

Accelerating Conservation Impact



The Lab Is an Accelerator

A conversation between **Linda Macaulay**, chair of the Cornell Lab of Ornithology's Administrative Board, and Executive Director **Ian Owens**



Linda: What role do you see the Lab playing in 2025 and beyond?

Ian: Think of a particle accelerator. The idea is to launch something into the world to have a major impact. But before you have that impact, you have to get it up to speed. We're working with all kinds of people—students, partner organizations, local communities all over the world. They know what they want to do, but they need effective tools. We often have the right skills, and know how to get the right groups together, to create those tools. Whether that's bioacoustics devices to survey wildlife in South America's remote Pantanal region, or statistical models to determine how to restore North America's grasslands. Ultimately, we want to accelerate our partners' actions. That's how the Lab can have maximum impact.

Linda: Can you say more about the Lab's role as an accelerator?

Ian: The Lab is in a fortunate position—thanks to our supporters and as part of a world-class university—to invest in both fundamental and applied science. This helps us build a strong pipeline of ideas, and a lot of long-term plays are coming to fruition just when they're needed. Take eBird, which is now in its 23rd year and has just surpassed 2 billion observations contributed by birders from every country in the world. With eBird, this data can be used in really sophisticated and important ways. That's how you get this year's *State of the Birds* report, which shows trends for 246 bird species.

Ultimately, we want to accelerate our partners' actions. That's how the Lab can have maximum impact.

It's one of the biggest uses of participatory science data ever, going from the average person on the street all the way to a continental scale. The fact that we can mobilize so many people in North America, get this data together, and inject it into decision-making processes is a complicated game, but it's happening.

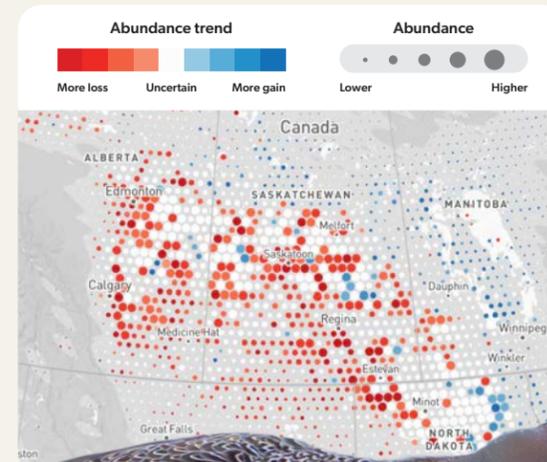
And then there's Merlin, which you'll read about in these pages, and which now has more than 30 million downloads. This was a long-term investment for the Lab. Many people said it was impossible to develop an automated way to recognize bird calls. We're now seeing the return on that by inspiring millions of people to think and care about birds on a daily basis and act on their behalf.

Linda: eBird and Merlin are marvels. What's an example of an earlier-stage initiative?

Ian: We're integrating social science theory to advance bird-friendly actions. One is to make windows safer. As you know, the Lab has done a lot of work using radar to track birds flying across the U.S., showing just how many birds we lose each year to window collisions. This one feels very personal to me because we used to get a lot of bird strikes at the Lab. We had to solve this.

The group that came together hung paracord outside all our windows, so now we have a safer building for birds. But we didn't stop there. Our bird-friendly team is helping to lead a new

Below: An eBird Status and Trends map showing the cumulative change in estimated relative abundance of the Blue-winged Teal from 2012 through 2022. Red indicates decline and blue indicates increase. The darker the color, the stronger the trend.



Blue-winged Teal by Matt Zuro / Macaulay Library



national partnership called the Bird Collision Prevention Alliance. And in the past few months there's been a mood change: A lot of people want to do something meaningful that they can do right now. Preventing window collisions is one thing that really rings true in people's hearts.

We're still in the initial stages, but this program is connecting people with nature as well as activating them with respect to conservation. It gives them a tangible way to protect the birds they've come to love.

The opportunity now is to do this at scale with partners around the world.

Linda: How do you know that you're on the right path?

Ian: In the past year, I had a near-death health experience. When you think you might die, it focuses your mind on what's important. I remember having great clarity, almost dream clarity. Everything got boiled down to what mattered: my family, and the things we're doing at the Lab. The experience was very affirming. Mission-affirming. If anything, I have even more resolve now. We are going to achieve this. We are going to protect habitats and biodiversity. And we will help people across the world do this important work.

It's an urgent time. But urgent times are incredibly important. When a lot of change happens, people are prepared to think differently and new opportunities arise.

I don't think we should hide or freeze in the face of challenges. That's not what the Lab was created to do. The Lab was created to excel, inspire people, and make a difference. Our role is to step up, not step out. And there's an opportunity here to make a series of investments, to prepare for what comes next, to create firm foundations upon which people will build in the future.

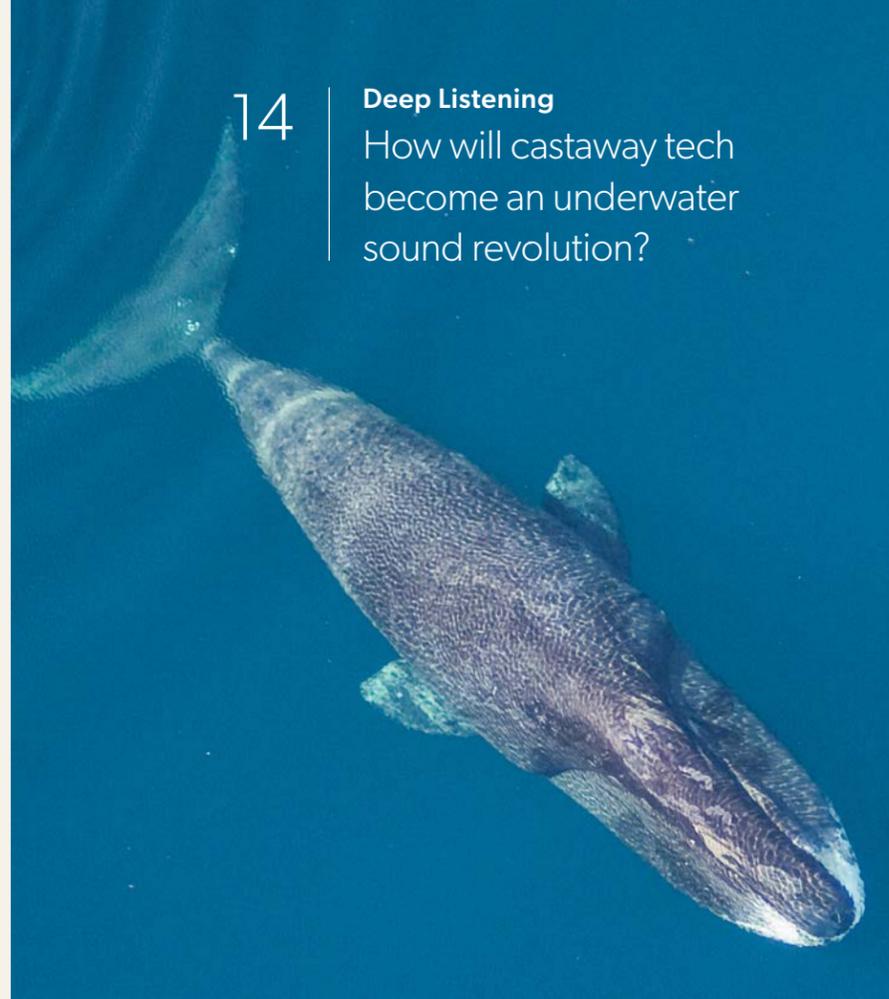
To do that, we will need to be bold. This is the time for us to invest.

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How Does the Cornell Lab *Accelerate* Conservation Impact?

