First Estimates of Rates of Survival From the Andes
by Steven Lotto

Conservation rests on knowing whether bird populations are increasing or decreasing, or if communities are changing in subtle ways. The most direct way to determine survival rates is to sample the population on a regular basis, using the same methods over many years. This sort of “constant effort” population monitoring can be accomplished with point counts (comprehensive visual and auditory detections of birds from specific spots for a set length of time), with mist net captures, or by combining both of these approaches.

In a recently published paper (Timoco et al. 2019), we have provided the first assessment of survival rates for birds in the Tropical Andes. Over 11 years, we banded more than 3,500 birds representing 72 species from three habitats that varied in how much they had been modified by human activities. These included native forest, introduced forest, and shrubs. Because we returned to the same sites three times each year, we recuperated many of the same birds.

We used these recaptures to calculate the apparent survival rates of 28 species across the three habitats.

Apparent survival rates varied from just 7% for Black-crested Warblers (Margarornis squamiger) to 75% for Violet-throated Metaltails (Metallura furcata), but we found no significant differences in survival rates among habitats, or among species grouped by their habitat specialization. Because we found similar results for a set length of time (with mist net captures), or by combining both of these approaches, we have concluded that there were no significant differences in survival rates among habitats, or among species grouped by their habitat specialization.

**Figures:**

- **Survival Rates**
  - **American Robin**
  - **Carolina Wren**
  - **Chickadees**
  - **Gray Catbird**
  - **House Wren**
  - **Song Sparrow**

**Note:** Survival rates are expressed as a percentage of the population surviving from one year to the next.
Collaborations Strengthen Conservation

I t often feels like there are far too many conservation problems facing birds for any of us to solve. Indeed, the challenges for birds and other wildlife have many different sources. It is for this reason that effective conservation has come to depend on diverse grassroots partnerships and professional collaborations. At the National Aviary, we maintain several long-standing partnerships, and we are always open to developing new relationships that can broaden our efforts to promote the conservation and protection of birds and their habitats.

In this issue of Flightpaths we highlight a new and exciting collaboration with Project Princípals, an incredibly dedicated group of searchers who collectively know more about the history and ecology of the Ivory-billed Woodpecker than almost anyone anywhere. The group includes two self-described “reformed” lawyers from New York and Ohio, a retired wildlife biologist from Louisiana, a retired engineer from Arkansas, a research veterinarian from Texas, an industrial monitoring specialist from Louisiana, and students from Louisiana and Georgia. Together they have seen and heard enough to be convinced of the Ivory-billed Woodpecker’s survival in an undisturbed area the group has monitored for many years. Our goals are to bring cutting edge science and technology to their search for a nesting pair, and then to help save the species from extinction — a tall order that clearly will require many collaborations!

Other long-standing partnerships highlighted in this issue of Flightpaths cross international boundaries. Our work in community outreach and education for the conservation of endemic birds in the Western Pacific is only possible with help from Pacific Bird Conservation, the government of the Commonwealth of the Northern Mariana Islands, and other zoos. In Ecuador, we partner with Bioparque Amaru and Universidad de Azuay. Partnerships are also important for work we do closer to home. Our popular Neighborhood Flightpaths program is made possible through our relationship with the Smithsonian Institution and with the families that voluntarily engage in this citizen science initiative. Our recent study of avian malaria in the Caribbean is a collaboration among three countries: the U.S. (University of Missouri-St. Louis), Canada (Western Ontario University), and the Dominican Republic (Ecological Foundation of Punta Cana and Grupo Acción Ecológica). Partnerships like these not only amplify what we can do, they also provide exceptional opportunities to expand our outreach and educational activities, and they enrich, educate, and inspire our staff as they strive to protect and conserve birds and their habitats around the world.

The Problem of Plastics

by Robert Mulvihill

Ironically, it was, in part, a desire to protect wildlife that motivated the invention of synthetic polymers, or plastics, in the late nineteenth and early twentieth centuries. Prior to that, elephants and other animals were killed for their natural ivory, used for everything from billiard balls to piano keys. Similarly, humans exploited sea turtles for their “tortoise shell,” which was used to craft fashionable eyeglass frames.

After World War II plastics began showing up everywhere— in our cars, in our kitchens, in our garages, and on every store shelf. The amount of plastic produced worldwide went from zero to more than 320 million tons in the short space of just 65 years.

Although some kinds of plastic can be recycled or repurposed, most plastics become part of an ever-growing stream of litter that eventually empties into the world’s oceans. In the marine environment, especially, this mass of plastic degrades, entangles, maims, and kills wildlife, often in horrific ways.

