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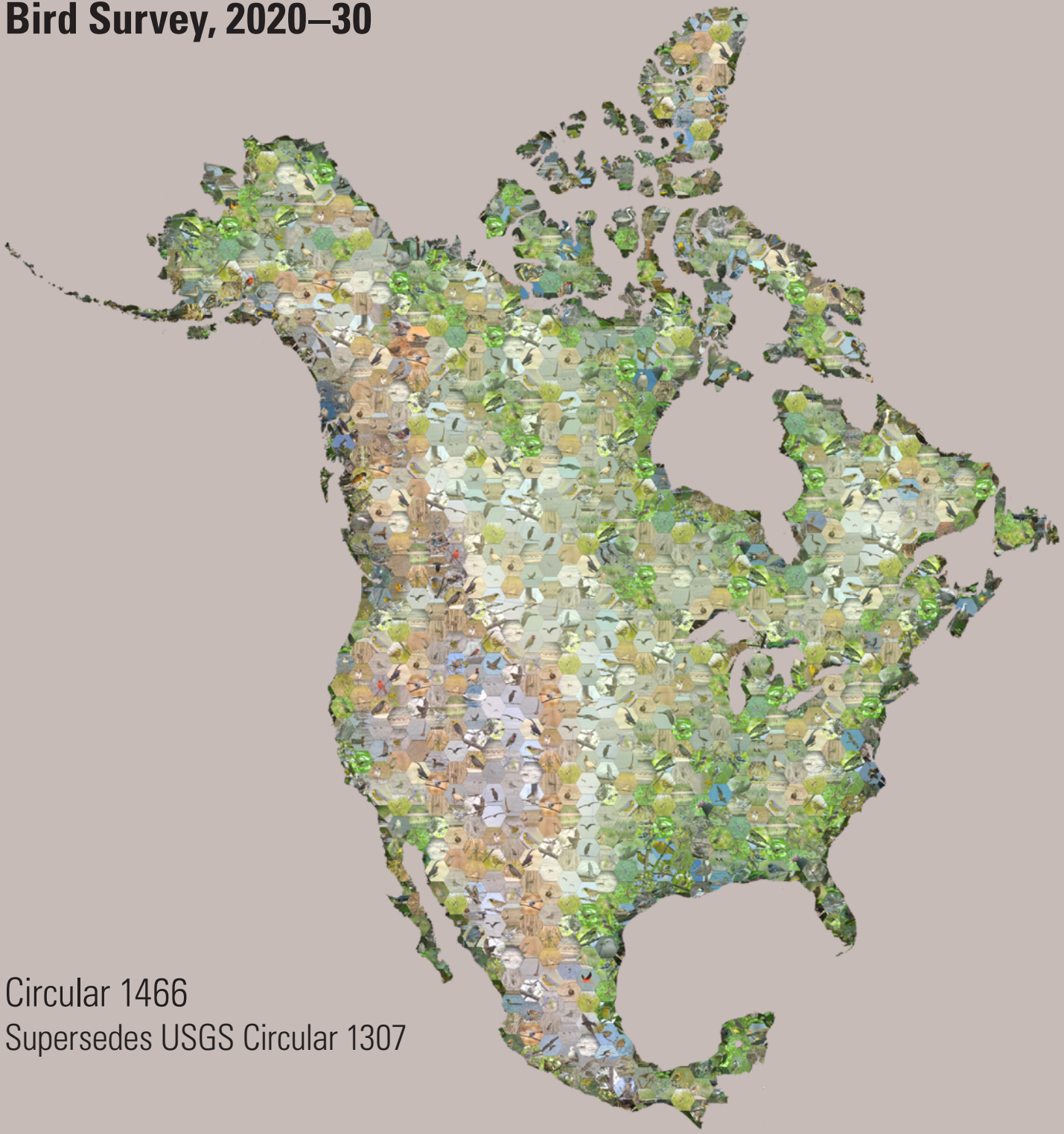
Strategic Plan for the North American Breeding Bird Survey, 2020–30



Circular 1466

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U.S. Department of the Interior
U.S. Geological Survey

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Strategic Plan for the North American Breeding Bird Survey, 2020–30

By U.S. Geological Survey and Canadian Wildlife Service

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U.S. Department of the Interior
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Cistothorus palustris (Marsh Wren),
Photo by Jacques Bouvier

U.S. Department of the Interior
DAVID BERNHARDT, Secretary

U.S. Geological Survey
James F. Reilly II, Director

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Acknowledgments

In September 2019, a broad panel of North American Breeding Bird Survey (BBS) experts and stakeholders met at the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center (PWRC) in Laurel, Maryland, to assist in the development of a new 10-year Strategic Plan as a follow-up to the 2006 BBS Strategic Plan. Many of the ideas captured during the workshop are reflected in this report. Participants in the workshop, organized by Allan O'Connell, Keith L. Pardieck, and David Ziolkowski, Jr., and facilitated by Dave R. Smith (Research statistician, USGS), included

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Dave Ziolkowski, Jr.*	Wildlife biologist, BBS Program	USGS, PWRC

