SMITHSONIAN'S NATIONAL ZOO AND CONSERVATION BIOLOGY INSTITUTE
MIGRATORY BIRD RESEARCH, OUTREACH, HUSBANDRY AND CARE PROGRAM OVERVIEW

STATE OF THE BIRDS: WHY BIRD CONSERVATION AND PUBLIC OUTREACH MATTERS

Since 1970, bird populations in the U.S. and Canada have declined by 29%, or almost 3 billion birds, signaling a widespread ecological crisis. The results show tremendous losses across diverse groups of birds and habitats — from iconic songsters such as meadowlarks to long-distance migrants such as shorebirds and backyard birds including sparrows.

- 2019 Study Finds U.S. and Canada Have Lost More Than One in Four Birds in the Past 50 Years
- 2022 U.S. State of the Birds Report Reveals Widespread Losses of Birds in All Habitats–Except for One

MIGRATORY BIRD RESEARCH

Founded by Congress in 1991, the Migratory Bird Center (MBC), part of the Smithsonian's National Zoo and Conservation Biology Institute (NZCBI), is dedicated to studying migratory bird species that fly thousands of miles every year from summer breeding grounds in the United States and Canada to warm winter homes in the Caribbean, Central and South America, and across the world's oceans.

Smithsonian scientists seek to understand basic bird biology, what drives population size and migratory behavior, and how these insights can be used to conserve bird populations. They are at the forefront of ornithological research, innovating holistic approaches and testing the latest tracking technologies. MBC scientists and graduate students spend months in the field annually in search of answers and conservation solutions.

Program and Research Highlights

Below is an overview of select research and areas of focus.

Tracking, Tech, and Migratory Connectivity

NZCBI expert interview: Autumn-Lynn Harrison, Research Ecologist
NZCBI expert interview: Amy Scarpignato, Bird Conservation Specialist

Smithsonian scientists attach miniature tracking devices to migratory birds to understand how their populations are linked spatially and temporally among seasons — a phenomenon called *migratory connectivity*. Knowing birds' exact movements and locations improves the ability of conservation biologists and wildlife managers to protect birds and their habitats. It also helps identify who should be working together across political boundaries to help save birds. Tracking data has unlocked important information to help conserve many types of birds. Examples:

- Common Nighthawks, a declining aerial insectivore, from across the entire North American breeding range converge on a single route for their fall migration to South America. But, populations enter the nighthawk "freeway" at different times.
- Tracking the long-billed curlew, North America's largest shorebird, has revealed breeding sites for the vanishing Eastern wintering population, identified priority conservation locations in Mexico, with partner organization Organizacion Vida Silvestre, and indicates that land conversion from natural grasslands in the mid-continent may be a cause of declining populations.
- Three sister seabird species called jaegers, nesting on the same high Arctic Canadian island, traveled to four different oceans after breeding.

Full Annual Cycle: Studying Bird Populations Across Seasons and Continents

NZCBI expert interview: Nathan Cooper, Research Ecologist

One of MBC's founding principles is to study birds throughout their annual cycles. As birds move from tropical wintering grounds (including oceans) to temperate or Arctic breeding grounds twice each year, they encounter radically different habitats, predators, competitors and environmental conditions. Most studies of migratory birds focus on breeding grounds, but events during the winter and migration can have

big impacts on bird populations. All seasons of the annual cycle (e.g. wintering, breeding, spring and fall migration) are important, but MBC research has shown that events in one season also carry-over to affect performance and survival in subsequent seasons. Key findings related to the annual cycle include:

- For songbirds, spring migration represents the most dangerous period of the annual cycle, but populations can be limited by events during any period.
- Birds wintering in low quality habitat leave late on migration, are more likely to die during migration, arrive late to the breeding grounds, and have reduced reproductive success.
- Declines of painted bunting breeding populations in the southeastern U.S. are due in part to the wild bird trade in Cuba where many buntings overwinter.

Great Plains: Grassland Birds and Prairie Ecosystem
NZCBI expert interview: Andy Boyce, Research Ecologist

In partnership with American Prairie and the Fort Belknap Native American Community, MBC scientists are studying how keystone species and grazing systems influence avian biodiversity in grassland ecosystems. Understanding how the grassland environment shapes which bird species are present and absent is vitally important for conservation. Current projects include:

- Effects of black-tailed prairie dogs and bison on breeding habitat quality for imperiled grassland songbirds.
- Improving survey methods for cryptic bird species using autonomous, audio recording units.
- Understanding how ecological differences between bison and cattle impact riparian (streamside) vegetation, the birds that breed and migrate through these areas, and the use of riparian corridors by native mammals.