Powering a global movement of on-the-ground conservation isn't just an intention. It's an imperative. The need is urgent and the time is now. At the Cornell Lab of Ornithology, we are focusing on three ways we can uniquely contribute to this effort:

Data-Driven Decisions

The future of conservation lies in the power of harnessing data—one of the Lab's core strengths—to drive precise, effective solutions.

Partnerships

Birds transcend borders and so must we, supporting partners around the world in spurring the kind of transformative impact no single institution can achieve alone.

Audience Activation

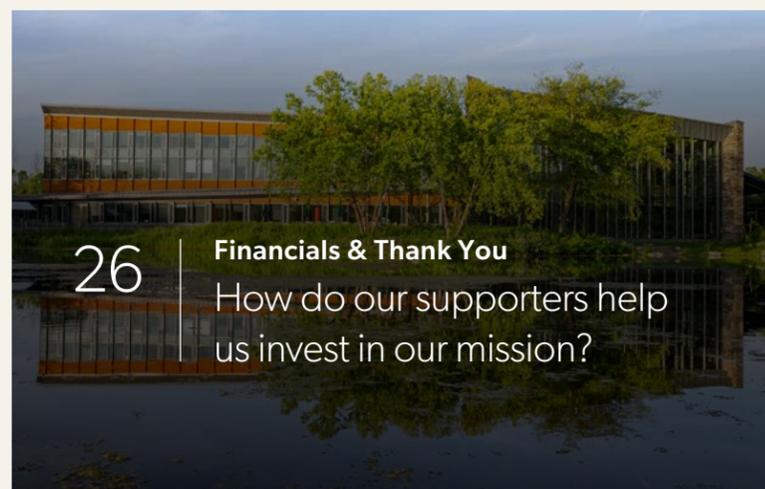
By helping people forge meaningful connections with the natural world and each other, we create a shared purpose to take action for birds and nature.

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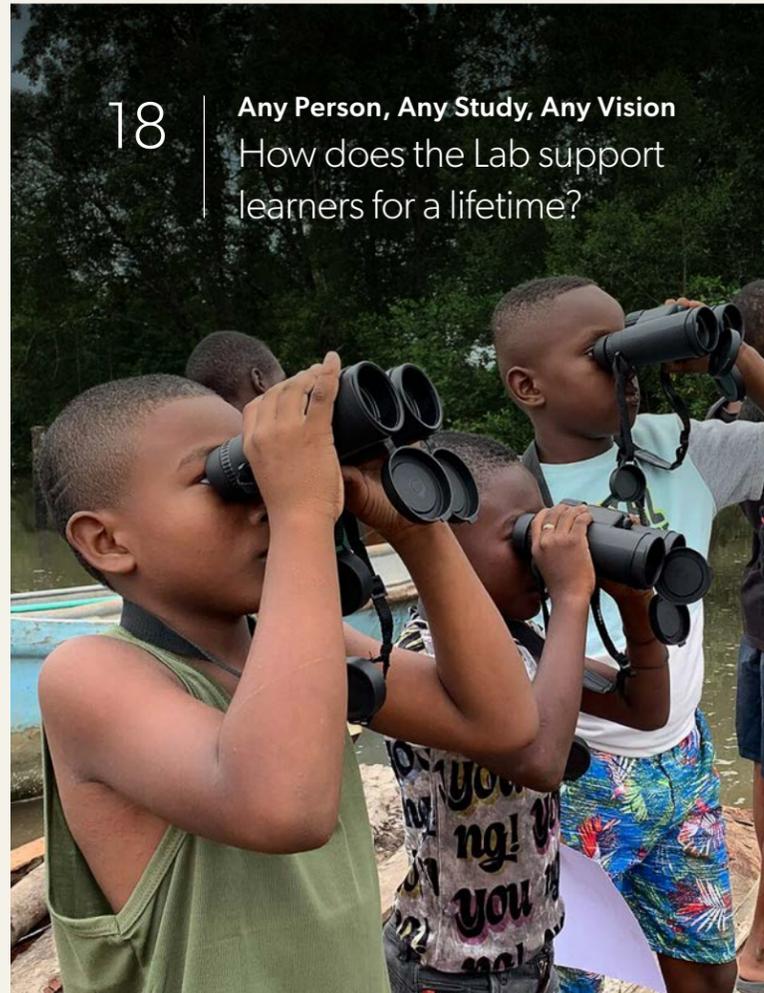
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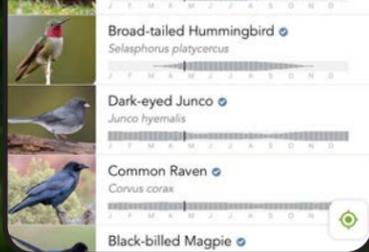
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The *Magic* of Merlin



TikTok photos courtesy of users @theylovefrico, @nonbinary, and @badgerandbirding. Other photos by Gerrit Vyn, Ian Davies, and Rachel Phillips. Birds: Blue-breasted Roller by Andrew Spencer, Common Yellowthroat by Brad Imhoff, and Merlin by Jonathan Eckerson / Mazarilly Library



The untold story of the rise and rise of the Merlin Bird ID app.

Imagine the world as you know it. Now, add 10 million people who care about birds. Did your world just get a little brighter?

Ten million. It's an astronomical number. And yet that is exactly what Merlin, the free bird ID app developed by the Cornell Lab of Ornithology, has accomplished since launching in 2014. Ten million active users the world over, from experts in the field to neophytes who let the app run in the background during their morning routine—and they're turning enthusiasm and newfound joy into participatory science that helps protect birds and biodiversity.

From Serbia: "It is my honor and pleasure that 165 of my photos were used to train Merlin to identify birds."

From Costa Rica: "Great for beginners. It motivates you to keep expanding your life list."

From India: "The app is so user-friendly...you can know about a lot of birds around you based on the pictures and their calls."

From the U.S.: "My four-year-old daughter and I were using Merlin to identify about 12 birds in our backyard. My daughter said to me, *Daddy, your phone is magical*. I've been programming for over 40 years. Merlin amazes me too."

So how is it that millions of people now hold this magic in their pockets? To satisfy that question, we have to go back nearly two decades when the Lab's idea for a bird ID app first hatched.

When we looked at analytics, we saw a lot of people typing in phrases like *little brown bird*. It became clear they were trying to use our website as a bird ID tool.

An Origin Story That Almost Wasn't

The year was 2008 and the Cornell Lab wanted to expand the capability of its online guide, All About Birds. According to Miyoko Chu, senior director of Science Communications at the Lab, users wanted more than the site could provide. "When we looked at analytics, we saw a lot of people typing in phrases like *little brown bird*. It became clear they were trying to use our website as a bird ID tool."

In the aftermath of the financial crisis, the Lab didn't have capacity to reimagine All About Birds. These were the early days of broad-based artificial intelligence, so the team brainstormed a game of 20 questions that would utilize machine learning to produce a positive bird ID and proposed it to the National Science Foundation. "The heart of the proposal," says Miyoko, "was the power of a bird's name. If you see something and you don't know its name, it's really hard to learn more. But as soon as you can call it a Yellow Warbler, you've got all the information in the world at your fingertips."

Top: A grandmother and granddaughter use Merlin to identify nearby waterfowl in Wissahickon Valley Park, Philadelphia.

Bottom: Merlin provides species ID, habitat, and behavior information you would expect to find in a field guide. Photos by Troy Bynum



After winning the NSF grant, the team needed to figure out how to teach the machine-learning model how to identify birds. Jessie Barry, who now leads the Merlin program through the Lab's Macaulay Library, cites AI as the reason the project was funded, but concedes that the initial machine-learning task didn't work all that well. "We didn't have enough data," says Jessie. Meanwhile, the team discovered a faster solution: the power of eBird data.