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Contents

Figures

Tachycineta bicolor (Tree Swallow),
Photo by Jacques Bouvier

Mniotilta varia (Black-and-white Warbler),
Photo by Mikey Lutmerding

Abbreviations

BBS	North American Breeding Bird Survey
CWS	Canadian Wildlife Service
ECCC	Environment and Climate Change Canada
NABCI	North American Bird Conservation Initiative
PWRC	Patuxent Wildlife Research Center
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

NORTH AMERICAN BREEDING BIRD SURVEY AND 2020–30 STRATEGIC PLAN AT A GLANCE

> 3,000 participants annually | **> 3,300** surveys annually | **> 600** species | **> 95M** bird sightings | **> 800** scientific publications

VISION: To be the authoritative source of information on long-term change in North American bird populations and widely used in management and conservation.

MISSION: To inform avian conservation and management efforts by collecting data on breeding bird populations across North America using a variety of standardized protocols and delivering scientifically credible measures of the status, trends, and environmental associations of birds at multiple geographic scales, in collaboration with partners.

2020

2030

GOAL 1:

Enhance the BBS program to support new data collection protocols and improved analyses to better serve the bird conservation and management community.

STRATEGIC OBJECTIVE 1A
Upgrade the program's electronic data collection and management systems to support new data collection protocols, to improve volunteer experience and to maximize the value of BBS data.

STRATEGIC OBJECTIVE 1B
Develop and implement additional standardized survey protocols to fill priority gaps in geographic coverage.

STRATEGIC OBJECTIVE 1C
Ensure sufficient observer participation to support existing and expanded geographic coverage.

STRATEGIC OBJECTIVE 1D
Advance research on model development, including integrating complementary data, to better meet stakeholder needs.

GOAL 2:

Ensure BBS data and products are accessible and widely recognized as the authoritative source of information on long-term changes in North American bird populations.

STRATEGIC OBJECTIVE 2A
Consistently make BBS data and analytical products easily available, and improve their transparency, utility, quality, and visual appeal.

STRATEGIC OBJECTIVE 2B
Increase support for the BBS program and use of its products by improving the BBS's brand recognition and perceived credibility.

GOAL 3:

Ensure adequate staffing and resources to maintain and expand the BBS program.

STRATEGIC OBJECTIVE 3A
Ensure that the government agencies delivering the BBS have adequate resources to run the BBS program and make progress towards meeting Goals 1 and 2.

STRATEGIC OBJECTIVE 3B
Building on 3A, develop strong partnerships with other organizations to enhance the BBS and help achieve Goals 1 and 2.

Zenaida macroura (Mourning Dove), Photo by Charles Francis

Strategic Plan for the North American Breeding Bird Survey, 2020–30

By U.S. Geological Survey and Canadian Wildlife Service

Abstract

The North American Breeding Bird Survey (BBS) has been the cornerstone of continental bird conservation and management for hundreds of North American bird species in the United States and Canada for more than 50 years. This strategic plan was developed in collaboration with key partners and stakeholders and charts the ambitious course for the BBS over the next decade (2020–30). Using this plan as a guide, the BBS program will set out to improve the breadth and depth of standardized data collection and analytical products; ensure its products are widely used and recognized as the authoritative source for long-term population change information for most birds; and secure adequate resources, internally and through partnerships, to realize the expanded vision of the BBS intended to support avian management needs through 2030.

Introduction

The North American Breeding Bird Survey (BBS), a roadside avian point count program, provides the foundation for conservation planning and management of hundreds of North American bird species at regional and continental scales. It contributes to all stages of the conservation and management cycle from identifying conservation needs to evaluating conservation actions (fig. 1). Started in 1966, in the United States and Canada, in response to growing concerns about the health of bird populations and the effects of pesticides and other threats (see Appendix 1 for brief overview and history of the BBS), the survey engages thousands of skilled volunteer birders and professional biologists every year to collect data on the status of bird populations across the continent using a rigorous, standardized survey protocol. In 2008, the BBS program expanded into northern Mexico with the goal of providing avian population status information for those regions. This dataset is unparalleled in North America in its temporal and geographic scope and the breadth of species covered (fig. 2). More than 150,000 point counts are conducted annually to provide the population data needed for management and conservation decisions.

