The INSTITUTE for BIRD POPULATIONS

2021 Annual Report

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On the cover: How does the climate compare on the Yellow Warbler's breeding & wintering grounds? A 2021 study, co-authored by IBP Research Ecologist Jim Saracco, investigated how living in two places affects the warbler's ability to adapt to local conditions. Photograph courtesy of Bruce Maynes.

IBP's year-round staff: Top row (L to R): Mandy Holmgren, Jim Saracco, Lauren Helton, Ramiro Aragon Perez, Helen Loffland, and Chris Ray. Middle Row (L to R): Harry Jones, Rodney Siegel, Lynn Schofield, Peter Pyle, Emma Cox, and Steve Albert. Bottom Row (L to R): Meredith Walker, Bob Wilkerson, Dani Kaschube, Ron Taylor, Deborah Mills, and Jerry Cole.

IBP enables science-based conservation of species and habitats by studying the abundance, demography, and ecology of birds and other wildlife.

In This Report

IBP Needs Your Support!

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A Message from IBP's Executive Director

Conserving birds in this time of rapid ecological change requires both constancy and adaptation, and IBP is facing the future with both. We remain constant in our mission – enabling science-based conservation of species and habitats by studying the abundance, demography, and ecology of birds and other wildlife – even as our innovative scientists adapt to change by asking new questions and developing fresh methods for answering them, and applying their skills to an ever-widening circle of landscapes, species, and conservation challenges.

As climate change and the activities of nearly 8 billion people alter ecosystems and landscapes at an alarming pace, long-term data collection and curation are critical for understanding, predicting, and addressing effects on birds. More than 30 years ago, IBP established the Monitoring Avian Survivorship and Productivity (MAPS) program (see page 9) to collect annual information on bird population dynamics across North America. Through financial ups and downs, political shifts and, most recently, the pandemic, our staff and an army of dedicated bird banders across the US and Canada have never wavered – sustaining the program and maintaining an unbroken thread of data continuity that constitutes a precious legacy for conservation and science.

Nearly 20 years ago, we established the *Monitoreo de Sobrevivencia Invernal* program (also known as the Monitoring Overwinter Survival or MoSI program), a sister program of MAPS, to monitor migratory and resident bird populations during the nonbreeding season in the Neotropics (see page 9). Our many stalwart partners across Latin America and the Caribbean continue to operate MoSI stations year after year, often despite great logistical and financial challenges.

Here in the US, IBP partners with the National Park Service to conduct annual bird counts across western national parks – an effort that requires our crews to collectively hike thousands of miles every summer. This work began in 2005, and is now yielding inferences about bird population resilience and vulnerability (see page 8) that only long-term data can provide.

Just as IBP remains constant in sustaining long-term data collection, our scientists are embracing and even pioneering emerging data collection methods. For example, deploying autonomous recording units and using automated sound classification to analyze vast amounts of acoustic data, and ever more sophisticated modeling approaches, to ensure we extract every last bit of information and meaning from the data we have.

I hope you enjoy reading about some of our current efforts in the following pages. If you are inspired by our work, please consider supporting or partnering with us.

In friendship,

Rodney Siegel, Ph.D.

Rodney enjoys the scenery after conducting bird surveys near Rainbow Falls in Devils Postpile National Monument in California, where IBP has been monitoring bird populations since 2011.

How a Labor of Love Became a Multi-Decade Study of Climate and Bird Dynamics on a Historic Subalpine Sierra Nevada Study Site

Harvey Monroe Hall Research Natural Area
Photograph by "somename", Flickr

Back in the summer of 1977, IBP founder Dave DeSante, then an assistant professor at Reed College, took a group of students to work at the Harvey Monroe Hall Research Natural Area—over 1,500 ha of alpine and subalpine meadows and forest on the eastern border of Yosemite National Park. The Hall Research Natural Area had a small cook cabin and an old garage that had been converted into a rustic bunkhouse. What it lacked in electricity and plumbing, it made up for in scenery.

"At first, I didn't know exactly what we were going to do there," says DeSante. But climate change was on his mind. "There was enough information about it even then, that it was happening and was serious." DeSante and his students established grids across a 100 ha subalpine site and by the end of the summer realized they could map the territories of all bird species breeding there and determine their annual productivity. They also recorded climate variables such as snowmelt timing. A subalpine bird and climate study was born and DeSante and his students would return annually for 32 years.

Dave DeSante with his field assistants (and a couple of their friends) at the Harvey Monroe Hall Research Natural Area in 1978. Pictured from far left to right are: Elliot Burch, Jefferson Burch, Thom Curdts, Margaret Campbell, David DeSante (in the back, far right), Charles Convis (with hat) with Brett Engstrom and Diane Raulston in the foreground. Photograph courtesy of Dr. David DeSante.

This year DeSante and co-author IBP Research Ecologist Jim Saracco published some of their results. They found that snowmelt timing and modeled climate variables, including spring and summer temperatures, and summer precipitation varied widely during the study, and that, as the years progressed, snowmelt occurred earlier, temperatures tended to increase, and summer precipitation generally decreased.

Townsend's Solitaire
Photograph by B.G. Washburn

During years with earlier snowmelt and warmer springs, they recorded greater species richness, greater numbers of breeding territories, and earlier fledging dates, but fewer fledglings per breeding territory. Three species showed strong evidence of a changing population trend: Clark's Nutcrackers and Chipping Sparrows declined while Yellow-rumped Warblers increased.

This study provides a rare, multi-decade view of the complex effects of rapid climate change on a high-elevation bird community. It would not have been possible without the collection of fundamental natural history data and the commitment needed to collect these data year after year. Saracco, who analyzed the data but was not involved in the fieldwork, explains:

"I don't know of any other data sets with detailed maps of multi-species bird territories for 3+ decades. It is really a remarkable achievement, requiring real dedication from Dave and all those that helped with this work over the years.

The data set is especially important in the context of understanding ecological consequences of

Chipping Sparrow
Photograph by Kenneth Cole Schnieder

climate change, which is happening relatively rapidly in many higher elevation ecosystems, such as the Sierra Nevada."

For DeSante, the study was a labor of love. "What was so amazing is just how beautiful the subalpine, tree-line habitat is in the Sierra," he says, "and the opportunity to live up there where we were working- the place is so magical."