One of the most compelling examples of the unintended consequences of our love affair with plastic is the impact that they have had on nesting seabirds far out in the Pacific Ocean. Populations of Laysan, Black-footed, and Short-tailed Albatrosses on Midway Island are tricked into feeding plastic to their chicks because the odor of the phytolchitin coating the plastic pieces equates to natural food. Although consuming the plastic pieces does not necessarily result in direct mortality, it is one of many factors casting a shadow on the long-term survival of these long-winged and long-lived birds of the world’s interconnected ocean ecosystems.

We and our planet’s birds are faced with an existing mass of many millions of metric tons of uncontained plastic pollution. It “lives” in our oceans as shape-shifting gyres, like the “Great Pacific Garbage Patch,” swirling over thousands of square miles. Our plastic waste, plastic from mismanaged waste streams, as well as fishing nets and lines, capsized cargo ship contents, and more have resulted in so much plastic pollution that the collective “biomass” of ocean plastic is projected to exceed the living biomass of the oceans’ fishes by 2050. The physical degradation of this plastic waste into ever-smaller pieces, or microplastics, means that plastics now enter the very base of our planet’s food chain, zooplankton.

There is no arguing the many very positive, even life-saving benefits of plastic to humans, but their excessive production and use has contributed to a throwaway mentality that could one day threaten the very organic stability of our global ecosystem. As Laura Parker summarized in National Geographic in their June 2019 Environment Explainer:

Plastics revolutionized medicine with life-saving devices, made space travel possible, lightened cars and jets — saving fuel and pollution — and saved lives with helmets, incubators, and equipment for clean drinking water…today, single-use plastics account for 40 percent of the plastic produced every year. Many of these products, such as plastic bags and food wrappers, have a lifespan of mere minutes to hours, yet they may persist in the environment for decades or longer.

Reducing our production and use of plastics, creating better waste management systems, increasing recycling rates for plastic products, and developing alternatives to plastic are essential steps we must take to reduce the threat that plastic pollution poses to our birds, and, ultimately, to ourselves.

Outreach Promotes Conservation on Pacific Islands

Community outreach and education are critical elements to any successful conservation program. In the Commonwealth of the Northern Mariana Islands (CNMI), where bird populations face pressures from invasive species, the participation and support of the local community is providing hope for a bright future for birds.

The National Aviary has recently taken a leadership role in international outreach through the Mariana Avifauna Conservation (MAC) Project. Established in 2004 as a partnership between Association of Zoos and Aquariums (AZA) institutions, Pacific Bird Conservation, and governmental agencies of the CNMI, MAC aims to protect birds from the threat posed by the invasive brown tree snake, which has already caused the extinction of many bird species on the island of Guam. Biologists want to take steps to protect birds living on nearby islands in case the snakes would ever find their way to those islands.

The major focus of MAC is translocating at-risk birds to neighboring snake-free islands and breeding many of the same species in human care. Another important aspect of MAC is community outreach and education on the islands where researchers are working. Educators from different American zoos, including the National Aviary, coordinate outreach efforts during each field season, networking with the island’s schools, libraries, community centers, and public festivals in order to make sure that people are aware of the work that the conservation team is doing in their community, and how they can support their island birds.

Local high school students have the opportunity to visit field sites, interact with zoo professionals, and learn about the conservation work on CNMI. This kind of immersive outreach experience gives the students a much deeper appreciation for their island’s birds and motivates them to help with their conservation.
Of Kents and Double-knocks: Searching for the Ivory-billed Woodpecker
by Steven Latta and Mark Michaels

The history of the Ivory-billed Woodpecker is full of controversy. Before European contact, some Native American nations valued the heads and bills, which were traded worldwide. The Ivory-billed Woodpecker has persisted at low densities in forests of the southeastern U.S.? truth of the species’ existence remains uncertain.

The National Aviary, in collaboration with Cornell University and the University of Pittsburgh, and new colleagues. In fact, several students who participated in this intensive field effort, and have completed theses with J. J. Kuhn, a local game warden, to graduate student, James Tanner, worked together to train students and field ornithology techniques, and of importance biodiversity hotspots: the tropical Andes. Journal of Field Ornithology 90:105-116.

First Estimates of Rates of Survival From the Andes continued from page 7

With the ambitious goal of finding a nesting pair of Ivory-bills and providing incontrovertible evidence of their survival, the National Aviary during winter, and the effects of these parasites on migratory performance and survival during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

First Estimates of Rates of Survival From the Andes continued from page 7

With the ambitious goal of finding a nesting pair of Ivory-bills and providing incontrovertible evidence of their survival, the National Aviary during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

Based on five years of sampling the blood infections in birds as part of a multinational collaboration that includes the University of Missouri St. Louis (Dr. Robert E. Ricklefs), University of Western Ontario (Dr. Leticia Soares), and Grau Acuña (Ecología) (María Paulino and Damián Mejía). Together we are characterizing parasite dispersal through host migration, the occurrence of disease-causing agents in birds during winter, and the effects of these parasites on migratory performance and survival during winter, in order to better understand global declines of migratory species.

