The INSTITUTE for BIRD POPULATIONS

2023 Annual Report

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On the Cover: A portion of an illustration by Lauren Helton from Peter Pyle's paper on the evolution of molt strategies that is in press at the *Journal of Avian Biology* (see page 18.) The image depicts a portion of the bird evolutionary tree with the branch colors indicating different molt strategies.

IBP's year-round staff at Taft Point in Yosemite National Park. Standing from L to R: Lynn Schofield, Harry Jones, Mandy Holmgren, Peter Pyle, Ron Taylor (Biologist Emeritus), Lauren Helton, Bob Wilkerson, Rodney Siegel, Helen Loffland, Lee Bryant, Steve Albert, Emma Cox, Danielle Kaschube, Jerry Cole, Ramiro Aragon. Crouching from L to R: Jim Saracco, Mary Clapp, Meredith Walker. Missing and sorely missed: Chris Ray, Deborah Mills (not shown.)

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!

Please consider a tax-deductible contribution, and multiplying the impact by encouraging friends and family to support IBP. Use the donation button below, donate through birdpop.org, or send a check to IBP, P.O. Box 518, Petaluma, CA 94953. Thank you!

DONATE

A Message from IBP's Executive Director

In October, IBP restored a long dormant tradition– gathering together our year-round staff, who are spread across 12 states, for an in-person retreat to share our science, build community, and renew enthusiasm for our work. We did this annually for more than two decades until the pandemic scuttled things.

This retreat was extra special because we held it in Yosemite National Park (see photo, page 2), a place of stunning natural beauty and high bird diversity, where IBP's founder, Dave DeSante, refined a standardized bird banding protocol in the late 1980s. That work not only launched the MAPS program, it also established our close collaboration with Yosemite scientists and land managers that endures today. We have continued to operate MAPS stations to monitor bird populations at meadows across an elevational gradient within Yosemite, and have augmented that effort with annual back-country point counts that extend interpretation of our findings across nearly the entire park. We have used data from these and other efforts in collaboration with park staff to assess effects of climate change, fire, and habitat restoration on birds. We have also conducted more targeted conservation-oriented research on numerous individual bird species in the park, including Spotted Owl, Great Gray Owl, Clark's Nutcracker, Willow Flycatcher, Black-headed Grosbeak, and Hermit Warbler – with the aim of providing park managers the best possible information for managing habitat and conserving bird populations into the future.

The retreat left me humbled and amazed at how much a small staff of incredibly dedicated people can accomplish. Even as IBP has maintained close ties to Yosemite over the years, we have expanded our focus to many other geographic areas and ecosystems. In 2023, we collaborated with land managers to tackle conservation challenges from arctic tundra in Alaska to steamy, lowland rainforest in Belize. These diverse, locally-oriented efforts were conducted even as we continued to maintain, modernize, and grow the long-term, geographically extensive MAPS and MoSI programs.

If you value our efforts on behalf of birds, please consider collaborating with us on research and conservation, joining an IBP seasonal bird survey crew, or making a donation to support our work.

In friendship,

Rodney Siegel, Ph.D.

Rodney Siegel in arctic Alaska where IBP is partnering with the Bureau of Land Management to study and conserve Bank Swallows.

IBP Brings the Science to Adaptive Management

The adaptive management process is central to modern wildlife conservation, and science is critical to adaptive management. There are generally considered to be six steps in the adaptive management: assess the problem, design a plan, implement it, then monitor, evaluate, and adjust it. Most of this requires a strong foundation of science. Land managers need an unbiased, well-thought-out sampling design and accurate measurements. Using established and peer-reviewed statistical techniques help detect patterns in the data. And informed interpretation can answer the question, "What do these patterns tell us?" Monitoring the effects of a plan also requires solid data and its analysis, and evaluating whether the plan is working requires informed interpretation.

When land managers at the US Forest Service, the National Park Service, and California State Parks use adaptive management to conserve wildlife on their properties, they often turn to IBP to bring science to the process. With decades of experience and cutting-edge techniques, we gather the data, analyze it with rigor, and interpret the results to help ensure that wildlife conservation on these lands is effective, informed, and adapting to changing circumstances. Learn more below about some of the many projects in which IBP is collaborating with land managers to make conservation work.

The Institute for Bird Populations enables science-based conservation of species and habitats by studying the abundance, demography, and ecology of birds and other wildlife.

SERAL Project

The Social and Ecological Resilience Across the Landscape (SERAL) project is a forest health initiative on the Stanislaus National Forest in California that is using mechanical thinning and prescribed fire to reduce the risk of stand-replacing megafires and protect late seral wildlife habitat and people. The project is intended to benefit wildlife in the long term, but in the short term, forest treatments could be disruptive or harmful. IBP is conducting surveys for Spotted Owls, Great Gray Owls, and American (Northern) Goshawks in the project area so that the Forest Service can avoid disturbing these raptors when implementing forest treatments. We are also assessing the impacts of treatments on these species, providing the information needed for successful adaptive management and raptor conservation.

American Goshawk. Image: © Quinn Diaz (Instagram: @quinndiaz16) Used with permission.

Wildlife Monitoring on Humboldt-Toiyabe National Forest

In partnership with Forest Service personnel, IBP is conducting surveys for Spotted Owl, American (formerly Northern) Goshawk, and Flammulated Owl on the Humboldt-Toiyabe National Forest in Nevada and California. Our methods include in-person surveys and passive acoustic monitoring using ARUs (Automated Recording Units) in difficult-to-access locations. We will also be using the ARU data to assess whether other rare wildlife, including gray wolves, may be present on the landscape, as well as to describe overall bird communities.

Flammulated Owl
Image: Julio Mulero

We collaborate locally, nationally, and globally with government agencies, universities, and NGOs to assess the effects of climate change, land management actions, and other ecological stressors on bird populations, and prescribe practical solutions to conservation challenges.

Long-term Bird and Pollinator Response to Forest Management

Most research on the impact of forest treatments on birds focuses on short-term (<10 years) effects. IBP is partnering with with the US Forest Service to study longer-term effects by assessing bird and pollinator populations on the Goosenest Adaptive Management Area, a large-scale ecological research project operated by the Forest Service on Klamath National Forest in northern California. Mechanical thinning and prescribed fire treatments were implemented at the site twenty years ago. Our work, in preparation for publication now, showed that the abundance of some bird species increased in treated areas, while others decreased; but the number of bird species (community richness) was higher in treated areas vs. untreated areas two decades post-treatment; insect pollinator abundance and species richness also responded positively to forest treatments. *Right: Dark-eyed Junco Image: Becky Matsubara*

Meadow and Aspen Restoration

In the last few decades, land managers in the Sierra Nevada have been working to restore the region's riparian habitat, including wet montane meadows and deciduous woodlands. For many years, IBP has been monitoring birds, and sometimes bees, to help gauge the success of this work. One of our newest projects includes conducting pre-restoration assessments of the health and biodiversity of aspen stands in the Upper Mokelumne River watershed. Data we gather will be used in designing restoration plans for 300 acres of priority riparian habitat. In 2023 we also began long-term monitoring of birds and bumble bees in meadows near South Lake Tahoe and Meyers, California, to assess their responses to meadow restoration efforts.

Hunt's Bumblebees
Image: Amy Hogan

Our Science Makes Conservation Work.

Great Gray Owls in Yosemite National Park

Each year, Yosemite National Park is visited by more than 3.5 million people, the majority of whom travel through the park in motor vehicles. Sadly, collisions with cars is a leading cause of death for Great Gray Owls in the park. IBP is working with Yosemite to track the movements of Great Gray Owls using GPS transmitters to better understand owl use of roadside habitat and help find ways to reduce vehicle strikes. We are also collecting data that will help land managers ensure that meadow restoration efforts in the park create good foraging and roosting habitat for the owls. *Image: Frank D Lospalluto*

Bank Swallows in Northern Alaska

IBP is working with the Bureau of Land Management in Alaska to better understand habitat use and habitat needs of Bank Swallows, which are nesting in gravel pits created during maintenance of the Dalton Highway. The highway runs from Livengood, Alaska up to Deadhorse, on Prudhoe Bay. The study is also assessing the breeding phenology and diversity of the overall bird community along the highway.

Image: Shawn McCready

Bad Timing:

As Spring Comes Earlier Due to Global Warming, Breeding Songbirds Aren't Adjusting Fast Enough.

A new study using data from the MAPS program estimates that songbirds could produce 12% fewer young by the end of the century.