Birds, Fire, and Forest Management

Driven by climate change and a century of fire suppression, today's wildfires are burning ever larger areas at high severity. These changes have enormous and often tragic consequences for humans, but they also have profound–though complicated–effects on wildlife.

Bird species that rely on old-growth forest characteristics that have developed over centuries can be permanently displaced by fire, whereas species that nest and forage in dead trees, or favor the chaparral that often emerges after fire in western forests, may thrive in a fire's aftermath.

Adding to the complexity, the measures that forest managers increasingly implement to blunt the impacts of high severity fire, such as mechanical forest thinning and prescribed fire, likely also have far-reaching implications for bird habitat.

Black-backed Woodpecker. Photograph by Julio Mulero.

Mountain Bluebird
Photograph courtesy of DaveShepardPhotography.com

IBP is working to understand the effects of fire, and forest management actions intended to reduce harms from fire on birds, and to identify strategies and best practices that managers can use to make forest management as bird-friendly as possible.

Data from national parks can be particularly useful for understanding the effects of fire on birds because potentially confounding timber harvest is absent. We are partnering with the National Park Service to assess the long-term effects of fire on bird populations at Yosemite and Sequoia & Kings Canyon National Parks, and use our findings to identify bird species likely to benefit or suffer from fire exclusion, prescribed fire, and unmanaged wildfire across a variety of forest conditions and time scales.

Black-backed Woodpeckers, which are highly adapted to burned forest, remain another focus of our work. In 2021, IBP scientists and colleagues published three new papers on this species' ecology and habitat management needs. One of the emerging themes of this work is that even this 'poster child' of a fire-loving bird species is actually more adapted to 'pyrodiverse' landscapes–where fire effects vary across space and time to form a mosaic of habitat conditions–than to vast areas burned at high severity.

Spotted Owl
Photograph by Will Demott

How can forest managers promote pyrodiversity, and what are the short-term consequences to birds of forest treatments intended to reduce the risk of high-severity fire? IBP is pursuing these questions from multiple angles in partnership with the US Forest Service. We are surveying California Spotted Owls and Northern Goshawks across three national forests in California and Nevada, so that forest managers can take into account nest locations and other sensitive areas as they plan forest treatments aimed at reducing wildfire risk, and set a baseline for evaluating how both species respond to those treatments.

Elsewhere in California, we are taking advantage of experimental forest thinning and prescribed fire treatments conducted 20 years ago in the Goosenest Adaptive Management Area of Klamath National Forest to assess longer-term responses by dozens of bird species – and also by insect pollinators such as bumble bees and butterflies (see below).

IBP Studies Insect Pollinators, Too!

With their compressed life-cycles and diverse habitat needs, insect pollinators are great indicators of ecosystem health–and populations of many of them are declining. IBP's Pollinator Ecology and Conservation program is partnering with the US Forest Service and others to assess how land management activities affect pollinators and identify ways land managers can help pollinators thrive. Ongoing projects include studying how mechanical thinning and prescribed fire implemented on Klamath National Forest 20 years ago have affected bumble bee and butterfly diversity and abundance; a study of the effects of montane meadow restoration on bumble bees that is yielding information to make restoration efforts in the Sierra Nevada even more bee-friendly; and an assessment of the effects of post-fire forest management and weather on inter-annual variability in bumble bee populations.

California Tortoiseshell
Photograph by Robert Shea

Some Good News About Birds in National Parks

IBP has been monitoring bird populations in US national parks since 1989, beginning with some of North America's very first MAPS stations in Yosemite. MAPS stations currently operate in about a dozen national parks across the US. IBP also conducts point count surveys to track trends in bird populations in another 13 national parks in California's Sierra Nevada, the Pacific Northwest, and starting next year, the desert Southwest. In 2021, our intrepid crews conducted approximately 2,000 mostly back-country point counts in these areas.

We monitor bird populations in collaboration with National Park Service staff, who use the data to inform decisions about habitat management and restoration. We also use the data to estimate population trends, model habitat relationships, monitor and predict bird responses to climate change, and provide a barometer of ecosystem health. Along the way, an encouraging pattern has emerged: bird species in the parks are doing pretty well. Not every species in every park, but in general, bird populations across the parks we study are holding their own, with stable or sometimes even increasing population trends.

This may seem surprising, as North America's birds generally are in trouble, with a nearly 30% reduction in overall numbers since 1970 across the continent. Nevertheless, our work is showing that birds are faring better in national parks than elsewhere. Likely factors include protection from habitat loss and fragmentation, and reduced threats from feral cats and invasive species that affect areas outside of parks more heavily.

In parks, birds may also have a more robust insect prey base and, in some ecosystems, the presence of cooler microclimates where old-growth forest buffers the most severe effects of climate change. Favorable habitat may not only benefit birds in the parks – it likely provides 'source populations' of birds that can disperse and bolster populations outside the parks. Writer and historian Wallace Stegner famously called national parks "the best idea we ever had…they reflect us at our best rather than our worst." Stegner was not writing specifically about bird conservation, but perhaps he might as well have been!

Photograph by Eric Guzman

MAPS and MoSI Data Are a Resource for Bird Conservation Across the Hemisphere

The Monitoring Avian Productivity and Survivorship (MAPS) and Monitoreo de Sobrevivencia Invernal (MoSI) programs are a network of more than 400 bird banding stations across the Americas, working together to understand the full annual-cycle ecology of birds. One of the great successes of these programs, which are coordinated by IBP, has been their ability to explore aspects of avian ecology that have gone beyond what even their founders envisioned.

MAPS and MoSI were started as a way to establish baseline data and begin long-term monitoring on avian vital rates such as productivity, survivorship, and recruitment. But data from these programs have also been used by dozens of researchers for studies of genetics, migration ecology, habitat relationships, and many other topics.

Together, the MAPS and MoSI databases contain nearly 2.5 million avian capture records, which include information on the age, sex, weight, reproductive status, molt status, and body condition of hundreds of species. IBP scientists analyze MAPS and MoSI data, but IBP also shares the data with any researchers willing to follow the program guidelines for data use, including authorship or acknowledgement of MAPS or MoSI contributors whose data were used.