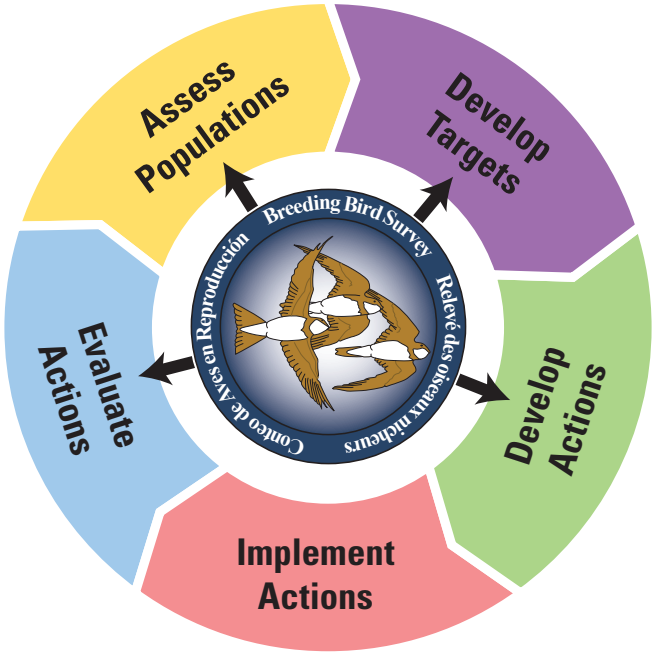


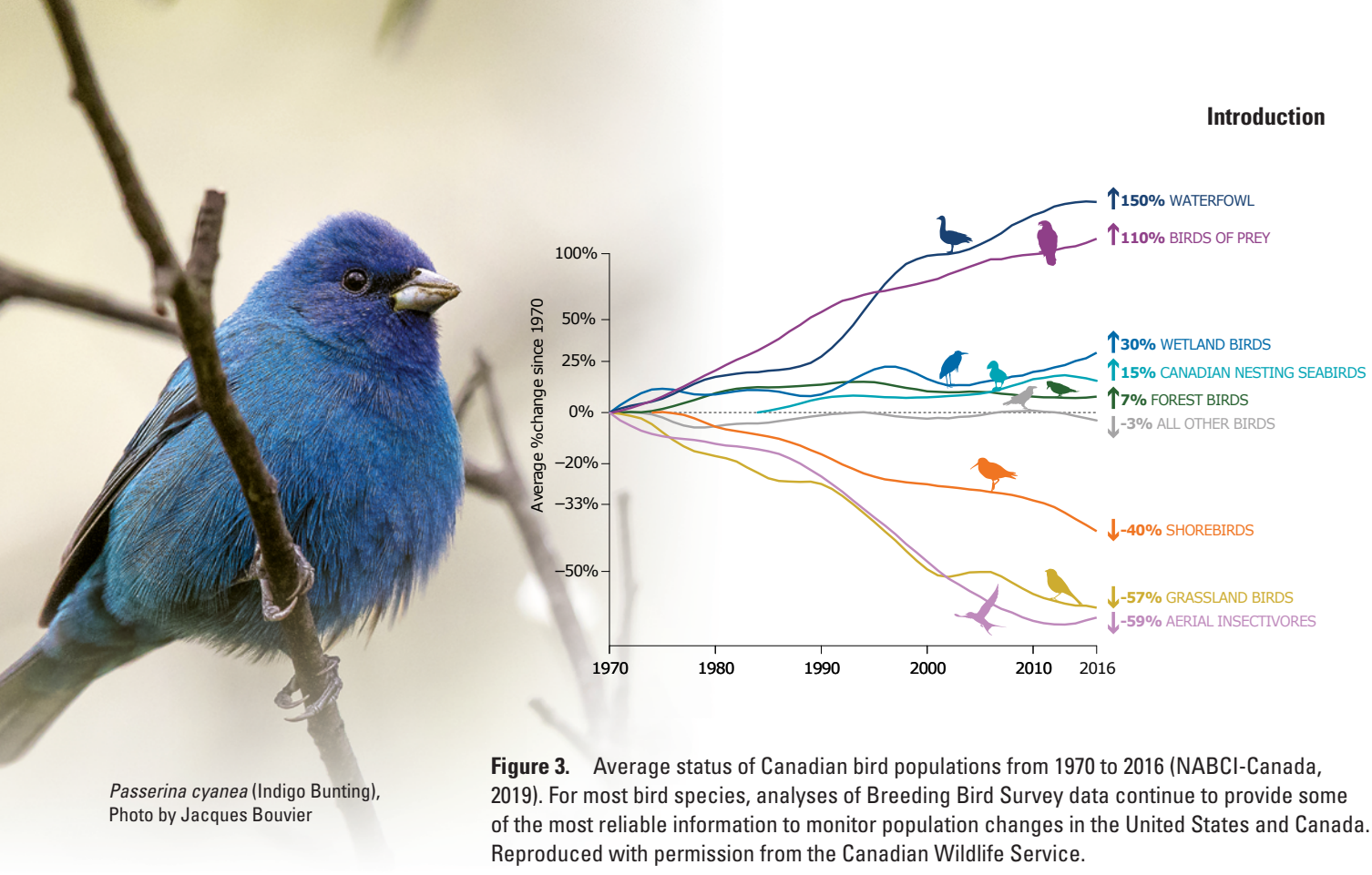
Figure 1. Stages of the avian conservation and management cycle. The Breeding Bird Survey directly and indirectly contributes to all stages of the conservation and management cycle, from identifying conservation needs to evaluating conservation actions.

Sialia currucoides (Mountain Bluebird), Photo by Daniel Irons

Figure 2. Locations of Breeding Bird Survey (BBS) routes across North America. Initiated in 1966, the BBS dataset is unparalleled in North America in its temporal and geographic scope and the breadth of species covered. Yellow dots indicate approximate locations of BBS routes across the continent. Along these routes, more than 150,000 avian point counts are conducted annually providing the critical population data needed to drive science-based management and conservation decisions for hundreds of bird species.

