

Neotropical Flyways Project: 2023 Season

Partners: SELVA: Investigación para la Conservación en el Neotropico, Colombia; Cornell Lab of Ornithology; Environment and Climate Change Canada; Bird Studies Canada; Parques Naturales Nacionales de Colombia; Fundación Julia Marquez, Colombia; Fundación Iguaraya, Colombia; ADOPTA: Panama Rainforest, Panama; Canopy Family, Panama, Costa Rica Bird Observatories; Proyecto Cerulea-CR; Las Brisas Nature Reserve; Reserva El Jaguar, Nicaragua; Quetzalii, Nicaragua.

States that have participated to date: Missouri, Wisconsin, Minnesota and the MS Flyway Council

States with a biological connection: All states in eastern U.S. have a significant biological connection through migratory species that use northern Colombia and Central America for critical stopovers; many western states also have connections through long-distance migrants such as Olive-sided Flycatcher and Western Wood-pewee. See attached list of species highlighted in this project, with specific ties to key states.

Overview: Close to 300 species of landbirds, whose combined populations represent billions of birds, migrate between the Neotropics and North America. For many species, migration is the greatest source of mortality during their annual cycle, such that even successive delayed arrivals or degradation at a single major stopover site can lead to significant declines, threatening the viability of populations across the Western Hemisphere.

To successfully migrate between their breeding and wintering grounds, Nearctic-Neotropical migrants typically depend on a series of (stopover) sites along the length of their migratory route, which provide critical resources such as the fuel for migratory flights, safe roosting sites, and refuges where birds can make emergency stops.

Outside of North America, the funnel-shaped geography of Central America and the biogeography of northern Colombia, act as bottlenecks, concentrating millions of migratory landbirds into a tiny area (relative to their breeding grounds), magnifying the importance of Neotropical stopover sites. Further, birds migrating through this region face major barriers in the form of both the Caribbean Sea and the Gulf of Mexico, giving rise to vital stopover regions where birds attain sufficient fuel to cross these barriers safely. Recent work on thrushes, vireos, and warblers on stopover in northern Colombia has shown that the energy reserves acquired there, may enable birds to not only cross the Caribbean Sea but also cover up to 40% of their total migration distance – highlighting an urgent need to identify major Neotropical stopover regions and assess the needs of birds within them.

To address this urgent need, the **Neotropical Flyways Project** (NFP) has been operating since 2016 with the goals of (1) rapidly discover and map new stopovers sites; (2) determine habitat quality and stopover behavior at these sites; (3) develop conservation strategies at key stopover sites; and (4) train and build capacity among in-country biologists and managers to protect sites and continue long-term monitoring.

Threats: Research to date indicates that the majority of birds stopping over in northern South and Central America rely on native forests, especially pre-montane forests on Caribbean-facing slopes as well as lowland tropical wet and dry forests. These tropical forests are under severe threat from expanding agriculture, agroforestry, and development – for example, we have lost over 600,000 hectares of pre-montane forest in this region in the last 20 years. Although some agroforestry systems, such as shade coffee, provide habitat for overwintering migrants, preliminary results from this study indicate that these habitats may not support adequate fueling conditions for several species on migration. The almost complete lack of knowledge of migratory stopovers in this region constitutes a threat, hampering full life-cycle bird conservation.

NFP: AT A GLANCE

- Over **one billion migratory landbirds** migrate to the Neotropics from N. America.
- Despite this massive movement of birds, the routes and strategies that migratory landbirds adopt in the Neotropics are almost completely unknown.
- Only by identifying **stopover sites and habitats** where birds lay down the energy reserves for migration can we identify the needs of migratory birds at all stages of their life cycle.
- The **NFP** is discovering critical stopover regions and habitats across six Central American countries and northern Colombia.
- **Intensive surveys** are used to identify previously **unknown** stopover sites.
- Constant effort **mist-netting stations**, combined with cutting-edge **radio-tracking** technology, determine how birds use stopover regions and to what degree a site contributes to the migration of each species.
- **Regional capacity for avian research** is enhanced by training biologists and students from six countries in research techniques for studying and monitoring migratory birds.
- The combined results will be used to develop a **conservation business plan** for stopover sites along the western Caribbean flyway.
- **Major discoveries to date:** (1) Sierra Nevada de Santa Marta, N. Colombia critical for Gray-cheeked Thrush and other migrants in spring; (2) N. Colombian dry forests critical for Yellow-billed Cuckoo in spring, and Blackpoll Warblers arriving after trans-oceanic crossing in fall; (3) major fall stopover by Cerulean Warblers in Caribbean foothills of Costa Rica; (4) global populations of most aerial insectivore species funnel through the Darien in spring and fall. (5) The highlands of Honduras provide stopover and winter habitat for several steeply declining migratory warblers.
- **Conservation applications:** >20,000 native trees planted to enhance stopover habitat along Colombia's Caribbean coast; the Corredor Azul initiative was launched to enhance and connect stopover habitat for Cerulean Warblers in Costa Rica; environmental education campaigns have reached hundreds of children in a major migratory bottleneck in NW Colombia.

