



# Project Proposals 2022-2023



## TABLE OF CONTENTS

Protection of Wintering and Stop-Over sites in the Conservation Coast Birdscape, Guatemala.....	3
Protection of Desert Grasslands Migratory Bird Habitat in the El Tokio Grassland Priority Conservation Area (in the Saltillo BirdScape).....	6
A Sustainable Grazing Network to Protect and Restore Grasslands on Private and Communal Lands in Mexico's Chihuahuan Desert .....	9
Protecting stopover and wintering habitat for shorebirds in Laguna Madre, Mexico.....	12
Conservation of Wintering Habitats in the Yoro-Pico Bonito and Agalta-Lost City Birdscapes, Honduras.....	14
Conserving Critical Piping Plover and other Shorebirds Wintering Sites in the Bahamas.....	17
Conservation and Management of Neotropical Migratory Birds and Thick-billed Parrots in old-growth forests of the Sierra Madre Occidental, Mexico .....	20
Neotropical Flyway Project: 2022-2023 Season .....	28
The Pacific Flyway Shorebird Survey: Identifying Threats and Conservation Hotspots in Northwest Mexico.....	61
Restoration of Migratory Bird Habitat in Ecuador .....	68
Improving Migratory Bird Habitat in Colombia .....	70
Conservation of Neotropical Migratory Birds in the Dry Tropical Forests of El Salvador: Assessing and Addressing Threats to Overwintering Habitat and Bird Populations.....	74
Marsh Bird Conservation: Identifying Threats and Implementing Conservation Actions in Northwest Mexico.....	81
Protection of Wintering Habitats in the Dominican Republic Septentrional Birdscape.....	83
Restoration of Wetland Hydrology in the Marismas Nacionales of Nayarit, Mexico to benefit migratory waterfowl and shorebirds. ....	86

## Protection of Wintering and Stop-Over sites in the Conservation Coast Birdscape, Guatemala

**Partners:** Fundación para el Ecodesarrollo y la Conservación (FUNDAECO), American Bird Conservancy (ABC)

**States that have participated to date:** Missouri, Tennessee, Arkansas, Iowa, Texas

**Overview:** The coastal Caribbean region of Guatemala lies between Belize and Honduras in the province of Izabal. This region includes several unique and isolated massifs rising from sea level up to 5,045 feet, low-land rainforest, large mangrove and natural beach systems and a Ramsar Wetland of International Importance. The region is bathed in moisture-laden Caribbean trade winds and supports a unique transitional ecosystem from the shoreline to rainforests and pine-oak forests. The unique combination of topographical and climatic conditions creates important stopover and wintering habitat for at least 153 species of neotropical migrant birds (NMBs) and is a high priority ABC BirdScape called the *Conservation Coast*.

FUNDAECO, ABC's Guatemalan partner, is conserving critical sites by purchasing and managing core habitat in areas identified for national protection by the Guatemalan government, who lack the funds to purchase or manage land. Southern Wings and other partners have made it possible to create a robust system of conserved lands with FUNDAECO. This project will conserve forest and wetland habitat, restore degraded lands, and improve management of agriculture systems in the buffer zones to benefit migratory birds.

**Threats:** Cattle ranching, oil palm expansion, illegal logging, slash-and-burn and industrial agriculture, and climate change

**Birds:** 153 neotropical migratory bird species have been identified in the Izabal region of Guatemala, including wood thrush, Kentucky, worm-eating, hooded, and black-throated green warbler; and painted bunting. Past ABC-funded research identified the region's Caribbean mountain tops as important spring stopover sites for the cerulean warbler—a priority watchlist bird. Other watchlist species that use FUNDAECO reserves include golden-winged warbler and Canada warbler, and olive-sided flycatchers. The coastline of Punta Manabique has been used by buff-breasted sandpiper, sanderling, stilt sandpiper, western sandpiper, red knot, and Wilson's plover during the winter migration. Other migrants in the region include Swainson's hawk, blue-winged, Tennessee, and magnolia warbler; Louisiana waterthrush; Baltimore oriole; and indigo bunting.

**Goal:** The goal is to secure the protection of core migratory bird habitat in this important wintering and stopover area through protected area creation and management, and implementation of sustainable agroforestry systems with local landowners on over 7,410 acres (3,000 ha). Critical to the agroforestry approach of land restoration is providing hands-on training and technical expertise to landowners. ABC and FUNDAECO have created a series of "BioCenters," which are plots of land we acquire where we can implement agroforestry systems and demonstrate to landowners the methodology of planting native tree species along with cardamom, black pepper, cacao, and other crops that can be grown in forest cover. BioCenters have the added benefit of earning money by selling the products grown in the demonstration plots. The profits can be invested back into conservation. BioCenters provide complementary conservation value to our land acquisition and conservation activities.

In 2020, ABC and FUNDAECO completed a 10-year BirdScape Conservation Plan. That plan included the following objectives that we are continuing to work toward, and for which we seek Southern Wings funding:

- Acquire 9,880 additional acres (4,000 ha) of forest for protection
- Reduce the deforestation rate from 7,965 acres/year (3,225 ha) to 2,223 acres/year (900 ha).
- Protect 100% of riparian forests (82 feet of buffer of forest on each side of river) within the BirdScape that are perennial waterways, representing a total of over 400 miles of riparian habitat.
- Ensure the protection of at least 83% of existing forest; approximately 284,050 acres (115,000 ha).
- Restore 14,629 acres (5,920 ha) of forest within core zones of National Protected Areas.
- Improve the conditions of degraded pasture lands through the establishment of 12,350 acres (5,000 ha) of silvopasture systems.
- Establish at least 7,410 acres (3,000 ha) of additional agroforestry systems.
- Expand the BioCenters by at least 904 acres (366 ha), for a total of 123 acres (500 ha).

**Previous Southern Wings Successes:** Since 2012, Southern Wings has supported the creation and expansion of five protected areas and one BioCenter called Guaytán through land acquisition. In total, these lands account for 11,818 acres (4,785 ha) of habit for migratory birds. FUNDAECO has now established protections for core areas within all priority locations of the Conservation Coast. This includes Sierra Caral, Cerro San Gil, Punta Manabique, Río Sarstún (Tapón Creek) and Sierra Santa Cruz. Within the Guaytán BioCenter, 41 acres (16.8 ha) of black pepper, 69 acres (28 ha) of cacao, and 77 acres (31 ha) of cinnamon have been established in agroforestry plots to restore cattle pasture. Southern Wings (along with counterpart funds) has also supported landowner engagement and agroforestry implementation at two additional BioCenters, Santa Marta and Las Jaras. In 2020, 17,000 trees were planted at the Santa Marta Biocenter on 37 acres (15 ha). At Las Jaras, 60 acres (24 ha) of cardamom production have been established including over 32,600 native trees.

**Conservation Actions:** FUNDAECO has identified two properties for sale that are of conservation interest and would help advance our established BirdScape goals. They are presented here in order of priority (Figure 1).

1. **Cañón del Río:** This property of 228 acres (92 ha) would be declared as a natural ecological reserve for its conservation in perpetuity. The main purpose of this property would be to help FUNDAECO support the management of two large protected areas: Río Dulce National Park and the Chocón Machacas Manatee Biotope. The price of the property is \$150,000.

2. **Punta de Palma:** This 118-acre (44 ha) property would protect the only freshwater pond on a peninsula of land within the Amatique Bay. This peninsular property is under high pressure by coastal developers, which could pollute the bay and have wide-ranging effects. The freshwater pond is known to be used by water birds and ducks. The price of the property is \$100,000. A down payment of \$25,00 would secure the property.

We also aim to restore 75 acres (30 ha) of degraded lands with organic and conventional shade-grown cardamom agroforestry and transform 25 acres (10 ha) of pastures to silvopastures by planting 300 native trees per hectare.

**Budget:** Acquisition, restoration, and coordination costs total \$494,000.

**Matching funds:** Matching funds will come from FUNDAECO and ABC investments in these properties, related management costs and other associated activities within the BirdScape.



**Figure 1:** Properties owned and managed by FUNDAECO are shown in blue. The yellow circles represent the location of properties to acquire. From left to right: Bahía Cocolí and Punta de Palma.



## Protection of Desert Grasslands Migratory Bird Habitat in the El Tokio Grassland Priority Conservation Area (in the Saltillo BirdScape)

**Partners:** Pronatura Noreste (PNE), ABC

**States that have participated to date:** Oklahoma, South Dakota, Nebraska, Iowa, Texas, Kansas

**Overview:** The desert grasslands, located south of the town of Saltillo in northern Mexico, are high elevation (6,000 to 7,000 feet) grasslands important to numerous wintering migratory birds as well as threatened resident bird species and a threatened endemic mammal, the Mexican Prairie Dog. PNE's Chihuahuan Desert Grasslands program goal is to ensure the protection and management of 2,400,000 acres (97,1245 ha) of grassland habitat. ABC is working with PNE to help them achieve this goal, and specifically for the improved protection, management, and restoration of grasslands within the El Tokio Grassland Priority Conservation Area (GPCA) (Figure 2), which ABC has incorporated into its El Tokio BirdScape initiative. Within this GPCA, the goal is to ensure habitat sufficient to support 30% of the global long-billed curlew population, 12% of the mountain plover global population, and to maintain the population of the endangered Worthen's sparrow.

Within El Tokio, PNE and ABC have supported conservation efforts on more than 140,000 acres of habitat through the creation of private reserves, ejido (community-owned) reserves, and conservation agreements that restrict cattle ranching and agriculture practices. We have also supported the installation of erosion control measures and ranching infrastructure, as well as implemented ranching best management practices. The ejidos currently involved include: La Hediondilla, Matehuapil, Tanque Nuevo, Puerto México, El Cercado, La India, Los Arrieros, San José del Alamito, La Carbonera, La Esperanza, Las Vegas, San Juan del Prado, and Nuevo Gómez. PNE and ABC also manage two formal protected areas, Cuatro Gorriones and Loma del Gorrión, which are being managed for the conservation of migratory grassland birds and Worthen's sparrow.

Working with ejidos is a dynamic process, and work can ebb and flow. To ensure habitat restoration is constantly moving forward, ABC and PNE want to conduct habitat improvement activities on properties with whom PNE already has conservation agreements and to expand to new properties in the region. Specific activities include creation of management plans and grazing recommendations, installation of erosion control systems to help restore grasslands, and installation of water infrastructure and fencing for livestock control.

**Threats:** One of the most significant threats to grassland habitat in El Tokio is overgrazing by cattle and goats. The loss of vegetative cover, in a region with naturally arid soil, has exacerbated drought conditions and is leading to desertification. Erosion and a proliferation of invasive plant species are a side effects of overgrazing and contribute to a loss of grassland and declines in the populations of migratory birds that depend on this habitat. Another significant threat is the rapid conversion of the land to agriculture across the Chihuahuan Desert Grasslands. In El Tokio, potato production is on the rise and we anticipate that it will drive additional loss of grassland. Industrial agriculture of this kind requires intense irrigation and the digging of new wells, which will deplete the underground water supply if it is not managed adequately by the government.

**Birds:** More than 250 bird species are found in El Tokio. Here, high concentrations of grassland wintering birds occur, including significant numbers of long-billed curlews (up to 2,000 individuals have been seen in a single flock). This region is one of the most important wintering areas for mountain plovers and Sprague's pipit. Other species include loggerhead shrike, lark bunting, Brewer's and Baird's sparrow and ferruginous hawk. Also wintering in the area are grasshopper, lark, and vesper sparrows. Passage migrants include the upland sandpiper and Swainson's hawk.

**Goals:** To scale up implementation of sustainable land use practices for grassland birds throughout the 2.5 million-acre El Tokio BirdScape. The projects long-term goal is to directly impact at least 370,000 acres (149,733ha) of grasslands through improved grassland management and erosion control. A key part of achieving this goal is to create a habitat corridor that would connect approximately 15 ejidos and ensure that each has at least some percentage of ejido land dedicated to conservation.

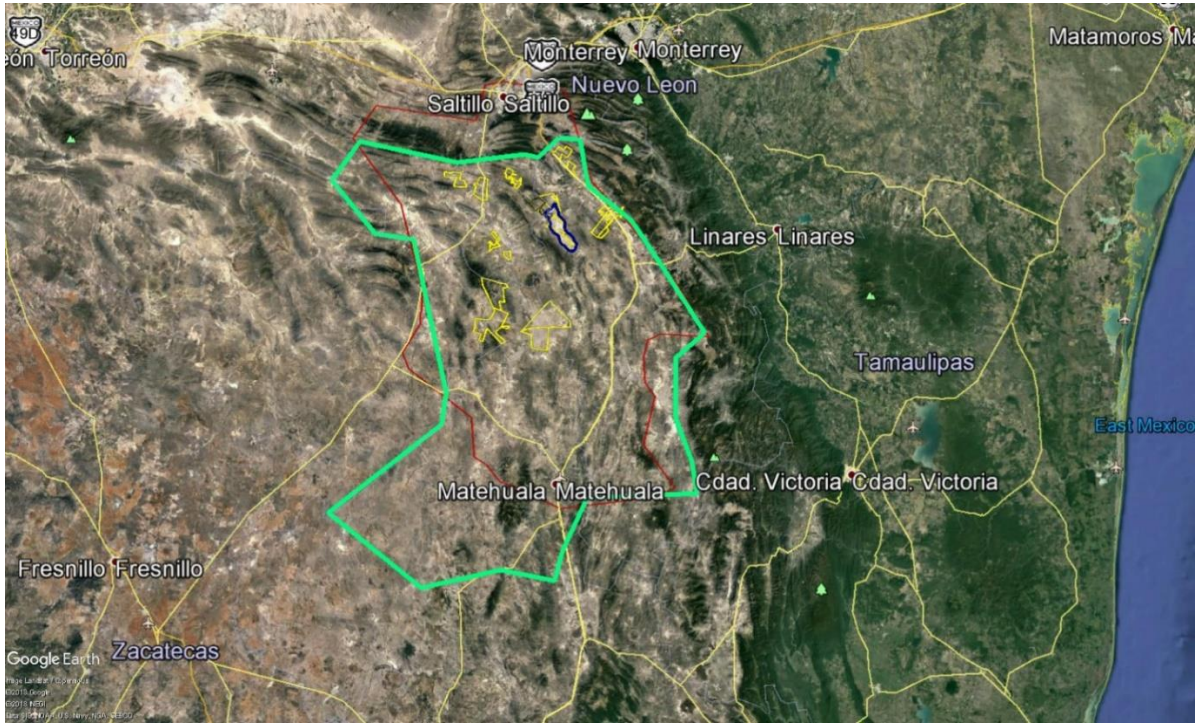
**Previous Southern Wings Successes:** With Southern Wings and matching funds, ABC and PNE have helped restore grasslands on a dozen properties in El Tokio. This includes the protection and management of two reserves owned and managed by PNE: Loma del Gorrión and Cuatro Gorriones. Here support has gone to maintaining a guard for the two reserves, which has been crucial for deterring illegal activity and carrying out management tasks such as monitoring and repairing the fence that prevents the ingress of goats from neighboring properties. In addition, we have installed erosion control devices, reforested with native junipers, removed invasive plant species, developed sustainable cattle grazing plans with ejidos, trained local ranchers on best cattle ranching practices, and conducted prescribed burns to help restore habitat.

We have also worked with the San José del Alamito, La Carbonera, El Cercado, La Esperanza, Las Vegas, San Juan del Prado, and Nuevo Gómez ejidos and in La India with matching funds. PNE works to develop conservation agreements on these properties and implement management activities that help protect and restore portions of these ejidos. Four livestock management plans were developed for La Carbonera, Puerto México, La Esperanza, and San José del Alamito ejidos which will lead to reduce the number of livestock grazing in the ejido and improve the grazing practices. Monitoring has been conducted across multiple ejidos to better understand the distribution of migratory birds and their presence and abundance.

**Conservation Actions:** ABC and PNE would like to continue collaborating with ejidos already in the program, as well as expand into additional ejidos. The communities of San José del Alamito and La Esperanza now have a conservation and livestock management plan to guide sustainable grazing practices. We will provide technical support for their implementation. Also, other actions we will work on this coming year include installing livestock ranching infrastructure and erosion control measures. These activities will ensure the conservation of up to 3,800 acres (1537ha) of grasslands. PNE has conducted preliminary assessments and has identified opportunity areas for preventing loss of grassland habitat. Ideally, we can move forward with developing an action plan for these communities and raise funds for implementation.