As of 2020, the U.S. Fish and Wildlife Service, the Canadian Wildlife Service (CWS), Partners in Flight, the North American Bird Conservation Initiative (NABCI), and State and provincial wildlife agencies all rely on the BBS to inform avian conservation priorities. For most bird species, cutting-edge analyses of these data continue to provide some of the most reliable information used to identify species of conservation concern and candidates for listing under the Species at Risk Act (Canada) and the Endangered Species Act (United States), as well as aid in evaluating species recoveries. Species-group analyses of BBS data presented in the State of the Birds reports (for example, NABCI-Canada, 2019; NABCI-U.S., 2019; note: BBS data from Mexico have not been published) have highlighted ongoing conservation concerns for North American birds and the health of the ecosystems that support them (fig. 3). Today, more than 800 scientific and conservation-based articles utilizing BBS information have been published, and researchers continue to find new applications of the data to inform emerging issues beyond tracking population trends (fig. 4). Most recently, BBS data have revealed, through the development of innovative analytical methods, the startling finding that North America has lost nearly 3 billion birds over the past half-century. BBS data were essential for the analysis of 82 percent of 529 species assessed in this study documenting declines and increases (Rosenberg and others, 2019; fig. 5).

The BBS is widely used and integrated into North American conservation efforts. Nevertheless, it is at a pivotal moment in its history, with opportunities existing that would allow the program to take full advantage of its invaluable dataset. Accomplishing the goals in this strategic plan will mean that the BBS program will fill geographic gaps, leverage new technologies to expand the applications of its data, have the resources to meet the needs and expectations of stakeholders, and meet its mandate as a publicly supported program. To accomplish the far-reaching goals set out in this document, this program needs to strengthen its core governmental support and reach beyond its traditional organizational structure by developing strong partnerships. This unique, long-standing program was built upon a strong science foundation and now represents the cornerstone of North American bird conservation, an accomplishment of which both its foundational government agencies and future partners can be proud.



Passerina cyanea (Indigo Bunting), Photo by Jacques Bouvier

Figure 3. Average status of Canadian bird populations from 1970 to 2016 (NABCI-Canada, 2019). For most bird species, analyses of Breeding Bird Survey data continue to provide some of the most reliable information to monitor population changes in the United States and Canada. Reproduced with permission from the Canadian Wildlife Service.

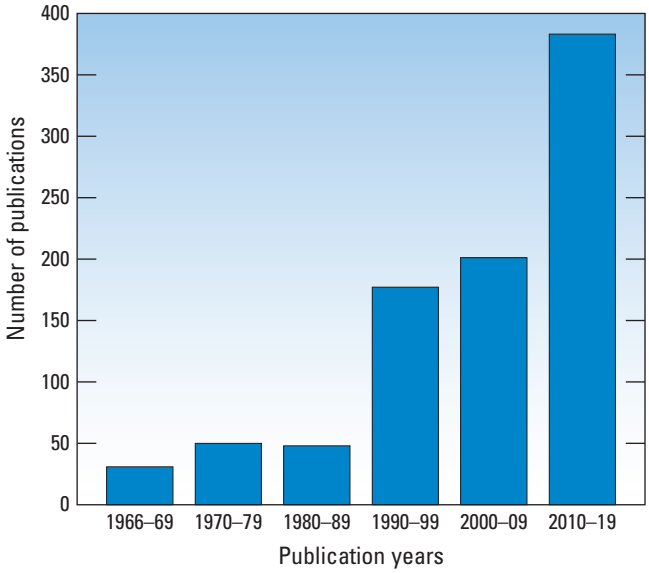


Figure 4. Number of publications using Breeding Bird Survey (BBS) information, 1966–2019. More than 800 scientific publications have relied extensively on BBS information, which further demonstrates the utility of the program. Researchers continually develop novel ways to utilize BBS data to inform emerging issues beyond the original intent to track avian population trends. Modified from https://www.pwrc.usgs.gov/BBS/Bibliography/, accessed 1 June 2020. See web site for information on methods.