White-eyed Vireo
Image: Kelly Colgan Azar

To be successful in many human endeavors–comedy, real estate, warfare–you have to have good timing. This holds true for most living things. Critical events in an organism's lifecycle must be timed so that they occur when weather conditions are suitable and food or other necessary resources are available. Plants leaf out in the spring once the likelihood of a hard frost has dropped. Insects emerge in time to take advantage of the plants' new leaves and flowing sap. In biology, the timing of seasonal or cyclical events in an organism's lifecycle is called "phenology."

But sometimes an organism's timing is off and a "phenological mismatch" occurs. Scientists have hypothesized that climate change, which is leading to earlier springs, may cause more phenological mismatches because different organisms may shift their life cycles to rapidly changing conditions at different rates. They also hypothesize that increased mismatch could have possibly dire consequences. For instance, if a flycatcher arrives on the breeding grounds before insects emerge, she may starve. If she arrives too late, she may miss out on the early spring glut of bugs, and, with less food and less time, may produce fewer offspring.

Prothonotary Warbler carrying nesting material peeks out of its nest hole. Image: Andy Reago and Chrissy McClarren

Despite ample real-life evidence of shifts in phenology, and theoretical support for the potential detrimental consequences of phenological mismatch, there have been only a few documented examples of the consequences of mismatch in the wild. Widespread evidence of these consequences over broad groups of species on large geographic scales was lacking, likely because it's hard to test these hypotheses without long-term, multi-species datasets gathered across broad geographic areas–and there are very few datasets that meet those criteria. But in a paper published this year in the *Proceedings of the National Academy of Sciences*, Dr. Casey Youngflesh of Michigan State University, along with colleagues from IBP, UCLA, and three other universities used data from the Monitoring Avian Productivity and Survivorship (MAPS) bird banding program, coordinated by IBP, to examine phenological mismatch between breeding songbirds and spring "green-up" (when deciduous plants leaf out).

continued

Long distance migrants, such as Swainson's Thrushes, did not adjust their breeding phenology to earlier springs as well as resident species or species with shorter migrations. Image: Andy Reago and Chrissy McClarren

The researchers found that spring is indeed occurring earlier than it did in past decades, and that birds are responding to this shift in timing, but not quickly enough. For every 1 day earlier that spring arrives, the timing of bird breeding changes by less than 1/3 of a day. For migratory species, arrival on the breeding grounds was slower to adjust to earlier springs than breeding itself. The species that best matched their breeding to changes in the arrival of spring tended to be resident species or shorter-distance migrants.

Yellow-Rumped Warbler with fly Image: Mark Watson

This phenological mismatch has consequences. The researchers showed that, when birds experienced larger phenological mismatches, they produced fewer young. This loss of productivity could have significant consequences for bird populations.

"Based on projected climate change, the number of young that birds produce could decline by about 12% by the end of the century," says Youngflesh, "which is problematic given that many of these North American species have already undergone substantial declines over the last 50 years."

Why does phenological mismatch occur? It's possible that different organisms use different cues to time life cycle events. For instance, temperate zone plants and the insects that feed on them typically rely on soil and air temperature as a prompt for when to "green up" and when to "eat up." Many birds, especially migratory species, use a variety of other cues, including day length, to time their migrations. Migratory species cannot assess temperature, food resources, or other conditions on the breeding grounds before they get there, so proxy cues such as lengthening days, or conditions on the non-breeding grounds, are what send them north. If these indicators are no longer accurate, there is a potential for birds to arrive and start breeding later in relation to spring green-up and the accompanying glut of insects. Like late partygoers who arrive after all the best snacks are gone, these birds could miss out on important food resources that fuel their reproduction, especially because changes in the timing of the onset of spring conditions may be happening faster than birds can respond to them.

In the future, the researchers would like to examine the relationship between bird and insect phenology. Unfortunately, data on insects are not yet available at the same scales as that for birds. This study presents the broadest-scale evidence yet of the demographic impacts of phenological mismatch due to climate change and the MAPS program played a critical role, says Youngflesh:

> *There are a number of great data resources available for birds. But MAPS is the only one where we can get demographic information at such broad spatial and taxonomic scales and over such a long period of time. Because ecological systems are so complicated it's very important to have large amounts of data that cover the variation that exists over space/time/ across species.*

Plumbeous Vireo. Image: John Breitsch

These insights into the impacts of climate change on breeding songbirds are only possible thanks to the thousands of dedicated MAPS program bird banders who had faith that their years of study, pre-dawn wake-ups, attention to detail, and meticulous record keeping would eventually build a dataset that would allow researchers to answer some of the most important questions in bird conservation.

Sneak Preview: Preserving Giant Sequoias and Birds in Sequoia and Kings Canyon National Parks

In recent years, we have seen shockingly heavy losses of ancient giant sequoias due to wildfires across their range. In response, the NPS is planning and implementing prescribed fires around giant sequoia groves in Sequoia and Kings Canyon National Parks to increase fire resilience.

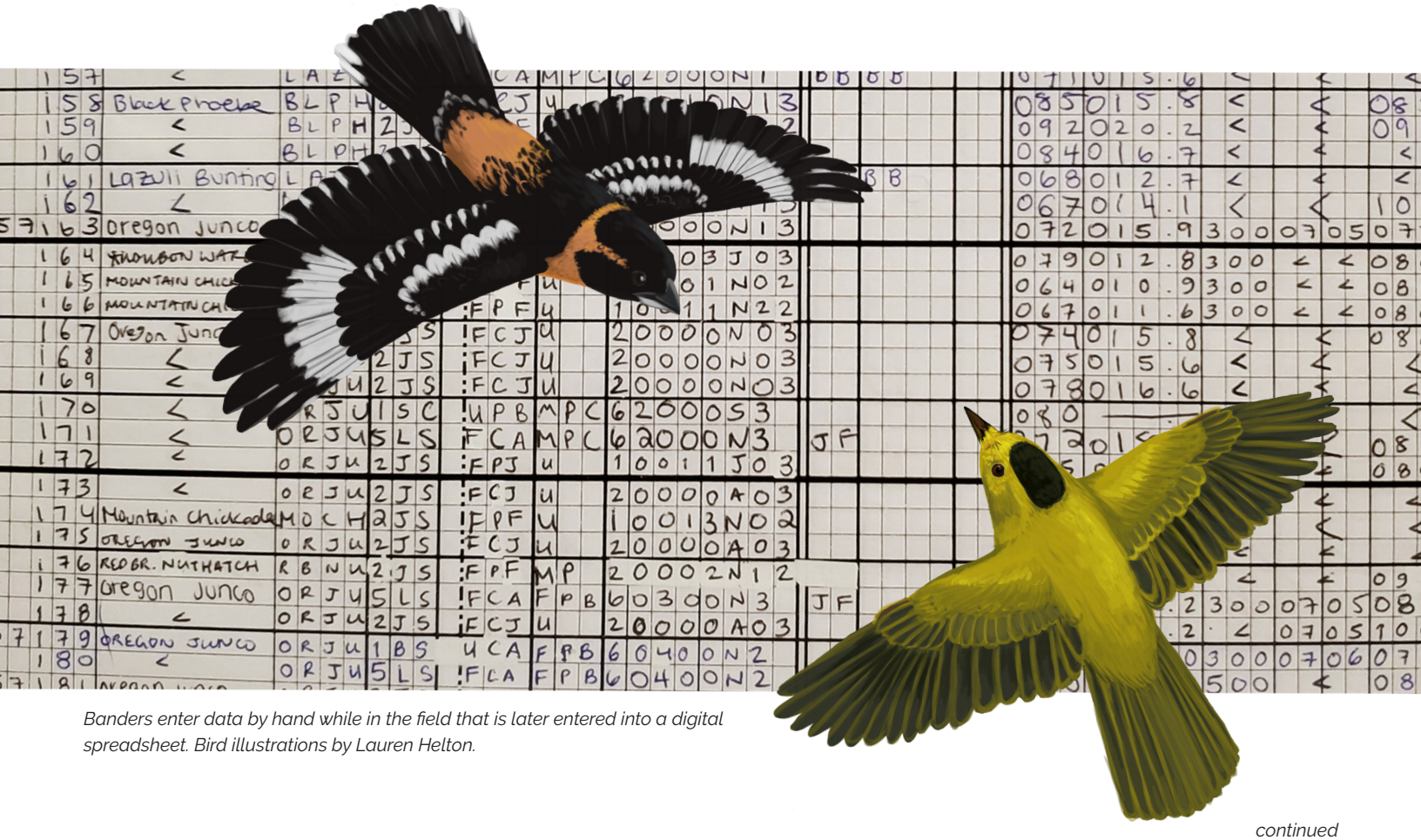
The goal of these prescribed burns is to reduce fuel loads so that future fires are less likely to extend into the canopy and kill the big trees. IBP's role (with newly hired biologist Lee Bryant in charge of the project) is a) to search for understory bird nests in and around the groves just prior to the prescribed fires so that the timing and spatial extent of the prescribed burns can be adjusted to protect the nests, and b) to capitalize on this opportunity to study the ecology of birds in giant sequoia groves, where rapid changes are occurring due to a changing fire regime that stems, in part, from anthropogenic climate change.