While we work to develop new conservation opportunities, it is extremely important that we maintain contact with ejidos that have already signed agreements and have received support. A stronger PNE presence would also demonstrate to communities that this is a long-term project and that PNE is their trusted partner and available to consult when there are challenges and so that conservation need not be at odds with their way of life. It is therefore vital that PNE adds staff to maintain a constant presence in the El Tokio region. ABC will help PNE fundraise to cover one new staff member working in the El Tokio BirdScape for at least one year.

**Budget:** Conservation actions and coordination total \$70,000.



**Figure 2:** El TokioBirdScape (green), El Tokio GPCA (red) and location of properties PNE is involved with (yellow), and Llano de Soledad Protected Area (blue)



## A Sustainable Grazing Network to Protect and Restore Grasslands on Private and Communal Lands in Mexico's Chihuahuan Desert

### Partners:



**States that have participated to date:** Arizona, Colorado, Montana, New Mexico, Pacific Flyway Council

**States with strong biological connections:** Seven to 28 Species of Greatest Conservation Need (SGCN) in each WAFWA state have a biological connection to the species in the Chihuahuan Desert.

**Overview:** Grassland birds that overwinter in the Chihuahuan Desert are declining twice as fast as other North American grassland birds, having lost 70% of their global populations since 1970. The Chihuahuan Desert, more than two-thirds of which lies in Mexico, is a continentally-important wintering area for grassland birds. It supports 90% of migratory species breeding in the western Great Plains, including species such as Baird's sparrow and chestnut-collared longspur, which winter nowhere else. These birds are sentinels for unsustainable practices that are degrading grasslands and aquifers across the continent, especially in Mexico. Conservation and restoration of winter habitat in northern Mexico is needed to stabilize and recover grassland bird populations and prevent the need for additional listings under the Endangered Species Act. Our collaborative, non-regulatory approach to conserving grassland birds addresses the root cause of habitat loss in northern Mexico – desertification due to unsustainable grazing practices. Using scientific guidance from our peer-reviewed research, we collaborate with landowners to foster planned grazing and grassland restoration to protect and improve habitat for grassland birds while at the same time making each ranch more productive, resilient and resistant to land use change. Less farming conserves aquifers that are being depleted, jeopardizing pastoral economies, rural communities, a shared cultural heritage and way of life spanning generations and nations.

**Birds:** chestnut-collared longspur, vesper sparrow, Brewer's sparrow, savannah sparrow, horned lark, grasshopper sparrow, lark bunting, chipping sparrow, mourning dove, clay-colored sparrow, Baird's

sparrow, eastern meadowlark, scaled quail, Cassin's sparrow, Sprague's pipit, loggerhead shrike, Say's phoebe, short-eared owl, northern harrier, Chihuahuan raven, western meadowlark, red-tailed hawk, American kestrel, mountain bluebird, burrowing owl, long-billed curlew, Aplomado falcon, white-tailed kite, ferruginous hawk, prairie falcon and golden eagle.

**Threats:** Intensive cropland agriculture is rapidly expanding in Janos and Valles Centrales, threatening to eliminate remaining native valley-bottom grasslands by 2025. Between 2006 and 2011, croplands in Valles Centrales expanded by 34%, destroying 170,000 acres of grasslands and displacing 355,000 grassland birds, including 133,000 wintering chestnut-collared longspurs. Land use change has continued since then, and croplands now occupy more than 63% of former low-slope grasslands in Valles Centrales. Long-term unsustainable grazing along with increased aridity/drought have reduced rangeland productivity and increased financial strain on ranchers, driving many to sell their land for farming.

**Success to Date:** Since 2013, we have enrolled 28 ranches encompassing over 504,000 acres into the Sustainable Grazing Network (SGN) and have identified additional properties we plan to enroll in the coming years, along with hundreds of thousands of additional acres of ranchlands with a high value and potential for enrollment. The SGN currently includes 21 co-managed ranches, where we develop an integrated wildlife and grazing management plan with each landowner and provide technical and cost-share assistance for implementing the plan (including range and habitat improvement projects) as well as 7 reference ranches that provide models of excellence for range management, and opportunities for outreach, habitat capacity, restoration, and bird monitoring. We have improved over 160,000 acres of grasslands through these actions, and we are monitoring the response of birds and vegetation annually to assess progress and inform next steps. For example, since 2014, Sprague's Pipits have increased 15% annually across our co-managed SGN ranches. This collaborative, win-win, science-based approach has significant proof-of-concept and is ready to be scaled up.

**Goals:**

1. Enroll an additional 10,000 acres (4046 ha) in the Chihuahuan Desert in the SGN (Figure 3) in 2022.
2. Improve range management on at least 25,000 acres (10,117ha) of desert grasslands in 2022.
3. Restore at least 200 acres (81ha) of degraded Chihuahuan Desert grassland in 2022
4. Increase abundance and survival of priority grassland bird species on SGN lands, including Sprague's pipit, Baird's sparrow and chestnut-collared longspur, through habitat restoration.
5. Host a meeting and celebration of private ranchers and conservation groups working together in the Chihuahuan Desert to build a sense of community, pride and understanding of their role in continental grassland conservation efforts.

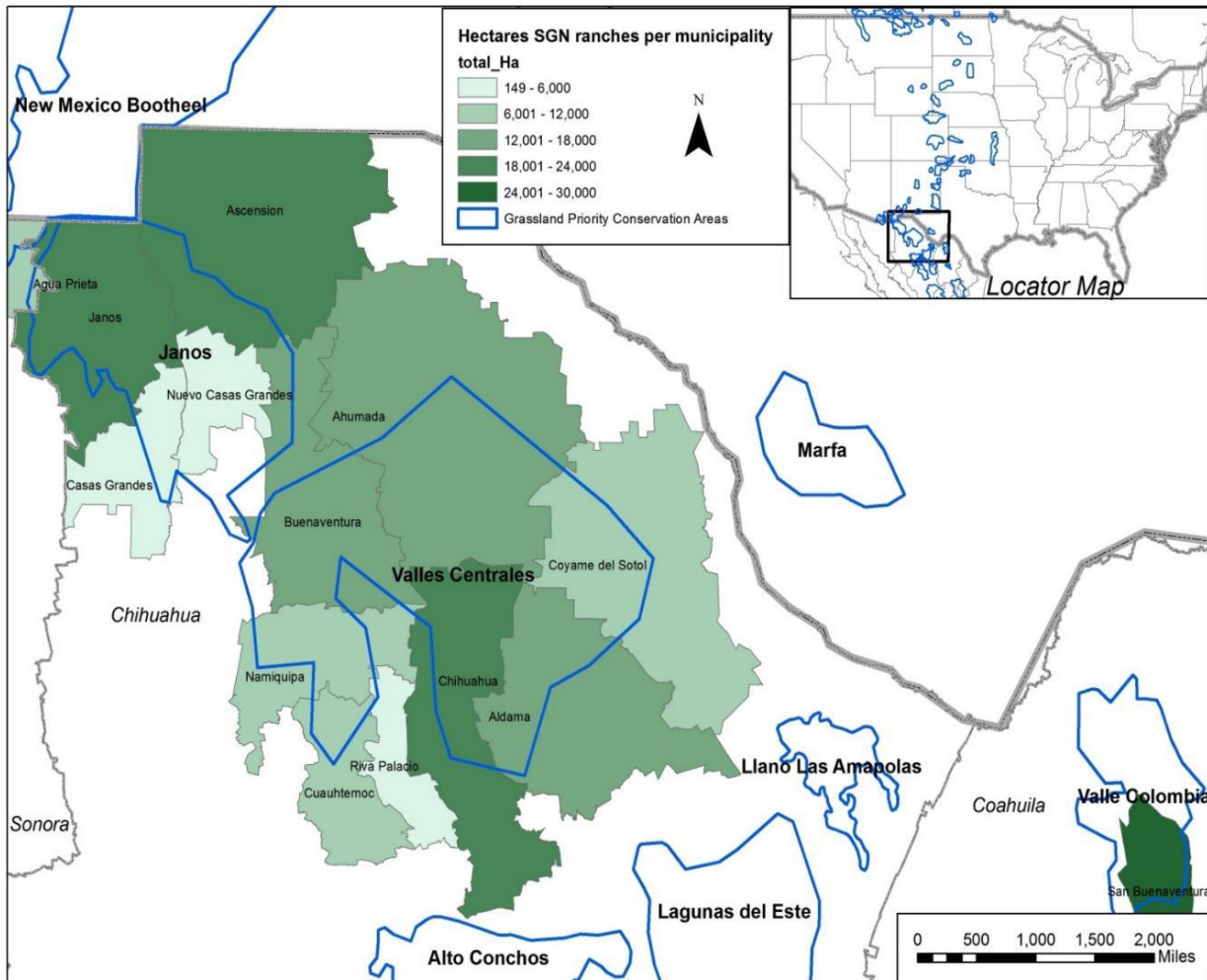
**Current Capacity and Needs:** Keeping ranchers on the land by helping them improve their management, profitability and carrying capacity for birds and other wildlife is the most immediate and cost-effective way to slow and begin to reverse the decline in grassland birds. Bird Conservancy of the Rockies (BCR) collaborates with *Especies, Sociedad y Habitat, A.C.*, PNE and other regional non-profit organizations with expertise in landowner outreach, grazing management and grassland birds.

We currently support three full-time private lands wildlife biologists in northern Mexico who operate all aspects of the SGN program from outreach and landowner relations, to development and implementation of management plans and habitat restoration, to bird monitoring and evaluation. Funding is needed to support additional boots on the ground and cost-share on infrastructure (i.e., fencing, water distribution lines, water storage tanks and troughs, etc.) is needed to facilitate rest-rotational grazing plans and improve grassland conditions, as well as pay for diesel and machinery rental for shrub removal (\$125/acre) and sub-

soil aeration (\$75/acre). Funding is needed to construct water tank escape ladders (2 m tall, \$60/each) and support training and landowner outreach events.

**Matching Funds:** This project leverages significant additional investment from Mexican landowners, private foundations, the Canadian Wildlife Service (CWS), Neotropical Migratory Bird Conservation Act (NMBCA)/US Fish and Wildlife Service (USFWS), Bureau of Land Management, the U.S. Forest Service International Program (USFS-IP), and municipal governments in Colorado. Every dollar invested leverages at least one additional dollar.

**Figure 3:** Distribution of SGN lands by municipality in 2021



## Protecting stopover and wintering habitat for shorebirds in Laguna Madre, Mexico

**Partners:** PNE, National Commission of Protected Areas (CONANP), Rio Grande Joint Venture (RGJV)

**States that have participated to date:** Texas

**Overview:** Shorebirds are facing drastic declines in their populations, due to the loss and degradation of breeding and nonbreeding habitats, making it urgent to implement conservation efforts in priority sites. Laguna Madre, México is composed of a variety of ecosystems, including lagoons, estuaries, deltas, marshes, intertidal swamps, sea grasses, coastal dunes and mangroves, playing a key role in the survival of shorebirds during their migratory cycles. That is why this region has international distinctions such as Ramsar Site 123, Western Hemisphere Shorebird Reserve Network (WHSRN) site, and Area of Importance for Bird Conservation (IBA).

In addition, PNE, ABC, and RGJV identified Laguna Madre as a priority site for migratory birds. Conservation of this complex mix of wetlands and other ecosystems is a priority in the RGJV implementation plan, and also supports priorities identified in the U.S. Shorebird Conservation Plan (Brown et al, 2001) and The North American Waterbird Conservation Plan, Version 1 (Kushlan et al, 2002). Our focus in Laguna Madre has been on habitat restoration, biological monitoring, community engagement, and land protection. We intend to propose conservation strategies linked to local and international initiatives that benefit the ecosystems and species at risk. In this proposal, shorebirds have the function of an umbrella biological group. We included activities that will benefit this group of birds and complex ecological interactions in the Laguna Madre.

Because of the habitat compatibility between shorebirds and other bird guilds this proposal is compatible with the Midcontinent Shorebird Conservation Initiative and International Reddish Egret Working Group, which recently updated the rangewide conservation action plan for this species and developed a conservation business plan for the U.S. Implementation of priority, on-the-ground conservation actions is one of the key next steps.

**Threats:** Several threats due to anthropogenic activities directly affect the prevalence of migratory shorebirds, such as disturbances due to unregulated tourist and recreational activities, inappropriate use of motorized and all-terrain vehicles, abandonment of domestic animals that become feral, and pollution by solid waste and agrochemicals. In addition, other problematic situations include shoreline and wetland modification, poor water management policies and enforcement, and erosion of barrier and interior islands causing sedimentation.

There are also information gaps about shorebirds due to lack of monitoring continuity and coverage. It is necessary to fill the gaps about migratory populations and the relationship with their ecosystems and threats, to implement conservation actions based on updated data.

**Birds:** The focal species considered for this proposal include Wilson's plover, snowy plover, piping plover, long-billed curlew, marbled godwit, red knot, western sandpiper, sanderling, American golden-plover, ruddy turnstone, American oystercatcher, and lesser yellowlegs, with complementary benefits for other priority species such as reddish egret, black skimmer, redhead, pintail, blue-winged teal and American wigeon.

**Goals:**

- Update knowledge of migratory shorebird populations in Laguna Madre, Tamaulipas.
- Improve knowledge and current status of habitat use and threats.

- Implement anthropogenic threat management activities focused on solid waste management, pollution, and disturbances.
- Increase local partners and stakeholders' capacity.

**Previous Southern Wings Successes:** In 2013 and 2017, Southern Wings invested in the Laguna Madre project, funding mangrove reforestation that resulted in the planting of nearly 21,000 mangrove saplings over 75.6 acres. Previously, with funding from the National Fish and Wildlife Foundation (NFWF), ABC and PNE created two new conservation agreements on private lands totaling over 10,000 acres, began a program to control feral animals on islands, improved fencing to reduce cattle and other agricultural animals from entering sensitive areas of Laguna Madre, conducted focal species monitoring, began mangrove restoration, and protected key nesting and wintering sites. In 2020, 222 acres (90ha) of islands were restored with black and red mangroves.

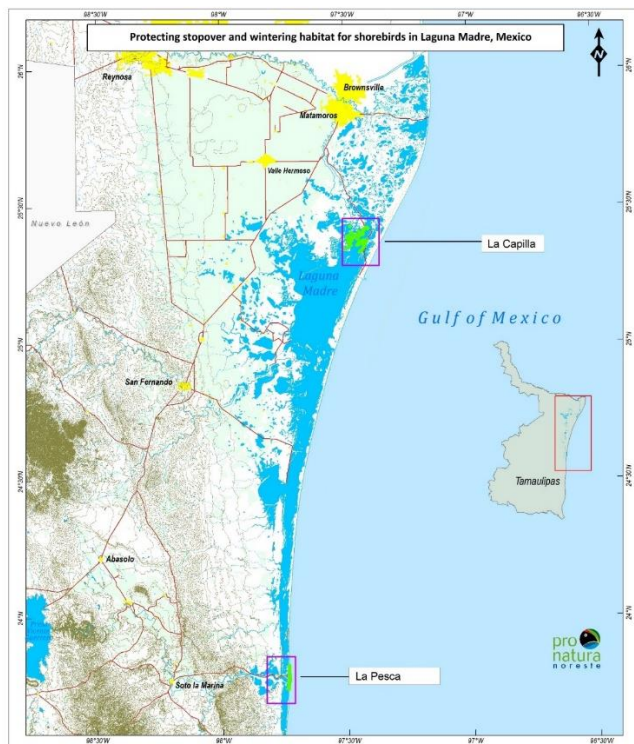
**Conservation Actions:** Our conservation priorities for shorebirds include:

- monitor migratory shorebirds in Matamoros and Soto La Marina, Tamaulipas;
- conduct shorebird monitoring training workshops for community monitors to implement the monitoring protocol;
- manage priority habitats through solid waste cleanup campaigns in Matamoros and Soto La Marina;
- implement an outreach and education strategy that includes an education campaign focused on human disturbances for shorebirds, implementation of surveys to evaluate the impact of visitors in tourist seasons, development and dissemination of materials (guides and pamphlets of best practices), and development of a media campaign for shorebird conservation using social networks; and
- develop training workshops focused on solid waste management for local fishermen.

