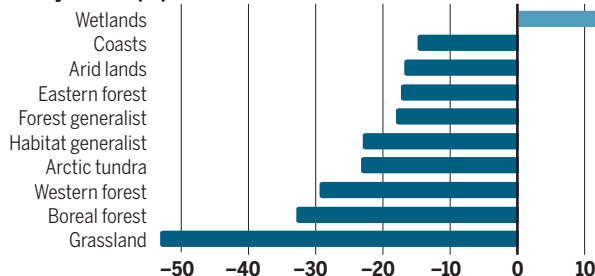
"I frankly thought it was going to be kind of a wash," Rosenberg says. He expected rarer species would be disappearing but common species would be on the rise, compensating for the losses, because they tend to be generalists, and more resilient. Indeed, waterfowl and raptors are thriving, thanks to habitat restoration and other conservation efforts. But the declines in many other species, particularly those living along shorelines and in grasslands, far exceeded those gains, Rosenberg and his colleagues report. Grassland birds have declined by 53% since 1970—a loss of 700 million adults in the 31 species studied, including meadowlarks and northern bobwhites. Shorebirds such as sandpeeps and plovers are down by about one-third, the team says. Habitat loss may be to blame.

The familiar birds that flock by the thousands in suburbs were not exempt. "There's an erosion of the numbers of common birds," Rosenberg says. His team determined that

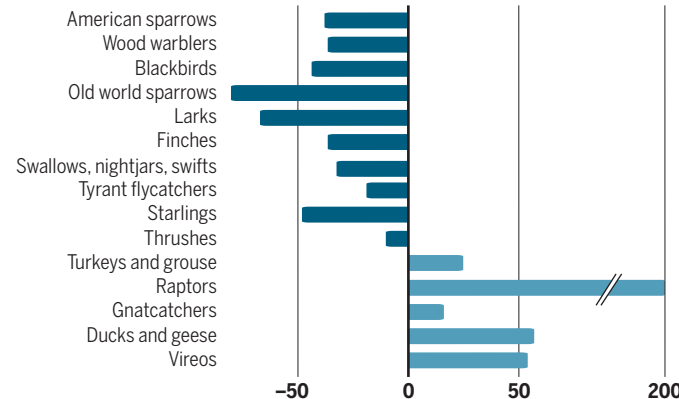
## Tallying the losses

Annual surveys show that since 1970, North American birds have dwindled in all habitats except wetlands (top). Whereas most groups have declined (bottom), ducks and geese have flourished, as have raptors since the 1972 ban on DDT.

### Bird decline by habitat (%)



### Decline by type (%)



Shorebirds such as sanderlings may be dwindling because of habitat loss.

19 common species have each lost more than 50 million birds since 1970. Twelve groups, including sparrows, warblers, finches, and blackbirds, were particularly hard hit. Even introduced species that have thrived in North America, such as starlings and house sparrows, are losing ground.

“When you lose a common species, the impact will be much more massive on the ecosystem and ecosystem services,” says Gerardo Ceballos, an ecologist and conservation biologist at the National Autonomous University of Mexico in Mexico City. “It’s showing the magnitude of the problem.”

Some of the causes may be subtle. Last week, toxicologists described how low doses of neonicotinoids—a common pesticide—made migrating sparrows lose weight and delay their migration, which hurts their chances of surviving and reproducing (*Science*, 13 September, p. 1177). Climate change, habitat loss, shifts in food webs, and even cats may all be adding to the problem, and not just for birds. “There’s general ecosystem collapse that could be happening here,” Marra says.

Weather radar data revealed similarly steep declines. Radar detects not just rain, but also insect swarms and flocks of birds, which stand out at night, when birds usually migrate. “We don’t see individual birds, it’s more like a big blob moving through airspace,” explains Cornell migration ecologist Adriaan Dokter. He converted “blobs” from 143 radar stations into biomass. Between 2007 and 2017, that biomass declined 13%, the *Science* paper reports. The greatest decline was in birds migrating up the eastern United States. “It’s an independent data set that confirms the other work,” says Nicole Michel, a population biologist with the National Audubon Society’s Conservation Science Division in Portland, Oregon.