MoSI bird banding in Ecuador in 2018. Pictured are (left to right): Nadia Palvata, Gabriela Toscano, Tatiana Santander, and Pablo Elizondo.

Golden-winged Warbler
Photograph by Andy Reago & Chrissy McClarren

In the past year alone, IBP has fielded inquiries and shared MAPS data with researchers across the US and the world addressing diverse topics, including:

- The phenology (the timing of annual cycle dynamics) and productivity of oak brush community birds.
- The risk of West Nile virus to American Robins and other species.
- Spatial aspects of population dynamics of several bird species in Canada.
- Population projection models for Prothonotary Warbler.
- Influences of phenological variability on demography across North America.

Linking Conservation Groups at Both Ends of the Annual Cycle of Migratory Birds

Effectively protecting birds requires effort at all phases of the annual cycle. For migratory birds, the challenge is even greater, as the breeding and non-breeding (wintering) areas may be hundreds or even thousands of miles apart.

About half of North American breeding bird species—billions of individual birds—migrate to the Caribbean, Central America, or South America, so conservation must involve partnerships across borders. That's why IBP and the US Fish and Wildlife Service have initiated a program to link US-based and Latin American conservation groups through IBP's MoSI program. MoSI station operators include hundreds of non-profits, universities, and individuals with a common goal: studying and protecting migratory and resident birds across the Neotropics.

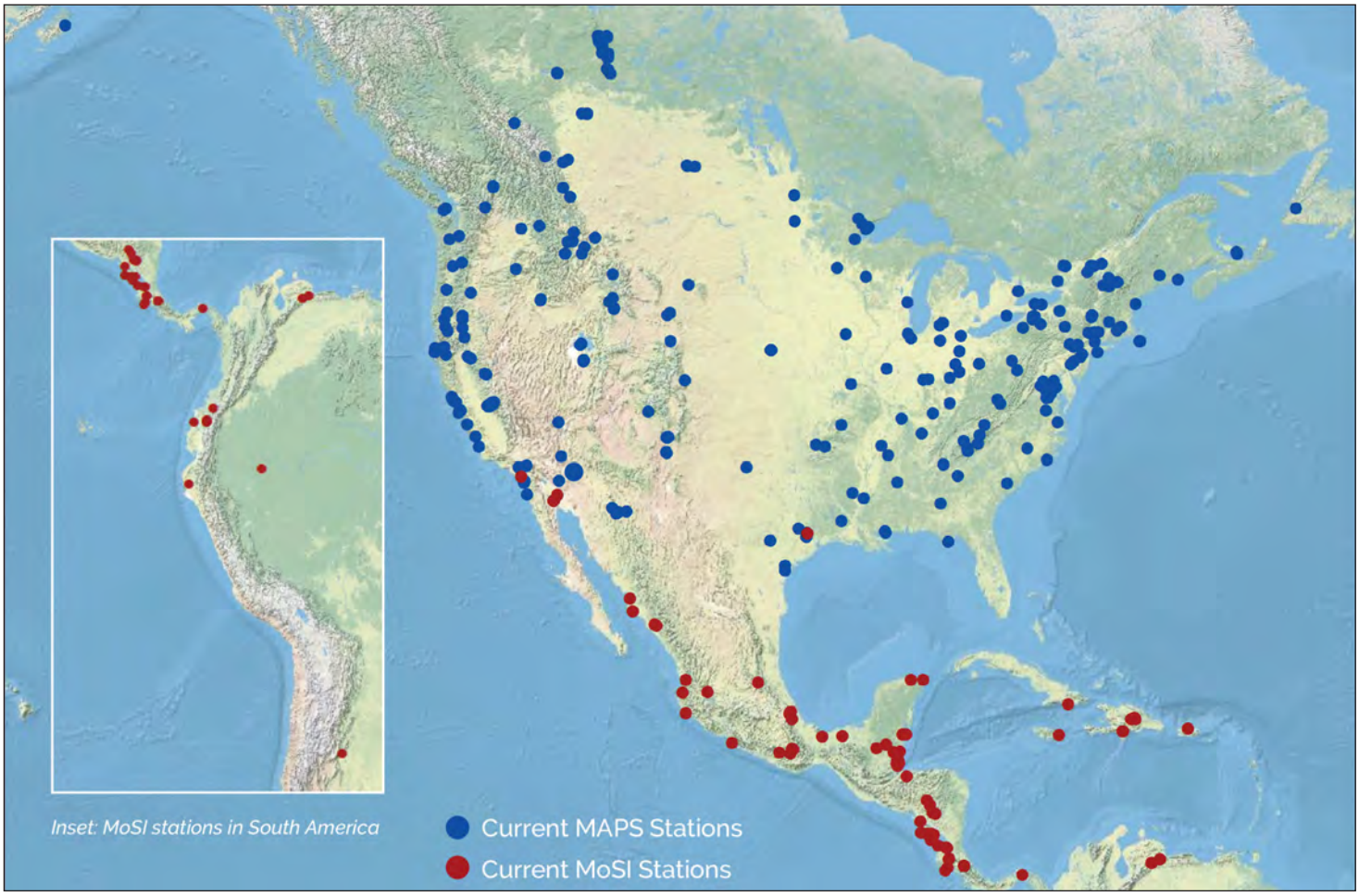
For MoSI station operators in Latin America and the Caribbean, the resources to monitor birds are often hard to come by. For the past 12 months, IBP has been acting as a "match-maker", linking conservation groups in the Upper Midwest of the United States with groups in Latin America that are studying the same species and, in some cases, the same populations of birds.

Since the program began, we have fostered partnerships with nearly 20 US-based groups (mostly local Audubon Chapters) who are providing support of some form to a nearly equal number of MoSI station operators in Mexico, Guatemala, Belize, Nicaragua, and Costa Rica. Support so far has mostly focused on the purchase of bird banding equipment, financial contributions to pay staff, and other expenses involved in operating a MoSI station. Some U.S. bird groups have even begun planning birding trips to visit their MoSI partners.

IBP's current efforts to link Upper Midwest bird conservation organization with individual MoSI station operators is funded by the US Fish and Wildlife Service Region 3 (the Upper Midwest), but we hope to expand this successful program to other regions of North America.

Prothonotary Warbler
Photograph by Dennis Church

Below: The MAPS and MoSI network.