**Budget:** Conservation action, monitoring, waste clean up and coordination total \$84,000.

**Matching Funds:** In-kind support from ABC and PNE total \$51,000.

**Figure 4: Map of Laguna Madre, Mexico**





## Conservation of Wintering Habitats in the Yoro-Pico Bonito and Agalta-Lost City Birdscapes, Honduras

**Partners:** La Asociación de Investigación para el Desarrollo Ecológico y Socio Económico (ASIDE); Wildlife Conservation Society (WCS), Tropical Agricultural Research and Higher Education Center (CATIE), Smart Consulting Enterprises (Smart), Uncommon Cacao, and Aves Honduras.

**States that have participated to date:** Missouri, Indiana

**Overview:** The Golden-winged Warbler Non-breeding Ground Conservation Plan identified priority wintering habitats for this near-threatened species. In Honduras, the highest priority focal areas are La Muralla Wildlife Refuge and Sierra de Agalta National Park and Tawahka and Río Plátano Biosphere Reserve. These areas have been declared as BirdScapes by ABC. Renewed support from Southern Wings would help ABC and our partners advance the implementation of conservation strategies within the Yoro-Pico Bonito and Agalta-Lost City BirdScapes, which include improving protection of protected areas, restoring forests, and improving the management of working lands to provide better quality habitat for NMBs.

**Threats:** Habitat degradation, loss of forest cover due to conversion to cattle production and monocultures, and watershed contamination caused by fertilizer and/or other chemicals.

**Birds:** Target wintering migratory species include: wood thrush, golden-winged warbler, golden-cheeked warbler, magnolia warbler, blue-winged warbler, Kentucky warbler, worm-eating warbler, Louisiana waterthrush, black-and-white warbler, black-throated green warbler, chestnut-sided warbler, Wilson's warbler, eastern wood-pewee, yellow-bellied flycatcher, yellow-throated vireo and white-eyed vireo. More than 15 other species also use this area as a stop-over including Canada and bay-breasted warbler, and yellow-billed cuckoo (YBCU).

**Project Goal:** Our long-term goal is to slow the rate of deforestation by working with landowners and communities to adopt land use practices that are compatible with forest preservation. In the short-term, we will restore at least 50 acres (20ha) of degraded lands with 30,000 native trees in La Muralla Wildlife Refuge in the Yoro-Pico Bonito BirdScape. In the Agalta-Lost City BirdScape and restore 200 acres (81ha) of degraded cacao farms to ensure they provide habitat for NMBs. We will work with CATIE to enhance 150 acres (61ha) of pasturelands through best ranching practices such as rotational grazing and living fences.

**Southern Wings Successes to Date:** With Southern Wings funding as well as matching funds, ABC and partners have facilitated habitat restoration in the Agalta-Lost City BirdScape, including the improvement of 335 acres (135ha) of cacao and coffee plantations by planting 9,617 native trees, 38,530 coffee and cacao plants, and 577 fruit trees. Additionally, nine communities signed conservation agreements that secured commitments to protect 4,283 acres (1,733ha) of land within the buffer zone of Sierra de Agalta National Park. In the Tawahka and Río Plátano Biosphere Reserves, we have established conservation agreements with 71 landowners who are now actively reducing the impact of their cattle ranching through implementation of silvopasture techniques, tree planting, and the creation of feed banks and rotational grazing systems. Rotational grazing helps reduce the amount of land needed for cattle and allows natural regeneration to occur where cows previously fed.

In 2020, WCS conducted a Spatial Monitoring And Reporting Tool (SMART) patrol training workshop in the town of Catacamas with ICF and municipal staff that are in charge of managing Sierra de Agalta National Park. The workshop included two classroom days and two field days practicing the use of the SMART protocol and

associated “CyberTrack” application, which allows for uploading of information from the field. This is the fourth SMART training in Honduras, and the trainings are already resulting in improved patrol methodologies for the Tawahka and Río Plátano Biosphere Reserves and Sierra de Agalta National Park.

In La Muralla Wildlife Refuge, ABC’s partner ASIDE has produced the first 20,000 pine seedlings for reforestation of 50 acres (20ha) within the reserve. A total of 30,000 seedlings will be planted in June 2022, with the beginning of the rainy season. In addition, ASIDE is coordinating with the Instituto de Conservación Forestal de Honduras (Honduran Forest Service) to train park guards and volunteers in the prevention and combat of wildfires.

#### **Proposed activities for FY23:**

##### **HONDURAS**

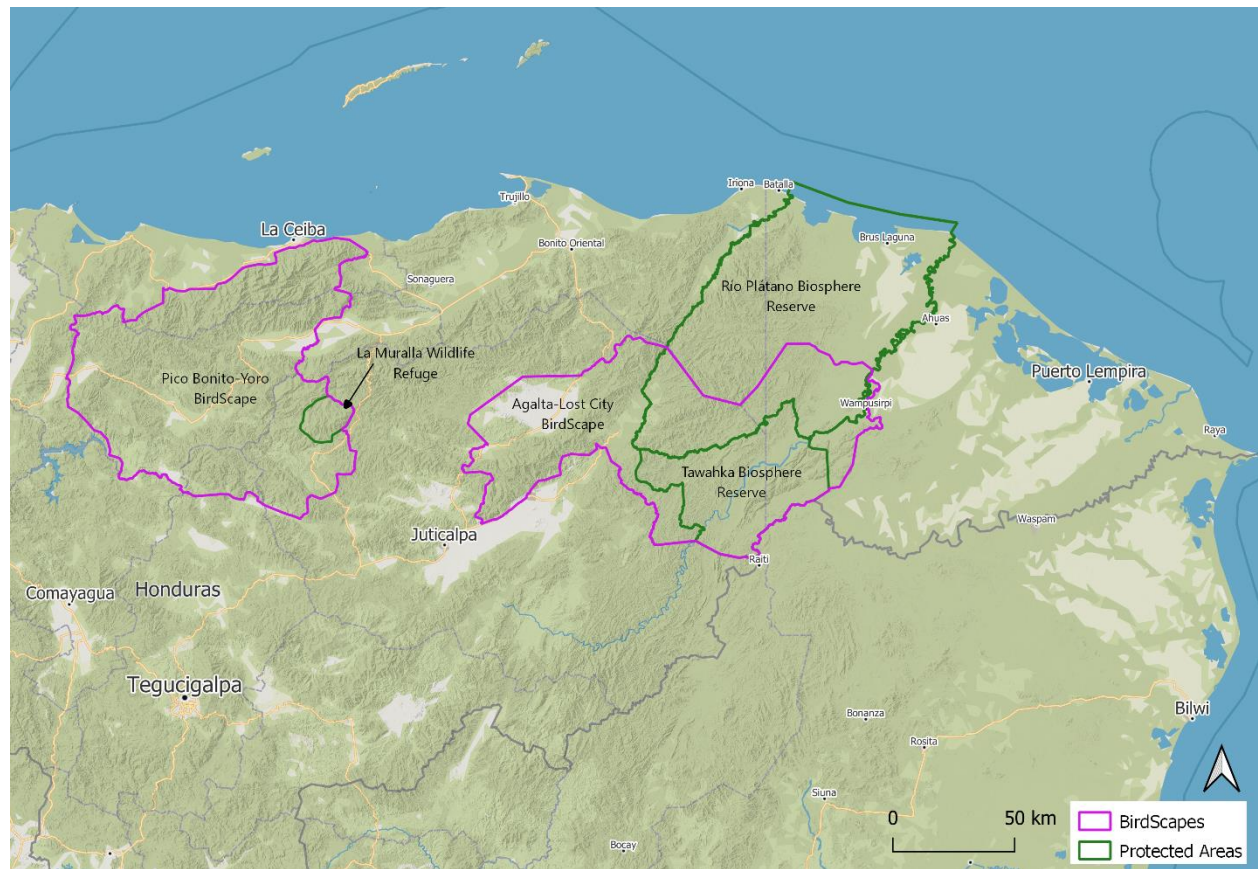
**Agalta-Lost City BirdScape:** In this BirdScape, ABC and our partners will continue to focus on improving land production practices—primarily agriculture and ranching—to benefit migratory birds. Funds are needed to ensure the survival of the 12,000 trees planted on the six demonstration farms we established with our partner CATIE in 2020. We also want to invest in the maintenance of the local tree nurseries in order to have additional trees available for project expansion. CATIE is in the process of obtaining funds from the German government for a large silvopasture project, but until that support is in place, we need to keep momentum going with the communities involved in the project. Similarly, we are seeking funding for at least one more year of monitoring on farms where agroforestry and silvopasture actions are being implemented.

In the Tawahka and Río Plátano Biosphere Reserves, we will work with our partner Smart to restore 200 acres (81ha) of degraded cacao farms and plant at least 1,200 native and fruit trees to ensure they provide proper habitat for neotropical migratory birds and a sustainable livelihood to 60 families of 11 communities, some of which are Miskito and Tawahka indigenous peoples. There is an existing market and cacao supply chain from this region that we would like to strengthen and expand. By ensuring that cacao farms remain a valuable production system, communities will be less inclined to enter into cattle production that would cause further deforestation. We are working with Uncommon Cacao, a global cacao sourcing company, to strengthen cacao production.

**Yoro-Pico Bonito BirdScape:** The La Muralla Wildlife Refuge has identified multiple needs and opportunities around this important area co-managed by ABC’s partner ASIDE. Some of these needs include the construction of basic infrastructure for the detection and prevention of forest fires and the promotion of tourism in the reserve. The construction of an observation tower would help with vigilance in a remote area of the reserve where fire is a significant threat and can also be used for bird watching by visitors. Furthermore, the reserve has a visitor center building, but it is lacking basic furniture and educational displays and does not employ an adequate number of personnel to receive visitors and do outreach to educate local visitors about migratory bird conservation. ABC is seeking funds to construct an observation tower, refurbish the existing visitor center, hire personnel to assist in the visitor center, build an interpretative trail, and improve the signage in the reserve.

ABC will also work with Aves Honduras to promote the conservation of migratory birds in the Yoro-Pico Bonito and Agalta-Lost City BirdScapes. The focus will be to promote community education and activism by bringing a national bird conservation organization active in other parts of Honduras to Olancho and Yoro and promoting the creation of local Aves Honduras chapters. Aves Honduras staff and volunteers will prepare an education and communications campaign for the three largest cities in and near these BirdScapes, with preparation of Bird ID materials, workshops to train local teachers in the Cornell BirdSleuth curriculum, and plenary lectures combined with community science workshops and guided bird walks. We also plan to produce billboards outside each of the cities to promote neotropical migratory bird conservation.

**Budget:** Conservation actions including restoration, workshops, and coordination across the two Birdscapes totals \$247,210



**Figure 5:** Location of BirdScapes and project areas in Honduras.

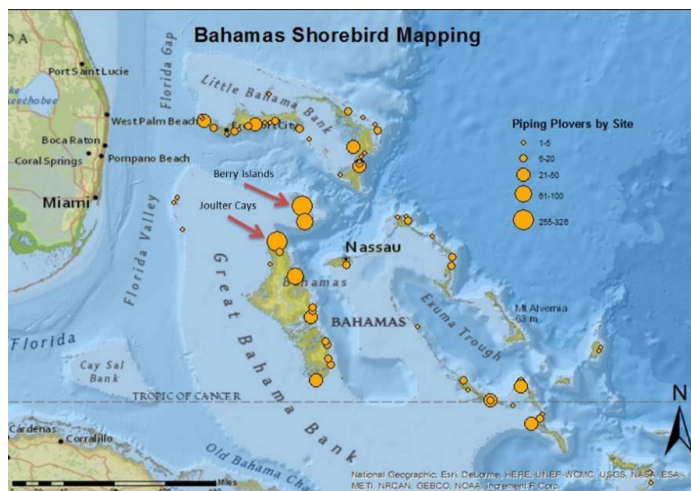
## Conserving Critical Piping Plover and other Shorebirds Wintering Sites in the Bahamas

**Partners:** National Audubon Society (Audubon), Bahamas National Trust (BNT), Virginia Tech, Environment and Climate Change Canada, Foundations, Private Donors

**States that have participated to date:** Northeastern Association of Fish and Wildlife Agencies (NEAFA), Virginia, North Carolina

**States with strong biological connections:** CT, DE, MD, ME, MA, NH, NY, NC, RI, VT, GA, SC and VA

**Overview:** More than thirty-three species of shorebirds that breed along the Atlantic coast of the U.S., Canada and the Arctic complete a perilous migratory journey each fall to reach remote islands of the Bahamas where they spend up to ten months each year. These include around half of the Atlantic population of the endangered piping plover. Audubon, in partnership with the BNT, is working to protect critical coastal habitats that wintering plovers and other declining shorebird species depend on. Shorebirds worldwide are in precipitous decline. The piping plover, with an estimated global population of only 8,024 individuals, is the most endangered shorebird breeding in the U.S. and Canada. Concern about the species has triggered widespread, intensive conservation action on its breeding range, but protecting its wintering grounds has received little attention until recently. The importance of The Bahamas for wintering piping plovers and other declining shorebirds was first understood in 2006, when Audubon scientists discovered high numbers of the Atlantic breeding population spending the winter months in remote parts of the archipelago. Now, Audubon,



BNT and other partners are taking ambitious steps to conserve and protect several of the highest priority sites across the Bahamas archipelago that are necessary to ensure the survival of these wintering shorebirds (Figure 6). By protecting these habitats, we are also helping other vulnerable species, including the red knot (*rufa*) the semipalmated sandpiper, reddish egret—and supporting important commercial and sport fish nurseries, coral reefs, eel grass beds and mangroves necessary for sustainable fisheries and traditional economic opportunities for local communities.

**Figure 6:** Important Areas for Piping Plover Conservation

Alongside BNT, we expect to meet the overall goal of protecting at least 20% of the Atlantic PIPL population with the protection of the Berry Islands IBA. We are now shifting gears to consolidate our efforts by focusing on a few critical sites and strengthening community support for conservation. We are also aligning our efforts with a BNT-led initiative to restore 620 acres (250ha) of critical coastal habitat on Andros Island by 2026.

**Goals:** Each objective is an essential step toward durable, protection and conservation for piping plovers and other shorebirds, from their summer nesting sites on the beaches of the U.S. and Canada to their wintering grounds in the Caribbean and South America.

**Conservation Action:** Over the next 12 months to line up future land protection and advance on the ground, *2022-2023 Southern Wings Projects*



community-led habitat management actions, we will do the following.

#### **Field Research Activities:**

- Monitor shorebirds across major habitats on Central, Northern Andros, the Joulter Cays and the Northern Berry Islands to develop population estimates for PIPL and other shorebirds.
- Resight banded birds to support survivorship and connectivity studies.
- Engage communities to build capacity and continue to elevate the importance of sites and species with stakeholders including government agencies and private landowners.

#### **Education and Outreach Activities:**

- Reestablish youth environmental education on Andros through the formation of youth bird watching clubs. COVID halted most environmental education programs with students. Over the next two years, we believe that a youth birding club approach to reengaging youth with nature would be the most prudent approach. We will work with schools and communities to offer after school activities that teach youth about birds and nature. We are aiming to have by October 2023, at least 2 youth bird clubs developed, beginning the process of reestablishing environmental education programs.

#### **Applied Conservation Activities:**

- By March 2023, designate at least two WHSRN sites on Andros. At least one site will be a community conservation site. The WHSRN criteria focus on highlighting the importance of sites for shorebirds with a prioritization process that highlights large concentrations of shorebirds. The effort would support greater collaboration with both traditional and non-traditional stakeholders. WHSRN requires local stakeholders including landowners, local government, and others to agree to the nomination and form a voluntary partnership to help manage the site. We will use this process to engage communities and other stakeholders to support the conservation of sites that fall outside existing protections.
- By June 2023, establish Audubon's Bird-Based Tourism Curriculum as part of the official education offerings by The Bahamas Agriculture and Marine Science Institute to secure the sustainability of the investments to date and support communities as they emerge from COVID. Eventually, we hope to create a recognized education certification program for The Bahamas, thereby mainstreaming bird tourism and conservation into the tourism offerings. We will focus on strengthening the bird-tourism offerings on Andros by training additional guides and strengthening the capacity of current guides. We will also work to build additional constituents on Andros who support conservation and see greater value in the environment.