In the early 2010s, eBird, the Lab's worldwide bird observation platform, was taking off. Tens of thousands of birdwatchers had already contributed millions of sightings, and their observations added two crucial factors: time of year and location. This meant that instead of trying to guess among, say, 800 species, eBird could help narrow it down to the few dozen species a person would most likely see. With just three more questions, it presented an answer. With time and location in hand, the team was able to compress the initial 20 questions into a simple five-question rubric to identify birds.

Halfway through development, the team met another "grant"—Grant Van Horn, an undergrad at UCSD knocking on doors and looking for professors to work with. He had joined Caltech's Visipedia project aimed at training computers to recognize objects in photos, using machine learning. To source the photos, they looked to Flickr, the world's largest photo-sharing site at the time. According to Grant, "Flickr's top photos of the day were some landscapes, a few portraits of people, and, inevitably, birds." The question quickly became: *Can we train a computer to recognize all these bird photos?*

"The Visipedia team had scraped the web to build this dataset," says Jessie, "but many of the birds were misidentified." In a spirit of sharing and collaboration, the teams partnered to build a robust and accurate archive of images. As Jessie remembers it, "We approached a bunch of friends to get their photos off Flickr as a way to build the dataset." By 2010, they'd collected enough images to have a basic working model. According to Jessie, "We were thinking, okay, 25% of the time, maybe this pre-Merlin system could identify a bird accurately."



Another breakthrough came when the team realized they could build out Macaulay's image archive by enabling eBirders to upload photos directly into the Macaulay Library as a part of their checklists. It has become a virtuous cycle; as birders share more images, the results get more accurate. Today, Macaulay's archive is an asset that simply can't be replicated anywhere else. On average, eBird users contribute an image every two seconds, and the accuracy of Merlin's visual ID hovers around 98%.

"By the way," Miyoko adds, "this was almost not funded. Some of the NSF reviewers were quite skeptical, asking, *How is this teaching anyone? It's basically doing all the work for people, you're just giving them the answer.*"

What impact would this new app have on the world of birding? Or, for that matter, on how people learn?

Launch

Where did the name *Merlin* come from? Miyoko remembers flipping through names of birds and coming to rest on the Merlin, a falcon that is both small and fierce. Merlin populations declined in the 20th century due to DDT and other pesticides, but bounced back once those were banned. Of course, Merlin also refers to

the mythical sorcerer in King Arthur's court. "We'd always talked about it being this magical experience where you would be so surprised that this name could pop up and give you the answer you were looking for," says Miyoko. The team rallied around the name and began making final preparations for the app's release.

With the NSF grant nearing its end, a fork in the road came when it was time to decide what to charge for Merlin. Alex Chang, who was leading the team's web communications, says, "At that time, companies were selling their apps for \$1, and it was moving toward \$2." But the Lab wanted to build a community, not just revenue. So Alex, who was also pursuing an MBA at Cornell at the time, wrote a business case showing that it was more valuable to offer Merlin for free in exchange for an email address.

That decision led to far more downloads, including in countries where any fee might be a significant barrier. It also gave the Lab a channel to connect with its users. Today, Merlin is at the heart of rapid growth in the number of participants and supporters of Lab programs, which has helped transform the scale of the Lab's global conservation work. Merlin has become the Lab's front door.

The app launched in 2014 with the ability to ID 285 species—just the most common backyard birds in North America—using the five-question rubric Jessie's team developed (the photo ID capabilities launched two years later). In 2015, Drew Weber joined the team to broaden Merlin's geographic footprint. Drew is now the project manager on the Merlin team, and has helped expand Merlin to include 11,000 species, nearly every known bird in the world. When he comes through customs after an international birding trip, the agents get excited when he tells them what he does for a living. "We love Merlin," they say.

"Merlin is a wide funnel that brings people into the world of birds," Drew says. "Some of those folks are going to download eBird and start collecting data. Some of them are going to start caring about birds and give money to protect their habitats. But for many others, Merlin simply lets them start to recognize and enjoy the birds around them in a way that wouldn't have happened otherwise."

On average, eBird users contribute an image every two seconds, and the accuracy of Merlin's visual ID hovers around 98%.

Susan Fox Rogers, author of *Learning the Birds*, agrees. “Merlin changed everything. This is something to celebrate in every possible way.” Susan started birding at age 49. “When I first went out, I couldn’t do it by myself. I needed the John Burroughs club, I needed to get to a baseline. It took two or three years, maybe 20 trips.” It used to be that to become an expert, you had to learn from another expert. But for millions of learners of all ages, Merlin has become their mentor.

But there was another quest on the horizon—one for the “holy grail,” as the Lab’s former executive director John W. Fitzpatrick puts it. For decades, the Lab had been trying to crack tech’s ability to identify birds by sound. Could Merlin become the “Shazam for birds”?

The Tipping Point: Sound ID

In many ways, it’s an unfair comparison: Shazam is an app trained to recognize the one true signature of a pop song in the swirl of a crowded room. Birds are different. They have more than one call. Songs differ slightly each time they’re sung. And even members of the same species can develop distinct dialects region to region. Add to that the sound of wind. Traffic. Your shoes crunching the forest floor. Or what about sound dampeners, like buildings and trees? Not to mention the songs of *other birds*.

As Jessie Barry remembers it, “When the pandemic hit in 2020, we saw [the number of] Merlin users go through the roof. So many people were watching birds, sometimes for the first time. It was a dream come true: The world is paying attention to birds. What can we do with this opportunity?”

While attending an audio workshop in New York City with Jessie, Grant van Horn was inspired by presentations that included spectrograms.



If we get to the point where one in 20 people in the U.S. is engaged with birds when a local land trust reaches out, they’re going to be more ready to hear those messages.

“What struck me,” says Grant, “was that we were looking at photos of audio. I thought, *Wait, they just take their audio and make a picture?* I’m a computer vision researcher, I can absolutely work with that!”

The timing was right: eBird had just begun accepting audio uploads in 2018. That meant Grant had two years’ worth of recordings to experiment with. “Someone told me Merlin’s photo ID couldn’t distinguish between the Alder and the Willow Flycatchers. I wasn’t really a birder before all this, so I asked my colleagues how you’d tell them apart in real life and they told me they’d listen to the vocalizations.”

So like the presenters at the audio conference, Grant made pictures. Specifically, he took 30 audio clips apiece for both flycatcher species and rendered spectrograms. Just as he’d trained Merlin’s algorithms to recognize images of birds, Grant now used the same technology to recognize images of their sounds. “The computer was perfect. It’s like, 100% accuracy.”

To make Sound ID feel miraculous, Merlin needs to bank at least 100 clean recordings of every call for each species. To achieve this, around 350 experts annotate thousands upon thousands of spectrograms made from recordings submitted by people from all over the world. These annotators painstakingly draw and label boxes around individual calls in the spectrograms, helping to train and improve Merlin.

Jessie was anxious to get this capability into the hands of people while birds still held their attention, so Sound ID was launched in June 2021. According to Drew Weber, “Each spring, we see a massive uptake. That year we had a double bump in downloads: May for migration and June for Sound ID.”

“When we first started,” says Alex Chang, “we got to number four in the app store’s reference category, and we thought, *There’s no way we can beat the Bible, right? Like, how do you beat the Bible?* But I guess Sound ID was the answer to that, because we got to number one.”

“Sound ID put Merlin on the map,” says Drew. “It’s in the mainstream conversation now. Sarah Jessica Parker posted about it on Instagram. Sam Darnold, the Seattle Seahawks quarterback, has talked about it at press conferences. Sound ID was a game changer.”