IBP Creates New Tools to Aid Bird Conservation

This year, IBP released two new tools designed to get our data and analyses into the hands of land managers and researchers! The first is the MAPS Data Exploration Tool, created to make the MAPS database more accessible and the MAPS program more impactful. The second is a decision support tool housed on IBP's website that land managers tasked with making forest management decisions in the critical period soon after a fire can use to better ensure habitat protection for Black-backed Woodpeckers.

The MAPS database is a unique and valuable scientific resource consisting of bird demographic and physical condition records spanning 33 years, and counting. We wanted to make it easier for researchers to use the data, and for everyone to understand how bird populations are faring. Within the MAPS Data Exploration Tool, researchers can use the "Maps Data Download" function to access nearly 2 million capture records. To date, more than 280 peer-reviewed research papers and reports using MAPS data have been published by IBP staff and outside researchers. We hope that this data download toll will encourage even more scientists to investigate bird conservation and other ecology questions using MAPS data.

Black-backed Woodpecker
Image: John Mangold



Banders enter data by hand while in the field that is later entered into a digital spreadsheet. Bird illustrations by Lauren Helton.

continued

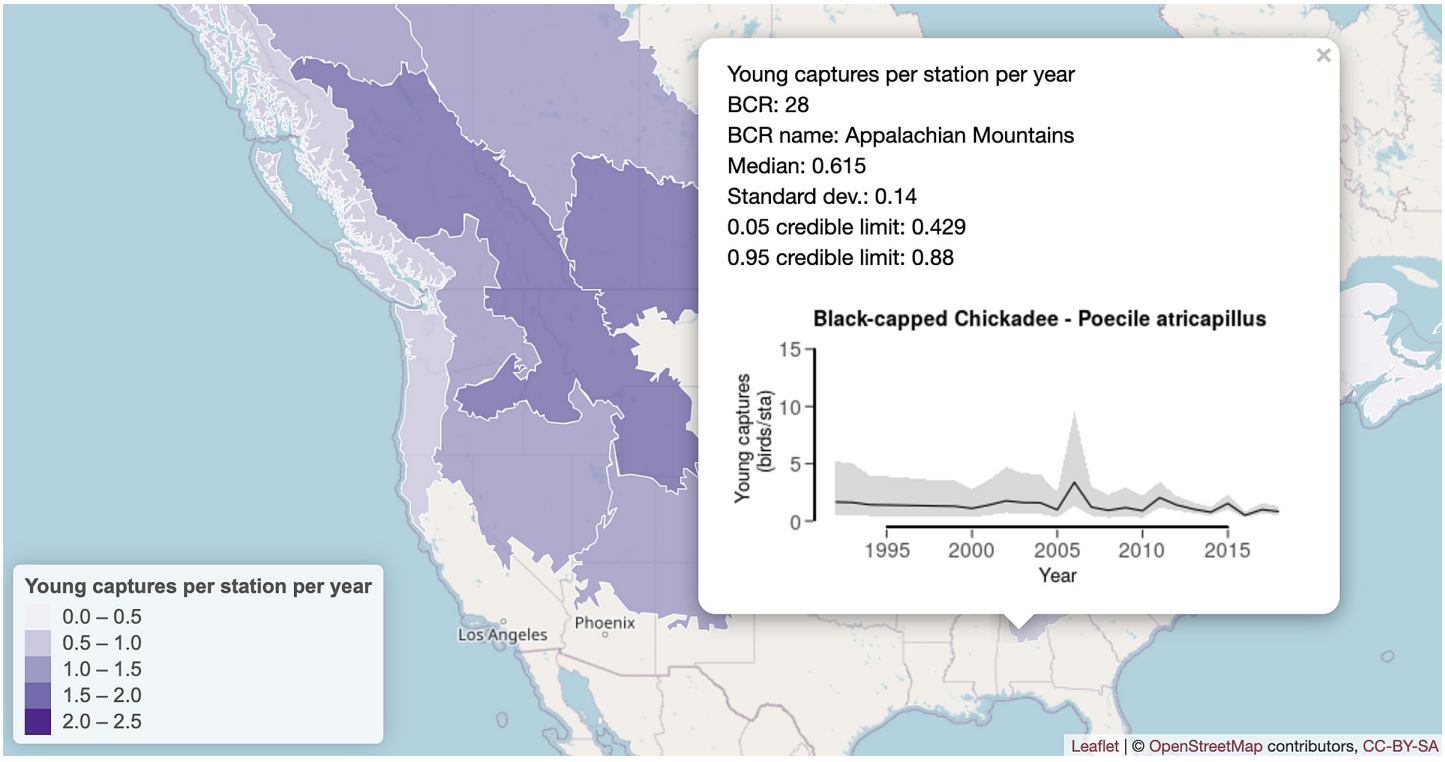
The "Explore MAPS Results" function in the MAPS Data Exploration Tool serves as an update to our Vital Rates of North American Landbirds website, which went online in 2015. Thirteen additional years of data and newer, improved statistical modeling techniques have been used to create region- and year-specific estimates of demographic parameters. The tool includes estimates or indices for 5 demographic parameters including adult abundance, productivity, and adult apparent survival for dozens of bird species. We are excited for you to dive in and explore the MAPS database with these new tools. The database is an amazing resource for bird conservation and it would not be possible without the hard work and sacrificed sleep of thousands of MAPS banders.

Our second tool is also derived from some of IBP's long-term research, this time on a single species- the Black-backed Woodpecker. For the past 15 years, IBP has studied and monitored woodpecker populations on national forests of California's Sierra Nevada mountains. The woodpecker is a post-fire specialist and the US Forest Service has designated it as a Management Indicator Species for burned forests across much of California. Over the last decade, our research in collaboration with IBP Research Associate and UCLA Professor Dr. Morgan Tingley and US Forest Service scientists has shown that the seasonal timing of fires and years since a fire can affect the use of burned areas by this species.

In addition, our recent findings demonstrate that pyrodiversity–in this instance defined as the heterogeneity of fire severity across the local landscape–also affects habitat use. We wanted to use these insights to improve the predictive models that land managers use to make management decisions in the critical period soon after a fire. In collaboration with the Tingley lab, we developed the **"Predicting Black-backed Woodpecker Abundance"** tool- an improved decision support tool that allows users to predict woodpecker abundance after fire simply by inputting a GIS shape file delineating the boundary of the fire and remote sensing data on the fire's severity. This tool will assist land managers in making post-fire forest management decisions that account for the potential effects on Black-backed Woodpeckers. It's very exciting to see over a decade of research directly improve a conservation tool that is now in the hands of land managers.

As scientists, we're naturally curious and excited to learn new things, but as conservationists, we're not satisfied with knowledge for knowledge's sake. At IBP, the goal of our science is to make conservation more effective, and these three new tools are great examples of putting science to work to help birds.

Below: A screen shot from the "Explore Maps Data" function in the MAPS Data Exploration Tools. It depicts the young captured per station per year for Black-capped Chickadees in the different bird conservation regions, as well as a graph showing the trends across years for all stations combined.



Bridging the Conservation Gap: New Grant Program Leverages MoSI Data for Conservation Action

Golden-hooded Tanager
Image: Andy Morffew

The Monitoring Overwinter Survival program (known by its Spanish acronym, MoSI) is one of the longest-running and most geographically extensive international networks of collaborative science in the Americas. Established and coordinated by IBP, the MoSI program's primary goal has been to provide non-breeding season demographic, morphometric, and physical condition data on Neotropical migratory and Neotropical resident birds in support of basic research and applied conservation.

In collaboration with the March Conservation Fund, we launched a program of grants during 2022/2023 to help MoSI operators implement direct conservation efforts. We provided grants of up to $10,000 to five MoSI station operators for projects that use MoSI data to improve conservation outcomes for birds. The five grantees included organizations in Mexico, Nicaragua, and Belize.