MAPS Data in Action for Grassland Bird Conservation

In 2019, the journal *Science* published a shocking report about bird declines in North America that identified grassland birds as one of the hardest hit groups, with population declines of over 50% since 1970. IBP's Monitoring Avian Productivity and Survivorship (MAPS) Program is uniquely suited to help understand changes in bird populations in response to long-term stressors. Recently, data from MAPS stations in Nebraska helped untangle how climate change and land management practices are affecting 3 iconic grassland bird species: Grasshopper Sparrows, Dickcissels and Bobolinks.

Bobolink
Photograph by Tim Lenz

In 2016, Dr. Nico Arcilla of the International Bird Conservation Partnership and colleagues were invited to establish a grassland songbird research program at a private nature reserve managed by the Crane Trust in the Platte River Valley of Nebraska. When she began work at the preserve, Arcilla learned that MAPS stations had been operated there between 2002-2007. Sensing a scientific opportunity, she re-opened the stations and used the data to examine how changing conditions over a span of a decade or more affected the birds that live on the reserve.

Healthy grassland ecosystems depend on disturbance such as flooding, wildfires, and grazing by native ungulates like bison. Over the last two centuries, these processes were partially replaced by cattle grazing, prescribed fire and other land management practices. In addition, climate change is expected to bring more extreme precipitation events and more frequent droughts to the Great Plains.

One study by Arcilla and colleagues focused on the Grasshopper Sparrow, an indicator species for grassland ecosystems, whose populations have declined by almost 70% since 1970. The researchers used their MAPS data to look at how precipitation, temperature, and prescribed burning, as well as their interactions, affected this iconic grassland bird. They found that wetter springs led to declines in Grasshopper Sparrow abundance, and hypothesized that more precipitation allowed vegetation to grow too tall and dense for this species, which prefers sparser vegetation. They also found that prescribed burning could mitigate the effect of high precipitation. However, during hotter breeding seasons, prescribed fire was less beneficial, presumably because denser vegetation (in the absence of burning) helped reduce heat stress on nestlings and fledglings.

Next, Arcilla and colleagues examined the effects of climate and land management on Dickcissel populations and their vulnerability to brood parasitism by Brown-headed Cowbirds. Analysis of MAPS data revealed that, like Grasshopper Sparrows, Dickcissels were less abundant in years with high precipitation, particularly precipitation early in the breeding season.

Male bison
Photograph by Nico Arcilla

Moderate rainfall generally benefits Dickcissels and other birds because it leads to an abundance of insect prey, more seeds, and dense vegetation where the birds conceal their nests. But extreme precipitation is bad news for Dickcissels. Hail can pummel and knock down nests and nests are also lost in flooding following heavy rain.

In contrast, cowbirds were more abundant in years with more rain in the early breeding season. So in these years lower numbers of Dickcissels nests may be exposed to higher numbers of cowbirds, leading to higher rates of brood parasitism. So climate change–which is predicted to include increased frequency of extreme precipitation events on the Great Plains–may increase the impact that cowbirds have on Dickcissel productivity.

A third study by Arcilla's research group used MAPS data to look at how the reintroduction of American bison on the preserve affected the abundance and productivity of Bobolinks. Both bison and Bobolinks are native to North America's grasslands, so it's reasonable to assume they are compatible. Unfortunately, it's not that simple. Prior to the arrival of European settlers, vast bison herds roamed freely across the Great Plains. Grazing by these herds had intense- but transient- impacts because they didn't stay in one place for long. In fact, their grazing helped maintain grasslands.

But today bison are often confined–as they were in on this nature preserve–which can lead to overgrazing. Cattle were also kept on the preserve, but were grazed rotationally to prevent overgrazing. To their surprise, the researchers found Bobolink abundance and productivity declined steeply in areas occupied by the bison, while they remained stable in adjacent areas with no bison- even those areas grazed by cattle.

Arcilla emphasized that these studies could not have been done without data from the MAPS program. Scientists are often asked to justify "monitoring" studies or collecting data in the absence of an experiment. But monitoring programs like MAPS allow researchers to take advantage of "accidental experiments" due to unforeseen events like bison reintroduction or other land use changes, and long-term processes like climate change.

Dickcissel
Photograph by
Nico Arcilla

"When the first MAPS data was collected in this area, I don't think the biologists doing so could have imagined that any of their sites would host a bison reintroduction or foreseen some of the changes in climate that the sites have experienced," Arcilla says. "In my opinion, MAPS data represents a highly valuable resource for understanding how our breeding bird populations are changing over time. This is particularly true because MAPS allows us to measure productivity and other demographic parameters in addition to abundance, so we can get a better picture of what is driving population change. We hope that this research will inform changes in land management for the conservation of grassland birds, both in our study area and beyond."

Grasshopper Sparrow
Photograph by Ryan Mandelbaum

Longtime IBP Biologist Ron Taylor Dives into a New Adventure

After 17 years with IBP, Biologist Ron Taylor is retiring! Ron started working with IBP in 2004 as a MAPS banding intern in Montana, then worked as a seasonal crew leader training and supervising IBP field crews. He quickly rose to a permanent Staff Biologist position and has since been a master of all things MAPS.

Ron has recruited, trained and supervised hundreds of IBP's MAPS banders, and also shared his expertise by teaching many of IBP's bird banding training courses. For many years Ron has served as our primary verifier of MAPS banding data. Data verification is a painstaking but critical process of vetting banding records to make sure all the information within a record is complete and consistent, both internally, and with other capture records of the same bird.

"Ron is one of the most meticulous people that I have ever met. While helping me manage and verify data on several of our big projects over the years, he leaves absolutely no pebble unturned. He will be sorely missed," says his colleague, Peter Pyle.

Ron inspires his colleagues at IBP with the dedication, enthusiasm, and the attention to detail he brings to his work—as well as his athletic achievements. He has been a competitive swimmer since he was five years old and he continues to compete in US Masters Swimming, where he frequently ranks in the top 10 nationally for his events. Perhaps his exercise regimen accounts for his uncannily serene demeanor. He is always an island of calm in the office, no matter what transpires around him. Ron has been a huge asset to IBP and the MAPS program and we will miss him dearly. Still, we're really excited for him. Ron's next gig is head coach of his local Masters swim team, the Richmond Plunge Masters.