Project objectives

1. Identify previously unknown stopover/staging sites (“Delaware Bays for songbirds”);
2. Determine habitat quality and needs for key species within stopover sites;
3. Determine migratory connectivity and migration strategies with tracking technologies;
4. Engage and train local biologists, conservationists, and communities;
5. Incorporate migration-stopover needs into full life-cycle bird conservation plans;
6. Develop and implement conservation strategies at newly discovered stopovers through local partners

Birds: More than 50 species of landbirds regularly migrate through northern Colombia and Central America on their way to and from South American wintering grounds, and many more both winter and use Central America for stopovers. These are primarily species from eastern and boreal forests of the U.S. and Canada, including species of high conservation concern, such as Canada, Cerulean, Blackpoll and Golden-winged Warblers, as well as common species central to ecosystem function, such as Red-eyed Vireo, Scarlet Tanager, and Swainson’s Thrush.

All eastern states have connections to this project due to the migration routes of many species (see Table 1). Western migrants, such as Western Wood-pewee, Olive-sided Flycatcher, and Yellow-billed Cuckoo, connect the project to western states.

Table 1. Species targeted by the NFP and their PIF and Road to Recovery (R2R) status. These species migrate primarily to South American wintering grounds and use sites within northern Colombia and/or Central America for stopover. PIF continental status: **XX** = Red Watch List, **XX** = Yellow Watch List, **XX** = Common Bird in Steep Decline (2016 PIF Landbird Plan). * Conservation actions are underway to enhance or conserve stopover sites under the NFP.

Species	PIF Status	R2R	Species	PIF Status	R2R
Mississippi Kite			Yellow-throated Vireo		
Broad-winged Hawk			Red-eyed Vireo*		
Swainson's Hawk			Bobolink	XX	R2R
Black-billed Cuckoo	XX	R2R	Golden-winged Warbler	XX	R2R
Yellow-billed Cuckoo*	XX		Tennessee Warbler		
Common Nighthawk	XX		Yellow Warbler		
Chimney Swift	XX	R2R	Cerulean Warbler*	XX	R2R
Olive-sided Flycatcher*	XX	R2R	Blackburnian Warbler*		
Eastern Wood-Pewee*			Blackpoll Warbler*	XX	
Western Wood-Pewee	XX		Bay-breasted Warbler*		
Acadian Flycatcher			American Redstart*		
Willow Flycatcher			Northern Waterthrush		
Alder Flycatcher			Prothonotary Warbler	XX	
Great-crested Flycatcher			Connecticut Warbler		
Eastern Kingbird			Mourning Warbler*		R2R
Bank Swallow	XX		Canada Warbler	XX	R2R
Barn Swallow*			Summer Tanager		
Cliff Swallow			Scarlet Tanager		
Veery*			Dickcissel		
Gray-cheeked Thrush*			Rose-breasted Grosbeak		
Swainson's Thrush*					

Previous Successes and history:

Generating novel information

During the initial phases of the NFP in 2016-2018, more than 10,000 transect surveys were conducted along 450 transects at 32 sites across northern Colombia, Panama, and Costa Rica. The surveys have produced over *150,000 records* during passive transects and migration counts, recording a total of over *3 million birds*. Surveys were designed to cover a range of elevations, climatic conditions and habitats, thereby facilitating the development of spatial predictions of stopover use at the regional level (see Fig. 1). Analysis of spring data, for example, revealed the previously unknown importance of dry forest stopover sites for species such as Yellow-billed Cuckoo and Barn Swallow in northern Colombia, while highlighting the importance of pre-montane forests for species like the Canada Warbler.

During Fall 2017 and 2018, we studied the use of tropical thorn scrub on the Guajira Peninsula, NE Colombia, by Blackpoll Warblers arriving after trans-oceanic crossings from North America. Our results revealed the critical importance of this habitat for Blackpolls to recover body fat and refuel for the remaining 1,000 km+ journey to wintering grounds in the Orinoco and Amazon basins. During Fall 2019 and 2020, a mist-netting station was established in the Caribbean foothills of Costa Rica and has described stopovers up to 12 days long by Cerulean Warblers, as well as significant fuel gains in abundant species like Red-eyed Vireos, Swainson's Thrush and Bay-breasted Warbler.