Tuning In at Scale

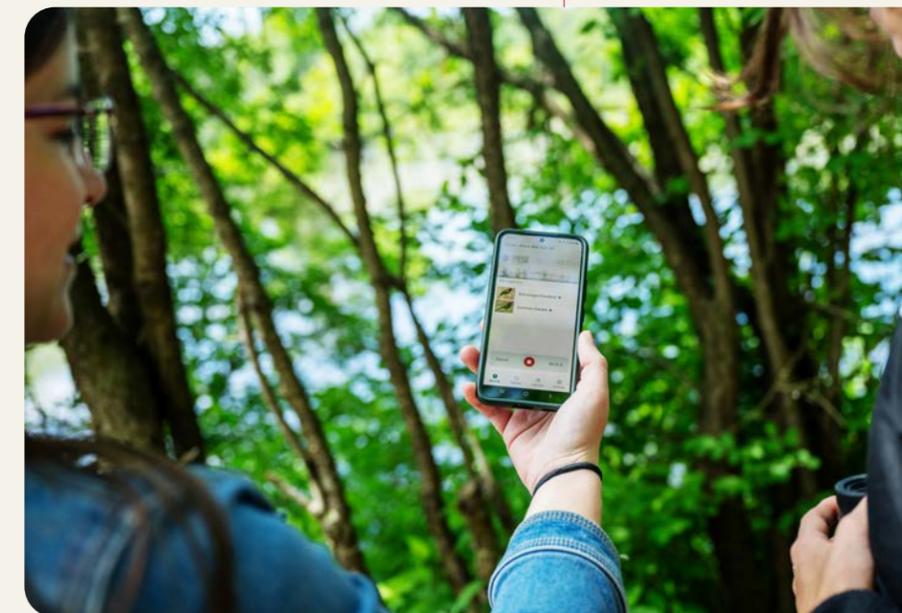
Imagine the world as you know it. Now, add 100 million people who care about birds. Add one billion. These numbers may seem improbable, but Merlin’s growth continues to accelerate. This past spring, American usage of Merlin was up 40% over last year. Europe was up 70% over the same period, and there’s double-digit growth in Africa and Asia as well.

“We have a long runway on these projects,” says Jessie Barry. “We’re building out Sound ID in South America, in Africa, really building a global team. We try to look a few years down the road for new opportunities, but right now we’re seeing big returns on the Lab’s mission—connecting people to birds is squarely what Merlin is able to do.”

How has this marriage of science and tech captivated so many people? “I think you can go all the way back to Arthur Allen and Peter

Paul Kellogg,” Jessie continues. “Arthur Allen founded the Lab. Peter Paul Kellogg was an electrical engineer. Together they figured out how to record the first bird sounds in North America in 1929. So in some way, that combination of engineering and ornithology that built Merlin goes back to the Lab’s origin story.”

In *Silent Spring*, Rachel Carson’s landmark book about the environmental destruction caused by DDT and other pesticides, she pointed to the “silencing of birds.” What if spring comes and no birds sing? Of course, this formulation only works if people are listening.



With Merlin, more than 10 million people are tuning into the world around them. “I think we’re just starting to feel the scale of a community,” says Jessie. “If we get to the point where one in 20 people in the U.S. is engaged with birds when, say, a local land trust reaches out, they’re going to be more ready to hear those messages.”

Already there are signs that the next generation of birders is more conservation-minded. Less focused on personal lists, today’s birders see birds as neighbors. They’re asking questions about what birds need to thrive and what they can do to help. Susan Fox Rogers puts it this way: “If more people are using Merlin, then more people are thinking about birds. You can’t protect something unless you know it. You can’t love something unless you know it.”

We’re seeing big returns on the Lab’s mission—connecting people to birds is squarely what Merlin is able to do.

Above: With Merlin Sound ID, users can see which birds are singing in real time. Photo by Rachel Philipson



Top: An annotator labels spectrograms in Sound ID. Photo by Jay McGowan

Bottom: A graph showing the seasonal swings and annual increases in Merlin active users and eBird users submitting checklists from 2015–2025.

Each year, billions of birds die from preventable causes. Millions of people love birds. How can we jumpstart their actions to help?

K-12 EDUCATOR
JEFF TRAIN
HOBOKEN, NEW JERSEY



The State of the Birds report and K-12 program inspired English teacher Jeff Train to think like a scientist and to launch a community project called "Our Tern." He's working to help create a floating island for Common Terns, like the one pictured, to resolve a conflict with terns on a private pier and provide a safe haven for nesting.

Photo by David Harp

NESTWATCH	
4,000+ PARTICIPANTS	139.4K NESTS IN 2024



Tina Phillips got her start at the Cornell Lab of Ornithology 26 years ago. As the leader of NestWatch, she saw how the simple act of putting up a nest box—multiplied by thousands of people—could help boost bird populations. But the real surprise was what she saw happening with the participants themselves.

"What they were doing went above and beyond the NestWatch protocol," Tina said. "They were creating community trails, nest boxes in neighborhood parks, getting youth involved." That phenomenon led Tina, a biologist, to pivot her career to social science to understand what motivates people.

K-12 EDUCATION

4,500+ EDUCATORS TRAINED	116 TRAININGS OFFERED
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NESTWATCH PARTICIPANT
GINA GERKEN
PAUMA VALLEY, CALIFORNIA



What started as a problem-solving mission to stop Pygmy Nuthatches from drilling holes into houses led to Gina Gerken's successful solution for the neighborhood and a nest box trail that fledged 3,000 young, including bluebirds, swallows, and more.

Photo by Melissa Hill



Above: Common Tern by Doug Hitchcock. Bottom left: Pygmy Nuthatch by Will Sweet. Right: Ruby-throated Hummingbird by Tom Baumgart. All courtesy of Merced Library

Today, Tina is assistant director of the Lab's Center for Engagement in Science and Nature, spearheading a new bird-friendly initiative. Informed by social science research, the initiative aims to help multiply the number of people taking action to stem the three biggest human causes of bird mortality: habitat loss, outdoor cats, and window strikes.

In this first season, 6,200 participants have joined an eight-month Garden for Birds pilot program. Hundreds of FeederWatchers are documenting bird mortality around their yards, and more than 8,000 people viewed a webinar on bird-friendly window treatments.

BIRD-FRIENDLY PARTICIPANT
JOHN VICKERS
HAMILTON, ONTARIO, CANADA



Each week, John Vickers could expect to hear at least one bird colliding with his windows. Songbirds, doves, a Cooper's Hawk. He joined the Lab's webinar about making windows safer, then installed Feather Friendly film and DIY Acopian BirdSavers. Now, he says, the collisions have stopped.

Photo by John Vickers



GARDEN FOR BIRDS PILOT	
6,200 PARTICIPANTS REGISTERED	650 BIRD SPOT SIGNS ADDED

Collaborations are underway with veterinarians to develop united messaging about how indoor cats benefit birds and cats alike. All co-developed with national partner organizations, these projects are poised to scale rapidly.

"It gives me hope to see participants excited about the increased bird diversity that they're witnessing in their yards, or how the steps they took led to a radical decrease in birds being killed by windows," Tina says. "People are seeing themselves as part of the solution: individuals taking action, compounded across a landscape, adding up to real-world impact."

BIRD-FRIENDLY WINDOWS

3.5M REACHED VIA SOCIAL MEDIA	8,000 WEBINAR VIEWS
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GARDEN FOR BIRDS PARTICIPANT
ANNA-MARIE SETTINE
NASHVILLE, TENNESSEE



Anna-Marie Settine joined Garden for Birds, a Lab pilot project to encourage bird-friendly landscapes. She added native plants such as bee balm and coneflower to supplement birds around her feeder. Since then, she's seen more young birds than ever before, plus several species of swallowtail butterflies.