Fossilized Feathers: How Did Archaeopteryx Molt?

Illustration by Lauren Helton

How can looking for evidence of molt millions of years ago help us understand birds today? Recently, scientists have been debating the evidence of molt in Archaeopteryx, a bird-like feathered dinosaur from the Jurassic period that has long been thought of as an ancestor of modern birds (though there is still some debate as to whether this species was a direct ancestor). IBP biologist and avian molt expert Peter Pyle co-authored a paper this year in *Communications Biology* (part of the prestigious journal *Nature*) that addresses molt in the primary feathers of the Thermopolis Specimen, a particularly complete and well-preserved Archaeopteryx siemensii fossil. "Fossil birds that give clues about molt are, understandably, very rare, since feathers, unlike bones, are constructed of soft tissue and don't preserve as well," said Pyle.

Determining the ways molt has changed over the course of evolution will help us better understand this essential process in the life of birds. "For me, the exciting thing about studying molt in feathered dinosaurs is that it will help us understand the evolution of molts; for example, how molts started out in primitive species relative to how they are in birds today," said Pyle. "I am especially interested in how the replacement sequence of wing feathers has evolved. Whereas timing, location, and extents of molts are very plastic, easily shaped by environmental factors such as those related to migration, the sequence or order in which primaries and secondaries are replaced is mostly fixed evolutionarily."

IBP Needs Your Support!

IBP relies on support from people like you to continue our work. Please consider a tax-deductible contribution to support our work. Monthly recurring donations are a particularly convenient option for many of our supporters. Use the donation button on the right, donate through birdpop.org, or send a check to IBP, P.O. Box 518, Petaluma, CA 94953. Thank you!

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New Faces at IBP

In a reflection of the growth of our research programs and our regional expansion, IBP welcomed three new year-round staff members in 2021: Ramiro (Ram) Aragon Perez, Harry Jones, and Emma Cox!

Ram jumped into the thick of it as a staff biologist this summer, co-coordinating Spotted Owl and Northern Goshawk surveys and research. Thankfully, he has extensive experience in field ornithology, having worked on numerous species. Ram also has a long history with IBP as both an intern and a crew supervisor with the MAPS program. He also established 5 MoSI stations in his home state of Oaxaca, Mexico. Ram has been interested in birds since he was a child. "I grew up in rural southern Mexico. When I was a child, I was inspired by nature documentaries and I loved to explore. I realized that some birds were present only during the winter; in fact, I noticed that Cedar Waxwings were in the Central Valley of Oaxaca every other winter. I got more interested in birds when I started matching them with the birdsongs I heard on my way to school." Ram lives with his family in Eugene, Oregon.

Harry Jones will be directing our inventory and monitoring work with the National Park Service in the Southern Colorado Plateau region. Harry recently received his Ph.D. in Zoology from the University of Florida and has conducted research throughout the Americas. He is particularly interested in how human-caused change in the environment affects bird communities. Working with IBP appealed to Harry because our science directly informs land management and conservation "I'm interested in applied research, so being able to work closely with the Park Service in this new position was really attractive. I also worked closely with a grassroots conservation NGO in Colombia. These experiences opened my eyes to a career outside academia." Harry is based in Flagstaff, Arizona.

Emma Cox will be training under Ron Taylor to take over Ron's MAPS and MoSI related work when he retires. Her time will be split between data verification, crew training, field logistics, and other tasks. Emma is a certified bird bander and is no stranger to IBP either, having worked on our Black-backed Woodpecker crew, and served as lead biologist for our Flammulated and Spotted Owl survey crew. Emma's passion for field biology started in college:

"I was a freshman at UC Davis with no car who really wanted to get to the Sierras to go backpacking. I responded to a call from a graduate student seeking volunteers to do water and invertebrate sampling. I learned that I could make a career of getting paid to go backpacking and it was all over for me."

Emma says she was excited to join IBP as a full-time staff member because "My experiences working with IBP have been wonderful and I was excited to work with a great group of people. I grew up in the San Francisco Bay Area and it's nice to feel like I'm returning home."

IBP's Work on Military Lands

The military is one of the largest land managers in the US and, while the primary mission of the Department of Defense (DoD) is to prepare troops, the agency is also responsive to environmental concerns, including the protection and management of migratory birds on its landholdings. For decades, IBP and the DoD have partnered to monitor and conserve landbirds on dozens of military bases. On page 21, one of our long-time partners, Jessie Shillaci at Fort Bragg, North Carolina, describes some of our collaborative efforts.

Much of IBP's early partnership with the DoD was accomplished through a network of breeding-season (MAPS) and wintering-season bird banding stations. More recently, IBP has conducted annual avian point count surveys at Fort Bragg, North Carolina, and Fort A.P. Hill, Virginia, to help base managers understand the status, habitat needs, and population trends of the bird species under their stewardship.

Prairie Warbler, one of the species IBP monitors through our collaborative work with Fort Bragg. Photograph by Eric Gropp.

IBP also recently collaborated with the Kalamazoo Nature Center to analyze 18 years of MAPS and point count data on more than 200 species detected at Fort Custer Training Center, Michigan. Military bases provide some of the country's best long-term data sets for understanding changing bird populations.

Dayna & Mark Mauer

Making a Planned Gift to IBP

For more than 30 years, IBP has conducted critical research on bird populations and other wildlife to generate data for effective, evidence-based conservation. We collaborate with local, national and international partners to assess the effects of climate change, land management actions, and other ecological stressors on bird populations, and prescribe practical solutions to conservation challenges. When you make a planned gift to IBP, you help ensure that we can continue to do the science that makes conservation work. Planned gifts cost nothing during your lifetime and can be modified at any time.

IBP Board Member Dayna Mauer recently decided to make a planned gift: "I decided to include IBP in our estate plans because I really believe in its mission, and I fell in love with California's Sierra Nevada. IBP does extensive work in that region; it has great partnerships with government agencies that allow for the long term conservation and study of the birds that make it so unique. Additionally, IBP is staffed by fantastic scientists who are also great people."

Planned gifts can take many forms. To learn more, visit our **Legacy Giving** page or contact **Deborah Mills**, IBP's Chief Financial Officer.