In 2020 through 2022, surveys were expanded to Nicaragua, Honduras and southeastern Guatemala and spring and fall surveys revealed important concentrations of Canada Warblers in the highlands, as well as high wintering densities of Golden-winged Warblers and both fall and spring records of Cerulean Warbler. Surveys also provided novel information on wintering Golden-cheeked Warblers, with up to 20 individuals recorded in the Cerros de Yali, Nicaragua, and >100 records from La Tigra National Park, Honduras.

Outreach

Outreach activities have included working alongside National Parks authorities in Colombia and Honduras; education activities in at least 10 schools in project areas (see photo of mural from Sapzurro, Colombia, below); the organization of a migration stopover symposium and presentation of results at PIF VI in Costa Rica (Nov 2017); the publication of a review of major stopover regions in the Neotropics ([PDF](#)) and five additional peer-reviewed publications; presentation of results at the Colombian Ornithology Congress (Nov 2016), American Ornithological Society (April 2018), and International Ornithological Congress (August, 2018), and NAOC (2020).

Capacity building

A major objective of the project is to build local capacity across the region and working with local partners in each country we have trained 12 Colombian, 6 Panamanian, 5 Costa Rican, 7 Nicaraguan, 8 Honduran and 4 Guatemalan biologists. In 2021, a workshop on advanced ornithological techniques was held in Costa Rica and individuals from Panama (2), Costa Rica (4) and Nicaragua (3) were trained in the use of nano-tags, manual telemetry, installation and maintenance of Motus automated telemetry stations, installation of canopy nets, ageing and sexing migratory birds, and the use of occupancy models to map stopover areas.

Translating research into action

Parallel to research activities, restoration and protection activities are underway in some of the critical stopover regions discovered to date, including the Guajira peninsula (Colombia), Caribbean dry forest (Cordoba, Colombia), and on the Caribbean slope of Costa Rica. To date >25,000 trees have been propagated in nurseries and planted through agreements with private land owners to enhance stopover habitats, with a special focus on native tree species that provide food resources to migratory landbirds (trees were identified through foraging observations of focal species).

Proposed Activities/Actions for 2023: Activities will focus on completing surveys in the final two countries earmarked in the corridor, Guatemala and Belize, and setting up a banding station in Honduras to monitor fall migration in La Tigra National Park. Parallel to these research activities, there will be an increased focus on data analysis and dissemination, and on conservation activities in Costa Rica. In the current proposal, we are seeking funding to expand data analyses and conservation actions in Colombia.

January-December 2023 – Carry out occupancy analyses to map *major stopover regions* across Colombia, Panama and Costa Rica and describe how migrants are distributed across an elevation gradient in Honduras.

March-May 2023 – Train observers in the Peten of Guatemala and southern Belize, and carry out occupancy surveys during spring migration to identify regionwide concentrations of migratory birds.

August-September 2023 – Carry out occupancy surveys across the Peten of Guatemala and southern Belize during fall migration to identify regionwide concentrations of migratory birds.

March-May 2023 – Establish and run a constant-effort mist netting station/s in La Tigra National Park in Honduras to understand how this region is used by 80 different species of migratory landbirds recorded during surveys in 2022. Includes the training of local biologists in scientific banding.

January-December 2023 – Continue and expand tree planting and protected area establishment in critical stopover regions on the Guajira Peninsula of Colombia, the seasonal dry forests in Cordoba, Colombia and on the Caribbean slope of Costa Rica.

Budget: (2023)

YEAR	COUNTRY	REGION	ACTIVITY	TOTAL	Current MATCH
2023					
Spring	Guatemala	4 regions (country-wide)	Occupancy Surveys	\$15,000	\$15,000
	Belize	3 regions (country-wide)	Occupancy Surveys	\$15,000	\$15,000
Fall	Guatemala	4 regions (country-wide)	Occupancy Surveys	\$15,000	\$15,000
	Belize	3 regions (country-wide)	Occupancy Surveys	\$15,000	\$15,000
	Honduras	La Tigra NP	Banding station	\$15,000	\$10,000
General	All	Multiple	Analysis & priority setting	\$10,000	\$10,000
General	Colombia/Costa Rica	Multiple	Conservation activities	\$40,000	\$20,000
General	All	Multiple	Coordination	\$10,000	-
			TOTALS	\$135,000	\$100,000

Note: because the project is built on modular activities in each country and region, with new modules being phased in through time, smaller amounts of funding can go towards specific components in each season.

Matching funds: a 1 to 1 match is required. Funding has been provided by Cornell Lab of Ornithology -- \$10,000 for 2018, \$15,000 for 2019, \$10,000 for 2020 and \$10,000 for 2022. The Canadian Wildlife Service has provided \$33,000 for 2018/2019, Southern Wings (\$79.5K from 2 states), and a private donor (\$20K). Smaller contributions from SELVA, Acadia University, Guelph University and Saskatchewan University total \$30,000. Equipment, namely 100 radio transmitters, represent a further \$20,000. From 2019 through 2022 Environment Canada provided \$60,000 towards conservation activities in key stopover regions identified in Colombia.

