The Status of Midwestern Aerial Insectivores

A Wisconsin Bird Conservation Partnership Issues Paper

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Research Findings in Wisconsin and Other Locations

Population declines

Most of our Midwestern aerial insectivore species (at least three out of six swallows [Barn, Bank, Purple Martin], Chimney Swift, Common Nighthawk, Eastern Whip-poor-will, and seven forest flycatchers [Least, Willow, Alder, Acadian, Yellow-bellied, Great Crested, Eastern Phoebe]) are experiencing population declines (Garret et al. 2022, Mills 2010, Mueller 2022, Nebel et al. 2010, Spiller and Dettmers 2019), with regional populations exhibiting some exceptions (Cliff Swallow in the Carolinas and Virginia; McNair 2024). These declines are more marked in the Canadian provinces to our north but are showing up in many U.S. states as well (PIF 2022).

Possible Causes of Declines

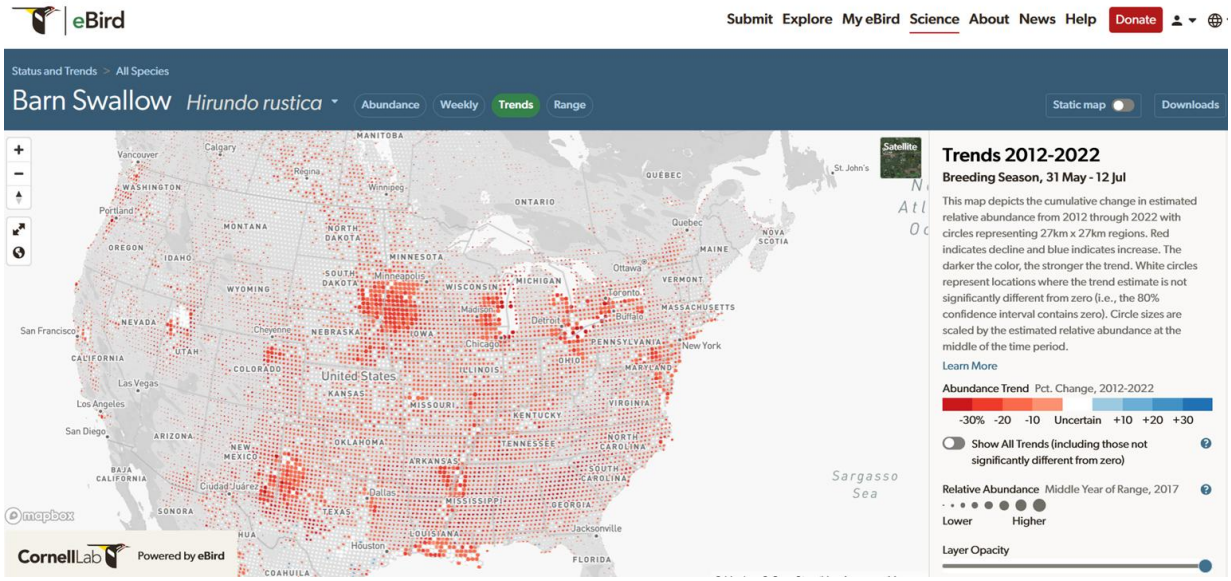
- Insect declines: One primary reason for the decline of these birds may be direct or indirect links to insect population declines, which each of the above species utilize as their main sources – indeed, for some – their only, sources of food (Forister et al. 2019, Habel et al. 2019, Hallman et al. 2017, Lebuhn et al. 2012, Petsopoulos et al. 2021, Samways 2019, Sanchez-Bayo and Wyckhuys 2019, Van der Suijs 2020, Windemuth et al. 2025).
- Pesticide ingestion (Zeng et al. 2025, Mayne et al. 2004) via intake of contaminated insects.
- Cold spring weather: Lack of insects due to late cold periods of spring weather (perhaps more frequent due to climate change [Shipley et al. 2020]) may exacerbate mortality of early-nest young, as well as adults (Garrett et al.2022, Shave 2017).
- Loss of habitat: Appropriate habitat for Eastern Whip-poor-will has been altered, during both breeding and non-breeding seasons. (Purvis 2015).
- Conversion of forest to agricultural lands can further limit habitat for whip-poor-wills and other forest-dependent species such as declining forest flycatchers (Skinner et al. 2023).
- Loss of chimneys. Some projects have identified uncapped chimneys as a limiting factor for nesting swifts (Yunes Perez 2025; although see Fitzgerald et al. 2014).
- Loss of “High trophic level” prey (for nightjars; English 2017).
- Loss of traditional gravel flat roof designs – for Common Nighthawk (NH Audubon 2009).
- Loss of ephemeral riparian corridor habitat for Bank Swallow (Golet et al. 2025), undue disturbance of aggregate (sand & gravel) sites (Burke et al. 2021).