These patterns are intriguing, and we do not fully understand yet why migratory birds have so few infections during their wintering time in the tropics. Our goal is to continue monitoring these populations during winter, focusing on different phases of the migration cycle, such as upon arrival in the Dominican Republic, and just prior to departure back to North American breeding grounds. Our results also have relevance to understanding the impacts of climate change. With climate change, the possibility that the mosquitoes that spread malaria may expand their geographic range could easily bring new threats to bird populations worldwide. The extinctions and population declines of several endemic Hawaiian birds due to introduced malaria parasites as just one tragic example of what can happen when immunologically naive bird populations are exposed to novel malaria pathogens.
C

Continuing a long history of work by National Aviary ornithologists and their collaborators, Research Associate Mack W. Frantz, who recently completed his Ph.D. at West Virginia University, was among five winners of the 2019 BioOne Ambassador Award. This award honors early career authors who best communicate the importance and impact of their specialized research to the public.

Frantz’s research has centered on the Louisiana Waterthrush (Parkesia motacilla) as a biomonitor of conditions in headwater stream ecosystems of the Appalachians. Because this songbird depends on both forested and aquatic habitats in these narrow streams, he has had the opportunity to quantify how waterthrush respond to a variety of habitat changes. Most of these changes are directly associated with rapid transformations over the last decade from unconventional shale gas development.

Working in a highly forested watershed of the Central Appalachians of West Virginia, Frantz banded birds and followed nest histories to document demographic shifts, changes in spatial distributions, and novel “epigenetic responses” to hydraulic fracturing and shale gas development. Epigenetic responses are actual changes to the birds’ DNA, some of which can be inherited by their offspring.

Results of his research indicated that multiple habitat features, including changes to the land and the water, were altered by shale gas development resulting in an interconnected suite of negative disturbances that precipitated a steep population decline in waterthrush in West Virginia.

BioOne is a leading nonprofit publisher of scientific research that aims to make scientific research more accessible to the public. It connects authors, publishers, professional societies, academic institutions, libraries, and research funders in the common goal of maximizing access to critical research.

After winning the award, Frantz commented, “We need to reevaluate if we should allow shale gas infrastructure and development as close to forested headwater streams as currently allowed. Our waterhead stream ecosystems are largely overlooked for protection and regulation despite their importance to downstream life and despite being the source of our public drinking water.”

We congratulate Dr. Mack Frantz on his well-deserved selection for the BioOne Ambassador Award! ■

Dynamic Changes in the Field

In the spring of 2019 I was humbled to be asked to return to my ornithological roots as the lead field technician on the National Aviary’s study of Louisiana Waterthrush in the Laurel Highlands of Pennsylvania. My very first field experience was with the same study two years earlier.

Living and working with others in the field can change your relationship with the world around you, and even your relationship with yourself. Moving into the shared cabin at Powdermill Natural Reserve, which hosts our field studies, is kind of like living in a hostel. Your housemates may be strangers at first, but by the end of the season, they have become friends.

Our focus, the Louisiana Waterthrush, is one of the wood warblers to arrive on their breeding grounds, and also the first to leave. In the short time we had to study them, from April through July, we conducted banding, nest searching, and made detailed observations.

Handling adults and handling nestlings were completely different ball games. Nestlings are so helpless, while the adults were completely different ball games. Our focus, the Louisiana Waterthrush, the field technicians and Ph.D. students who study them also move on. My seasons at Powdermill have been short, but my emotions are always stirred upon recalling my experiences. ■

Waterthrush, the field technicians and Ph.D. students who study them also move on. My seasons at Powdermill have been short, but my emotions are always stirred upon recalling my experiences.

Neighborhood Nestwatch continued from page 1

one year subsequent to their banding (i.e. birds known to be site faithful). Although the sample size is not very large, it appears that Song Sparrows may actually enjoy a higher rate of annual survival in our urban sites, compared to suburban and rural. In fact, preliminary analysis indicates that Carolina Wrens, chickadees, and robins all experience daily.

We look forward to continuing to analyze the data that our Neighborhood Nestwatch participants have collected, and making future comparisons with the other participating cities. Our thanks to all of the Pittsburgh Neighborhood Nestwatch participants who contributed data to the study. Thanks, too, to the biologists at the Smithsonian Institution, Robert Reitma and Brian Evans, who have helped us in so many ways to get the Pittsburgh program off the ground and up to speed with Washington and the other Neighborhood Nestwatch cities. ■