Photos by Anna-Marie Settine

Deep

Repurposed fiber optic cables are revolutionizing underwater sound monitoring.

Combining decades of experience working in the ocean environment with the very latest in acoustic processing technology and techniques, the K. Lisa Yang Center for Conservation Bioacoustics at the Cornell Lab is helping open new pathways to conservation in the biggest natural habitat on Earth.

According to NOAA, more than 80% of our ocean is unobserved and unexplored. That makes it challenging to understand, let alone protect, the complex web of life found there—life that provides the oxygen for one out of every two breaths we take.

For nearly 40 years, the Cornell Lab has been pioneering ways to demystify the world's oceans

through a series of technological advances, such as marine autonomous recording units, that have enabled humans to hear the ocean environment as never before. These advances have helped stop whale collisions, enforce marine protected areas, and show scientists what is needed to protect ocean life when faced with rapid shoreline development, increased shipping traffic, and warming temperatures.

In 2022, Cornell Lab research faculty Léa Bouffaut and her collaborators discovered a brand-new way of monitoring sounds of the ocean that could be safer, more efficient, and more economical than current methods—and it's shaping up to be a game changer for marine conservation.

Listening



Fiber optic cables have a secret power: They can detect underwater vibrations, which can be listened to (and looked at) as sound recordings.

Old Communications Lines Become Cutting-Edge Detectors

Nearly a million miles of undersea fiber optic internet cables—enough to circle the globe 40 times over—run along the ocean floor. As the years pass and new technology emerges, many of the cables outlive their usefulness to telecommunications companies. But far from becoming oceanic litter, these aging cables have a secret power: They can detect underwater vibrations. With a device called an interrogator, those vibrations can be listened to (and looked at) as sound recordings.

The technology is called distributed acoustic sensing (DAS)—it’s a way of sensing strain on the cables by sending out a laser and measuring tiny movements in the fibers. “It’s like echolocation in bats,” says Léa. “They send a click out, and it comes back from a reflection on an object. When the object moves there’s a little phase shift in the click, and that is how they’re able to understand how an object is moving. DAS is the same thing, except that instead of an acoustic signal, the interrogator sends an optical signal.”

Léa first visited the Cornell Lab in 2018 for an internship as she was developing signal-processing methods to analyze whale sounds in the Indian Ocean. She says scientists were already using DAS to measure things like seismic activity and ocean swells through fiber optic cables when she first found out about the technology. Then, in 2020, Léa was continuing her marine bioacoustic work as a postdoctoral researcher at the Norwegian University of



Science and Technology, when her advisor, Martin Landrø, asked if she wanted to check fiber-optic-cable recordings from Svalbard, Norway (inside the Arctic Circle), for whale sounds. “He told me that fiber optic cables were good at detecting very low-frequency sounds, and we knew that low-frequency sounds from blue whales and fin whales show up on other seismological instruments. We thought maybe it would work for DAS too.”

It worked. Léa and her colleagues were able to detect the vocalizations of blue whales marking the first ever use of DAS to monitor whales by way of the sounds they make.

And the marine bioacoustic world took notice. In just three years, the paper has been downloaded nearly 4,000 times, and has been cited in other published research more than 60 times. Léa recently co-led a day-long session dedicated to distributed acoustic sensing for ocean acoustics at the 188th meeting of the Acoustical Society of America in May 2025.

Innovation at the Edges of the Continent

Two projects on opposite sides of North America are demonstrating the potential wide-ranging applications for this revolutionary technology.

Off the coast of northern and western Alaska, bowhead whales are an indispensable part of

the Arctic marine ecosystem. Since the 1980s, the Cornell Lab has deployed hydrophones to help the North Slope Borough conduct once-a-decade bowhead whale surveys for the International Whaling Commission.

In the Arctic, the use of hydrophones is becoming more challenging, and the need for whale monitoring is becoming more urgent, as warming oceans are prompting other whale populations—including humpback and fin whales, as well as predatory killer whales—to spend more time at higher latitudes.

“The area is ice-covered for most of the year. We have to deploy our instruments during the open water season, because the ice is not stable and predictable enough anymore to dig a hole for spring deployments,” says Léa. “When you use DAS, you don’t have to go to sea to put recorders out, [or to] pick them back up again. That’s a big financial burden, and can be quite a safety risk as well. And, DAS has the potential for near-real-time monitoring. Having the interrogator on shore reduces constraints on data storage, energy, and processing demands.”

Building on the work she did with the recordings from Svalbard, Léa and a team of partners are now using the existing fiber optic cables around the North Slope of Alaska to test how well they can detect bowhead whales, while still using hydrophones to help verify the results.

Léa and a team of partners are now using the existing fiber optic cables around the North Slope of Alaska to test how well they can detect bowhead whales.

On the opposite end of the continent, the mouth of the St. Lawrence River contains the largest estuary in the world. It serves as a superhighway for whales and contains some of the most productive fisheries on the planet. Each summer baleen whales, including endangered blue whales and North Atlantic right whales, move into the area to feast in the highly productive waters.

Because the estuary narrows as the whales swim from the Atlantic Ocean toward the St. Lawrence River, it creates a bottleneck for whales, putting them at an increased risk of collisions and entanglements with cargo ships and fishing pots, respectively. Working with the University of Quebec in Rimouski, First Nations, the Canadian government, and industry partners, Léa and her collaborators are using existing fiber optic cables to explore real-time ship traffic and whale monitoring in hopes of reducing harm to the whales in the area.

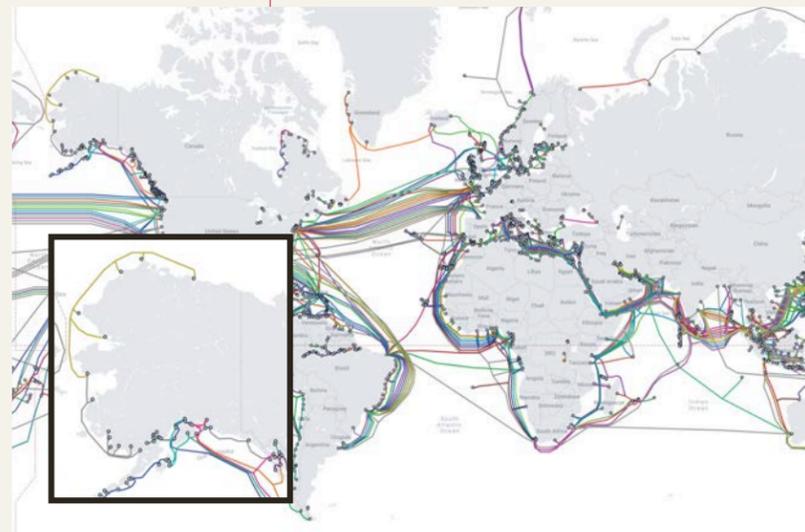
A Future of Faster Conservation Action

Looking to the future, Léa sees incredible potential for DAS to be used around the world for monitoring, as well as plenty of challenges. “Storage is the main constraining factor. DAS records huge amounts of data, and we need to be able to process that data as it comes in and quickly get it into the hands of conservation decision-makers.”

Over the next few years, Léa and her team will be developing algorithms, testing the sensitivity of these cables for their effectiveness in detecting different species. “As we develop these methods and calibrate them for much larger scales, the next two to three years are going to really unlock just what we can do with this technology.”