“We want this to be the real wake-up call,” Rosenberg says. The recovery of eagles and other raptors after the U.S. ban on the insecticide DDT in 1972 shows that when the cause of a decline is removed, “the birds come back like gangbusters.” This time around, reversing habitat loss—from the conversion of grasslands for biofuel crops or coastal development, for example—could help stabilize populations.

Concurrent with the paper, a coalition of conservation groups has come up with policy recommendations and an action plan for citizens. Simple steps, such as keeping cats indoors or planting native plants, can help, Rosenberg says. “I am not saying we can stop the decline of every bird species, but I am weirdly hopeful.” ■

## PUBLISHING

# New deals could help scientific societies survive open access

Goal is to eliminate paywalls while preserving revenue

By Jeffrey Brainard

In the push to make the scientific literature open access, small scientific societies have feared they could be collateral damage. Many rely on subscription revenue from their journals—often among the most highly cited in their disciplines—to fund other activities, such as scholarships. And whereas big commercial publishers have the scale to absorb financial losses in some of their journals, many scientific societies operate at most a handful of journals.

A reprieve may be in sight. Last week, a project supported by funders backing Plan S, the European-led effort to speed the transition to open access, released a set of contract templates and tips meant to help small, independent publishers reach deals with libraries that would eventually eliminate subscriptions while protecting revenue. The project also helped arrange pilot deals, which may soon be inked. They would allow researchers served by library consortia to publish an unlimited number of open-access articles in return for a set fee paid to societies.

The Biochemical Society, based in London, is participating because “we have to start somewhere, and our principle is, learn by doing,” says Malavika Legge, its publishing director. The new guidance grew out of a June workshop in London attended by two dozen society and library officials, which “opened the door to talking to librarians in a way we’ve never done before.”

Plan S, due to begin in 2021, requires researchers funded by participating agencies to ensure that their papers are free to read on publication. To ease the transition, the plan allows authors to publish in a “hybrid” journal, with a mix of free and paywalled content, but only if the publisher commits to shifting the journal to entirely open access by 2024. Commercial publishers and their biggest customers—library consortia representing multiple research institutions—are already signing “transformative agreements” that allow researchers to read a publisher’s paywalled content

while publishing open-access articles in its journals.

But negotiating those deals is complex and time consuming, putting them out of reach of many small societies. The report, released last week by a project called Society Publishers Accelerating Open Access and Plan S, and the pilot projects aim to help smaller societies get into the game. Five societies and four library consortia—most of them in Europe—have committed in principle to testing

transformative agreements in coming months, says Alicia Wise, director of Information Power, a consulting firm in Winchester, U.K., that wrote the report. The Biochemical Society, for example, is discussing a deal for its seven journals with Jisc Collections, a nonprofit in Bristol, U.K., that manages subscriptions for 180 U.K. libraries.

Kathryn Spiller, a licensing manager at Jisc who worked on the pilots, says some libraries remain skittish about negotiating with small publishers. One hurdle is that a society may lack the data needed to negotiate pricing, which can depend on how many articles the authors at each institution in a library consortium have published in the society’s journals. “Some have systems in place to [track] that. A lot don’t,” Spiller says.

In addition to negotiating with Jisc, the Biochemical Society plans to offer a one-size-fits-all transformative agreement to its 700 institutional subscribers not represented by library consortia. The cost will match this year’s subscription charges, with an additional fee to make up for the revenue that some subscribers will no longer pay in per-article publishing fees. Other societies are talking about joining forces to negotiate jointly with library consortia.

But some societies are still hesitant, says Rachael Samberg, scholarly communication officer at the University of California, Berkeley, and co-chair of Transitioning Society Publishers to Open Access, a group of librarians mostly at North American institutions. “For societies, it’s sort of a game of chicken,” she says. “They want to see what happens when other people go first.” ■

**“We have to start somewhere, and our principle is, learn by doing.”**

**Malavika Legge,**  
The Biochemical Society

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*Science* **365** (6459), 1228-1229.  
DOI: 10.1126/science.365.6459.1228

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