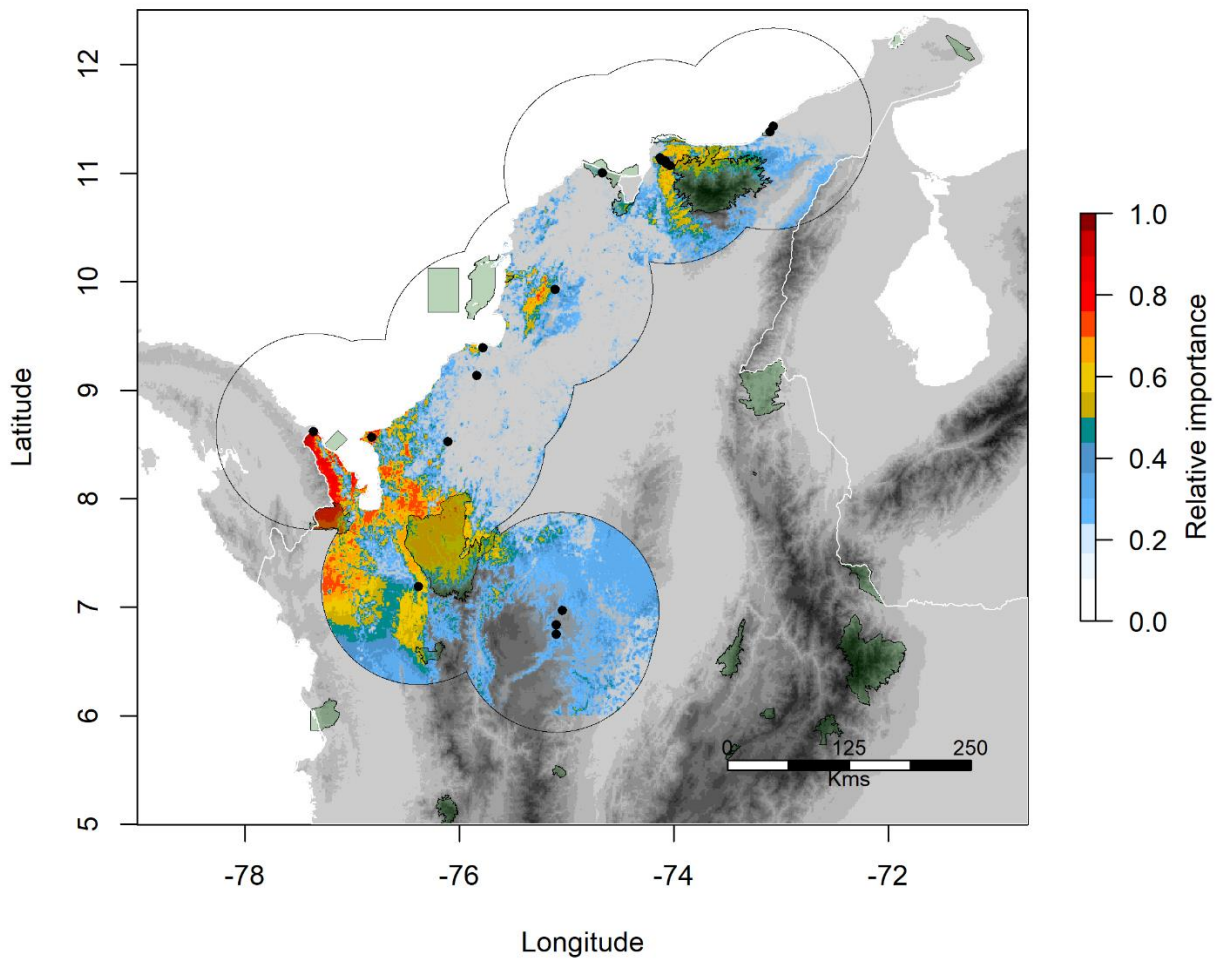


Figure 1: Priority spring stopover areas in northern Colombia based on the results of occupancy surveys and a subsequent modeling exercise for 20 species of migratory landbirds. Priority areas are limited to areas where natural forest remains and the presence of protected areas is indicated by transparent green shapes. The area outlined by a thin black line, is the area within which spatial predictions from occupancy models can be assumed to be appropriate, while black symbols represent survey sites. Critical stopover habitat in need of protection remains in north-west Colombia in the Darien and Uraba regions and on the northern and western flanks for the Santa Marta mountains in the north east.



A mural showcasing migratory birds under construction in the village of Sapzurro, Colombia, as part of education activities focused on a major migratory bottleneck.