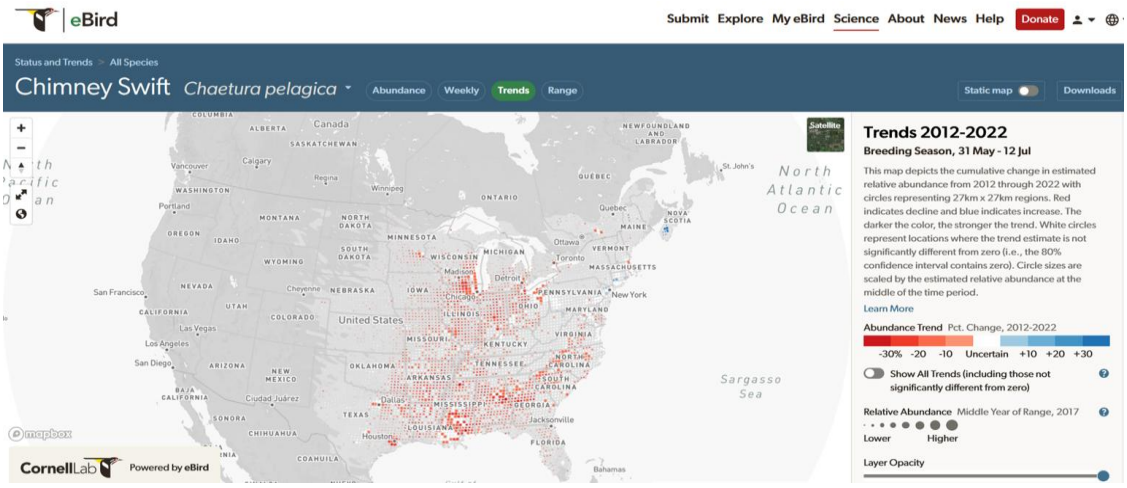
Aeroecology

For many decades, researchers have focused on terrestrial and aquatic habitats. Recent advances in the subdiscipline of aeroecology show that we need to focus on airspace as habitat (in addition to the terrestrial and aquatic habitats). Aeroecology also studies many organisms that humans ordinarily do not notice (such as ballooning spiders, other small insects that live out much of their life cycles aboveground, (sometimes referred to as the "aeroplankton"), which can be important prey for aerial insectivores (Diehl 2013).

eBird Status and Trends mapped examples The following "trend maps" from eBird Status and Trends (https://science.ebird.org/en/status-and-trends) display examples of several of these bird species' declines: Regions on maps depicted in red show declines. See Fink et al.2023.

This material uses data from the eBird Status and Trends Project at the Cornell Lab of Ornithology, eBird.org. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Cornell Lab of Ornithology."





Partners in Flight describes aerial insectivores as a group, and several species individually, as being species at risk. Chimney Swift is an “Orange Alert Tipping Point” species (Partners in Flight 2022):

TIPPING POINT SPECIES

Immediate Conservation Needed for Birds That Have Experienced the Steepest Population Losses

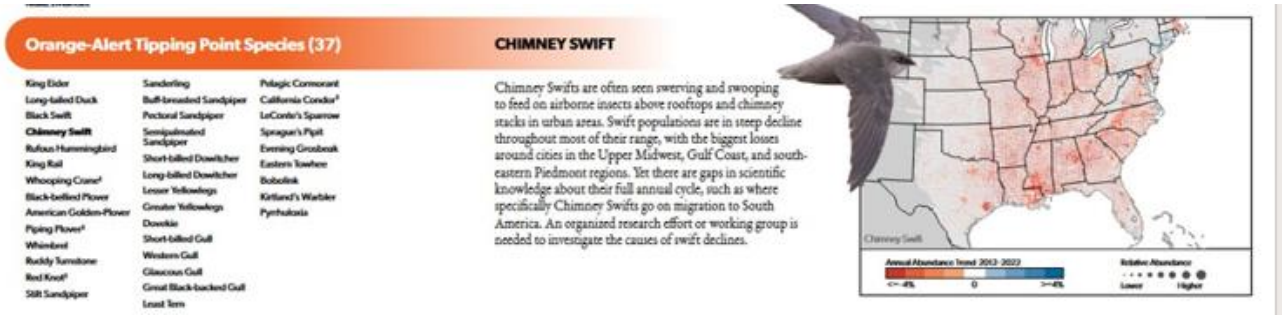
Tipping Point bird species* have lost more than 50% of their populations within the past 50 years. The Road to Recovery initiative—a government/academic conservation collaborative that formed in response to the 3 billion birds lost research published in the journal *Science*—identified Tipping Point species in hopes of accelerating voluntary and proactive approaches to recover bird populations.