Introducing IBP's New Southwest Science and Conservation Program

IBP is expanding into a new region: the American Southwest! With permanent staff members already based in Arizona, Colorado, Nevada, and New Mexico, IBP is well positioned to make an impact on bird conservation across the region, where birds face many stressors, including climate change, drought, increasing fire severity, and water and land management changes.

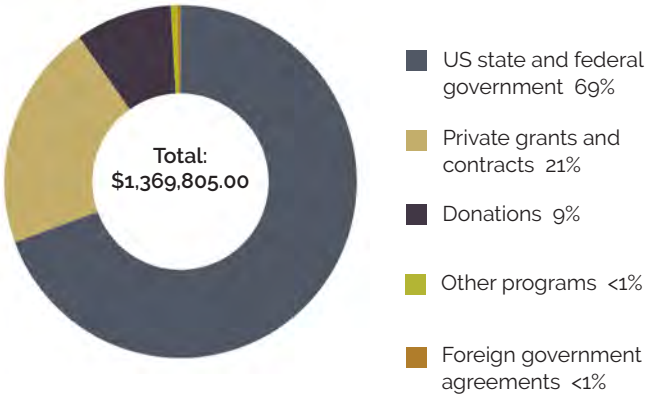
While this landscape of mountains and canyons is beautiful, it is also often rugged and remote. This is particularly true in the national parks of the Colorado Plateau Regional Monitoring Network (including jewels in the crown of the National Park system like Grand Canyon, Mesa Verde, and Bandelier), where IBP is collaborating with the National Park Service to revamp and implement an ambitious bird monitoring program that will help park managers understand the impacts of environmental change. For example, we are planning an inventory of birds during the 2022 breeding season at Petroglyph National Monument, which will help park managers ensure that upcoming changes to the trail network and other park infrastructure will not harm sensitive bird populations.

We are also partnering with the Bureau of Land Management (BLM), using the emerging technologies of autonomous recording units (ARUs) and automated sound classification to survey birds in hard-to-reach riparian canyons in the Mojave Desert, where data are needed to assess whether increased recreational activity may be stressing sensitive bird populations. In a paper in review at this writing, IBP scientists and colleagues show that ARUs can yield comparable detection ability to human observers, at least when deployed over longer time intervals. They are ideal for organizations or agencies with small staffs and remote locations to survey. Individual ARUs can record for hundreds or thousands of hours during a season, which may be especially useful for detecting species that have low detection probability, or that might be sensitive to repeated human visits. We've begun a pilot project with the BLM to test using ARUs to monitor one such species- the Gunnison Sage-Grouse. This spring we'll be testing the utility of ARUs for detecting lek use by this threatened species in western Colorado.

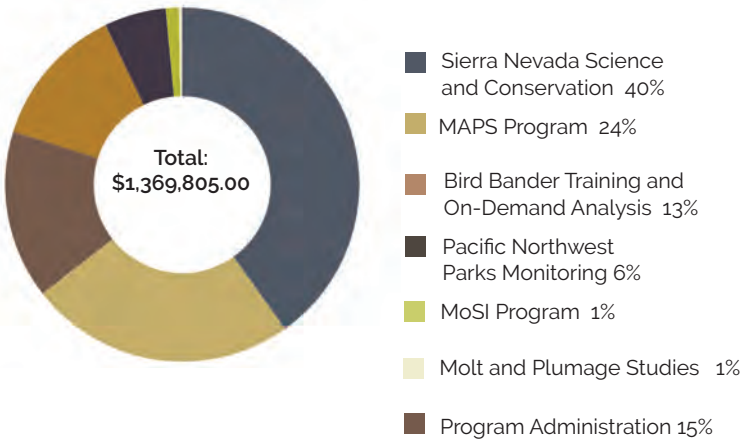
Grand Canyon
Photograph by Alexey Suloev

Fiscal Year 2020 Program Revenue & Expenditures

Program revenue and expenditures for 2020 are shown below. IBP's fiscal year runs from January 1 to December 31. Final figures for 2021 were not available at the time this report went to press.



2020 Revenue



2020 Expenditures

Coming Next Year: Listening for the Gunnison Sage-Grouse

Gunnison Sage-Grouse is a federally Threatened species that ranges over sage-covered plains and mesas of southwestern Colorado and southeastern Utah. Since the 1900s, the occupied range of the species has contracted by approximately 90%, due largely to conversion of sagebrush to agriculture and development. The current population is estimated at 5,000 birds.

Sage-Grouse breeding requires leks–areas where males gather in competitive displays and where courtship rituals take place. This fall, IBP initiated a project with the Bureau of Land Management to deploy Autonomous Recording Units (ARUs) to acoustically monitor a subset of known historical leks in western Colorado. The goals of the project are to find out which leks are still active, and determine their timing and duration of use. Acoustic monitoring may be especially well suited to this project because the units are unobtrusive and are much less likely than a human observer to bother the birds during this crucial and sensitive phase of their annual cycle. Knowing which leks are being used and when could greatly aid BLM in protecting these sites and the Gunnison Sage-Grouse that depend on them.

Illustration by Lauren Helton

Peer-reviewed Publications

As part of our effort to disseminate our scientific findings widely, IBP scientists frequently publish results in peer-reviewed scientific journals. In 2020-2021, IBP staff published more than 40 scientific articles, most of which are available in our searchable database of more than 800 publications at birdpop.org.

Albert, S., J.D. Wolfe, J. Kellerman, T. Sherry, B.J.M. Stutchbury, N.J. Bayly, and A. Ruiz-Sánchez. 2020. Habitat ecology of Nearctic–Neotropical migratory landbirds on the nonbreeding grounds. *The Condor: Ornithological Applications* 122: 1–18.

Bay, R.A., D.S. Karp, J.F. Saracco, W.R.L. Anderegg, L.O. Frishkoff, D. Wiedenfeld, T.B. Smith, and K. Ruegg. 2021. Genetic variation reveals individual-level climate tracking across the annual cycle of a migratory bird. *Ecology Letters* 2021:1-10.

Blakey, R.V., R.B. Siegel, E.B. Webb, C.P. Dillingham, M. Johnson, and D.C. Kesler. 2020. Northern Goshawk (*Accipiter gentilis*) home ranges, movements, and forays revealed by GPS-Tracking. *Journal of Raptor Research* 54:388–401.