Above: Léa Bouffaut and her team observe the ice as they prepare to deploy instruments. Photo by Léa Bouffaut

Below: Submarine cable map of the world with an inset highlighting the Alaskan coastline where Léa has been conducting research. Map courtesy of TeleGeography



SOUTH AMERICA



Listening to Wetlands

Located in central South America, the largest contiguous wetland on the planet—the Pantanal—shelters and supports a diversity of life-forms across more than 70,000 square miles of mostly privately owned land. The Pantanal is under threat from increasing wildfires, clearing for cattle ranching, and overall climate change. K. Lisa Yang Center for Conservation Bioacoustics assistant director and postdoctoral researcher Larissa Sugai has been working closely with university researchers, community leaders, and landowners to begin building out a network of more than 1,000 next-gen Magpie recorders, developed by the Cornell Lab. These will help assess species diversity and aid decision-makers in shaping public policies for the conservation and restoration of the biome.

Any Person

Cornell University's motto is "...any person... any study." At the Lab, we open doors to people of all ages around the world, supporting their passions, diverse skills, and lifelong pursuits with birds, nature, and conservation.

Any Study

EARLY CHILDHOOD

Spark a Love of Birds

Children in Tumaco, Colombia, scan for birds such as Blue-and-white Swallows and Golden-hooded Tanagers to add to their eBird checklists. Five local organizations brought birding activities to the entire community, supported by a Cornell Lab mini-grant. This year, Lab staff collaborated with more than 100 educators to co-create educational materials that will be piloted this fall in 100 communities across Colombia.



Photos courtesy of the Fundación Guandál

ELEMENTARY & MIDDLE SCHOOL

Connect the Dots

Fourth-grade students in Washington learn where 10 bird species migrate, including places where they and their families have connections across the Americas. Their community was one of 90 across the U.S., Latin America, and the Caribbean to receive a Cornell Lab mini-grant to engage youth with birds, birding, and improving habitats.



Photo by Tia Kerner



Photos by Aili Smith



HIGH SCHOOL

See Possibilities

Sixteen high school students from seven countries joined the Young Birders event at the Cornell Lab this summer to immerse in birding, science, and conservation. Reuben Shallom, from Tanzania, said a highlight was learning to record and study birdsong. "Back at the Lab, as we were going through our recordings, I saw sound for the first time in my life. I was completely captivated: the way the whistling tunes of warblers created ripples of music or the way junco chips made cheerful folds in the spectrogram." After annotating spectrograms, a process used to develop the Merlin app's sound ID feature, he said, "I have never really been a tech guy, but being shown what to do, and how to do it, made me feel like I really could make a difference."

UNDERGRADUATE

Try Solutions

As a 16-year-old, Lorena Patricio Silva traveled from her home country of Brazil for the Lab's Young Birders event. Seven years later, she's a Cornell undergraduate, working with fellow student Brian Hofstetter and the conservation group AQUASIS to translocate Ceara Gnatcatchers to a "ghost forest" in Brazil where many species are extirpated.

"Being involved in this work gave me hope that areas that lost their biodiversity in Brazil, and all over the Neotropics, can have their species back," Lorena said. "I hope to return someday to hear the calls of Ceara Gnatcatchers and all the birds that once lived there." Lorena and Brian are two of more than 80 undergraduates at the Lab engaged in hands-on projects this year.



Photo by Jesus Moo-Yam



Photo by Lorena Patricio Silva

"Each day, in countless ways, the Lab helps people discover the joy of birds and the wonders of nature. We spark pathways for people of all ages to support their lifelong journeys, fueling a global movement across local landscapes to cherish and restore nature."

—MYA THOMPSON, CO-DIRECTOR, ENGAGEMENT IN SCIENCE AND NATURE



Any Vision

Photo by Glenn Crawford

Transforming Global Knowledge of Birds

The Cornell Lab's scholarly online platform, *Birds of the World*, serves as a wellspring for ornithologists, students, conservationists, and bird enthusiasts to learn with unparalleled breadth and detail about every one of the world's bird species.

Birds of the World "drives huge transformational advances by providing a one-stop shop for data to study evolution, biodiversity, bioinformatics, climate change, cultural ornithology, and more," says Joe Tobias, professor of biodiversity and ecosystems at Imperial College London.

That mission is more urgent than ever. A 2025 analysis of more than 2,000 papers covering 10,000 ecological sites around the world found that humans are having negative impacts on animal biodiversity everywhere, from microbes to megafauna. The *Birds of the World* team is laser-focused on changing that narrative.

To become an even more powerful hub for bird research and conservation action, *Birds of the World* is transforming into a comprehensive science platform that pairs its rich, textual content with machine-readable, data-rich resources. This will create instant data access and large-scale analyses needed to accelerate timely, science-based decision-making as researchers and conservationists race to counter biodiversity loss and protect the world's birds.

"The Lab's lifelong learning programs are an amplifier. By training people and sending them out with expanded skillsets, that's where the scaling comes from. It's not additive, it's multiplicative."

—IRBY LOVETTE, DIRECTOR, CENTER FOR BIODIVERSITY STUDIES AND HIGHER EDUCATION

Indigo Bunting by Marly Muechler / Macaulay Library



Photo by Robert Gill

GRADUATE

Lead & Mentor

Graduate student Bridget Tweedie has spent the past three summers waking before dawn to study birdlife in the White Mountains of New Hampshire. She's developing her own research project on Black-throated Blue Warblers at a location where birds and their ecology have been studied continuously for more than 50 years—the Hubbard Brook Experimental Forest.

This summer, Bridget mentored five undergraduates as they tracked nesting Black-throated Blue Warblers, adding to an uninterrupted thread of research on the species since 1982. As part of the Lab's Field Ornithology program there, the students get a boost from Bridget's experience and enthusiasm as they learn to set up mist nets, find nests, and track radio-tagged birds. "Entering the field can be intimidating...so I try to make sure students leave here with the right skills and a positive relationship with the work," said Bridget. "It is really a privilege to be part of the broader bird research at Hubbard Brook, and to be able to share that experience with students who will go on to do their own work."



POSTDOC

Innovate & Illuminate

Irina Tolkova is trying to crack what computer scientists call a "cocktail party problem": the challenge of discerning individual voices in a crowd. To identify the bird species singing in a dawn chorus, she is experimenting with a device that uses four microphones to distinguish sounds from different directions. Her goal is to improve the accuracy of biodiversity assessments and aid conservation efforts. Irina is part of a community of three dozen early-career scientists working on cutting-edge research and conservation in the Edward W. Rose Postdoctoral Scholars Program.



Black-throated Blue Warbler by Ryan Justice / Macaulay Library



Photo by Marie Reed

ANY STAGE

Learn for a Lifetime

Gene "Gino" Ellison, a pro angler and outdoorsman, got hooked on birding during the pandemic in 2020. He began using the Merlin Bird ID app, then took a Bird Academy course—followed by 19 more! Since then, he's completed a Big Year with 802 bird species logged in eBird. He's now a traveling educator for the Lab's K-12 team. Gino is one of 289,000 enrollees in Bird Academy since 2015.