Setophaga americana (Northern Parula), Photo by Jacques Bouvier

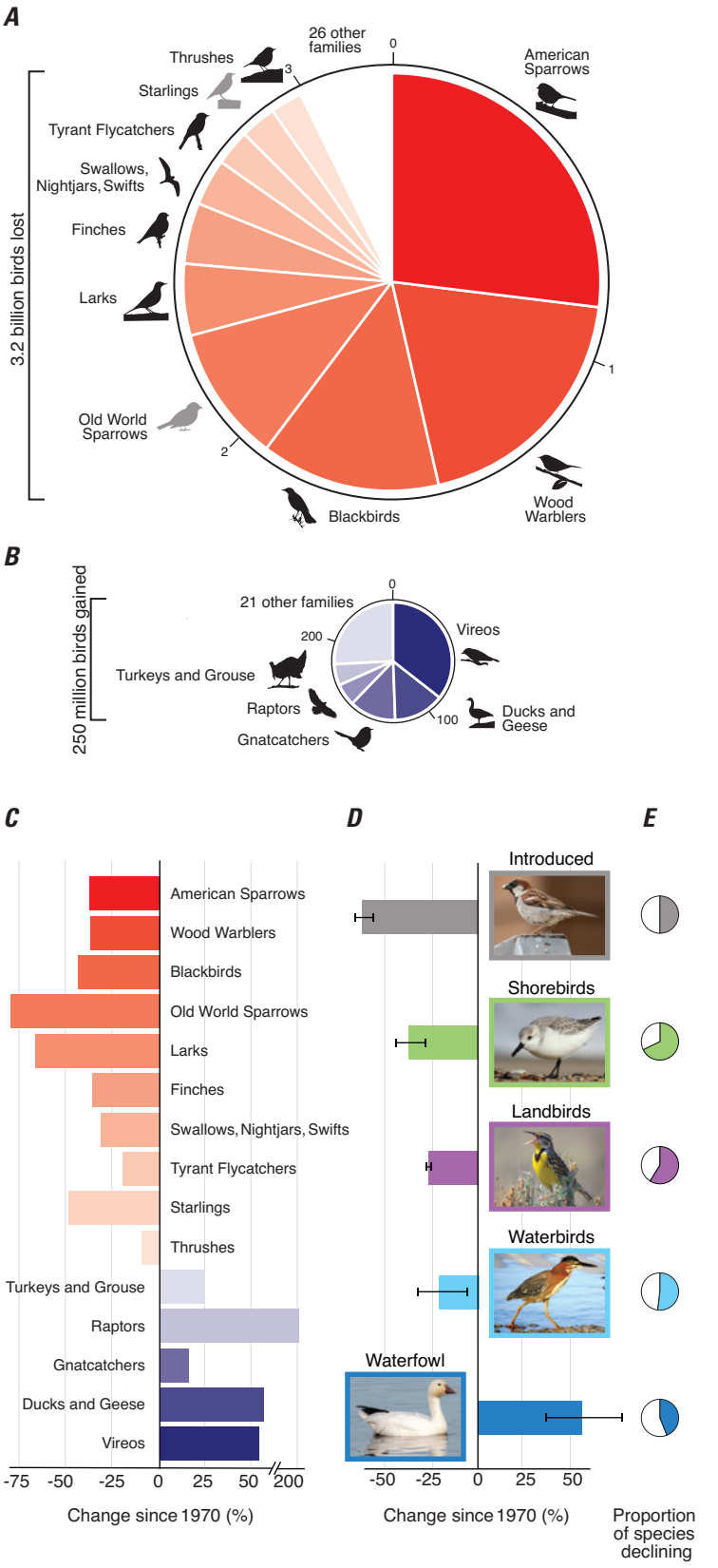


Figure 5. Gains and losses across the North American avifauna from 1970 to 2017. Breeding Bird Survey data were essential for the analysis of 82 percent of the 529 species examined in Rosenberg and others (2019), which revealed startling declines of North American bird populations over the last 50 years. *A*, Bird families categorized by net loss. Total loss of 3.2 billion birds occurred across 38 families; each family with losses greater than 50 million individuals is shown as a proportion of total loss, including two introduced families (gray). Swallows, nightjars, and swifts together show loss within the aerial insectivore guild. *B*, Bird families categorized by net gain. Twenty-nine families show a total gain of 250 million individual birds; the five families with gains greater than 15 million individuals are shown as a proportion of total gain. Four families of raptors are shown as a single group. Note that combining total gain and total loss yields a net loss of 2.9 billion birds across the entire avifauna. *C*, Net gain or loss since 1970. For each family, as represented in *A* and *B*, the percentage of population change within that family is shown. *D*, Percentage population change among introduced birds, shorebirds, landbirds, waterbirds, and waterfowl (18). A representative species from each group is shown [top to bottom, *Passer domesticus* (House Sparrow), *Calidris alba* (Sanderling), *Sturnella neglecta* (Western Meadowlark), *Butorides virescens* (Green Heron), and *Anser caerulescens* (Snow Goose)]. *E*, Proportion of species with downward trends. From Rosenberg and others, 2019. Reproduced with permission from the American Association for the Advancement of Science.

Vision

To be the authoritative source of information on long-term change in North American bird populations and widely used in management and conservation.

Mission

To inform avian conservation and management efforts by collecting data on breeding bird populations across North America using a variety of standardized protocols and delivering scientifically credible measures of the status, trends, and environmental associations of birds at multiple geographic scales, in collaboration with partners.

Strategic Goals and Objectives

This Strategic Plan includes three main goals, each containing strategic objectives, followed by a short rationale.

Goal 1. Enhance the BBS program to better support the collection of standardized data through robust, design-based methods, and the analysis of scientifically credible trend estimates of, and spatial models depicting, North American bird populations at continental and regional scales.

Strategic Objective 1A. Upgrade the program's electronic data management systems to increase efficiency in the collection, management, and delivery of BBS bird population and point count-level spatial data; to facilitate integration of new data collection protocols within the BBS program; and to maximize the value of BBS data for spatial modeling and other relevant applications.