Blakey, R.V., E.B. Webb, D.C. Kesler, R.B. Siegel, D. Corcoran, J.S. Cole, and M. Johnson. 2021. Extent, configuration and diversity of burned and forested areas predict bat richness in a fire-maintained forest. *Landscape Ecology* 36:1101–1115.

Campos, B.R., R.D. Burnett, H.L. Loffland, and R.B. Siegel. 2020. Bird response to hydrologic restoration of montane riparian meadows. *Restoration Ecology* 28:1262–1272.

Carnes, B.H., C.M. Godwin, K.R. Foster, and P. Pyle. 2021. Clarification of molt strategies in three Empidonax flycatchers. *The Wilson Journal of Ornithology* 133:34-42.

Cole, J.S., N.L. Michel, S.A. Emerson, and R.B. Siegel. In Review. Automated bird sound classification of long-duration recordings produce occupancy model outputs similar to human annotated data.

Cole, J.S., R.B. Siegel, H.L. Loffland, E.A. Elsey, M.W. Tingley, and M. Johnson. 2020. Plant selection by bumble bees (Hymenoptera: Apidae) in montane riparian habitat of California. *Environmental Entomology* 49:220–229.

Dayer, A.A., E.A. Silva-Rodríguez, S. Albert, M. Chapman, B. Zukowski, J.T. Ibarra, G. Gifford, A. Echeverri, A. Martínez-Salinas, and C. Sepúlveda-Luque. 2020. Applying conservation social science to study the human dimensions of Neotropical bird conservation. *The Condor: Ornithological Applications* 122:1–15.

DeSante, D.F., and J.F. Saracco. 2021. Climate variation drives dynamics and productivity of a subalpine breeding bird community. *Ornithological Applications* 123:1–16.

Fernández-Ordóñez. J.C., and S. Albert. In Press. A century of bird band recoveries in Venezuela yields insights into migratory connectivity. *Southwestern Naturalist*.

Floyd, H., and P. Pyle. 2021. Variation in winter dowitchers. *Birding* 52(8):48-58.

Floyd, T., and P. Pyle. 2020. In praise of the rectrix: feather birding with a point-and-shoot. *Birding* 52(4):42-45.

Graves, T.A., W.M. Janousek, S.M. Gaulke, A.C. Nicholas, D.A. Keinath, C.M. Bell, S. Cannings, R.G. Hatfield, J.M. Heron, J.B. Koch, H.L. Loffland, L.L. Richardson, A.T. Rohde, J. Rykken, J.P. Strange, L.M. Tronstad, and C.S. Sheffield. 2020. Western bumble bee: declines in the continental United States and range-wide information gaps. *Ecosphere* 11:e03141.

Guallar, S., R. Rueda-Hernández, and P. Pyle. 2021. Evolution of the preformative molt in *Cardinalidae* correlates with transitions from forest to open habitats. *Ornithology* 138:1–14.

Hudon, J., and P. Pyle. In Press. Diet-related plumage erythrism in the Western Tanager and other western North American birds. *Western Birds*.

Jackson, B.K., S.L. Stock, L.S. Harris, J.M. Szewczak, L.N. Schofield, and M.A. Desrosiers. 2020. River food chains lead to riparian bats and birds in two mid-order rivers. *Ecosphere* 11:e03148.

Kiat, Y., P. Pyle, A. Balaban, and J.K. O'Connor. 2021. Reinterpretation of purported molting evidence in the Thermopolis Archaeopteryx. *Communications Biology* 4:837.

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Loverin, J.K., A.N. Stillman, R.B. Siegel, R.L. Wilkerson, M. Johnson, and M.W. Tingley. 2021. Nestling provisioning behavior of Black-backed Woodpeckers in post-fire forest. *The Journal of Field Ornithology* 92:273-283.

Moisan Perrier, J., D. Kneeshaw, M.H. St-Laurent, P. Pyle, and M.A. Villard. 2021. Budworm-linked warblers as early indicators of defoliation by spruce budworm: a field study. *Ecological Indicators* 125:107543.

Summer Tanager
Photograph by Doug Greenberg

Pandolfino, E. R. and C. Ray. 2020. Comparison of the songs of Cassin's and Plumbeous Vireos. *Western Birds* 51:293-306.

Pyle, P. 2020. Molt, age, and identification of the Masked and Nazca Boobies in California. *Western Birds* 51:129–149.

Pyle, P. 2020. Aging and sexing Cedar Waxwings. *Birding* 52(1):22-23.

Pyle, P. 2020. The molts and plumages of the Bobolink. *Birding* 52(1):61-62. Second in a two-part article with Rick Wright.

Pyle, P. 2020. A Black White Noddy. *Birding* 52(2):59-60.

Pyle, P. 2020. Further musings on an unusual solitaire: was it a returning bird? *Birding* 52(3):60-62.

Pyle, P. 2021. Examination of digital images from Macaulay Library to determine avian molt strategies: a case study on molts and plumages in eight species of North American hummingbirds. *bioRxiv* 2021.02.03.429637

Pyle, P. 2021. The plumages of the Pileated Woodpecker. *Birding* 52(8):26-33.

Pyle, P., K.R. Foster, C.M. Godwin, D.R. Kaschube, and J.F. Saracco. 2020. Yearling proportion correlates with habitat structure in a boreal forest landbird community. *PeerJ* 8:e8898.

Pyle, P., M. Gahbauer, E.I. Johnson, T.B. Ryder, and J.D. Wolfe. 2021. Application of a global age-coding system ("WRP"), based on molts and plumages, for use in demographic and other studies of birds. *American Ornithology* 139:1-12.

Pyle, P., M. Gustafson, T. Johnson, A.W. Kratter, A. Lang, M.W. Lockwood, K. Nelson, and D. Sibley. 2020. 31st report of the ABA Checklist Committee, 2020. *North American Birds* 71(2):8-13.

Pyle, P., M. Gustafson, T. Johnson, A.W. Kratter, A. Lang, M.W. Lockwood, K. Nelson, and D. Sibley. 2021. 32nd report of the ABA Checklist Committee, 2021. *North American Birds*: in press.