A recent reassessment sorted the Tipping Point species by different levels of urgency †(Red, Orange, and Yellow) based on trajectory of declines, severity of threats, and security of core breeding populations. Some of these species lack sufficient monitoring to thoroughly investigate losses. Tipping Point species require focused scientific research to pinpoint drivers of declines, paired with fast action on conservation measures to bring these birds back.

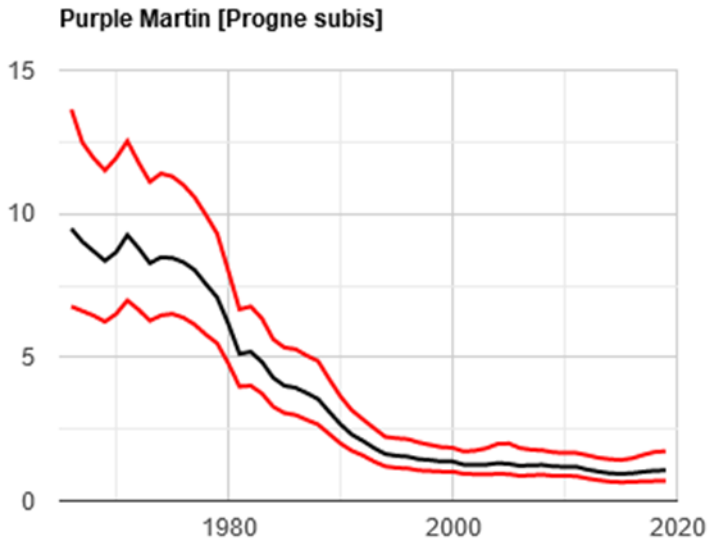
Red Alert
Birds with perilously low populations and steep declining trends

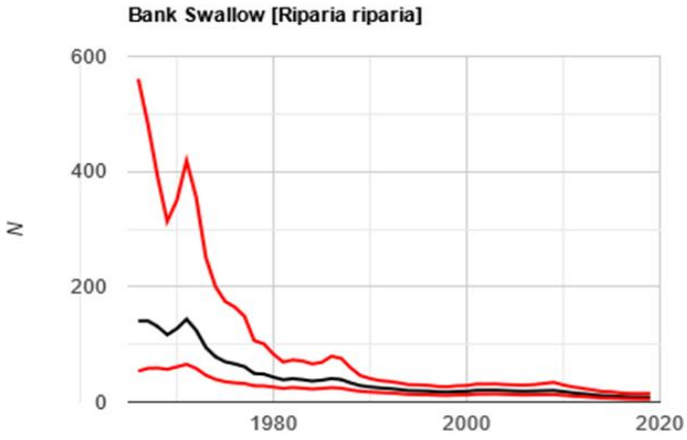
Orange Alert
Birds showing long-term population losses and accelerated recent declines within the past decade