#### **From Discovery to Conservation**

**2006:** Audubon discovers over 400 piping plovers wintering on several islands.

**2010:** 57 plovers are banded on three islands in The Bahamas.

**2011:** 41 banded plovers are found along the Atlantic coast, from North Carolina to Nova Scotia.

**2011:** 1,066 piping plovers are found on 14 Bahamas islands by 31 researchers from 10 organizations

**2012:** Audubon focuses efforts and discovers 708 birds or 20% of the Atlantic piping plovers wintering on just 3 islands Andros, the Joulter Cays and The Barry Islands.

**2013:** Audubon and BNT submit a proposal to the Bahamian government for establishment of a 92,000 acre National Park on the Joulter Cays.

**2015:** The Bahamian Government declared the 92,000 acre Joulter Cays a National Park protecting winter habitat for over 10% of the Atlantic breeding population of piping plover.

**2016:** International Plover Census records 1404 piping plovers in the Bahamas and adds important sites in Turks and Caicos.

**2017:** First Motus Tracking efforts from the Bahamas maps initial migration pathways.

**2021:** Critical shorebird and seabird sites placed into protection, including Berry Islands IBA (7% PIPL pop) and Long Island.



- By March 2024, at least 15 people will have graduated from the bird guide training program. In 2015, Audubon and BNT developed a comprehensive guide curriculum and piloted the training programs. This training has been repeated in five countries - Belize, Bahamas, Guatemala, Colombia and Paraguay, training over 700 guides. The Curriculum covers chapters on Biology; Diversity and Taxonomy; Conservation; Bird ID, Guiding; Group Management; Ethics and Security; Business skills; English for bird guides; Citizen Science; Tools of the Trade. The training takes place over six to ten sessions lasting 1.5 days -approximately 140 hours of training. The training is 50% classroom and 50% field work. Completion of the training and certification for the guides happens after completing a written test, a field bird ID test, and practical guiding test. In addition, the trainees have to be present for at least 75% of the course. An expectation from the training will be that the community members participate in at least two citizen science events and develop a community-led conservation program.
- By September 2024, strengthen the constituency on Andros to better support coastal conservation efforts that support PIPL conservation.

**Budget:** Conservation actions including monitoring, environmental education, and tourism total \$64,750

**Match:** Disney Conservation Fund, \$25,000

## Conservation and Management of Neotropical Migratory Birds and Thick-billed Parrots in old-growth forests of the Sierra Madre Occidental, Mexico

**Partners:** Organización Vida Silvestre A.C (OVIS), Ejidos (local communities), CONANP, Comisión Nacional Forestal (CONAFOR), Arizona Game and Fish Department (AGFD), Unidad Forestal Galván, Asociación de Silvicultores de Guadalupe y Calvo, San Diego Zoo Wildlife Alliance, USFWS/NMBCA, Universidad Autónoma de Nuevo León.

**Overview:** Mexico's national forest management policy, which now considers the management of biodiversity, presents an opportunity to work at reducing threats (e.g., destructive fires, over-harvesting of timber) to maintain or restore populations of birds in remaining forests of the Sierra Madre Occidental (SMO). Timber harvesting for the past 70 years has been implemented through Forest Management Units. These units cover vast territories where various timber harvesting treatments have been applied, sometimes including destructive clear-cutting and high-intensity timbering. Through new partnerships, forest managers are adopting and implementing practices that promote sustainable forest production and productivity and explicitly integrate biodiversity conservation objectives and indicators.

This project focuses on establishing and maintaining a network of forests under conservation schemes and integrating best management into forest management plans. The project area encompasses high elevation forests found in the mountainous regions of Chihuahua and Durango (2,471,00 acres/1,000,000 ha) where threats are severe and ongoing. Continued loss of old-growth forests will inevitably lead to loss and/or significant population declines of species associated with these old-growth forests. One of the most dramatic examples is the almost complete loss of remnant old-growth forests in northern Durango and Cerro Mohinora in southern Chihuahua and with it the loss of locally-nesting populations of thick-billed parrots (TBPA) (an endemic species) and Neotropical migrant populations dependent on old-growth forests.

This project implements strategies outlined in the Partners in Flight (PIF) *an Integrated Conservation Strategy for Western Temperate, Mexican Pine-Oak, and Tropical Cloud Forest Birds: North America to Central America*. Furthermore, the project addresses threats identified in the species recovery plan for the TBPA.

**Threats:** The birds of the SMO are seriously threatened from the loss and degradation of habitat as a result of poor forest management policies over more than a hundred years, as well as from fire suppression and a higher incidence of catastrophic fires. Large scale timber harvest has been practiced for many decades without considering the need to manage for biodiversity. The main threats have caused the Imperial woodpecker to be considered extinct and for two other endemic species to be critically endangered (Sierra Madre sparrow and the TBPA). Forest exploitation has eliminated old-growth forests (it's estimated that less than 1% remains of their original distribution) affecting groups of birds that depend on mature forests to provide cavities for nesting and shelter, such as trogons, woodpeckers, and owls.

There is an urgency to advance the conservation of the TBPA, a species listed as endangered by both the U.S. and Mexico. This parrot historically occurred in Arizona but is now only found in the mountain ranges of the SMO (in mix conifer forest habitats). TBPA are seriously threatened from the loss and degradation of habitat as a result of poor forest management policies, as well as from fire suppression and a higher incidence of catastrophic fires.

**Birds:** The rugged Sierra Madre harbors a system of canyons dominated by temperate forests in the higher areas and jungles in the lower areas. As a result, the footprint of the project can be felt over an extensive area of critical habitat for more than 300 bird species, 45% of which are Neotropical Migratory Birds (NMBs). At

least 19 species in the region are considered species of common concern (USFWS 2008) and more than 30 species are listed as high priority by PIF, including band-tailed pigeon, Bell's vireo, calliope and rufous hummingbird, elegant trogon, flammulated and short-eared owl, Grace's, hermit, and Lucy's warbler, loggerhead shrike, purple martin, and YBCU. Other species of note include dusky and Hammond's flycatcher, and painted bunting. Other resident bird species of high conservation priority also benefit, such as eared quetzal, Mexican spotted owl and Apache northern goshawk.

**Project Goals:** The project focuses on conserving habitat and implementing sustainable forest management practices by integrating habitat needs of NMBs (Table 1) and the TBPAs into forest management plans using the national forest management policy framework. The policy incorporates biodiversity management and environmental education to preserve wildlife populations and habitats. Also, in partnership with AGFD, the project will implement management of breeding populations of TBPAs in the protected natural areas of Tutuaca, Papigochi, Campo Verde, Mesa de Guacamayas and Madera (Figure 7). The project will use TBPA satellite tracking data to begin conservation planning in wintering habitats for TBPAs and NMBs.

**Southern Wings Successes 2021:** In coordination with CONANP, CONAFOR, Forestry Units and Ejidos, the following achievements were accomplished.

**Implement habitat conservation measures to protect, restore and manage mixed coniferous forests**

- Held virtual workshop on best forestry practices for decision makers in the state of Durango.
- Integrated best forestry practices into Ejido EL Largo's Forest Management Plan.

**Manage breeding populations of TBPAs**

- Documented 108 breeding pairs at 5 nesting sites, with a productivity of  $1.6 \pm 0.89$  fledglings/ nest.
- Built 3 artificial nest boxes for use in Mesa Prieta Janos and 4 for deployment later.
- Documented one nest possibly predated by bobcat, and installed metal barriers on two trees with active nests to minimize predation.

**Research migratory patterns of TBPAs (deployment of satellite radio transmitters)**

- Installed 30 transmitters in 5 TBPA breeding populations: 10 transmitters in 2019, 10 in 2020, and 10 in 2021. All transmitters provided by the San Diego Zoo. (Table 2, Figure 10).
- Increased knowledge of the phenology of the life cycle of the TBPAs with transmitter data (Table 3) (The breeding populations traveled south on similar migratory routes (Figure 11), although the populations did not travel together if they were found on mountain peaks. During their migratory journey, they traveled between 60 and 150 kilometers per week and traveled to the mountainous region of central Nayarit. The maximum distance of their migration to the south was 648 km from Tutuaca, although on average it was a distance of 612 km and  $\pm 49.8$  km, with the southernmost range extending into Nayarit. Most of the time the wintering range centered within the State of Durango (Figure 11)).

**Verification and characterization of wintering areas used by TBPAs and NMBs**

- Conducted exploratory visits in TBPA's winter sites in the state of Durango (Figure 11) at Neveros, Las Cebollas, Revolcaderos, San Miguel de Cruces, Granizo and Las Veredas. No parrots were found and very little food availability was observed.
- Characterized the habitat used by TBPAs in their winter range by evaluating forest diameter at breast height. The heights of all the trees within forest stands were measured, in addition to counting the small trees by species. This information is found in the master's thesis "**Characterization of Winter Habitat of *Rhynchopsitta pachyrhyncha*, in the Southwest of the State of Durango, Méx.**" By Sergio Guzmán.

- Ten plots of 1,000 square meters were evaluated, (each had been occupied by a parrot). A total of 8 tree species were recorded, on average 5 per stand, the height is from a minimum of 8.7 to 19.7 meters with an average of 13.9 meters.
- On average the stands had a 6% availability of pine cones. The average age of the trees sampled was 104 years, the oldest being a *Pseudotsuga menziensis* at 242 years and the youngest a *Pinus durangensis* at 52 years.
- The predominant species were *P. durangensis* and *P. strobiformis*.

### **Monitor Populations of NMBs**

- Sampled different associations of temperate forests located between 1800 to 3000 meters above sea level and dry forests between 1400 to 1800 meters above sea level.
- Conducting 82 point counts of 5 minutes and separated every 500 m during the months of September 2020 to January 2021. We developed bird lists in the various TBPA nesting areas in Chihuahua (RB Janos, Madera, APFF Tutuaca and Papigochic). The total diversity of birds for the region was 242 species of birds; 72 species (30%) were migratory Neotropical birds. The site with the greatest diversity was the Mesa de San Agustín, because it includes ecosystems of dry forests in canyons and mountain peaks of temperate forests in a good state of conservation, due to its difficult access and low level of grazing.

**Conservation Actions:** OVIS and partners will implement the following conservation actions.

Implement habitat conservation measures to protect, restore and manage mixed coniferous forests (Chihuahua and Durango).

- Work with foresters and other partners to continue implementing best forest management practices for more sustainable forests that maintain biodiversity values (Figures 8, 9). The work will focus on new nesting areas located in 2020 (Mesa Prieta in RB Janos and Yahuirachi in APFF Tutuaca). Including 4 priority wintering areas for conservation in the State of Durango: Espadañal de San Jerónimo (68,000 ha) municipalities of San Dimas and Tamazula, Santa Rita (37,000 ha). Neveros (17,000 ha) and La Ventana (33,000ha), the three areas in the municipalities of San Dimas. Work may occur in other wintering localities opportunistically and based on partners' interest.
- Carry out restoration works in areas affected by fires at parrot distribution sites.
- Analyze the feasibility of protection schemes for sites in the winter range (areas voluntarily destined for conservation, agreements, etc.)

### **Monitor populations of NMBs and TBPAs.**

- Conduct point counts to monitor migrant and resident species.
- Survey TBPA populations and monitor breeding colonies.

### **Manage breeding populations of TBPAs**

- Monitor and manage accessible nests to increase reproductive success.
- Continue research to identify potential predators and develop approaches to mitigating threat.
- Reduce the mortality of pairs and chicks to increase recruitment and the size of the breeding population, by installing as many anti-predation systems as possible (metal bands around the nest trees and in some cases, neighboring trees, where predators may climb up and jump into the nest tree).
- Maintain existing or install new artificial nest boxes at Cerro Mohinora and Mesa de Guacamayas.
- Maintain natural water sources by appropriate conditioning of drinking sites.
- Protect food banks (nectar, seeds etc.) to enhance foraging habitat.
- Verify the presence of TBPA in historical and potential nesting sites in Chihuahua (San Juanito, Cerro Rumurachic and Sierra del Nido) and Durango (Cocono, Vacas, San Camellones and Nevado).

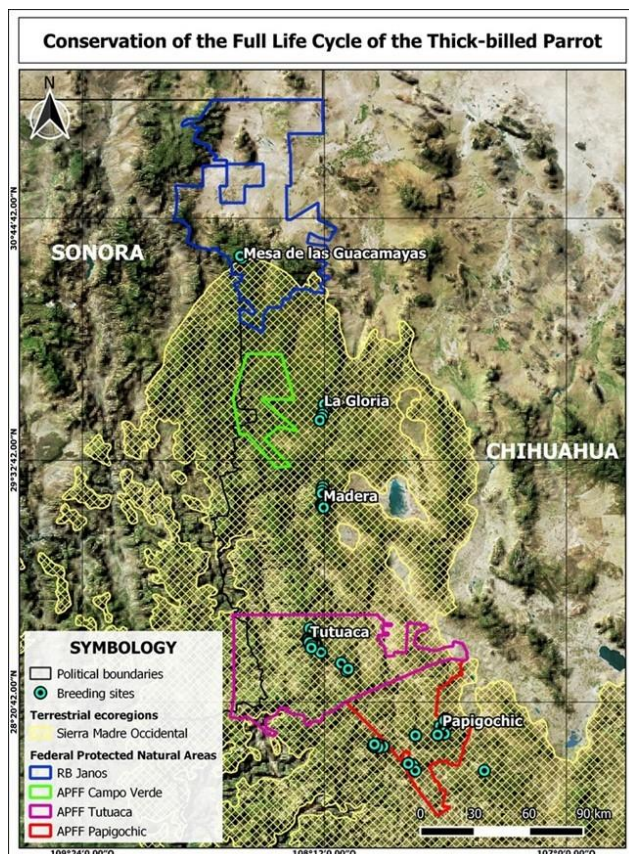
### Verification and characterization of wintering areas used by TBPAs and NMBs

- Update breeding habitat and newly discovered migration routes and wintering habitats.
- Integrate new distribution information (obtained from satellite transmitters) into a conservation plan that encapsulates the network of newly discovered migration/wintering areas and provide this to CONANP to inform conservation planning and management.
- Disseminate information on migration and wintering areas to key decision makers and conservationists through workshop(s) and other communication means.

### Evaluate habitat use and movements of the long-eared quetzal

- Locate eared quetzal nests and install GPS transmitters to record local movements to be able to identify specific resting, feeding and nesting sites.

**Budget:** AGFD will provide USD \$41,521.50 for some of the conservation actions. The total budget is \$77,521.



**Figure 7:** Project locations in the breeding range (high mountain peaks of the Sierra Madre Occidental): (1) Mesa de las Guacamayas at Ejido 5 de Mayo in the Janos Biosphere Reserve (2) At the Ejido El Largo Maderal and Socorro Rivera in RPC Madera, (3) Ejidos Tutuaca and Conoachi in APFF Tutuaca. (4) At the Ejidos Heredia, Rojo Gómez, El Ranchito and Cerro Rumúrachic in APFF Papigochic and (5) Ejido Las Pomas and Heroínas in APFF Campo Verde. (Cruz 1998, Cruz et al 2011 and Cruz et al. 2014).