The Asociación Mexicana para la Conservación de las Aves y Sus Hábitats (AMCAH), Mexico, worked to strengthen protection of native habitats on Isla Contoy National Park, a small island just off the coast of the Yucatán Peninsula. They hired two community park rangers who protected beaches and coastal dunes to deter poaching and disturbance of the migratory and native birds nesting there. The rangers were trained to make observations on key species and their habitat use to further strengthen management and protection.

Círculo Interdisciplinario por la Naturaleza y la Comunidad A.C., (Chicatana), Mexico, worked with local communities in the state of Oaxaca to promote soil and vegetation conservation practices on coffee plantations and small farms in areas where the MoSI program is monitoring local bird populations.

With MoSI Conservation Grant funding, they engaged farmers to encourage sustainable management of agroecosystems that promote bird habitat and increased avian diversity, holding several workshops and environmental education classes throughout the region.

Plants ready for reforestation with the Richland Center-Santa Teresa Sister City Project.

The Kiekari Bird Reserve near Xico in the Mexican state of Veracruz, protects important cloud forest habitat. They used their MoSI Conservation Grant to conserve and restore cloud forest habitat by replanting native trees, constructing exclosures to eliminate livestock grazing in restored areas, and creating a native plant nursery to supply their reforestation efforts.

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The Richland Center-Santa Teresa Sister City Project was established to promote people-to-people relationships between Richland Center, Wisconsin, and the municipality of Santa Teresa, Nicaragua. Both communities have been active in the MoSI program for many years. With MoSI Conservation Grant funds, they improved understory forest conditions at the MoSI station and local farms in Santa Teresa in order to provide better habitat for resident and migratory birds; and reforest an area near the school in the community of El Papalón, engaging students and teachers to help with the work while providing hands-on lessons in conservation.

Painted Bunting is one of the many Neotropical migratory songbirds that spends the non-breeding season in Central America. This species will benefit directly from work carried out by at least three of our five partners.

Toucan Ridge Ecology and Education Society (TREES), Belize, a long-time MoSI cooperator, encourages the creation of social, environmental, and cultural networks by promoting partnerships within Belize and internationally. The group used their MoSI Conservation Grant to build local capacity for avian research through the recruitment of new bird banders within Belize. They improved the management of wetland, grassland, and orchard habitats surrounding the MoSI station, and conducted environmental education with local schools.

Northern Parula
Image: Kenneth Cole Schneider

New partnership helps the National Park Service understand climate change impacts on birds in the Southwest

Black-throated Sparrow
Image: Mick Thompson

In spring, the low-elevation grasslands and shrublands of the US Southwest ring with the tinkling songs of Black-throated Sparrows and Horned Larks, while in the mid-elevation pinyon pine and juniper woodlands Gray Vireos warble lazily and Juniper Titmice fire off their rapid syllables. In the cooler montane forests, Red-breasted Nuthatches sound their tiny horns, and Mountain Chickadees whistle fee-bee-bee. These species and others may have adapted to breed in one of the hottest and driest regions of North America, but they're in a hotspot of another kind as well.

The Southwest is also a climate change hotspot. The region's bird species are among the fastest declining in North America, according to a 2019 paper in the journal *Science*. As average temperatures rise and extreme heat waves become more common, precipitation is declining. For the last 23 years, the Southwest has been experiencing a "megadrought," the driest multi-year period in the region since the year 800 CE, driven in part by climate change.

The North American Monsoon, a significant precipitation phenomenon unique to the region is also being affected by climate change. The monsoon occurs from July through October, when shifting wind patterns bring moisture from the Pacific, Gulf of California, and Gulf of Mexico over the US Southwest and northwestern Mexico- leading to frequent rain and often violent thunderstorms. Scientists are still uncertain how climate change will affect the monsoon precipitation totals, but many studies predict that climate change will delay the monsoon, such that it starts later in the summer and ends in the early fall.

This climate change hot spot is also home to some of our most spectacular national parks and monuments. These protected lands are ideal places to study how climate change is affecting bird populations. The National Park Service's (NPS) Inventory and Monitoring Program offers an opportunity to do just that. In 2022, IBP began partnering with NPS on this program in the parks of the Southern Colorado Plateau region, much as we do in the Sierra Nevada and Pacific Northwest parks. IBP scientists are analyzing existing bird-monitoring datasets and are implementing a new program with greater spatial scope to monitor the abundance and distribution of birds in 6 parks: Canyon de Chelly National Monument, Grand Canyon National Park, Petrified Forest National Park, Wupatki National Monument, Mesa Verde National Park, and Bandelier National Monument.

Mountain Chickadee
Image: JN Stuart

In a soon-to-be-published study, IBP and NPS scientists led by Harry Jones analyzed Southwestern bird monitoring data collected in the parks between 2007 and 2018, using climate data to examine how drought and the timing of the North American Monsoon affect bird populations in the region. Drought can affect bird populations directly and indirectly. When coupled with high heat, drought can kill birds via dehydration and heat exhaustion. It can also reduce insect populations or alter plant communities, leading to loss of food resources, nesting sites, or habitat structure. Less is known about how the timing of the monsoon affects Southwestern birds. This late summer dose of precipitation leads to a boom in the insect population and food for millions of birds.

Scott's Oriole
Image: Mick Thompson

Many species use the post-breeding season spike in resources by migrating to this area to fuel their energetically demanding annual molt. Because the southwest's monsoon occurs when other parts of the western US are getting drier and their insect populations are declining, many species breeding in these regions migrate into the monsoon region, particularly northwestern Mexico and southeastern Arizona, to undergo molt before they continue onto their wintering grounds farther south (a phenomenon known as 'molt migration').

Jones and colleagues found that the effects of the drought on birds varied according to elevation. Birds in the higher elevation conifer forests seemed to benefit from drier years in the short term, likely due to earlier snowmelt which allowed them to start breeding earlier and possibly produce more young. However, over the longer term, many of these same species are declining, most likely due to habitat loss as drought exacerbates tree death and severe, stand-replacing fires. Dry years seemed to negatively affect lower elevation grassland birds most, likely because grass doesn't grow as tall or as dense in dry years which provides less cover for ground nests.

Less precipitation also means less insect prey to feed to nestlings. In contrast, later monsoons (which are predicted by many climate-change models) seemed to benefit grassland birds, possibly because fewer late summer nests were lost to due flooding and hypothermia caused by intense rainstorms. However, species that rely on the monsoon's food pulse to fuel their molt ('molt migrants') were negatively impacted by later monsoons compared to species that don't molt in the monsoon region, perhaps because of a mismatch between the timing of their molt and the monsoon's abundant resources.

This year, IBP field crews completed the second year of field surveys using the revised monitoring plan. We are also using ARUs (autonomous recording units) to explore the singing phenology of birds breeding in the region to make the timing of our field surveys more effective.

Climate change is bringing earlier spring weather and some bird species are breeding earlier in turn. Most species sing most frequently early in the breeding cycle when they are attracting a mate and establishing territories. This is also when they are most detectable in surveys, so if the breeding season and the peak of singing are getting earlier and the timing of surveys no longer matches that, they may need to start earlier to be most accurate at estimating the actual abundance of birds.

"Climate change in the Southwest is already affecting bird populations and, in many ways, we are entering a new era of climate- one in which we are only beginning to understand how wildlife are being affected," says project leader and Southwest Avian Ecologist Harry Jones. "Long-term monitoring is more important than ever to act as a warning system about the changes we are seeing, and to understand what is driving them."

“Global Weirding” Leads to a Wild-Weathered 2023 Field Season.

IBP field crews had to use some new tools like paddleboards and skis.

IBP Acoustic Avian Biologist, Jerry Cole, pulls equipment in a sled in March in western Colorado.

You know it was an unusual field season when Willow Flycatcher surveys in the montane meadows of the Sierra Nevada required a stand-up paddle board! IBP’s 2023 field season was a doozy thanks to some “global weirding” (the changes in weather patterns due to global warming that lead to extreme precipitation events and heat waves and other anomalies) creating challenging field conditions. Thankfully IBP’s field crews are tenacious and creative and were able to get the job done.

The year started off with snow and lots of it. IBP’s field sites in the Sierra and Colorado finally had a good snow pack after years of drought. April Snowpack in the Sierra Nevada’s national parks ranged from 244% to 326% of average, while snowpack in Gunnison River Basin in Colorado came in at about 160% of average. There was also record snow farther south on the Southern Colorado Plateau where IBP is monitoring bird populations in National Parks like Grand Canyon and Canyon de Chelly. Flagstaff AZ, had its second-highest snowpack on record.