Climate Change Effects on Migratory Birds
NZCBI expert interview: Scott Sillett, Research Wildlife Biologist and Head, MBC

MBC scientists integrate data on migratory connectivity and full-annual-cycle ecology with decades-long field studies to investigate how bird populations are responding to rapid environmental change. Birds have diverse diets and exist at the top of terrestrial and marine food webs, making them an ideal "ecological litmus paper." Declines of bird populations in response to climate change and other environmental factors tell us that their ecosystems are in trouble and can inform how to best conserve and restore habitats. MBC research has revealed that:

- Increasing drought frequency on tropical winter grounds of migratory songbirds has reduced survival rates overwinter and on spring migration, and may be shifting breeding ranges.
- As the growing or "green season" has been getting longer in the temperate zone, migratory birds are breeding later, departing on fall migration later, and having increased mortality on fall migration.
- The timing of Arctic bird migration is affected by sea ice extent, storm frequency, and dynamic ocean features like fronts and eddies.

Smithsonian Bird Friendly Coffee and Cocoa
NZCBI expert interview: Ruth Bennett, Research Ecologist

MBC scientists study the impact of tropical land management — specifically the farming of crops, such as coffee and cocoa — on the migratory and native wildlife that share these working landscapes. This research helps optimize food production and biodiversity conservation under different climate change scenarios. The Smithsonian's Bird Friendly program certifies climate-resilient farming systems that support wildlife and creates a market for Bird Friendly coffee and cocoa. Instead of clearing forests to plant coffee plants or cocoa trees, certified farms plant coffee and cocoa under or adjacent to native trees that capture carbon.

- Achieving certification allows farmers to access specialty markets and premiums for their products.
- Currently, over 5,000 farmers in 13 countries produce 36 million pounds of Smithsonian Bird Friendly certified coffee and 356,000 lbs. of certified cocoa annually.
- The Bird Friendly program works with a community of importers, coffee roasters, and chocolatiers to bring Bird Friendly certified products to market. Consumers can identify Bird Friendly certified products by looking for the Bird Friendly seal on product packaging or through our online portal.

EDUCATION AND OUTREACH
The MBC's education and outreach programs provide scientific information to conservation stakeholders and connect the public to migratory birds.

Shorebird Science and Conservation Collective
NZCBI expert interview: Autumn-Lynn Harrison, Research Ecologist

- Brings together agencies, universities, nonprofits and community scientists to advance shorebird conservation in the Western Hemisphere by contributing shorebird tracking data into a unified resource for conservation.
- Hemisphere-scale analyses that can be down-scaled to identify important sites and gaps in knowledge.
- Scientific support to regional initiatives focused on shorebird conservation in the Central and Mississippi Flyways.

Connecting Classrooms: Bridging the Americas
NZCBI expert interview: Mary Deinlein, Bird Conservation and Education Specialist

- Bridging the Americas is a cross-cultural environmental education program that partners classes in grades 2 through 4 in Maryland, Virginia, and Washington, D.C. with classes in Latin America.
- Paired classes learn and exchange information about the migratory birds that winter in the Neotropics and return to the U.S. and Canada each spring to breed.
- Since 1993, tens of thousands of students from classrooms in the U.S., Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, and Venezuela have participated.

Citizen Science: Neighborhood NestWatch
NZCBI expert interview: Brian Evans, Migratory Bird Ecologist

The Neighborhood Nestwatch program provides an opportunity to "be a biologist in your own backyard." Participants learn about birds and help scientists solve critical questions regarding the survival of backyard bird populations. This citizen science program takes place in metro-area backyards, as well as at under-resourced schools in cities throughout the United States.

- Participants contribute to important scientific research by re-sighting banded birds, monitoring nests and to recording/reporting their observations.
- Scientists are especially interested in comparing how successful nests are in urban, suburban and rural backyards.
- Habitat around the new Bird House will be an important study site.

Building Research Capacity within Underserved Tribal Communities
NZCBI expert interview: Andy Boyce, Research Ecologist

- Dedicated internships with MBC projects for wildlife biology students at Aaniiih-Nakoda College (ANC) and the Fort Belknap Native American Community.

- Annual short-courses on ornithological field methods (e.g. bird ID, nest-searching and capture/tagging for ANC undergraduate classes.