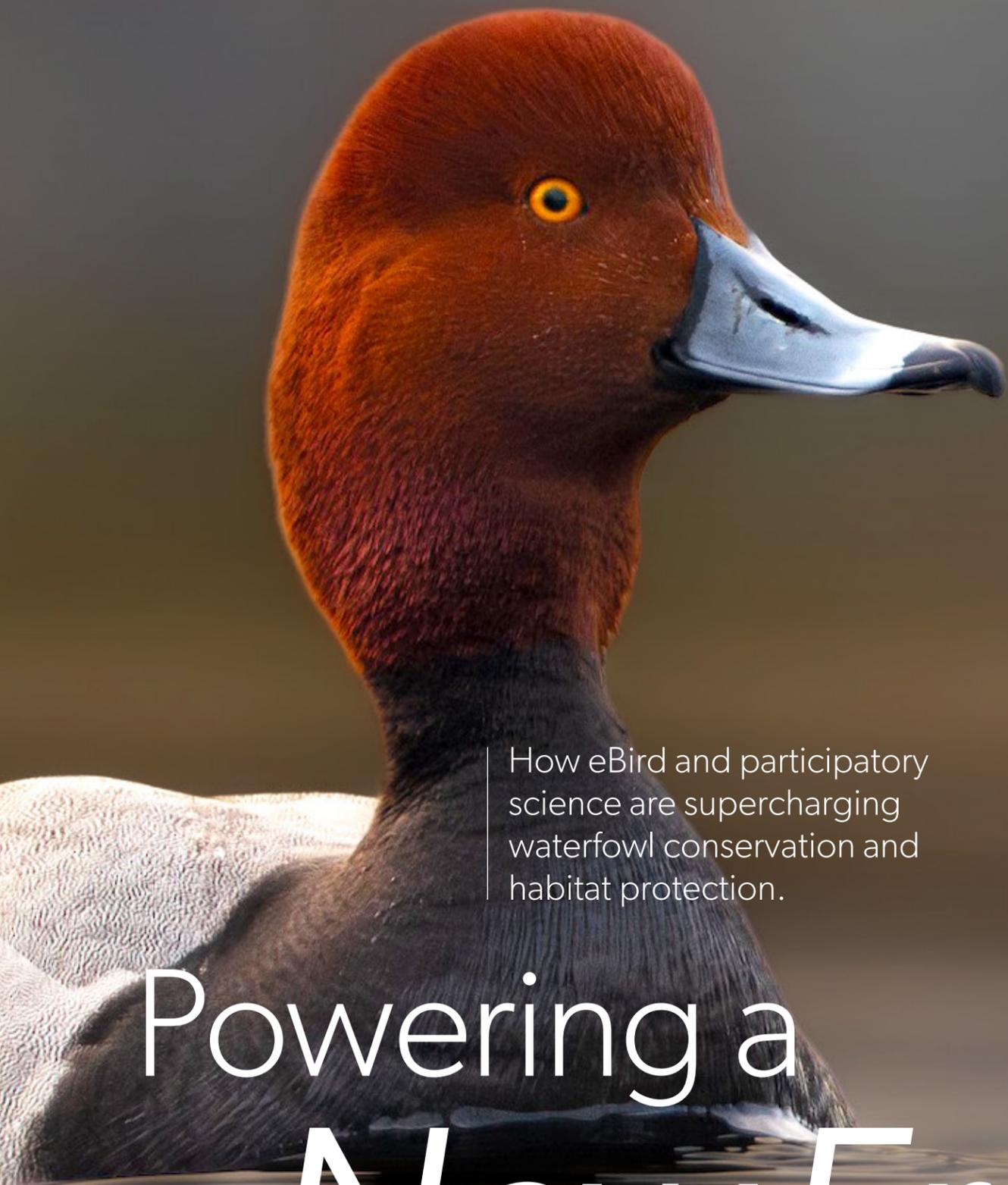


EARLY CAREER

Move Knowledge to Action

Vainqueur Kilindo Bulambo is an information technology professional from the Democratic Republic of the Congo where he worked with the Dian Fossey Gorilla Fund, monitoring gorillas by sound as well as images from camera traps. Now at the Cornell Lab, he is using AI neural networks to detect the chest beats and vocalizations of gorillas. This will reveal the behaviors and movement of gorillas, and increase the accuracy of monitoring. Vainqueur is one of four professionals in the inaugural year of the Katharine B. Payne Fellows Program, designed to foster the talent of leaders internationally in conservation bioacoustics.





Redhead by Isaac Poiranik / Alamy Library

How eBird and participatory science are supercharging waterfowl conservation and habitat protection.

Powering a New Era of Conservation

You've seen the headlines. Three billion birds lost over the past 50 years. A 2019 study published in the journal *Science* painted a startling picture of how habitat loss, environmental degradation, and extreme weather events are impacting North American birds.

One bright spot has always been ducks. Since 1970, duck populations have rebounded thanks to decades-long conservation efforts with funding from sources like the North American Wetlands Conservation Act and sales of Federal Duck Stamps. This increase is a testament to what can happen when a coalition of allies—in this case, conservationists, hunters, and federal agencies—align around a shared interest: seeing waterfowl flourish in protected habitats.

But the 2025 State of the Birds report, released in March by the Cornell Lab of Ornithology and a consortium of more than a dozen conservation groups, shows that birds are declining in all habitats. In the past five years, even ducks are on a downward trend.

Tools Built for Conservation

Fortunately, there is an extraordinary new tool to help us understand and reverse these declines: eBird Status and Trends. It's a tool that combines the treasure trove of eBird data with machine learning and supercomputing power, and it's providing a detailed, county-level look at how birds are faring across the U.S.

"This is the first time we've had fine-scale information that allows us to understand the drivers of declines much better than we've ever been able to before," says Amanda Rodewald, faculty director of the Cornell Lab's Center

for Avian Population Studies. "eBird Status and Trends gives us a new lens to detect and diagnose population declines and to respond to them in a way that's strategic, precise, and flexible."

One group making heavy use of eBird Status and Trends is the North American Waterfowl Management Plan (NAWMP) partnership. This international partnership among the U.S., Canada, and Mexico outlines waterfowl management and conservation goals and works with regional Joint Ventures, a collection of federal and state agencies and nonprofit organizations, to conserve waterfowl.

Orin Robinson, a senior research associate at the Lab, has been working with Joint Ventures to use eBird Status and Trends to refine waterfowl population goals.

"It's been rewarding to work with the North American Waterfowl Management Plan and Joint Ventures...to start using the eBird Status and Trends data in their models of waterfowl planning," says Orin. "And the better we can make these tools, the easier it will be for more partners to use them."

Engaging with duck hunters could provide much-needed support to bring awareness to the issues and help reverse population declines.

"The more hunters and duck enthusiasts can contribute to eBird, the better information we'll have to conserve and manage populations," says Amanda. "We know that over half of hunters are also birders, so there's already a strong connection there."



eBird Tools in Action

Joint Ventures are the regional planning and delivery arms of the North American Waterfowl Management Plan. Their job is to translate continental population objectives into regional habitat objectives that support target duck populations.

To do that, managers need estimates of duck numbers and their distributions for the entire year—during the breeding season, migration, and the nonbreeding season. According to Joe Lancaster, the biological team leader for the Gulf Coast Joint Venture, that kind of year-round data is hard to find. “We just didn’t have the data that derived contemporary migration chronologies we needed across our region,” says Joe, “so we started exploring using eBird data.”

“eBird Status and Trends are the only data available to understand the distribution and relative abundance of waterfowl at a species level across the entire continent,” says Michael Brasher, senior waterfowl scientist at Ducks Unlimited.

And a new study is showing just how credible eBird data are when used in combination with available waterfowl surveys to produce estimates of duck abundance throughout the year.

Michael says, “We’ve compared eBird Status and Trends to existing datasets from traditionally collected methods as a way of helping to verify, validate, and build confidence in eBird datasets. And for the areas where we looked, it does a pretty darn good job of it. It matches up with other datasets, and it matches up with our expectations and expert knowledge across the waterfowl management community.”

The results are now being implemented across Joint Ventures and at Ducks Unlimited to drive habitat priorities. “eBird Status and Trends products are being used to establish and guide habitat conservation objectives on the ground, like: *Where do we need to be providing waterfowl habitat? When do we need to be providing it? And then how much?*” says Michael.

In the South, the Gulf Coast Joint Venture uses this information to identify regions where a specific type of habitat may be lacking for duck populations. Then they start working with partners to put more habitat on the ground.