**Table 1.** Species of Greatest Conservation Need (SGCN) (considered NMBs\*) in the project area, listed by state.

Species	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
Sharp-shinned Hawk	X		X									
Spotted Sandpiper	X											
White-throated Swift		X										
Violet-crowned Hummingbird		X						X				
Golden Eagle		X		X	X		X			X	X	
Great Egret												
Short-eared Owl	X		X	X	X		X		X		X	X
Lesser Scaup	X											X



<b>Species</b>	<b>AK</b>	<b>AZ</b>	<b>CA</b>	<b>CO</b>	<b>ID</b>	<b>MT</b>	<b>NV</b>	<b>NM</b>	<b>OR</b>	<b>UT</b>	<b>WA</b>	<b>WY</b>
Red-tailed Hawk	X											
Swainson's Hawk			X	X					X			X
Common Black-Hawk								X				
Lark Bunting												X
Wilson's Warbler	X											
Red-faced Warbler		X										
Killdeer	X											
Common Nighthawk							X	X	X			
Northern Harrier	X		X	X								
Yellow-billed Cuckoo		X	X	X	X		X	X		X	X	X
Western Wood-Pewee	X											
Broad-billed Hummingbird		X						X				
Black Swift				X	X	X		X		X		
Gray Flycatcher		X										
Pacific-slope Flycatcher	X											
Cordilleran Flycatcher		X										
Magnificent Hummingbird		X										
Merlin												X
Peregrine Falcon	X	X		X			X	X	X	X	X	X
American Kestrel	X											
Common Yellowthroat	X		x									
Barn Swallow	X											
Yellow-breasted Chat		X										
Bullock's Oriole		X										
Hooded Oriole		X										
Scott's Oriole		X	x				X					
Dark-eyed Junco			x									
Blue-throated Hummingbird		X										
Loggerhead Shrike				X					X			
Belted Kingfisher	X											
Lincoln's Sparrow	X	X										
Elf Owl		X	x					X				
Ash-throated Flycatcher												X
Brown-crested Flycatcher			x									
Painted Redstart								X				
Sulphur-bellied Flycatcher		X										
Black-crowned Night-Heron												X
Rose-throated Becard		X										
Osprey		X										
Savannah Sparrow	X	X	x									
Varied Bunting		X						X				
Band-tailed Pigeon				X						X	X	
Spotted Towhee			x									
Summer Tanager		X	x									
Blue-gray Gnatcatcher						X						
Vesper Sparrow								X	X		X	
Purple Martin				X							X	
Vermilion Flycatcher			x									
Ruby-crowned Kinglet	X											
Rufous Hummingbird	X			X			X					

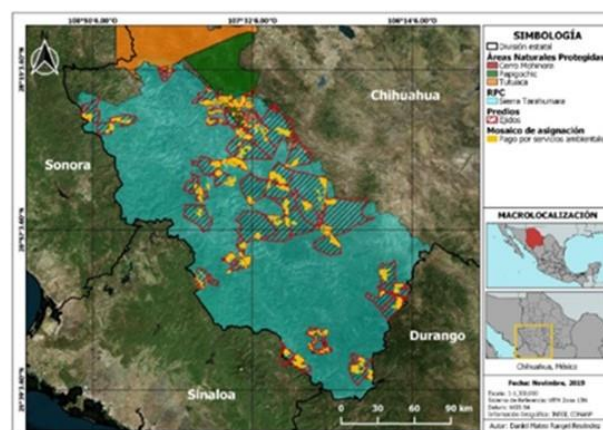
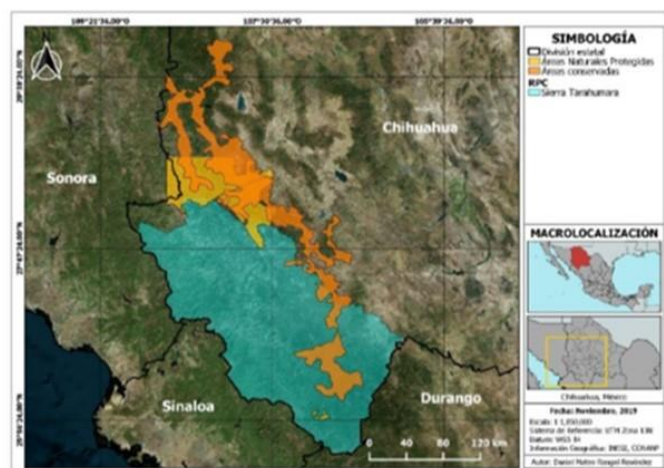
Species	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
Grace's Warbler		x		X				X				
Black-throated Gray Warbler								X				
Yellow Warbler	X	x	x									
Townsend's Warbler	X											
Mountain Bluebird		x						X				
Western Bluebird								X			X	
Eastern Bluebird		x										
Red-naped Sapsucker		x										
Williamson's Sapsucker		x						X				
Chipping Sparrow	X								X			
Tree Swallow	X											
Elegant Trogon		X						X				
Thick-billed Kingbird								X				
Bell's Vireo		X	X				X	X				
White-crowned Sparrow	X	X										
<b>Total</b>	<b>24</b>	<b>32</b>	<b>16</b>	<b>12</b>	<b>4</b>	<b>2</b>	<b>8</b>	<b>19</b>	<b>7</b>	<b>5</b>	<b>8</b>	<b>9</b>

\*SGCN NMBs as defined by the NMBCA Program.

**Table 2:** Deployment of satellite transmitters in 2019 and 2020 on TBPAs from key breeding site localities.

2019		2020	
ID Radio	Ubicación	ID Radio	Ubicación
178327	Madera	203315	RB Janos
178328	Madera	203311	Madera
178329	APFF Tutuaca	203312	Madera
178330	APFF Papigochic	178334	APFF Tutuaca
178331	APFF Papigochic	203314	APFF Tutuaca
178332	Madera	203313	APFF Tutuaca
178333	APFF Papigochic	197885	APFF Tutuaca
178334	APFF Campo Verde	203317	APFF Papigochic
178335	APFF Tutuaca	203316	APFF Papigochic
178336	APFF Papigochic	197886	APFF Papigochic

**Figure 8:** Location of project activities: Protecting critical habitat for NMBs and TBPAs through a mix of legal mechanisms like forest segregation, and integration of best management practices into forest management plans.



En la RPC Sierra Tarahumara, cuya extensión aproximada es de 4 millones de ha, se seleccionaron un total de 56 predios, sumando un área de 1,060,900 ha. Dentro de dichas áreas se localizaron 69 AA/C Segregados del Aprovechamiento Forestal en una superficie de 152,170 ha (Figura 4; Tabla 3)

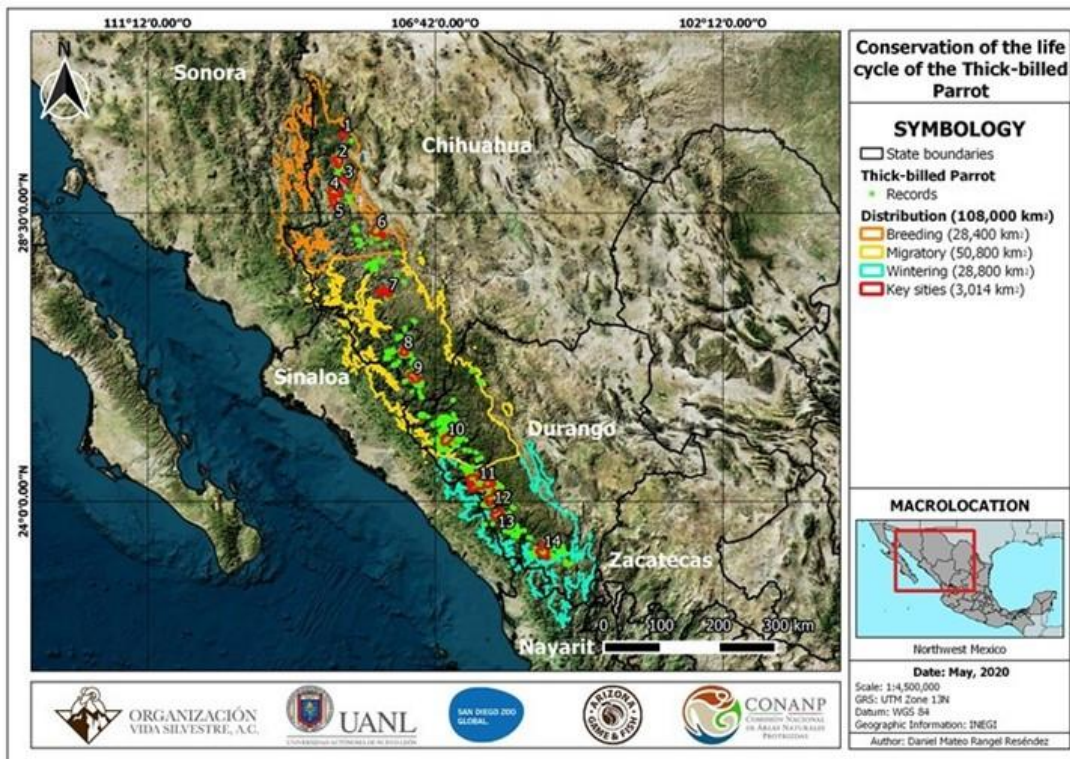


**Figure 9:** Manual of best forestry practices for the conservation of biodiversity in the Sierra Madre Occidental, which includes Neotropical migratory habitat values.



**Figure 10:** Deploying transmitters on an adult (left) and a juvenile (right) TBPA.

**Figure 11:** Wintering, migratory and breeding sites of TBPAs from 2019 and 2020 radio transmitter data.



**Table 3:** Annual reproductive phenology of TBPAs.

	M				J				J				A				S				O				N				December-April			
Evento	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Arrival at nesting area																																
Inspection and selection of nesting cavities																																
Asynchronous laying of eggs																																
Incubation																																
Hatching of eggs																																
Chick development																																
Successful fledgling of chicks																																
Parental care for fledged juvs.																																
Flock migration																																

## Neotropical Flyway Project: 2022-2023 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 and Wisconsin

**States with a biological connection:** All states in eastern U.S.; many western states have connections through long-distance migrants such as olive-sided flycatcher, western wood-pewee, and YBCU (Table 4).

**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.

**Threats:** Most 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. 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.

**Goal:** The Neotropical Flyways Project (NFP) has been operating since 2016 with the goals of (1) rapidly discover and map new stopover 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. The overarching goal is to prioritize and conserve key habitats and sites through an investment strategy for migration stopover sites in Central America and northern South America aimed at ensuring that not only major stopover regions are safeguarded for currently threatened species and but also species that are common yet declining.



Specific objectives of this project are to:

- identify previously unknown stopover/staging sites (“Delaware Bays for songbirds”);
- determine habitat quality and needs for key species within stopover sites;
- determine migratory connectivity and migration strategies with tracking technologies;
- engage and train local biologists, conservationists, and communities;
- incorporate migration-stopover needs into full life-cycle bird conservation plans; and
- develop and implement conservation strategies at newly discovered stopovers through local partners.

#### NFP: AT A GLANCE

- Over **one billion migratory landbirds** migrate to the Neotropics from North America.
- Despite this massive movement of birds, the routes and strategies that migratory landbirds adopt in the Neotropics are almost completely unknown.
- The Caribbean Sea represents a major **ecological barrier** to many species and quality of stopover sites on either side can influence the success of migration.
- 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 five 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.
- This will inform a **conservation investment strategy** 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 YBCU 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 Nicaragua provide stopover habitat for Canada Warblers, Cerulean Warblers and Golden-winged Warblers, and for the latter during the winter.

**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 warbler, cerulean, and golden-winged warbler, as well as common species 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 (Table 4).

**Table 4.** Species targeted by the NFP, and their SGCN status in selected states. PIF continental status: **XX** = Red Watch List, **XX** = Yellow Watch List, **XX** = Common Bird in Steep Decline (2016 PIF Landbird Plan).

PIF	Species	NY	MO	LA	NC	GA	VA	TN	KY
<b>XX</b>	golden-winged warbler	X			X	X	X	X	X
<b>XX</b>	common nighthawk	X	X		X				
<b>XX</b>	black-billed cuckoo	X	X		X				
<b>XX</b>	olive-sided flycatcher	X						X	
	Tennessee warbler	X							
	bay-breasted warbler	X							
<b>XX</b>	cerulean warbler	X	X		X	X	X	X	X
	dickcissel	X	X	X	X			X	X
	Louisiana waterthrush	X	X	X			X	X	X
<b>XX</b>	Canada warbler	X			X		X		X
	scarlet tanager	X	X				X		
<b>XX</b>	prothonotary warbler	X	X	X			X	X	X
<b>XX</b>	yellow-billed cuckoo		X	X	X		X	X	
<b>XX</b>	chimney swift		X		X		X		
	eastern wood-pewee		X		X		X	X	
	rose-breasted grosbeak		X		X		X		X
	Mississippi kite		X		X			X	X
	eastern kingbird		X		X		X		
	black-and-white warbler		X				X		
	yellow warbler		X				X		
	yellow-throated vireo		X				X	X	
<b>XX</b>	bank swallow		X				X		X
	Acadian flycatcher		X					X	
	blackburnian warbler								X

**Previous Successes and history:** In 2016-2018, with funding from Cornell Lab of Ornithology, Environment and Climate Change Canada, and SELVA, 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 (Figure 12). Analysis of spring data, for example, revealed the previously unknown importance of dry forest stopover sites for species such as YBCU and barn swallow, while also highlighting the importance of pre-montane forests for species like blackburnian warbler and scarlet tanager.

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 to understand cerulean warblers stopover and revealed this region to provide important fuel reserves for species such as cerulean, blackburnian and bay-breasted warblers.

In 2020, surveys were expanded to Nicaragua 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.

Working with local partners in each country we have trained 12 Colombian, 6 Panamanian, 5 Costa Rican and 7 Nicaraguan biologists; worked alongside the National Parks authority in three national parks and carried out education activities in local schools. Other outreach activities included 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](#)), at least five additional peer-reviewed publications, presentation of results to three Colombian National Parks, the Colombian Ornithology Congress (Nov 2016), American Ornithological Society (April 2018), and International Ornithological Congress (August, 2018), and NAOC (2020).

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.

Parallel to research activities, restoration and protection activities are underway in some of the critical stopover regions mentioned above, including the Guajira peninsula (Colombia), Caribbean dry forest (Cordoba, Colombia), and on the Caribbean slope of Costa Rica. To date >15,000 trees have been propagated in nurseries and planted through agreements with private landowners to enhance stopover habitats, with a special focus on native tree species that provide food resources to migratory landbirds. Results from occupancy surveys in the form of spatial maps have updated regularly on the project website: <https://www.neotropicalflyways.com>

**Conservation Actions:** In the current proposal, we are seeking funding for planned actions during 2022 that will build on the activities carried out during 2016-2021. These include:

**January-December 2022:** Carry out occupancy analyses using fall migration data from Panama, Costa Rica and Colombia to identify major stopover regions (ongoing).

**March-May 2022:** Train observers in Honduras, Guatemala and Belize and carry out occupancy surveys during spring migration to identify regionwide concentrations of migratory birds.

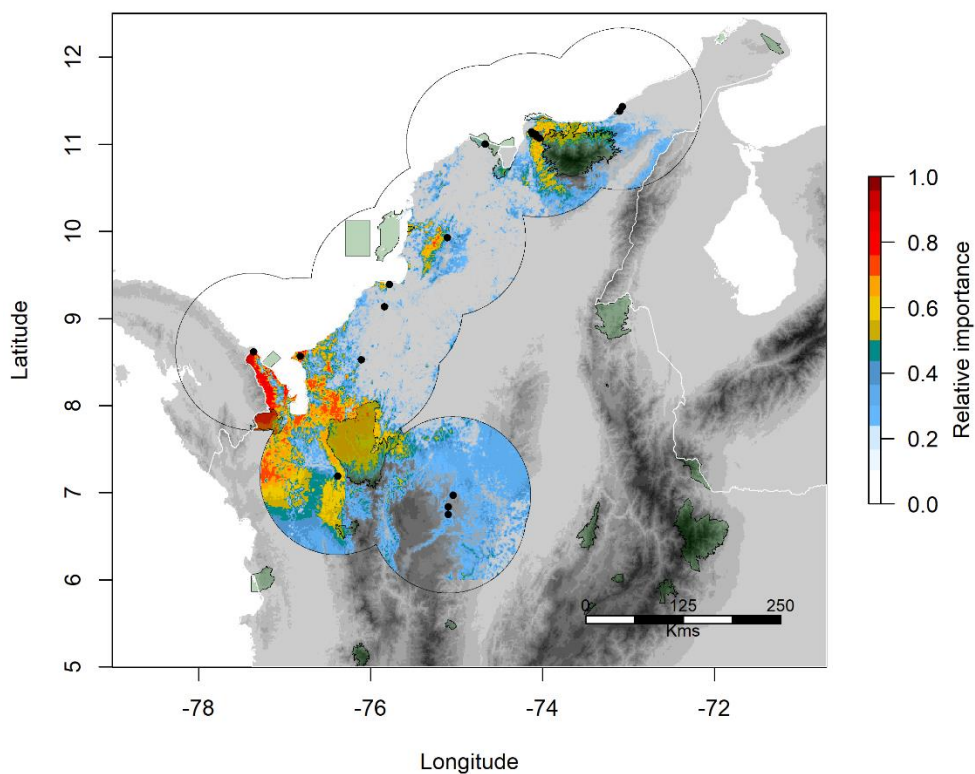
**March-May 2022:** Run the constant-effort mist netting station established in the highlands of Nicaragua at the Selva Negra Ecolodge focused on the migration ecology of golden-winged warblers and Canada warbler.