Rationale. The continued success of the BBS program relies on the integrity of the BBS electronic infrastructure and availability of the 95-million-record database, which continues to grow by about 2 million bird records each year. In addition, the precise locations where the 50 point counts were conducted in each year along BBS routes are currently unavailable and, in many cases, unknown. New digital tools and data management systems need to be adopted to enable the streamlined entry of bird data, the annual collection and management of geographic coordinate data, and the dissemination of these data. Count-level geographic information is key to the integration of BBS data with compatible avian, environmental, and land-cover data (fig. 6), as well as with the incorporation of new protocols into the BBS program itself. Geospatial information is also becoming increasingly important for accurately estimating population sizes, investigating the causes of population change related to habitat change and other drivers, and allowing for more accurate spatial modeling. Ensuring and improving the continued seamless collection, management, and delivery of BBS data are critical for North American bird conservation and management efforts.

Strategic Objective 1B. Develop and implement additional standardized survey protocols that are compatible with the current protocol to fill priority gaps in geographic coverage.

Rationale. Current BBS coverage, though extensive, has some significant geographic gaps that affect inferences regarding regional and continental population trends. These gaps include remote areas where there are few roads and (or) participants, for example, boreal and Arctic regions, montane areas, and most of Mexico. Thanks to modern analytical techniques and innovative, standardized data collection protocols, we now have novel methods to incorporate BBS data with other complementary data. Filling these geographic gaps in coverage will