This snow (and eventual river water) was badly needed but it definitely created some logistical hurdles. In early March, avalanches blocked the roads in and out of Lee Vining, CA where IBP Avian Acoustic Ecologist Mary Clapp lives, knocking out her water and power. Meanwhile, in Colorado, where IBP biologist Jerry Cole and our BLM partners were deploying autonomous recording units to listen for Gunnison Sage-Grouse, snow drifts foiled even a tracked UTV (utility task vehicle), requiring the crew to deploy the units using cross-country skis and pulling their equipment in sleds.

Mary Clapp and friends pose against the snow wall along the road to Tioga Pass near Yosemite in mid-June. Image: Jess Malish.

Snow in the Sierra Nevada stuck around well into the start of field work for our owl crews. When Ramiro Aragon's Spotted Owl crew arrived at the field house in Twain Harte, CA where they would be living for the season they practically had to dig a tunnel to the door. Field work for most of our projects in the Sierra was delayed for at least a couple of weeks because roads were blocked by snow or downed trees. IBP operates 6 MAPS bird banding stations in Yosemite National Park, one of which opened late and two of which did not operate this year at all due to lingering snow.

Closure of Big Oak Flat Road after it was washed out by snowmelt made travel between some banding stations a multi-hour trip around the park rather than a quick couple-mile drive.

Near Lee Vining, where Mary Clapp lives, the road through Tioga Pass into Yosemite National Park was not cleared of snow-related hazards and opened until July 22, the latest such opening since the route was established in 1915. Likewise, several of the high elevation sites in the Sierra region national parks where we typically survey birds were still inaccessible in late July, requiring a readjustment of the survey design.

All that snow eventually melts and runs downhill which lead to unusually wet conditions for the field crews. In the Southwest, snowmelt flooded Canyon de Chelly and crew members had to do their surveys wading through knee to thigh deep water in some places. One upside: "wading through ice-cold meltwater does wake you up quickly!" said project leader and IBP's Southwest Avian Ecologist Harry Jones.

The view from Emma Cox's stand-up paddle board while she did meadow bird point count surveys near Truckee, CA.

Snowmelt also posed challenges for our crews surveying birds in montane meadows in the Sierra Nevada. For many years the meadows have been abnormally dry due to drought and stream channelization, but this year formerly small creeks turned into raging streams that necessitated long detours to access field sites. Early in the season, many meadows morphed into temporary ponds too deep to wade through. So IBP biologist Emma Cox and her crew conducted bird surveys on stand-up paddle boards. (Surveying for birds while balancing on a drifting paddle board requires elite binocular skills.)

Later in the season, when most of our fieldwork was done, the weirdness continued. California saw its first tropical storm in almost 30 years! And in the Southwest, the monsoon rains on the Southern Colorado Plateau arrived late. That didn't affect our bird survey crew there this year, but it may affect the monitoring results next year. (See "New Partnership" page 13.)

We're thankful for our determined and resourceful field crew members–and the much needed precipitation. In the last decade or so, most of our field challenges have been due to wildfire and smoke. Not so this year! Let's see what the 2024 field season brings–we may have to make some unusual additions to our equipment lists!

Peter Pyle's Molt Studies Go Global

IBP Biologist Peter Pyle, one of the world's experts on molt, always has many ongoing molt investigations, but two of his current projects have a global reach: revising the plumages and molts sections for Cornell Lab of Ornithology's Birds of the World website, and authoring a paper on molt evolution for the *Journal of Avian Biology*.

Streaked Spiderhunter. © Thitiphon Wongkalasin | Macaulay Library at the Cornell Lab of Ornithology (ML607123131)

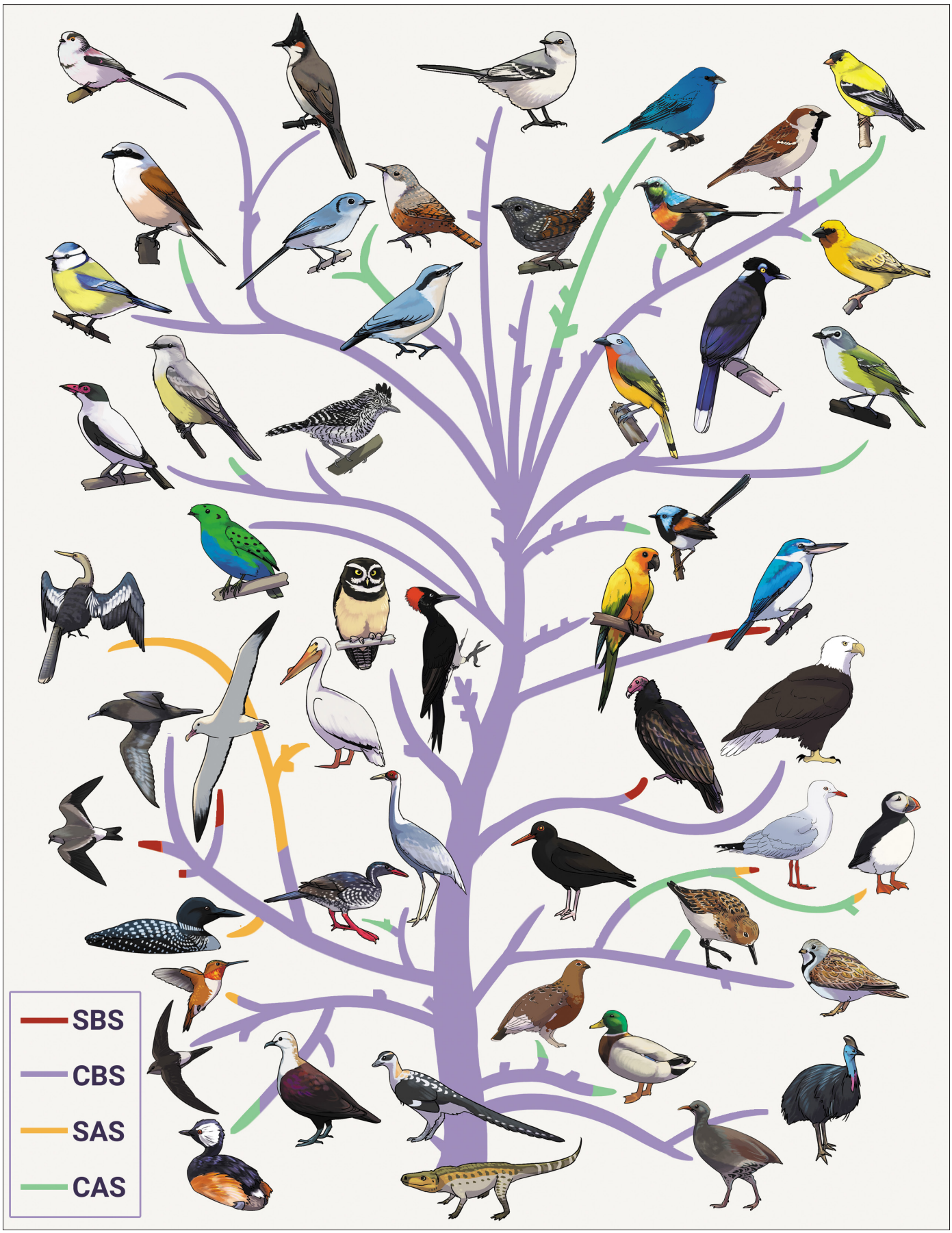
If you were a bird enthusiast way back in the paper era, you may remember the Birds of North America (BNA)–a series of printed species accounts by different experts with, unfortunately, various takes on molt terminology that led to inconsistency. Shortly after the Cornell Lab of Ornithology took BNA online, in 2004, the editor of the series, Alan Poole, asked Pyle to revise and standardize the "Plumages, Molts and Structure" sections for the 760 North American species as they were also being revised by the species experts. Then, in 2020, when BNA was incorporated into Birds of the World–which includes over 10,000 species accounts–Pyle went along for the ride and is updating molts and plumage descriptions for species across the globe, most of which have little published information to guide him.

Pyle has relied primarily on physical specimens from the California Academy of Sciences, Museum of Vertebrate Zoology, and other museum collections, but now is increasingly examining digital images from Cornell's Macaulay Library to inform his molt descriptions. He has championed the use of photos for studying molt for many years, notably in a 2022 paper on hummingbirds in *The Wilson Journal of Ornithology*. "It's gratifying to see how many birders, naturalists, and photographers are out gathering images from all over the world. Even little-known species can have dozens or hundreds of images. Fun species that I've worked on lately, with very little known about molts and plumages include Zanzibar Boubou, New Zealand Fernbird, Horned Screamer, Streaked Spiderhunter [see photo], and dozens of others."