**August-September 2022:** Carry out occupancy surveys across Honduras, Guatemala and Belize during fall migration to identify regionwide concentrations of migratory birds.

**October 2022:** Detailed study of blackpoll warbler habitat use and relation to precipitation at critical recovery/stopover sites in NE Colombia, where birds arrive following trans-oceanic flights >2500 km. This dry region of Colombia may be highly susceptible to climate change. It is important to understand how this might impact the declining blackpoll warbler and other species using this region (e.g., YBCU).

**Budget** (Spring and Fall 2022): Conservation action in Nicaragua, Honduras, and Belize/Guatemala totals \$100,000. Amounts of \$5,000 and \$10,000 can be very impactful. There is an immediate need for funding for Fall 2022 occupancy surveys in Honduras, Guatemala and Belize.

**Matching funds:** Cornell Lab of Ornithology (\$10,000 for 2018, \$15,000 for 2019, \$10,000 for 2020 and \$10,000 for 2022). CWS (\$33,000 for 2018/2019). Private donor (\$20,000). SELVA, Acadia University, Guelph University and Saskatchewan University (\$30,000). Equipment (\$13,000). Environment Canada (\$25,000 for 2019/2020, \$35,000 for 2020/2021 and 2021/2022).



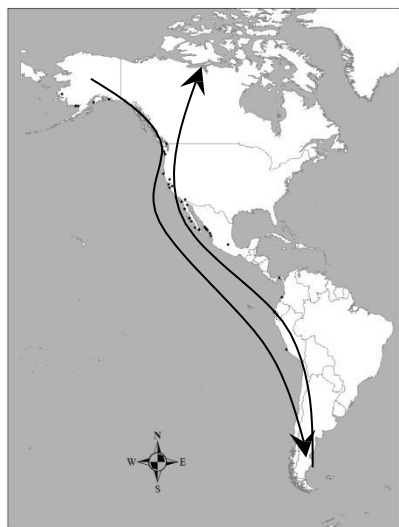
**Figure 12:** Priority spring stopover areas in northern Colombia for 20 species of migratory landbirds. Protected areas are indicated by transparent green shapes. The area outlined by a thin black line, is the area within which spatial predictions from occupancy models can be assumed to be appropriate, 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.

## The Pacific Flyway Shorebird Survey: Identifying Threats and Conservation Hotspots in Northwest Mexico

**Partners:** Terra Peninsular, Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Centro de Investigación en Alimentación y Desarrollo, A.C. (Guaymas, Sonora), Point Blue Conservation Science, Universidad Nacional Autónoma de México (UNAM), Centro de Investigaciones Biológicas del Noroeste (CIBNOR), Universidad Autónoma de Baja California Sur (UABCS), Grupo Aves del Noroeste De México (GANO), USFS-IP

**States that have participated to date:** Arizona, California, Pacific Flyway Council.

**Overview:** Nearctic-neotropical migratory shorebirds (Order: Charadriiformes; Families: Charadriidae, Recurvirostridae, Scolopacidae) are highly migratory species that traverse thousands of kilometers across the Western Hemisphere bi-annually and are reliant upon a network of coastal and interior wetland ecosystems. The Pacific Coast of the Americas (Figure 13) supports entire populations of neotropical migratory shorebird species from November to February. Wetlands stretching from western Alaska to southern Chile are critical for the survival of these birds; including 13 WHSRN sites in NW Mexico. The health of these sites is critical to supporting shorebird populations during their annual migrations.



**Figure 13:** The Western Hemisphere with stylized migration route of shorebirds along the Pacific Coast of the Americas and important wetland sites (black dots) as designated by the WHSRN.

The lack of broad-scale coordinated monitoring for Pacific Flyway shorebirds has limited our ability to effectively manage their populations particularly in light of the predictions of climate change, which will likely alter habitat conditions (e.g. sea-level rise, reduced wetlands due to drought). In 2011, in collaboration with the Copper River International Migratory Bird Initiative and >100 individual and organizational partners throughout the Pacific Flyway, we initiated the Pacific Flyway Shorebird Survey (PFSS) and then the Migratory Shorebird Project (MSP) to fill gaps in Pacific Flyway population status and trends and to assess threats to shorebirds and identify priority conservation locations. Specifically, the objectives of the PFSS and then the MSP are to: (1) quantify spatial and temporal trends in distribution and abundance of shorebirds and other waterbirds both at the individual site level and across their wintering ranges; (2) provide science-based guidance for managers to inform actions and measure the response; (3) develop an “iterative learning” analytical framework to critically evaluate specific hypotheses about the factors influencing population changes and to identify priority wetlands; and (4) educate individuals, communities, and governments about the importance of their wetland resources and their connectivity with people, via shorebirds, throughout the Americas. These programs now collect standardized bird and habitat condition data on over 2.5 million non-breeding waterbirds from 13 countries annually.

**Threats:** The primary threats include 1) changes in habitat availability; 2) exposure to contaminants and pollutants; 3) human disturbance; 4) climate change; and 5) increasing predator populations. Human disturbance is thought to particularly be a problem in beach habitats (important to the snowy plover and red knot), which get a lot of use by humans compared to intertidal mudflats and rocky areas commonly used by other shorebird species.

**Birds:** Shorebirds (Families: Charadriidae, Haematopodidae, Recurvirostridae, Scolopacidae); waterfowl (Pacific brant and ducks); raptors; and waterbirds (terns, egrets, etc.) (Table 5). In addition to shorebirds, all 13 sites of importance for wintering Pacific brant in northwest Mexico are surveyed each year, and brant as well as other



waterfowl are counted as part of the MSP (Table 6).

**Project Goal(s):** The overall goal is to improve the efficiency of conservation and management for coastal wetlands, shorebirds, waterbirds and waterfowl in Mexico through the integration of data and prioritization in decision-making. This will be achieved by conducting the following actions.

1. Complete annual non-breeding bird surveys at 21 sites across Mexico (Figure 14) and compile data in to the PFSS node of the Avian Knowledge Network (AKN). Data collected includes the number of birds (shorebirds, waterbirds and waterfowl), measures of bird disturbance, and assessment of habitat condition. The number of avian predators (raptors) and other waterbirds are also recorded.
2. Expand survey efforts on sandy beaches to improve sampling for snowy plover, red knot, willet, and sanderling, and improve our understanding of human impacts on beaches.
3. Integrate survey data, along with spatial data on the distribution of shorebird habitat across Mexico, into models to determine drivers of shorebird distribution and abundance, and the prevalence of different threats. Distribution models developed with these data for Pacific Flyway state SGCN will be used to highlight priority areas for non-breeding shorebird conservation.

**Southern Wings Successes in 2021:** Funds have helped to conduct midwinter Pacific brant surveys, nonbreeding shorebird and waterfowl surveys as part of the MSP, breeding shorebird surveys at coastal wetlands and sandy beaches (targeting breeding snowy plover, Wilson's plover and American oystercatchers), and identify key wintering sites and develop conservation strategies. Also, these funds have strengthened conservation and management of sites, disseminated information to land managers, and conducted education/outreach to the general public. Achievements to date include:

#### Nonbreeding Surveys

- During January/February, we completed the annual non-breeding midwinter shorebird surveys at 21 sites (Figure 13) with 250 sampling units and 50 volunteers.
- We conducted the 2021 mid-winter Pacific brant surveys and provided a summary report to the Pacific Flyway Council (*Palacios, E., and A. Heredia. 2021. Pacific brant mid-winter ground surveys in Mexico (2021)*).
- We collaborated with the hunting organization "Los Volcanes" to monitor Pacific brant in Bahia San Quintin and protect loafing and gritting sites for Pacific brants and conduct surveillance to avoid illegal hunting and human disturbance. Our partner also collected two tons of plastic garbage at the San Quintin saltmarsh wetlands. See details in Terra Peninsular's [magazine article](#).
- During January 2021 we coordinated with the snowy plover midwinter survey along the Pacific coast of the United States to conduct nonbreeding snowy plovers surveys in five sites in northwest Mexico (Estero de Punta Banda, Bahía San Quintin, Laguna Atotonilco, Marismas Nacionales and Bahía Ceuta).
- We completed winter surveys of roosting aggregations of American oystercatchers during high tides at five wetlands of southern Sonora: Las Guásimas-Guaymas, El Tóbari, Lobos, Yávaros and Agiabampo.

#### Breeding Surveys

- During May 2021 we assessed the breeding population of the snowy plover in the Colorado River Delta. The Alto Golfo and Colorado River Delta Biosphere Reserve includes the most extensive potential habitat for this threatened species in Mexico and thus it is important to know the current status of its populations and their habitats. We found 408 individuals, which is the most important aggregation in Mexico, and its habitat is in excellent condition. Participant partners included CICESE, Terra Peninsular, UABCS, Coastal Solutions Program of the Cornell University, CONANP and PNE. We submitted a report to CONANP and USFWS. *Palacios, E. y A. Heredia. 2021. Abundancia y distribución de Chorlo Nevado en el Delta del Río Colorado.*

- We completed two surveys (in May and June) of Ridgway's rails in the mangroves at five wetlands of southern Sonora: Las Guásimas-Guaymas, El Tóbari, Lobos, Yávaros and Agiabampo.
- During April through June we collected blood samples from American oystercatchers in Natural Protected Areas of Northwest Mexico, including Bahías Santa María, Ceuta and Navachiste, Sinaloa; El Tóbari, Bahía Kino, Tóbari, Guasimas, and Lobos, Sonora; Bahía Magdalena, and Bahía de La Paz, BCS. These samples will be used to study the genetic structure of this species in Mexico.

### Education/Outreach/Training

- Along with our partners, we held a workshop in Ceuta to train participants in deploying GPS receptors on snowy plover. In 2022, two new sites will be included in the conservation and monitoring of the snowy plover.
- We mentored graduate students on data analysis and interpretation for use in conservation and management. Daniela Michelle Valdez Gámez finished her M.Sc. thesis in July 2021 by using MSP data to study the ecology of Wilson's plover in Ensenada de La Paz. Jennifer Hernandez, is finishing her M.Sc. thesis by using shorebird data from Ensenada de La Paz collected by MSP. Jonathan Vargas, a fellow of the Coastal Solutions Fellows finished his project on reducing human disturbance on the western snowy plovers in Baja California. Estefanía Muñoz is about to finish her M.Sc. thesis on the abundance and distribution patterns of three shorebirds in California and northwest Mexico in relation to weather, also using the data from MSP.
- We published Palacios, E. *et al.* 2021. Ten years of the Migratory Shorebird Project. See [news article \(2021\)](#).
- In collaboration with Deb Hahn (AFWA) we contributed to a note for Southern Wings on *Pacific Shorebird and wetland bird Conservation: Identifying Threats to Direct Strategic Action*.
- Application of Shorebird Data: Two scientific publications:
  1. Palacios, E. *et al.* *Biotropica*. *Impact of human disturbance on the abundance of nonbreeding shorebirds in a subtropical wetland*. Accepted.
  2. Valdez-Gámez, D.M., E. Palacios, *et al.* *Impact of temperature and human disturbance on a Wilson's Plover population*. *In review*.
- Application of Shorebird Data: Five technical reports submitted to CONANP and USFWS.
  1. Palacios, E., C. Guerrero-Ávila, A. Heredia, and G. Fernández. 2021. Beach nesting shorebird conservation in northwestern Mexico.
  2. Palacios, E., A. Heredia, D. Galindo-Espinosa, J. Vargas, L. Alfaro, E. Amador, L. A. Jauregui- Mascareño. 2021. Estado actual de la población de Chorlo Nevado en la península de Baja California.
  3. Palacios, E., A. Heredia, y G. Fernández. 2021. Estado de la población reproductora de Ostrero Americano en el noroeste de México.
  4. Palacios, E., A. Heredia, y J. Vargas. 2021. Abundancia y distribución de Chorlo Nevado y Ostrero Americano en la Reserva de la Biósfera Marismas Nacionales Nayarit.
  5. Palacios, E. y A. Heredia. 2021. Abundancia y distribución de Chorlo Nevado en el Delta del Río Colorado.
- A [radio interview](#) was held on La Chula FM radio station to publicize the Public Use Program and the work that has been done on the trails of the reserve.

### Data Entry

- We entered all 2021 mid-winter shorebird survey data into the project's online data entry portal hosted by AKN's California Avian Data Center. Data includes the number of shorebirds, waterbirds and waterfowl, measures of human disturbance and raptors, and assessment of habitat condition.

### Habitat Protection

- In order to protect the nests of snowy plovers and California least tern in early April 2021 we installed a temporary fence on three nesting beaches of Estero de Punta Banda. This action includes breeding season monitoring. The fence remained installed until August, see [video note](#) and [magazine article](#).

- To protect the public beach of the City of Ensenada, Terra Peninsular signed a Co-Management Agreement with Pacifica. This real estate company holds the concession of the federal zone which is a nesting ground for the snowy plover. This agreement will provide the legal background to control disturbance and promote best management practices. See [video note](#).
- Terra Peninsular has been restoring hiking trails in the natural reserves, by conducting soil restoration, delimitation and trail enhancement, plastic garbage cleanup along, and infrastructure improvement. Local people from ejido Chapala have been participating in restoring trails and clean up activities in Monte Ceniza and Punta Mazo natural reserves. These reserves provide important habitat for a suite of migrants including thousands of Pacific brant, surf scoter, western sandpiper, marbled godwit, willet, and dozens of long-billed curlew, snowy plover, and sanderling.
- Terra Peninsular built a 6.2 km interpretive trail "La Dudleya" in the Punta Mazo nature reserve. This interpretive trail will share with visitors the importance of mud flats, dune systems, sandy beaches, and rocky cliffs as critical habitats for migratory birds. This work was conducted with neighboring communities and under the guidance of experts in trail design. The Terra Peninsular team was in charge of the educational contents using the methodology for nature and culture interpretation of the National Association for Interpretation. See several [magazine articles](#) on the reserves and trails work.
- In 2021 a Public Use Program in San Quintín was created to protect natural and cultural resources that sustain productive activities (commercial fishing, shellfish harvesting, aquaculture, agriculture) and recreational activities (waterfowl hunting, bird watching, sport fishing, boat rides). The framework will provide natural spaces and outdoor experiences in which all users can coexist. Read more [here](#).

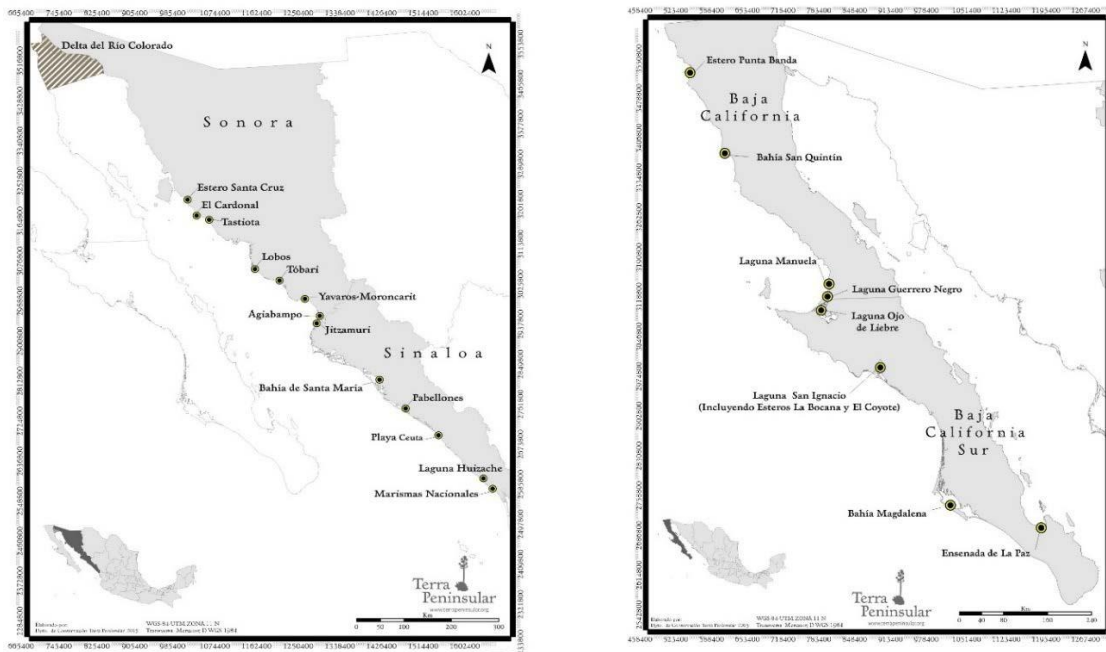
**Conservation Actions:** Terra Peninsular and partners will implement the following conservation actions.