Toxostoma rufum (Brown Thrasher), Photo by Charles Francis

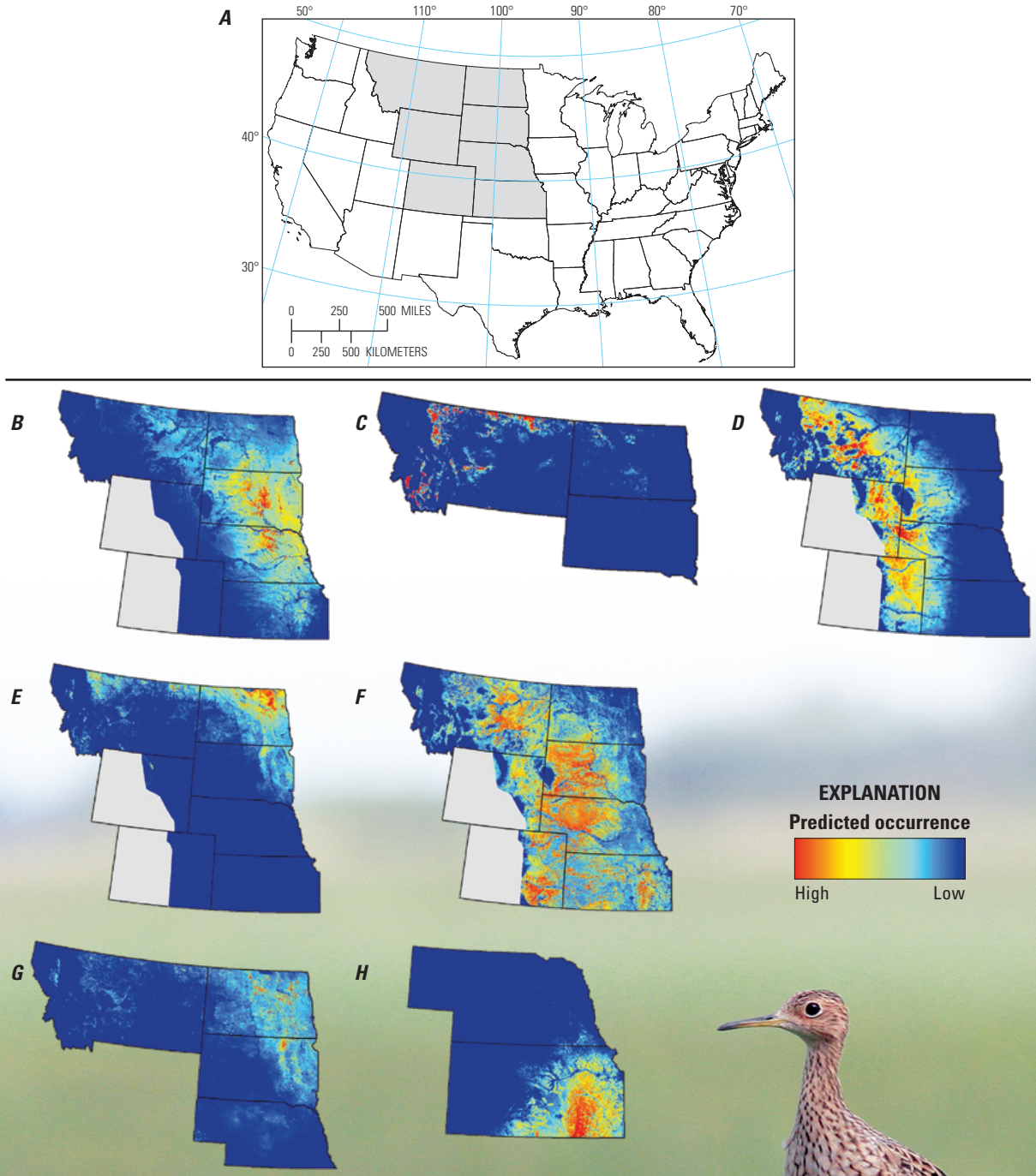


Figure 6. Example of the many applications of North American Breeding Bird Survey (BBS) count-level geographic information. Niemuth and others (2017) used BBS point count locations and species data in conjunction with environmental predictors to develop comprehensive, species-specific spatial planning tools for guiding grassland bird conservation in the U.S. Northern Great Plains. *A*, Map of the contiguous United States depicting the Northern Great Plains study area in gray. Predicted occurrence maps of, *B*, *Bartramia longicauda* (Upland Sandpiper), *C*, *Anthus spragueii* (Sprague's Pipit), *D*, *Calamospiza melanocorys* (Lark Bunting), *E*, *Passerculus sandwichensis* (Savannah Sparrow), *F*, *Ammodramus savannarum* (Grasshopper Sparrow), *G*, *Dolichonyx oryzivorus* (Bobolink), and *H*, *Sturnella magna* (Eastern Meadowlark); gray indicates areas outside the region of analysis. Predicted occurrence maps reproduced with permission from The Condor.

Bartramia longicauda (Upland Sandpiper), Photo by Christian Artuso

improve our ability to produce credible estimates of population trends and sizes that span the gaps, address regional conservation issues, and ensure that inferences based on BBS data are truly continental.

Strategic Objective 1C. Ensure that the BBS achieves its mission by having sufficient observer participation to support existing geographic coverage as well as expanded coverage.

Rationale. The BBS observer base, a network of thousands of participants, requires constant recruitment to maintain current levels of coverage. Filling priority gaps will require an even larger pool of volunteers. Also, over the last decade, organizations like the Cornell Lab of Ornithology have redefined birders' expectations regarding ease of data entry and mapping through novel applications, like eBird. Partnerships with existing avian organizations (for example, Cornell Lab of Ornithology, Audubon, and others) can provide an unprecedented opportunity to recruit new participants and streamline data entry through the use of existing web and mobile applications. Enhanced support and engagement of current and future BBS participants, the lifeblood of the BBS, are critical to the continuity of the program.

Strategic Objective 1D. Continue to advance model development to estimate population trends, species distributions, and abundance through time and space, including approaches for integrating complementary data from other sources, through credible, well-documented analyses, to better meet the needs of the bird conservation and management communities.

Rationale. New statistical approaches are being developed that can integrate data from multiple sources, better address potential sources of bias, and provide more precise estimates of bird population change. The incorporation of new statistical methods into BBS analyses needs to be well justified, rigorously evaluated, and peer-reviewed to maintain the credibility of the program.

Loxia curvirostra (Red Crossbill), Photo by Jonathan Irons

Goal 2. Ensure that BBS data and analytical products are highly accessible and are widely recognized as the definitive source of information on changes in North American bird populations, owing to their scientific rigor, utility, and visual appeal.

Strategic Objective 2A. Consistently make BBS data, including current and historical count-level data, and analytical products easily and publicly available, and improve their transparency, utility, quality, and visual appeal to ensure their continued relevance for bird conservation and management.

Rationale. Stakeholder and public expectations continue to evolve and grow, creating a demand for new products beyond the impressive breadth of available BBS products. Users also require timely and open access to BBS data, models, analytical codes, and results; a lack of transparency or delays in delivery undermine the credibility of the program. The availability of modern data-management and visualization tools represents an opportunity for the BBS program to release its data and products efficiently and allow users to easily find the results they seek. BBS data need to be made available through straightforward, efficient, and reliable data platforms to ensure that they remain highly relevant to stakeholders, increase the program's overall impact and user base, so that it achieves its mission as a publicly supported program.

Strategic Objective 2B. Increase support for the BBS program and use of its products by improving brand recognition and perceived credibility among policymakers, administrators, and the public through clear, effective, and engaging communication.

Rationale. Despite the longevity of the BBS program, segments of the birding community and relevant government agencies remain unaware of the BBS, its unique position as a publicly funded program, and its critical role in North American bird management and conservation. This lingering obscurity leaves the BBS vulnerable to shrinking budgets and the intense marketing and outreach efforts of other programs when competing for resources. In addition to clearly understanding the bird conservation management needs of decisionmakers and working towards high priority goals which the BBS can support, the program needs to communicate in a more engaging way to ensure that the credibility of the BBS program is maintained, the value and quality of the BBS's products are recognized and used to their fullest extent, and the BBS brand is known. More effective marketing is necessary for the program to garner the support needed to meet its strategic objectives.

Goal 3. Ensure adequate staffing and resources to maintain and advance the BBS program as an important foundation for bird conservation in North America.

Strategic Objective 3A. Ensure that agencies supporting the BBS have adequate resources to staff and run the BBS program effectively and to progress towards meeting Goals 1 and 2.