Ray, C., D.R. Cluck, R.L. Wilkerson, R.B. Siegel, A.M. White, G.L. Tarbill, S.C. Sawyer, and C.A. Howell. 2020. Chapter 9 - Woodboring beetle colonization of conifers killed by fire and bark beetles: implications for forest restoration and Black-backed Woodpecker conservation. Pages 179-186 in: K.M. Potter and B.L. Conkling, eds. Forest health monitoring: national status, trends, and analysis 2019. *U.S.D.A. Forest Service General Technical Report SRS-250*.

Ray, C., R.M. Rochefort, J.I. Ransom, J.C.B. Nesmith, S.A. Haultain, T.D. Schaming, J.R. Boetsch, M.L. Holmgren, R.L. Wilkerson, and R.B. Siegel. 2020. Assessing trends and vulnerabilities in the mutualism between whitebark pine (*Pinus albicaulis*) and Clark's nutcracker (*Nucifraga columbiana*) in national parks of the Sierra-Cascade region. *PlosONE* 2020:1-25.

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Saracco, J.F., and M. Rubenstein. 2020. Integrating broad-scale data to assess demographic and climatic contributions to population change in a declining songbird. *Ecology and Evolution* 10:1804-1816.

Saracco, J.F., L. Helton, J. Liske-Clark, and P. Radley. 2020. Recent dynamics and trends of landbird populations on Saipan, Northern Mariana Islands. *Pacific Science* 74:319-329.

Schofield, L.N., S.A. Eyes, R.B. Siegel, and S.L. Stock. 2020. Habitat selection by spotted owls after a megafire in Yosemite National Park. *Forest Ecology and Management* 478:118511.

Stillman, A.N., T.J. Lorenz, P.C. Fischer, Siegel, R.B., R.L. Wilkerson, M. Johnson, and M.W. Tingley. 2021. Juvenile survival of a burned forest specialist in response to variation in fire characteristics. *Journal of Animal Ecology* 90:1317-1327.

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Partner Perspective

Jessie Schillaci
Red-cockaded Woodpecker Monitoring Program Coordinator, Fort Bragg, NC
Endangered Species Branch

During the 18 years I've spent as the Red-cockaded Woodpecker monitoring and non-game avian species program coordinator on Fort Bragg Military Installation, The Institute for Bird Populations has been integral in informing our efforts at migratory bird conservation.

Fort Bragg Endangered Species biologists rely on over two decades of IBP data, both from the MAPS program and from point count data collected on and off the Installation. IBP scientists use long-term datasets to model abundance and productivity of a variety of avian species throughout North America and compare them with local populations on Fort Bragg. Fort Bragg scientists can then monitor the effects of past and current management practices, such as fire frequency and seasonality, and their impact on bird communities.

For example, in the early 1980s, base land managers began to use prescribed fire to manage the forests for both the military troops, which need large brush-free areas to train, and wildlife. Thus began a gradual transformation of large areas of Fort Bragg back to the historic longleaf pine ecosystem—and a steady population increase in the Endangered Red-cockaded Woodpecker, a bird which relies on frequent fires to maintain its preferred habitat.

Our collaboration with IBP helps us more effectively incorporate bird habitat conservation into our land use planning. Evaluating long term trends in bird populations has led Fort Bragg habitat managers to ask additional science-based questions concerning different fire regimes, which we hope to address in the coming years with the help of IBP.

Above: Jessie Schillaci assisting a Gray Hawk research project in Harlingen, TX.

IBP is grateful to our many partners for helping to make our work possible.

Alberta Biodiversity Monitoring Institute, Canada
Amador Calaveras Consensus Group, CA
American Bird Conservancy
American Birding Association
American Rivers
Amigos de la Tierra
Asociación CAMBIO
Assateague Island National Seashore, MD
Association of Fish and Wildlife Agencies
Audubon Canyon Ranch, CA
Audubon Chapter of Minneapolis, MN
Avinet, Inc.
Bernice P. Bishop Museum, HI
Big Bluestem Audubon Society, IA
BIOMETEPE, Nicaragua
Birds Caribbean
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California Academy of Sciences
California Cooperative Ecosystem Studies Unit
California Department of Fish and Wildlife
California Dept. of Parks and Recreation, OHMV, Rec. Div.
Colorado State University
CONABIO, Mexico
Cornell Lab of Ornithology, NY
Costa Rica Bird Observatories
Council of Ohio Audubon Chapters
Devils Postpile National Monument, CA
Eastern Bird Banding Association
Eco Kaban, Mexico
Eldorado National Forest, CA
Environment and Climate Change, Canada
Evanston North Shore Bird Club, IL
Evansville Audubon Society, IN
Farallon Marine Sanctuary Association, CA
Fundacion Ara Macao, Venezuela
Green Mountain Audubon Society
Gulf of the Farallones Nat. Marine Sanctuary, CA
Humboldt-Toiyabe National Forest, CA/NV
Inland Bird Banding Association
Kalamazoo Nature Center, MI
Klamath Bird Observatory, OR
Knobloch Family Foundation
Lewis and Clark National Historical Park, OR/WA
March Conservation Fund, CA
Minneapolis Audubon, MN
Mount Rainier National Park, WA
Museum of Vertebrate Zoology, UC Berkeley, CA
National Audubon Society
National Ecological Observatory Network Program
National Park Service Southern Colorado Plateau Inventory & Monitoring Network
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North American Bird Conservation Initiative
North Cascades National Park, WA
Olympic National Park, WA
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Osa Birds, Costa Rica
Owl Moon Environmental, Inc., Canada
Partners in Flight
Plumas National Forest, CA
Point Blue Conservation Science, CA
Reserva El Jaguar, Nicaragua
Robert Cooper Audubon Society, IN
Runaway Creek Nature Reserve, Belize
Saint Paul, MN Audubon Society
San Juan Island National Historical Park, WA
SELVA, Colombia
Sequoia and Kings Canyon National Parks, CA
Sierra Foothills Audubon Society, CA
Slate Creek Press, CA
Southern Sierra Research Station, CA
St. Paul Audubon, MN
Stanislaus National Forest, CA
Stillwater Sciences, CA
The Sierra Meadows Partnership, CA
Tierra de Aves, Mexico
Tracy Aviary, UT
Truckee Donner Land Trust, CA
Truckee River Watershed Council, CA
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