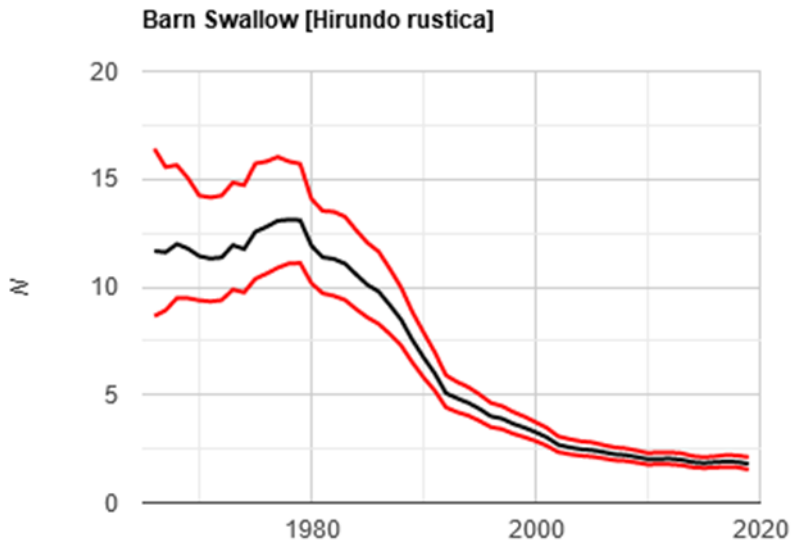
Yellow Alert
Birds with long-term population losses, but relatively stable recent trends; continued conservation efforts needed to sustain recovery



The following are three Breeding Bird Survey "trend graphs" from Midwestern Bird Conservation Regions, for three declining swallow species (Mueller 2022).







Recommended actions

1) Providing/increasing natural habitat for aerial insectivores is perhaps the most effective activity: https://academic.oup.com/condor/article-abstract/128/1/1/8328054
2) Referencing the need to regulate and discourage pesticides such as has been done in some countries and states (see the Wisconsin Bird Conservation Partnership Issues Paper on pesticides and birds: http://www.wisconsinbirds.org/wp-content/uploads/2017/04/effectspesticides-1.pdf)

Below are displayed several additional practical approaches to aerial insectivore conservation actions:

Barn Swallow nesting structures such as the following design and others ("Pairs breeding in old natural nests and artificial nests bred earlier, laid more eggs, and produced more nestlings and fledglings than pairs breeding in new natural nests"; Teglhøj 2018) are being tried at a variety of sites, with varying degrees of success, especially in locations where it is desirable to relocate nests due to swallows interacting with humans (Atwood et al. 2024).

Protecting sand and gravel nest sites for Bank Swallow:

https://www.nhaudubon.org/wp-content/uploads/Bank-Swallows-at-Gravel-Pits.pdf

A vast array of designs of Chimney Swift “towers” (replacements for chimneys) is in use across eastern North America (Kyle and Kyle 2005), with some refinements added in colder northern states (insulation, closing doors at the lower end, and playing attractant calls in early spring: see more at Wisconsin Chimney Swift Working Group; https://www.wiswifts.org/chimney-swift-towers/).

Nighthawk Gravel Rooftop Nesting patches

Provision of gravel nesting patches on new flat roofs with large-diameter stone coverings are being tried in areas where nighthawks are declining (New Hampshire Audubon 2016). The former use of “pea gravel”-sized limestone on top of tar for flat roof coverings has given way to a combination of

rubber sheeting overlaid with larger-diameter stone (sometimes referred to as “river rock”). This newer style is difficult to negotiate by nesting nighthawks (Foley 2018, New Hampshire Audubon 2007, 2025). The provision of “pea gravel” patches is an attempt to get nighthawks to nest where this experimental approach is being tried. It has had little success thus far.

Classic patch location in the southeast corner of a large flat roof. Fractured peastone on top of large stone ballast.

Project Nighthawk Gravel Nest Patch Handbook: https://nhbirdrecords.org/all-articles/Nighthawk-handbook.pdf

Some excellent Barn Swallow nesting information: https://www.nhaudubon.org/wp-content/uploads/Barn-Swallow-handout.pdf

Common Nighthawk Management Recommendations: https://nhaudubon.org/storage/Nighthawk-Habitat-Recomendations.pdf

Protecting under-bridge nest sites for swallows: https://escholarship.org/uc/item/9nz1s9fm

Resources

Chimney Swift Working Group https://www.wiswifts.org/

In September 2018, the Wisconsin Bird Conservation Partnership and Bird City Wisconsin held a conference on aerial insectivores: *S.O.S. For Our Flying Bug Eaters*. The presentations from that event are at: http://www.wisconsinbirds.org/annual-meetings/2018-wbci-annual-meeting/

See also: “The New Science of Aeroecology Reveals So Much About the Amazing Creatures That Populate the Skies and How Humans Can Ensure Their Survival”: https://www.smithsonianmag.com/science-nature/new-science-aero

ecology-tells-more-about-amazing-creatures-humans-can-ensure-survival-180987151/

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