Rationale. The standardized, 50-plus-year BBS dataset is unparalleled and continues to grow by more than 2 million records annually. Because of this growth, as well as rapidly evolving information technology, continued program delivery requires additional investment. The BBS requires core government resources to maintain program coordination, continue professional data analyses, ensure timely and accessible delivery of data and products, and meet changing stakeholder needs. Additional resources will allow the BBS to continue to meet its goals of providing annual population data on more than 600 bird species, thereby supporting the mandates of the U.S. Department of the Interior and Environment and Climate Change Canada.

Strategic Objective 3B. Building on Strategic Objective 3A, develop strong partnerships with other organizations, to achieve Goals 1 and 2.

Rationale. Other Federal agencies with management responsibilities for migratory birds have not always been fully engaged with the BBS program. Furthermore, additional resources beyond the scope of government support are required to implement the suite of actions detailed in this Strategic Plan. Other Federal and non-Federal organizations may have the capacity to assist the BBS with several facets of program delivery, such as data and information management, communication, and (or) marketing. They may also offer a different and (or) more varied volunteer base. Building partnerships will improve the quality of BBS data products and the manner in which they are served to the conservation and management communities. The participation of other organizations may also help reinvigorate the program and increase efficiencies in a resource-stressed environment.

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Aix sponsa (Wood Duck), Photo by Charles Francis

Appendix 1. Overview and Brief History of the North American Breeding Bird Survey

What is the North American Breeding Bird Survey?

The North American Breeding Bird Survey (BBS) is a continental-scale avian monitoring program that was established in 1966. It is coordinated jointly by the U.S. Geological Survey; Environment and Climate Change Canada, Canadian Wildlife Service; and the Mexican National Commission for the Knowledge and Use of Biodiversity. The program has proven to be an effective and inexpensive means of assessing range-wide population trends for hundreds of bird species, providing a quantitative foundation for avian conservation in North America, with more than 2,000 skilled participants sampling 50 point-count locations along 3,300 routes annually across the United States and Canada. Stakeholders include Federal, Provincial, and State agencies, Indigenous peoples, private land managers, educators, policy makers, university researchers, science networks, and many others who make decisions about natural resource management, as well as the more than 45 million North Americans who self-identify as birdwatchers (U.S. Department of Interior and others, 2016).

Each year, BBS data and products on more than 600 species provide critical scientific information for

- Understanding how bird populations respond to environmental change and variability,
- Identifying declining populations of species before losses threaten population viability,
- Understanding changes in biodiversity and landscape use,
- Understanding vector-borne disease transmission, and
- Informing analytical models to better manage game birds, invasive and nuisance species, and agricultural pests.

History of the BBS

In the early 1960s, widespread pesticide use was strongly suspected to be having adverse effects on bird populations. Unfortunately, no long-term regional or continental population data were available for most bird species to allow researchers to track changes over time. In a bold initiative to remedy this information gap, Chandler S. Robbins and colleagues in the U.S. Fish and Wildlife Service developed the BBS. Field tested in Maryland and Delaware in 1965, the BBS was officially launched in 1966 with a sample of 600 roadside routes in the eastern United States and eastern Canada with the help of Tony Erskine (Canadian Wildlife Service). By 1968, the BBS had sampled more than 1,200 routes annually, encompassing the contiguous United States and the southern half of all Canadian provinces. As of 2020, about 3,300 routes are sampled annually, providing range-wide population data for hundreds of bird species in the United States, Canada, and portions of northern Mexico.

Chandler Robbins, Danny Bystrak, and Paul Geissler, all with the U.S. Fish and Wildlife Service, firmly established the utility of the BBS for tracking large-scale avian population changes with “The Breeding Bird Survey: Its First Fifteen Years, 1965–1979” (Robbins and others, 1986). In it, they provided baseline population trend estimates for 230 North American bird species, documented the effects of extreme weather events on birds, and tracked the expansion of exotic and introduced species. In a 1989 publication, BBS data were instrumental in documenting large-scale population declines of neotropical migrant woodland bird species in eastern North America (Robbins and others, 1989), galvanizing research and conservation efforts to identify and reverse the causes of those declines. More recently, BBS data focused conservation attention on the plight of declining grassland birds (Peterjohn and Sauer, 1999) and aerial insectivore populations (Smith and others, 2014). The BBS has been invaluable for identifying conservation priorities, determining appropriate conservation

Cardellina rubrifrons (Red-faced Warbler), Photo by Jonathan Irons

actions, and evaluating those actions (see Hudson and others, 2017; Rosenberg and others, 2017; Sauer and others, 2017). New and innovative analytical approaches have highlighted the loss of nearly 3 billion birds in North America over the past half-century (Rosenberg and others, 2019). These reports all relied heavily on the BBS (for example, 82 percent of 529 species assessed in Rosenberg and others (2019) used data from the BBS exclusively), further cementing the critical role of the BBS in avian conservation science.

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Coccothraustes vespertinus (Evening Grosbeak), Photo by Jacques Bouvier

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