Pyle is a staunch advocate for standardizing the global terminology around molts and plumages to that of the Humphrey-Parkes (H-P) system, which bases terminology on the evolution of molt rather than its timing and/or location relative to breeding (the "life-cycle system"). To help people better appreciate the H-P system, Pyle and others wrote a perspective paper for the *Journal of Avian Biology* that illustrates how molt strategies may have evolved along all avian lineages.

You can see a portion of an illustration from that paper on the cover of this report and the illustration in its entirety on page 19, depicting the bird "family tree" with the molt strategies mapped onto it. "Once one envisions the evolutionary bases of H-P, which can be difficult to do for those of us who grew up on the life-cycle system, the categorization and study of molts becomes much less confusing, much more satisfying, and actually rather enjoyable."

Horned Screamer. © Holmes Pantoja | Macaulay Library at the Cornell Lab of Ornithology (ML601858081)



The evolutionary tree of birds. Different branch colors indicate different molt strategies (see legend.) Legend Abbreviations: SBS= Simple Basic Strategy, CBS= Complex Basic Strategy, SAS= Simple Alternate Strategy, and CAS= Complex Alternate Strategy. Pyle et al. In Press. Moult Terminology: envisioning an evolutionary approach. *Journal of Avian Biology*. Illustration: Lauren Helton

View from the Field: Melissa Marshall, IBP Seasonal Biologist

During the summer, my alarm is set to wake me well before first light and, even though I'm craving a little more sleep, there is one thing that is always worth waking up for: the dawn chorus. It is a uniquely beautiful experience to hear the forest wake up in the morning, and I'm lucky enough to witness that every day for my job.

I started working on the Pacific Northwest Parks Avian Monitoring Crew in 2021 and, before my first season was even half over, I knew I wanted to return. What's better than spending your summers backpacking and birding? Don't get me wrong, aspects of the job can be physically and mentally challenging, but I've learned to appreciate those challenges because each one has taught me new lessons that help me grow. And it's hard to be dissatisfied with your job when you're working in some of the most picturesque locations in North America.

One of my favorite parts of the point count crew is that it's a never-ending learning experience. It's impossible to feel bored as a birder because there will always be more calls to learn, unusual songs to decipher, and (what feels like) an infinite number of subtle field marks to study. My supervisor, IBP Biologist Mandy Holmgren, is a wealth of knowledge about birds and the Pacific Northwest in general, and I'm also surrounded by incredible coworkers who are passionate about plants, insects, mammals, and national park cultural history. Each year I try to be a sponge and absorb as much of that knowledge as I can.

The field season is exciting because so much is unknown. Will we see any new species in the park? How much snow will there be? What will my favorite transect be? It's impossible to predict, but I know I'll love each season from start to finish.

Melissa Marshall

A view of Mount Rainier, one of the national parks in the Pacific Northwest where Melissa has conducted bird surveys for IBP.

View from the Field: Sandy Liu, IBP Seasonal Biologist

I forgive the willow branch for smacking me in the face at five in the morning as I slosh out into the meadow, icy water parting reluctantly before me as it rushes over the crisp landscape. The flooded world around me is awash in more than just snowmelt. As I tread through Perazzo Meadow, the most breathtaking hues are borne over the mountains. Tumbling blossoms of pinks and purples. Stunning shoots of orange. Wings of pure gold. A Bald Eagle rises over my head, pulsing in and out of the splatter of colors strewn above. I want to cry.

No, I swear it wasn't the willow.

Getting to work in meadows at sunrise every morning is magnificent. The Song Sparrow's bouncing tune and raspy bark, the sweet slashes of the Yellow Warbler, the snipe's haunting winnow–every sound floods in a tumultuous grace, refusing to leave you long after you've moved on. And cutting through it all, the epic, glorious FITZ-BEW.

Blasting this absolute banger from Bluetooth speakers for 6 minutes on repeat was a real bonding experience for me and the Willow Flycatcher. Straining my ears for the slightest hint of response, heart leaping upon receiving one, my mornings swelled around the little olive-brown birds clinging proud and steadfast to their slices of this world.

I learned so much about birds and life from my crewmates over the two months I spent conducting point counts and Willow Flycatcher surveys. Their patience, camaraderie, and compassion meant the world to an undergrad from Minnesota without any survey experience, who, at any other organization, could have easily felt like a fish out of water. Every single person approached their lives and aspirations with a passion and genuine joy for the natural world that I will never forget. Whether it was a pristine mountain meadow or a Tahoe parking lot, there was something to be seen, appreciated, and remarked upon. Something to be cared about. Something to be respected.

Willow Flycatcher
Image: Dave Lewis

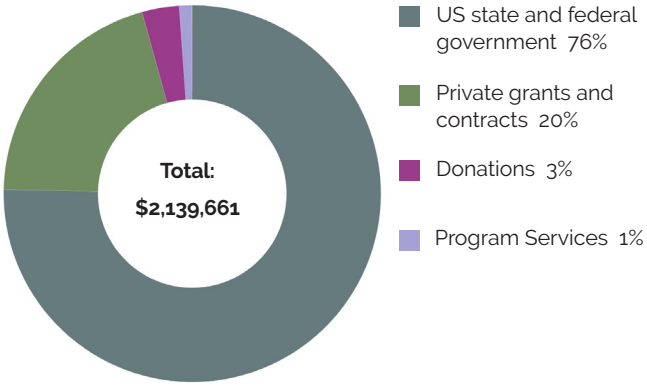
Sandy Liu

With each birdsong and call I drilled into my psyche, I learned a valuable lesson about how to give back to this world. (Thank you Emma and your effective, chocolate-driven training!) With each morning spent in icy mountain water, arms aching from paddle-board hauling, I gained an unshakeable connection to the countless species all around me. I went into this summer loving birds, and I went out of it loving them even more. I have the wonderful human beings of IBP and the never-ending marvels of Sierra Nevada birds to thank.

A male Anna's Hummingbird. This summer, our MAPS banders in Yosemite swabbed hummingbirds and other avian pollinators for pollens as part of a study by Cornell graduate student Carolyn Coyle. Image: Robin Gwen Agarwal

Fiscal Year 2022 Program Revenue & Expenditures

Program revenue and expenditures for 2022 are shown below.
IBP's fiscal year runs from January 1 to December 31.
Final figures for 2023 were not available at the time this report went to press.



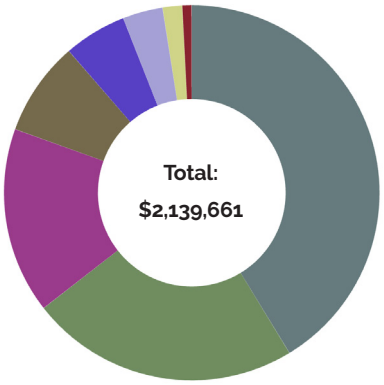
US state and federal government 76%

Private grants and contracts 20%

Donations 3%

Program Services 1%

2022 Revenue



Sierra Nevada Science and Conservation 41%

Program Administration 23%

MAPS Program 16%

Southwest Science & Conservation 8%

Pacific Northwest Science & Conservatioin 5%

MoSI Program 4%

Molt & Plumage Studies 2%

Bird Bander Training & On-Demand Analysis 1%

2022 Expenditures

Red-breasted Nuthatch
Image: Michael Klotz

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 2022-2023, IBP staff produced more than 40 scientific articles, most of which are available in our searchable database of more than 800 publications at birdpop.org.

Albert, S. and R. Plumer. 2023. Tribes and the Endangered Species Act. Pages 135-144 in: We Feel Our Place in Our Soul: Wildlife Stewardship on Tribal Lands, S. Hoagland and S. Albert, eds. Johns Hopkins University Press. Albert, S., and S. Hoagland. 2023. We feel our place in our soul: an introduction. Pages 5-11 in: *We Feel Our Place in Our Soul: Wildlife Stewardship on Tribal Lands,* S. Hoagland and S. Albert, eds. Johns Hopkins University Press.

Albert, S., C.J. Ralph, A. Hannuksela, W.H. Sakai, A. Nelson, C. Kondrat, M. Krzywicki, H. Garrod, C. Woolley, and C. Stuyck. 2022. Is the term "Bird Banding" obsolete? And what should we do about it? *North American Bird Bander* 47:199-200.