- Conduct standardized annual non-breeding bird surveys of 21 wetland sites (Figure 14), and compile these survey data into the AKN node. Data collected includes the number of birds (shorebirds, waterbirds and waterfowl), measures of bird disturbance, and assessment of habitat condition. The number of avian predators (raptors) of shorebirds and other waterbirds will also be recorded.
- In collaboration with local hunting organizations, we will strengthen conservation and management wildlife conservation units (UMAs) in San Quintín, Baja and El Tóbari, Sonora, by implementing the following.
  - Monitor wintering population of Pacific Brant and work to maintain/enhance habitat.
  - Assist in the voluntary designation of hunting and non-hunting units within the UMA.
  - Improve capture of harvest information (sex and age) for hunted Pacific brant.
  - Conduct outreach and a workshop on sustainable and responsible hunting practices.
  - Promote birding and wildlife photography tours.
  - Implement a beach cleanup campaign.
- Work with an irrigation district (Yaqui River watershed, Sonora) to implement management practices that allow for vegetation to be maintained on one side of each canal to serve as loafing and foraging areas for waterfowl. Irrigation districts in Sonora traditionally work to keep canals free of any vegetation, but these vegetated areas provide important habitat for wintering populations of waterfowl as well as breeding Mexican duck and other species.
  - Organize workshops (and meetings) with the irrigation district to adopt the management of vegetation and dredged sediment.
  - Design and supervise the removal of vegetation in a channel slope or drainage ditch.
  - Monitor the response of birds to the management of the vegetation.
- Conduct monitoring of breeding snowy plover at six sites across NW México (Estero de Punta Banda and Bahía San Quintín, Baja California; Ensenada de La Paz, Baja California Sur; Laguna Atotonilco, Jalisco; Bahía Ceuta, Sinaloa; and Marismas Nacionales, Nayarit). Breeding Least Tern colonies will also be monitored at three of these sites (Ensenada de La Paz, Punta Banda and San Quintín). Protect nesting habitat (through perimeter fencing) and implement public outreach/education activities at three sites (Guerrero Negro,

Bahía San Quintín and Estero de Punta Banda) to mitigate the effects of human disturbance on breeding snowy plover and least tern.

- Implement or support education/outreach and training activities such as 1) outreach campaign “Share the Beach” focused on nesting snowy plover and least tern, 2) other activities that disseminate conservation information to land managers, new professionals, and the general public.

**Budget:** Contributions of \$5,000 to \$10,000 each will significantly advance implementation of the conservation actions. \$18,000 is needed to complete the budget.



**Figure 14:** Location of 21 coastal wetland sites which are part of the PFSS in NW Mexico.

**Table 5:** SGCN in the project area, listed by state.

Species (SGCN)	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
spotted sandpiper	X											
western grebe		X			X						X	
northern pintail							X					X
cinnamon teal											X	
greater white-fronted goose	X											
great egret		X										
ruddy turnstone			X									
black turnstone	X		X									
lesser scaup	X											X
brant goose			X								X	
Pacific black brant	X								X			
sanderling	X		X									
red knot			X								X	
western sandpiper	X						X					
semipalmated sandpiper	X											
mountain plover		X	X	X		X		X				X

Species (SGCN)	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
snowy plover			X					X		X	X	
western snowy plover		X		X			X		X			
killdeer	X											
black tern			X	X	X		X					X
black-bellied whistling duck		X										
fulvous whistling duck			X									
snowy egret		X							X			X
Species (SGCN)	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
common loon			X		X		X				X	X
gull-billed tern			X									
black oystercatcher	X		X						X			
black-necked stilt									X			
Caspian tern					X	X			X	X		X
loggerhead shrike			X	X			X	X	X		X	
California gull					X							
ring-billed gull					X							
short-billed dowitcher	X											
long-billed dowitcher	X						X					
marbled godwit												
belted kingfisher	X											
surf scoter											X	
wood stork			X									
long-billed curlew				X	X		X	X	X			X
whimbrel	X											
black-crowned night heron												X
American white pelican			X	X	X		X		X	X	X	
brown pelican (California)			X						X		X	
neotropic cormorant								X				
Brandt's cormorant			X									
red phalarope	X											
red-necked phalarope							X					
Wilson's phalarope							X					
white-faced ibis				X	X		X			X		X
black-bellied plover	X											
eared grebe								X				
American avocet							X					
black skimmer			X									
Forster's tern												X
least tern				X		X		X				
California least tern		X	X									
elegant tern			X									
royal tern			X									
lesser yellowlegs	X											
<b>Total species</b>	<b>18</b>	<b>7</b>	<b>21</b>	<b>8</b>	<b>9</b>	<b>3</b>	<b>13</b>	<b>7</b>	<b>10</b>	<b>4</b>	<b>10</b>	<b>11</b>



**Table 6:** Waterfowl abundance and distribution documented in the sampling units of the MSP sites in NW Mexico.

Common Name	Abundance	Percent of sites	Number of sites
northern shoveler	35606	29	7
green-winged teal	28380	38	9
brant	5378	50	12
redhead	4932	17	4
ruddy duck	4032	29	7
northern pintail	3457	58	14
American wigeon	2872	25	6
gadwall	2568	13	3
blue-winged teal	889	33	8
lesser scaup	858	33	8
cinnamon teal	689	25	6
surf scoter	557	17	4
black-bellied whistling-duck	259	8	2
red-breasted merganser	193	46	11
bufflehead	116	29	7
mallard	34	4	1
fulvous whistling-duck	10	8	2
greater white-fronted goose	5	4	1
white-winged scoter	3	4	1

## Restoration of Migratory Bird Habitat in Ecuador

**Partners:** Fundación Jocotoco (Jocotoco), Los Aliados, ABC

**States that have participated to date:** Missouri

**Overview:** Ecuador provides wintering habitat to 105 species of neotropical migratory birds, many of them included in the USFWS Species of Conservation Concern List. Ecuador has the highest deforestation rate in South America over the last 50 years because of expanding human development. Forest loss is highest in the Andes and the Chocó Rainforest, prompting our partner, Jocotoco, to establish bird reserves in these regions and elsewhere throughout the country where habitat protection is needed the most. Furthermore, Jocotoco and ABC are partnering with Los Aliados, an NGO promoting agroforestry with local communities to scale up bird habitat conservation as well as support sustainable and improved livelihoods.

ABC will be focusing our work with Jocotoco and Los Aliados in the Ecuadorian Chocó, located in northwest Ecuador, which is one of the last remnants of the Tumbes-Chocó-Magdalena Global Biodiversity Hotspot. The Chocó is characterized by high species endemism and accelerated habitat loss; only 2% of the original forest in the area remains. The Chocó rainforest is important to numerous wintering migratory birds including olive-sided flycatcher, cerulean warbler, Acadian flycatcher, western wood-pewee, and Swainson's thrush. The area is also important for threatened resident bird species such as the great green macaw and the banded-ground cuckoo. In this region, as part of ABC's BirdScape Initiative, ABC has established the Chocó-Canandé BirdScape, which encompasses the 13,000-acre Canandé Reserve and the 4,560-acre Tesoro Escondido Reserve, owned and managed by Jocotoco.

By introducing trees in pastures, farmers will provide shade and diet supplements to the cattle while protecting the soil from erosion and providing additional habitat and corridors to NMBs. By adding trees to their existing monocultures, farmers will generate extra revenues, which has the potential to prevent further deforestation. In addition, by restoring abandoned lands that were previously deforested, the communities will be able to secure a clean source of water year-round. Building the communities' capacity to manage nurseries, diversify their income sources, and value wildlife will be key to the long-term success of our conservation efforts.

**Threats:** Forests in Ecuador, especially in the Chocó, are rapidly disappearing due to local timber extraction and agricultural expansion (mostly oil palm, and more recently balsa plantations). Land use change is an on-going process accelerated by poverty and the lack of alternative income opportunities for the communities. From 2001 to 2017, the Chocó lost 883,352 acres of forests. Deforestation is likely to keep increasing given the construction of new roads and bridges to cross rivers that historically were only crossed by boat. In addition, industrial development, particularly from oil palm production, is polluting the waterways and after many years of deforestation water sources are drying up.

**Birds:** Acadian and olive-sided flycatcher; Canada, Blackburnian, cerulean, and black-and-white warbler, Swainson's thrush, summer tanager, western wood-pewee, southern rough-winged swallow, and broad-winged hawk.

**Previous Southern Wings Successes:** In FY 2020, ABC and Jocotoco worked with eight communities in and around the Chocó-Canandé BirdScape. Funds helped Jocotoco build six nurseries in five communities, each one with capacity to produce 5,000 seedlings. A total of 20,000 seedlings were planted in 75 acres of cacao monocultures, pastures, and fallow lands. Staff of Jocotoco's Tesoro Escondido Reserve gave a series of workshops about tree

nurseries, seed collection, bird identification, and wildlife conservation. In addition, ABC supported the establishment of four nurseries in four new communities.

**Goal:** The goal of this project is to slow the rate of deforestation and work with landowners to improve land use practices and create better habitat connectivity in the buffer zones of existing protected areas in the Chocó-Canandé BirdScape. In FY 2023 our objective is restore 150 acres of monocultures and degraded lands. In addition, we will start to identify and engage additional communities.

**Conservation Action:** In the Chocó-Canandé BirdScape, we will:

- identify at least one area for reforestation in and around the Canandé and Tesoro Escondido Reserves,
- conduct community workshops to strengthen local capacity, particularly around cacao production,
- build one new nursery, with a total production capacity of 6,000 seedlings, and
- produce and plant at least 6,000 seedlings across 150 acres to enhance monocultures and pastures and restore fallow and degraded lands.

**Budget:** Conservation actions including nursery construction, tree planting and coordination total \$44,000.

**Matching Funds:** ABC, Jocotoco, and Los Aliados have secured funds for work in Canandé from CWS and private donors. Los Aliados and the local farmers will provide in-kind investment including providing the tools, land, expertise, and workforce to plant tree seedlings.

**Figure 15:** Location of Chocó-Canandé BirdScape and project area in NW Ecuador, Esmeraldas Province.



## Improving Migratory Bird Habitat in Colombia

**Partners:** Coffee Producers Ecological Foundation (FEC), Vivo Cuenca, SELVA, Fundación Biodiversa Colombia, and ABC.

**States that have participated to date:** Missouri, Indiana, Tennessee, Virginia, North Carolina

**Overview:** The country of Colombia is an integral part of the lifecycle of more than 170 migratory species. ABC has been working in Colombia for more than 15 years to support the creation and management of bird reserves and ecological easements; develop and promote bird tourism opportunities; restore degraded lands; and promote bird-friendly agriculture. In Colombia, we have prioritized seven BirdScapes for developing and implementing conservation projects.

In 2019, ABC began to take action in the Central Andes BirdScape, one of the highest coffee producing regions in the country, where native vegetation is rapidly being replaced with agriculture and pasture lands. The Central Andes provides critical habitat for golden-winged, cerulean, and Canada warblers.

In 2019, we started working with our partner Vivo Cuenca and have prioritized the Río Chinchiná watershed in the Caldas Department, in the western section of the Central Andes BirdScape. We engaged with multiple agencies and groups already working successfully in the region to restore watersheds, implement best management practices for coffee growing and processing, and conduct outreach to involve the communities in conservation. In the eastern portion, the Tolima Department supports a variety of habitats and high bird diversity in small concentrations – more than 500 bird species have been recorded in an area slightly smaller than the city of Houston, Texas. We worked with our partner SELVA to develop alliances with stakeholders, conduct outreach activities and promote best management practices that will restore, connect and improve habitat for the native and migratory species with the community of Libano.

A second BirdScape is in the Magdalena River Valley, where in 2020, ABC assisted Fundación Biodiversa Colombia with the acquisition of 3,869 acres (1,565ha) to expand the El Silencio Reserve. The acquisition connects two significant forest patches, protecting the largest contiguous forest in the Magdalena Valley. ABC is keen to build off this success and support restoration of degraded areas, as well as develop agroforestry plots that can produce revenue for reserve management. Approximately 85-90% of original forest has disappeared from the region due to livestock, agriculture, mining, and oil development. The result is that this region is one of the most threatened and least protected in Colombia. Furthermore, recent geolocator data on prothonotary warblers (Tonra et. al., 2019) identifies the area as a potential important wintering area for this species. Birds tagged in Arkansas, Louisiana, South Carolina, Virginia, Wisconsin and Ohio show high levels of connectivity with this region of Colombia.

**Threats:** The Colombian Andes have some of the highest rates of deforestation in Latin America; a significant amount of this loss is due to agriculture. In Colombia, it is estimated that 87% of NMB occur in agroecosystems and more than 70 species have been registered in coffee systems. Furthermore, in the Magdalena River Valley remote sensing information reveals that the deforestation rate in the area of Barbacoas is nearly 5.7%, or 2,160 acres per year. Most of this is for unsustainable cattle farming. Alternative economic models are needed for the region, along with protection and restoration. Otherwise, it is estimated that all forest habitat could be gone in less than a decade.

**Birds:** In the Central Andes BirdScape, 74 migrant bird species have been registered, including: golden-winged, cerulean, Canada, black-and-white, Tennessee, Blackburnian, yellow and blackpoll warblers; American redstart; broad-winged hawk; YBCU; Acadian and olive-sided flycatchers; eastern wood-pewee; summer tanager; rose-

breasted grosbeak; northern waterthrush; spotted sandpiper; red-eyed vireo; and Swainson's thrush. In the Magdalena Valley, a mix of passerines and shorebirds use riparian and flood plain habitat including prothonotary and bay-breasted warbler; buff-breasted upland, and solitary sandpiper; YBCU, American golden-plover, lesser yellowlegs, and willow flycatcher.

**Goals:** Our goal is to protect existing forest and improve habitat quality and connectivity through restoration. Specific objectives include:

- plant at least 50,000 native trees in the Central Andes BirdScape,
- engage 130 coffee producers in conservation activities in the Central Andes BirdScape, and
- restore 100 acres of degraded lands within the Middle Magdalena BirdScape.

**Previous Southern Wings Success:** ABC worked in the Eastern Andes, specifically the Cerulean Warbler Corridor. Southern Wings funds contributed to the creation of this habitat corridor through the planting of more than 500,000 saplings on 2,835 acres across 200 private farms. A total of 18 ecological easements were also established by ProAves, as a measure to reduce deforestation. More than 5,000 people received information about birds and biodiversity.

Most recently, Southern Wings funding has supported engagement with coffee producers in the Central Andes BirdScape, facilitating over 200 agreements with landowners and the planting of over 58,000 trees. In 2021, the project expanded to lower elevations to implement silvopasture systems and create habitat connectivity along an altitudinal gradient from 800m to 3,000m. Funds have been provided to install 9km of fencing to protect 194.7 acres. States participating in Southern Wings have also provided funding for specific golden-winged warbler Surveys in Colombia and Venezuela.

### **Conservation Actions:**

*Central Andes BirdScape:* We will plant native trees in coffee farms and silvopasture systems to increase connectivity between forest patches. Funds are needed to maintain employment of our Forestry Technicians. The Forestry Technicians are the primary point of contact with the landowners and provide technical assistance for the implementation and maintenance of restoration sites and nurseries.

We will also continue to conduct outreach and educational activities in the watershed in order to facilitate new planting agreements with landowners and facilitate implementation of sustainable practices. In addition, we will develop activities with the local birdwatching group that has been attending the participatory monitoring. Our hope is that as interest grows and skills develop, these community members can become citizen scientists and help make formal observations of migratory birds.

*Middle Magdalena BirdScape:* At the El Silencio Reserve there are current needs and opportunities for reforestation, agroforestry system development for reserve income generation, and related avian studies to inform reserve management action. Fundacion Biodiversa works closely with the local community of Barbacoas to develop the reforestation activities within the reserve. There are three small nurseries in the area, one managed by the local action board and two belonging to women in the community. These nurseries will be maintained and improved to produce trees for the reforestation.