Top: Dr. Casey Setash of Ducks Unlimited searches for waterfowl nests in a flood-irrigated pasture in Colorado. Photo by Derek Christians

Middle: Ring-necked Ducks by Jacob Meier / Macaulay Library

Bottom: Joe Lancaster releasing a duck with a transmitter for tracking. Photo by Ken Gross



“Our information [with eBird data] basically shows that in Louisiana and on the Texas Chenier Plain, we have sufficient types of habitat to support our population objective, whereas in our Texas Mid-Coast region we have a deficit in that type of habitat. So, the Texas Prairie Wetland Program has shifted to focus more on the Texas Mid-Coast and improving habitats there to reduce the deficiencies in that region,” says Joe.

A Way Forward

“Our commitment to sharing the latest science with partners is making a difference, but the results from the 2025 U.S. State of the Birds Report remind us that we cannot be complacent,” says Amanda Rodewald.

According to the U.S. Fish and Wildlife Service, wetland habitat is being lost at an alarming rate. Loss of wetland habitat has increased by 50% since 2009. And new policy is about to accelerate those losses. The recent changes to the Clean Water Act and the Waters of the United States narrowed the definition of navigable waters, which, according to a recent study published in the journal *Science*, means that 690,000 stream miles and 35 million acres of wetlands will lose federal protections.

Amanda and environmental economists from the Dyson School of Applied Economics and Management at Cornell University are

eBird on Fire

eBird Status and Trends provides the United States Forest Service with the localized information it needs to create efficient prescribed fire plans and manage forests to reduce the risks of wildfires on birds and people. “eBird Trends helps land managers look at different scenarios, pinpoint the areas of opportunity, and see where an investment in conservation actions could benefit birds the most,” says Andrew Stillman, a researcher at the Cornell Lab. Sarah Sawyer, the national wildlife ecologist at the U.S. Forest Service, says, “At the Forest Service we see immense value in citizen-science data, especially when the Lab really digs into the accuracy and reliability of the data, so that when the final data product comes to us, we have some confidence to utilize that information.”

Without federal protections, wetlands and waterways are subject to development or draining, which could reduce critical feeding and breeding grounds for waterfowl.

investigating what these changes mean to waterfowl populations. According to preliminary analysis using eBird data, Amanda says they estimate that waters supporting 20% of waterfowl populations in the contiguous U.S. will lose federal protection.

Without federal protections, wetlands and waterways are subject to development or draining, which could reduce critical feeding and breeding grounds for waterfowl. “Those waters,” says Amanda, “represent important breeding, migratory stopover, and nonbreeding areas for waterfowl and other bird species.” She adds, “eBirders are basically the eyes and ears of the environmental and conservation agencies working to make conditions better for birds.”

A new era of conservation that provides hope and a way forward is unfolding thanks to birders around the world. And eBird now holds more than two billion observations—an unprecedented amount of data that is fundamentally changing what we know about birds and how we protect them.

“The Lab’s investments in eBird Status and Trends are improving the ability of agencies and nongovernmental organizations to monitor changes in waterfowl populations and respond accordingly,” says Amanda. “The scientific expertise and credibility of the Lab, combined with its ability to engage birders around the world, make it uniquely suited to support agencies and nongovernmental organizations doing the frontline work to conserve waterfowl.”



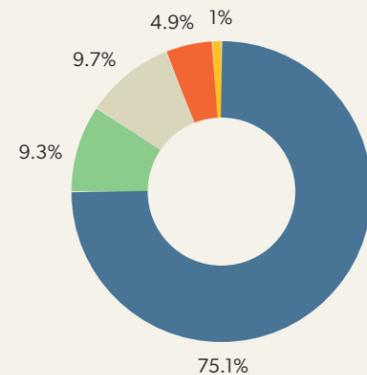
Financial Report

2025 Fiscal Year
(July 1, 2024, to
June 30, 2025)

The Cornell Lab of Ornithology continues to thrive thanks to our dedicated community of supporters. During fiscal year 2025, generous contributions from thousands of members and donors—representing more than 75% of our annual revenue and totaling \$38.7 million—amplified our ability to advance conservation through research, education, and participatory science. Our unique position as a nonprofit organization within a world-class research institution allows us to maximize our impact,

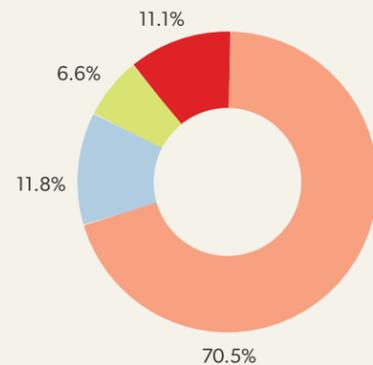
equipping individuals and organizations worldwide with the knowledge, tools, and inspiration needed to address declining bird populations and protect biodiversity.

The steadfast philanthropic commitment from our supporters empowers us to nurture talent, embrace cutting-edge technology, and pursue bold solutions on behalf of birds and nature. We are deeply grateful for your partnership in this vital work.



FY25 REVENUE

Membership & Gifts	\$38,688,321
Grants & Contracts	\$4,786,912
Program Income	\$5,000,517
Invested Funds Income	\$2,532,753
Other	\$514,692
Total Revenue	\$51,523,195



FY25 EXPENDITURES

Program	\$34,390,686
Development & Membership	\$5,763,269
Administration & Infrastructure	\$3,220,126
University Administrative Support	\$5,376,610
Total Expenditures	\$48,750,691

If you have questions, comments, or requests for the Cornell Lab's membership and development team, please contact Stephanie Herron at sh2684@cornell.edu or 607-254-1105.

Left: Cedar Waxwings by Zachary Vaughan / Macaulay Library
Back cover: Barrow's Goldeneye by Sharif Uddin / Macaulay Library

Donors As *Accelerators*



Birds, like the Lab's supporters, find strength in numbers. View our list of legacy society members and honor and memorial tributes at birds.cornell.edu/donors.

Have you ever been lucky enough to watch a murmuration? Hundreds of thousands of starlings turn, swell, dive, and move as one. It's breathtaking, in part, because this sinuous dance can happen only at a staggering scale.

The Cornell Lab of Ornithology has mobilized our own murmuration. Because of committed supporters like you, the Lab is extending our network of global partners, deepening our investment in data tools and tech, and expanding our efforts to activate millions of people around birds and biodiversity.

Thank you for being part of a mighty and growing flock. By working together, we will bring about a healthier planet and a more hopeful future.

I so appreciate all that the Lab does in terms of research, conservation, and education. In my mind, the Lab is an absolutely premier organization that does things the right way. I've been a member for quite some time, and I love sharing stuff from *Living Bird* with my students!

—Kevin Dodge, McHenry, MD

We started supporting the Cornell Lab after seeing glorious nesting eagles in Central New Jersey and a variety of birds—egrets, spoonbills, ibis, and burrowing owls—in our neighborhood in Southwest Florida. **We recognized that the Lab's research and support of birds can make a difference as the world grapples with climate change.** And as coffee lovers, we supported the Cornell Lab's initiative to provide research and support for shade-grown coffee, where shade trees offer homes to Central and South American birds.

—Lisa Ullman, Princeton, NJ

I support the Cornell Lab because it's inclusive and encourages buy-in. **The Lab has developed programs and apps that make it possible for everyone who wants to contribute data to do so. Those data are used to inform decisions that determine what projects are most urgent.** The Cornell Lab's global influence is important, because worldwide cooperation is critical to address environmental issues.

—Joyce Alton, New Haven, CT



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Through partnerships with these companies and organizations, we grow our capacity to reach and engage new audiences to improve the understanding and protection of birds, from backyards to ecosystems around the world. The Cornell Lab is grateful to these sponsors for their support during the past year.

For information about partnership opportunities, contact Justin Cleveland, Manager of Corporate Partnerships, at jbc258@cornell.edu.

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