Albert, S., and R.B. Siegel. In Press. Improving the language of migratory bird science in North America. *Ornithological Applications*.

Bedoya-Durán, M.J., H. Jones, K. Malone, and Branch, L. 2023. Continuous forest at higher elevation plays a key role in maintaining bird and mammal diversity across an Andean coffee-growing landscape. *Ornithological Applications* 124:duac026.

Cole, J.S., N.L. Michel, S.A. Emerson, and R.B. Siegel. 2022. Automated bird sound classifications of long-duration recordings produce occupancy model outputs similar to manually annotated data. *Ornithological Applications* 124:1-15.

Desrosiers, M.A., L.N. Schofield, B.K. Jackson, and S.S. Stock. 2022. Low flows in a regulated river system are associated with reduced breeding bird abundance and diversity in Yosemite National Park, California. *River Research and Applications* 2022:1-17.

DeSaix, M.G., E.C. Anderson, C.M. Bossu, C.E. Rayne, T.M. Schweizer, N.J. Bayly, D.S. Narang, J.C. Hagelin, H.L. Gibbs, J.F. Saracco, T.W. Sherry, M.S. Webster, T.B. Smith, P.P. Marra, and K.C. Ruegg. In Press. Low-coverage whole genome sequencing for highly accurate population assignment: Mapping migratory connectivity in the American Redstart *(Setophaga ruticilla). Molecular Ecology.*

Fernández-Ordóñez, J.C., and S.K. Albert. 2023. A century of bird band recoveries in Venezuela yield insights into migratory ecology. *Southwestern Naturalist* 67:39-51.

Hickman, C., A. Carlisle, S. Hoagland, J. Thorstenson, and S. Albert. 2023. A suggested framework for the co-production of knowledge for wildlife conservation, and the critical importance of placing relationships first. Pages 229-247 in: *We Feel Our Place in Our Soul: Wildlife Stewardship on Tribal Lands,* S. Hoagland and S. Albert, eds. Johns Hopkins University Press.

Hudon, J., and P. Pyle. 2022. Diet-related plumage erythrism in the Western Tanager and other western North American Birds. *Western Birds* 53:30-42.

Jones, H.H., M. Juliana Bedoya-Durán, G.J. Colorado, G. Londoño, and S.K. Robinson. 2023. Dietary and habitat specialization, eye size, clutch size, and aerial lifestyle predict avian fragmentation sensitivity in an Andean biodiversity hotspot. *Biodiversity and Conservation* 10.1007/s10531-023-02682-z.

Jones, H., G.Z. Colorado, and S. Robinson. 2022. Widespread bird species show idiosyncratic declines in residual body mass to selective logging and edge effects in the Colombian Western Andes. *Ornithological Applications* 124:duac026.

Jones, H.H., C. Ray, M. Johnson, and R.B. Siegel. In Review. Habitat associations and molt strategy mediate the effects of drought and monsoon rain timing on breeding bird densities in the southwestern United States.

Kaschube, D.R., J.F. Saracco, C. Ray, C.M. Godwin, K.R. Foster, and P. Pyle. 2022. Minimum capture-recapture rates and years of banding station operations to obtain reliable adult annual survival estimates. *Journal of Field Ornithology* 93:7.

Kim, H., R.B. Siegel, J.L. Stephens, J.C. Hagar, B.J. Furnas, M.-S. Jeong, B.C McComb, and M.G. Betts. In Review. Annual migratory movement, apparent molt-migration, migration schedule and diffuse migratory connectivity of Hermit Warblers revealed from geolocator tracks.

Loffland, H.L., L.N. Schofield, R.B. Siegel, and B. Christman. 2022. Sierra Nevada Willow Flycatcher decline continues but losses abate at two restored meadows. *Western Birds* 53:52–69.

Miller, C.V., C.M. Bossu, J.F. Saracco, D.P. L. Toews, C.S. Rushing, A. Roberto-Charron, J.A. Tremblay, R.B. Chandler, M.G. DeSaix, C.J. Fiss, J.L. Larkin, S. Haché, and K.C. Ruegg. In Review. Genomics-informed conservation units reveal spatial variation in climate vulnerability in a migratory bird.

Montaño-Centellas, F., J. Muñoz, G. Mangini, I. Ausprey, F. Newell, H. Jones, M.E. Fanjul, B. Tinoco, G. Colorado, J. Cahill, E. Arbeláez-Cortés, O. Marin-Gómez, P. Astudillo, E. Guevara, S. Ippi, M. McDermott, A. Rodewald, E. Matthysen, and S. Robinson. 2023. Network structure of avian mixed-species flocks decays with elevation and latitude across the Andes. *Philosophical Transactions of the Royal Society B* 378 (1878).

Pandolfino, E.R., L.A. Douglas, and P. Pyle. 2023. Vocalizations and bill measurements may resolve some questions about taxonomic relationships within the Fox Sparrow complex. *Western Birds* 54:117–132.

Pandolfino, E.R., L.A. Douglas, and C. Ray. In Review. Population trends of the Ferruginous Hawk *(Buteo regalis)* wintering in California.

Pandolfino, E.R., L.A. Douglas, and C. Ray. 2022. Irruptive movements of the Black-Chinned Sparrow *(Spizella atrogularis)* in response to variations in precipitation: implications for climate change resiliency. *Western Wildlife* 9:24–37.

Peer-reviewed Publications

continued

Scissor-tailed Flycatchers
Image: Ken Slade

Pyle, P., S.N.G. Howell, D.I. Rogers, and C. Corben. In Press. Moult terminology: envisioning an evolutionary approach. *Journal of Avian Biology.*

Pyle, P., and L.N. Schofield. In Review. Molting strategies of sapsuckers *(Sphyrapicus)*: Effects of age and migration distance through the fourth and later plumage cycles.

Pyle, P. 2022. Defining moults in migratory birds: a sequence-based approach. *Journal of Avian Biology* 5:1-9.

Pyle, P. 2022. 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. *The Wilson Journal of Ornithology* 134:52-65.

Pyle, P. 2022. 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. Supplemental Material, including a full primer on ageing hummingbirds. *The Wilson Journal of Ornithology* 134:52-65.

Pyle, P. 2022. *Identification Guide to North American Birds, Part 1, 2nd Edition.* Slate Creek Press, Forest Knolls, California. 698 pp.

Pyle, P., and B.H. Carnes. 2022. Molt strategies by age and subspecies in the Willow Flycatcher. *Western Birds* 53:216–231.

Pyle, P., M. Gahbauer, E.I. Johnson, T.B. Ryder, and J.D. Wolfe. 2022. Application of a global age-coding system ("WRP"), based on molts and plumages, for use in demographic and other studies of birds. *Ornithology* 139:1-12.

Pyle, P., M. Gustafson, A. Jaramillo, T. Johnson, A.W. Kratter, A. Lang, M.W. Lockwood, M. Mutchler, and D. Sibley. 2022. 33rd report of the ABA Checklist Committee. *North American Birds:* 73(2)18-22.

Rueda-Hernandez, R., Guallar, S. and P. Pyle. 2023. Preformative molt extent of *Cardellina* warblers increases with breeding latitude and migration distance. *The Wilson Journal of Ornithology* 135:46-55.

Ray, C., R.L. Wilkerson, R.B. Siegel, M.L. Holmgren, and S.A. Haultain. 2022. Landbird population trends in parks of the Sierra Nevada Network: 2011–2019 synthesis. Natural Resource Report NPS/SIEN/NRR—2022/2402.

Saracco, J.F., R.L. Cormier, D.L. Humple, S. Stock, R. Taylor, and R.B. Siegel. 2022. Demographic responses to climate-driven variation in habitat quality across the annual cycle of a migratory bird species. *Ecology and Evolution* 12:e8934.

Saracco, J.F., P. Pyle, D.R. Kaschube, M. Kohler, C.M. Godwin, and K.R. Foster. 2022. Demographic declines over time and variable responses of breeding bird populations to human footprint in the Athabasca Oil Sands Region, Alberta, Canada. *Ornithological Applications* 125:1-14.

Saracco, J.F. and C.B. Yackulic. In Review. Fast and flexible Bayesian Jolly Seber models and application to populations with transients.

Schofield, L.N., R.B. Siegel, and H.L. Loffland. 2023. Modeling climate-driven range shifts in populations of two bird species limited by habitat independent of climate. *Ecosphere* 14:e4408.

Sieburth, D.E., R. Terrill, and P. Pyle. 2023. The potential identification and distribution of Ainley's Storm-Petrel at sea by timing of molt. *Western Birds* 54:133–143.

Siegel, R.B. 2023. David F. DeSante, 1942-2022. *Ornithology* 140:1-2.

Siegel, R.B., and R. Wilkerson. 2022. A giant loss: losing sequoias could be a blow to Sierra Nevada Birds. *The Wildlife Professional* 16:54-55.

Stillman, A.N., R.L. Wilkerson, D.R. Kaschube, R.B. Siegel, S.C. Sawyer, and M.W. Tingley. 2023. Incorporating pyrodiversity into wildlife habitat assessments for rapid post-fire management: a woodpecker case study. *Ecological Applications* 2023:e2853.

Tingley, M.W., G.A. Montgomery, R.L. Wilkerson, D.R. Cluck, S.C. Sawyer, and R.B. Siegel. 2023. Multi-trophic occupancy modeling connects temporal dynamics of woodpeckers and beetle sign following fire. *PLoS ONE* 18:e0281687.

Varner, J., Z.J. Carnes-Douglas, E. Monk, L.M. Benedict, A. Whipple, M.D. Dearing, S. Bhattacharyya, L. Griswold, and C. Ray. 2023. Sampling a pika's pantry: temporal shifts in nutritional quality and winter preservation of American pika food caches. *Ecosphere* 14:e4494.

West, E.H., and H.H. Jones. 2022. Human food subsidies drive individual specialization and intrapopulation dietary differences in a generalist predator. *Ecosphere* 13:e4246.

Youngflesh, C., G.A. Montgomery, J.F. Saracco, D.A.W. Miller, R.P. Guralnick, A.H. Hurlbert, R.B. Siegel, R. LaFrance, and M.W. Tingley. 2023. Demographic consequences of phenological asynchrony for North American songbirds. *Proceedings of the National Academy of Sciences* 28:e2221961120.

Youngflesh, C., J.F. Saracco, R.B. Siegel, and M.W. Tingley. In Review. Placing the rate of phenotypic change into context. A response to Nord et al.

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Partner Perspective

Sylvia Haultain

Inventory & Monitoring Program Manager, Sierra Nevada Network, National Park Service

On the western slope of the Sierra Nevada, an extraordinary continuum of ecosystems is arrayed along the greatest vertical relief of any protected area in the lower 48 states. From the raucous acorn woodpeckers in the foothill oak woodlands to the always-curious gray crowned rosy finches of the highest peaks, these mountains provide habitat for an astounding diversity of bird species.

For nearly four decades, The Institute for Bird Populations has been a key partner in studying and protecting the birds of the Sierran Nevada. Starting with the first MAPS station in 1989, landmark inventories of birds and habitats, and the establishment of an extensive network of long-term monitoring transects, IBP has been instrumental in documenting and monitoring bird populations in the parks and surrounding wildlands.

Without fail, IBP brings exceptional scientific expertise–in study design, implementation, and cutting-edge analytical techniques–to the conservation planning table. With active investigations that cross international borders, partnering with IBP allows us to place the changes we are seeing in the Sierra within a broader global context–an essential perspective as we work together to protect birds throughout their ranges.

On a personal note, it is deeply satisfying to work with IBP to mentor the next generation of highly skilled biologists, who bring fresh enthusiasm and passion to the demands of fieldwork. This, perhaps more than anything else, imbues me with a sense of hope for the future of these wild places and the birds that depend on them.

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

Alberta Biodiversity Monitoring Institute, Canada
Alpine Watershed Group, CA
Amador Calaveras Consensus Group, CA
AMCAH, Mexico
American Bird Conservancy
American Birding Association
American Rivers
Amigos de la Tierra, Mexico
Asoc. Mexicana Para La Conservación de las Aves
Asociación CAMBIO, Mexico
Association of Fish and Wildlife Agencies
Audubon Chapter of Minneapolis, MN
Avinet, Inc.
Bandelier National Monument, NM
Bayfield County Forestry and Parks Dept., WI
Belize Audubon
Bernice P. Bishop Museum, HI
Big Bluestem Audubon Society, IA
BIOMETEPE, Nicaragua
Birds Caribbean
Cal Poly San Luis Obispo, CA
California Academy of Sciences
California Central Coast Joint Venture
California Department of Fish and Wildlife
California Dept. of Parks and Recreation, OHMV Rec. Div.
California Polytechnic State University, Pomona
California Tahoe Conservancy
Canyon de Chelly National Monument, AZ
Chicatana, Mexico
Chile-California Council
Colorado State University
Colorado State University at Fort Polk, LA
CONABIO, Mexico
Cornell Lab of Ornithology, NY
Council of Ohio Audubon Chapters
Devils Postpile National Monument, CA
Div. of Fish and Wildlife, Commonwealth of the Northern Mariana Islands
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
Florida Museum of Natural History
Fundacion Ara Macao, Venezuela
George Mason University, VA
Grand Canyon National Park, AZ
Gulf of the Farallones National Marine Sanctuary, CA
Guyra, Paraguay
Humboldt-Toiyabe National Forest, CA/NV
Indiana Audubon
Inland Bird Banding Association
Inyo National Forest, CA
Kiekari Bird Reserve, Mexico
Klamath Bird Observatory, OR
Knobloch Family Foundation
Lake Tahoe Basin Management Unit, CA/NV
Landmark Environmental, CA
Lassen National Forest, CA
Lewis and Clark National Historical Park, OR/WA
Louisiana State University, LA
March Conservation Fund, CA
Mesa Verde National Park, CO
Minneapolis Audubon, MN
Modoc National Forest, CA
Montana Department of Fish, Wildlife and Parks
Mount Rainier National Park, WA
Museum of Vertebrate Zoology, UC Berkeley, CA
National Audubon Society
National Park Service Southern Colorado Plateau Network
National Park Service, National Inventory and Monitoring Program
National Park Service, North Coast and Cascades Network, WA/OR
National Park Service, Sierra Nevada Network, CA
North American Bird Conservation Initiative
North Cascades National Park, WA
North Central Washington Audubon Society
Olympic National Park, WA
Oregon Natural Desert Association
Oregon State University
Osa Birds, Costa Rica
Owl Moon Environmental, Inc., Canada
Partners in Flight
Petrified Forest National Park, AZ
Petroglyph National Monument, NM
Plumas Corp, CA
Plumas National Forest, CA
Point Blue Conservation Science, CA
Red de Observadores de Aves y Vida Silvestre de Chile
Reserva El Jaguar, Nicaragua
Richland Center-Santa Teresa Sister City Project, WI
Runaway Creek Nature Reserve, Belize
Saint Paul, MN Audubon Society
San Fernando Valley Audubon Society, CA
San Juan Island National Historical Park, WA
SELVA, Colombia
Sequoia and Kings Canyon National Parks, CA
Sequoia National Forest, CA
Sierra Foothills Audubon Society, CA
Sierra Meadows Partnership, CA
Sierra National Forest, CA
Slate Creek Press, CA
Smithsonian Migratory Bird Center, Washington DC
Southern Sierra Research Station, CA
Stanislaus National Forest, CA
Tahoe National Forest, CA
Teton Raptor Center, WY
The National Science Foundation
Tierra de Aves, Mexico
Toucan Ridge Ecology and Education Society, Belize
Tracy Aviary, UT
Truckee Donner Land Trust, CA
Truckee River Watershed Council, CA
Tulane University, LA
Tungite Labs, NC
Un Poco de Choco, Ecuador
Universidad del Valle, Colombia
Universidad ICESI, Cali, Colombia
Universidad Nacional de Colombia sede Medellin, Colombia
University of Belize Environmental Research Institute
University of California, Los Angeles
University of Florida
Upper Mokelumne River Watershed Authority, CA
US Army, Fort A.P. Hill, VA
US Army, Fort Bragg, NC
US Bureau of Land Management
US Fish and Wildlife Service, Div. of Migratory Birds
US Fish and Wildlife Service, Region 3
USDA Forest Service Pacific Southwest Research Station
USDA Forest Service Region 5
USGS Bird Banding Laboratory
Wabash Valley Audubon Society, IN
Western Bird Banding Association
Western Field Ornithologists
Wolf Ridge Environmental Learning Center, MN
Wupatki National Monument, AZ
Yosemite Conservancy, CA
Yosemite National Park, CA
Zamorano University, Honduras
Zumbro Valley Audubon, MN

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