To support the long-term sustainability of the reserve and generate income, we will establish an Agroforestry Unit (AU) on 12 acres of former cattle pastures within the reserve. The AU includes six acres of sustainable agroforestry for organic production of the Sacha Inchi nut – a specialty “super food” nut that is gaining popularity and other food plants like avocado, cacao, cassava, and plantain. Fundacion Biodiversa has established a relationship with the company Don Juan Organics that provides technical assistance for growing Sacha Inchi and guarantees purchase for its producers. The AU also includes six acres of sustainable timber production.



We will continue with the monitoring of NMBs during the non-breeding season 2022/2023. The monitoring has provided valuable information about the habitats and plants that the NMB use in El Silencio. Nine species of native tree will be used in the reforestation efforts. In addition, we will conduct trainings in bird identification and monitoring with the forest rangers and interested members of the local community.

**Budget:** Conservation actions across both Birdscapes totals \$164,500. \$5,000 to \$10,000 could have an impact.

**Matching Funds:** ABC has funding support from CWS, Blue Ridge Audubon Society, Amos Butler Audubon Society, March Conservation Fund and USFWS via the NMBCA program for this project. In addition, Vivo Cuenca, FEC and Fundación Biodiversa have significant matching funds available for related activities in this proposal.



**Figure 16:** The location of the proposed Middle Magdalena BirdScape.



**Figure 17:** Central Andes BirdScape (in brown) and the Chinchiná watershed (white polygon) in the Caldas Department.



**Figure 18:** Location of El Silencio Reserve within Middle Magdalena BirdScape (left). Locations of restoration areas within the El Silencio Reserve (right).

## Conservation of Neotropical Migratory Birds in the Dry Tropical Forests of El Salvador: Assessing and Addressing Threats to Overwintering Habitat and Bird Populations

**Partners:** Paso Pacífico, Zoological Foundation of El Salvador (FUNZEL), Fundación Enrique Figueroa Lemus, Ministerio de Medio Ambiente y Recursos Naturales (MARN), AGFD, Sociedad Salvaje, Asociación de Desarrollo Turístico de la Costa Oriental De El Salvador (ADETCO), Compañía Azucarera Salvadoreña (CASSA), Southern Sierra Research Station (SSRS)

**State(s) Participating:** Arizona

**Overview:** The U.S. Paso Pacifico proposes to work with U.S. states, Federal agencies and in-country partners to protect overwintering and stopover habitat areas in Central America, specifically El Salvador. Numerous NMBs from throughout the Pacific flyway use Central America's Pacific coast during stopover migration and overwintering. Most of this geography was once dominated by seasonally dry tropical forests (Figure 19). However, large scale conversion to agriculture and pasture has made the dry tropical forest one of the world's most endangered ecosystems, with less than 2% of the original forest intact. Only 5% of remaining dry forest in Mexico and Central America receive some degree of protection.

The project aims to protect overwintering birds and their dry tropical forest habitats in the eastern region of El Salvador (Figure 20). The eastern region has high conservation potential for birds due to its relatively low human population density and high cover of tropical forest and also because it is located near the coast and the border of the Gulf of Fonseca, a recognized passageway for migratory birds. The challenge in the eastern region is that it is poorly studied due to its history of the civil war and recent security concerns. The security situation has greatly improved, so it is urgent that conservation efforts begin before threats displace forests.



**Figure 19.** Map of El Salvador showing the distribution of dry tropical forests (yellow)

**Threats:** The primary threats to NMBs are: 1) habitat conversion from forest to intensive agriculture, 2) habitat degradation through timber and firewood extraction and wildfires, and 3) direct mortality from unregulated hunting (e.g., sling shots). Intensive agriculture is perhaps the largest threat in the tropical dry forest lowlands, and export crops such as melons and sugar cane continue to replace dry tropical forest with monoculture crops. Meanwhile more traditional farming (maize, beans) operate in a landscape matrix that often includes small patches of dry tropical forests and thus can provide some habitat to western migratory birds.



**Birds:** In the lowlands portion of the dry tropical forest 364 bird species have been recorded, including 38 species that are considered SGCN from across 12 western states. Some SGCN species using these dry tropical forests include southwestern willow flycatcher, YBCU, Mississippi kite, peregrine falcon, Swainson’s hawk, brown-crested flycatcher, Macgillivray’s warbler, summer tanager, and bell’s vireo, among others (Table 7).

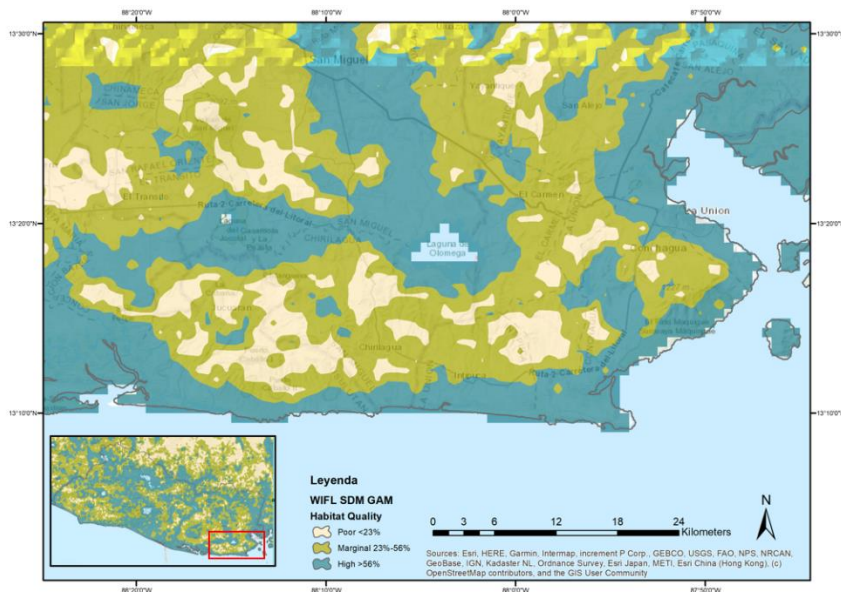


**Figure 20.** General project area in eastern El Salvador with specific sites of importance to overwintering birds noted (consisting of dry tropical forest habitats and adjacent wetland areas).

Two priority species in this region are the Southwestern willow flycatcher (SWIFL) and YBCU, both federally listed species that have experienced substantial population declines across their U.S. ranges. These trends are mirrored in data from capture stations in North and Central America; an overall view of demographic trends of survival and recruitment strongly infer that factors acting on migrating and overwintering populations play an important role in these declines. The SWIFL and YBCU use Central America’s Pacific coast during stopover migration and overwintering respectively.

In addition to NMBs, the tropical dry forests hosts other priority species such as the endemics white-bellied chachalaca and blue-tailed hummingbird. In addition, the endangered yellow-naped Amazon (parrot) nests in this region and the federally endangered cyanoptera macaws cross the gulf of Fonseca from Nicaragua to forage in the dry forests that border the gulf. The proposed project activities will compliment Paso Pacifico’s yellow-naped amazon and Cyanoptera Macaw Conservation Programs which operate in the same geography.

**Goals:** This project seeks to restore tropical dry forests and to protect forest-dependent migratory and resident bird populations in El Salvador, and in particular for the SWIFL and YBCU. To reach this goal, the project will use a three-pronged strategy: 1) restore and protect dry tropical forest habitat (for example, maintain suitable willow flycatcher habitat (Figure 21), 2) carry out targeted monitoring and research of species of special concern, and 3) build capacity amongst local people, private sector partners, and governments for improved habitat management and awareness of migratory birds.



**Figure 21:** Distribution of suitable SWIFL habitat in eastern El Salvador with dark blue representing good potential habitat (Based on a model by Lauren Phillips and Tom Albright, University of Nevada Reno, and Paso Pacifico, 2020).

### Southern Wings Successes 2021:

#### Conserve dry tropical forest habitats:

- The dry tropical forests south of Laguna Olomega are likely one of the largest tracts of forest remaining in the country. While much of the forest is secondary, the area includes patches of old-growth dry tropical forest. Within the buffer zone of the RAMSAR site, the area is not under any formal protection. In order to demarcate this forest and prevent human disturbance and fires, we conducted a site visit with the Ministry of the Environment (MARN). We pinpointed locations for signs to demarcate the dry tropical forest areas and to prevent entry to the forest. We followed up with meetings with ministry officials in San Salvador and with two landowners to seek support for sign placement on their properties, which border the forest area.
- We met with a Salvadoran company that exports non-timber forest products. There we acquired a sample of Peruvian balsam resin sourced from endemic balsam trees (*Myroxylon balsamum var. pereirae*). The sample was shipped to a cosmetic company in France, and now we are in talks with two companies with the goal of exporting over 1 ton of balsam oil annually, with a portion of proceeds to be designated for dry tropical forest conservation. The trade of this non-timber forest product also generates income for farmers and incentivizes the maintenance of riparian forests. The balsam tree is a dry tropical forest species which is under threat due to selective logging for its precious wood. Balsam oil extraction does not kill the trees.
- We met with the Corporate Social Responsibility team at the CASSA sugar mill in eastern El Salvador. There we connected with staff who coordinate with farmers, encouraging them to leave living fence-rows and protect streams and other water sources. The CASSA sugar cane company also manages the Chilanguera natural protected area of 375 ha. We distributed camera traps to be installed at the reserve and planned a bird weekend there for 2022 with a local birding club to establish an eBird hotspot.
- We continued in conversations with the IUCN-Netherlands Land Acquisition Fund to set aside forest areas in El Salvador's eastern dry tropical forest, prioritizing areas near Caballito and Olomega Lagoon protected areas. In parallel, we continued engagement with a landowner in northern El Salvador who possesses over 500 Ha of dry forest property and is looking to eventually transfer ownership for conservation. We visited one private property in the coastal village of Aguas Frias where the private landowner is seeking a partnership for



managing the property but determined that the interests of the landowner were not for public involvement and so did not pursue this partnership further.

**Photo 1:** Dry tropical forests near the Olomega Lagoon border milpas. Working closely with farmers to manage fires will enable forest protection.

- With matching funding for primate conservation (Zoo Boise, Apenheul Zoo, IUCN-NL), we sustained two community rangers who carry out twice weekly patrols to protect the mature forest on the Olomega Hills covering up to 5,396 acres (2,184Ha) of tropical dry forest. During these patrols, they worked to prevent poaching and wildfires. We also began recruitment to hire 10 additional community rangers from three communities whose main role will be to protect water sources, support bird monitoring, and prevent wildfires.
- Paso Pacifico participated in meetings with the Ministry of Tourism and the Ministry of Transportation as it planned a highway project for the east coast. Together with the development association ADETCO, we provided input on the proposed highway to minimize its reach into the roadless coast of Jucuaran. We were successful in persuading the government to shift its plans and now the highway will avoid cutting through the coastal forest. Now the focus is ensure roadway construction does not eliminate large trees and or generate large amounts of erosion.



#### **Promote bird monitoring as a tool to inform management**

- We worked in partnership with the MARN and consultants to develop a manual and poster for best practices when observing birds. This manual will aid the country as it receives a growing number of tourists and citizens who participate in birding.
- We held follow-up meetings to work towards the development of a national program for migratory birds. The MARN requested our support for a national strategy. The program was stalled during the year due to Covid-19 affecting MARN participation, but efforts to develop this national plan will continue in 2022.
- We advised and provided financial support from matching resources (Globalgiving.org) to local non-profit FUNZEL in the design and implementation of a bird conservation program at Isla Tasajera, a mangrove forest habitat with one of the country's most significant population of critically endangered yellow-naped Amazon. Already they have recorded movements of 18 pairs. Through this program, ornithologist Ricardo Ibarra has provided bird monitoring training to 4 local youth who will assist with parrot nest monitoring.
- We transferred two MOTUS sensors to El Salvador and held an initial meeting with the MARN to seek permission and long-term support to establish the MOTUS stations in Eastern El Salvador.

#### **Build local awareness and appreciation for birds and their habitats**

- We previously reviewed bird data for the eastern region of El Salvador by reviewing eBird data. Through this analysis, we observed major geographic gaps in data, located mostly in dry tropical forest areas and on isolated volcanos and islands in the Gulf of Fonseca. To reduce these knowledge gaps, we linked up with a group of citizen birders in eastern El Salvador and plan to provide them with support in publishing books about the birds of their region, to offer logistical support for bird surveys in new geographies, and to further

their goal of involving more members of the public in appreciating birds.



**Photo 2:** Logo of volunteer birding group that is documenting birds in Eastern El Salvador

- We provided supplies to strengthen tourism and education, including two pair of binoculars and 4 guidebooks to leading birders in birding tourism who are dedicated to promoting bird tourism and conservation. In eastern El Salvador we provided guidebooks and one binocular pair to the environmental education non-profit Sociedad Salvaje and to our two community rangers at Olomega reserve.
- We supported half-day educational events in celebration of International Migratory Bird day in three communities near the dry forests of El Salvador: Los Riitos, Tamsique, and Las Flores. The workshops were carried out through a collaboration with a group of women scientists called Mujeres y Naturaleza (MUNAT). This group aims to share the wonder of birds, especially with girls. The scientists at MUNAT reached dozens of parents and 93 children, of whom 43 were girls. The workshops included an engaging story about the yellow warbler, discussion about bird food and habitat, bird-oriented crafts, and a birding walk. With contributions from Environment for the Americas, the teachers at MUNAT sent the children home with an educational packet to help the young ornithologists continue their learning adventure.



**Photo 3:** MUNAT ornithologists teach children in Los Riitos about the annual migration of birds.

**Conservation Action:** Paso Pacifico and local partners including CASSA, ADETCO, Sociedad Salvaje, FUNZEL, and MARN will implement the following activities in 2022.

### **Conserve dry tropical forest habitats**

- Continue hosting educational workshops with community rangers and their villages near the wetlands and lowland area with suitable SWIFL habitats to discuss how farming practices can be modified to allow time for SWIFL to remain in the area before their northward migration. It involves a total of 2 workshops at 3 village locations (6 workshops targeting 50 farmers and 500 acres).
- Increase our collaboration with the CSR office of CASSA sugar-cane processor, supporting their efforts to reduce post-harvest burning and to ensure vegetation corridors for SWIFLs and other sensitive species.

- Ranger trainings planned for the Chilanguera and Olomega reserves in partnership with MARN were delayed due to continuation of Covid-19. These will be resumed in 2022 with a focus habitat management, fire prevention, bird observation opportunities.
- Apply for funding to purchase land within the tract of Olomega dry forest. To prepare for this we will also carry out a Rapid Ecological Assessment with matching funding from a land purchase NGO (i.e. rainforest trust) and in partnership with local non-profits such as ATVES.
- Facilitate interactions between farmer groups and interested buyers of non-timber forest products to advance dry tropical forest conservation

#### **Promote bird monitoring as a tool to inform management and build capacity**

- Support MARN in developing a national strategy for bird conservation.
- Partner with the Colegio de Biologos to provide support for Salvadoran students by establishing a small thesis scholarship program. The scholarship program would focus on bird research and thesis projects on western migratory birds in Eastern El Salvador. Priority topics include study of SWIFL habitat management by small-holder farmers, characterization of potential stopover sites for olive-sided flycatcher, and study avifauna at riparian sites across dry forest landscapes.
- Set up one or two MOTUS stations in Eastern El Salvador to monitor birds.

#### **Build local awareness and appreciation for birds and their habitats**

- Support the MARN in developing a national migratory bird program.
- Provide technical assistance and support to the citizen birding group “Observadores de Aves del Oriente”
- Increase appreciation for birds through birding events such as Global Big Day and International Migratory Bird Day. With local partners (e.g. MUNAT), we will carry out another set of bird education workshops with 100 youth from 3 villages, culminating in these youth participating in a public birding events and recording their observations in the eBird platform.

#### **Develop science-based conservation tools for two endangered migratory birds: SWIFL and YBCU**

- Through ethnographic interviews, document history of harvest and consumption of the YBCU and its perceived overwintering spatial and temporal distribution in El Salvador. This research will provide conservationists with additional information on status and distribution of the species in El Salvador.
- Establish baseline for long-term monitoring of overwintering SWIFLs in eastern El Salvador. We will establish three permanent transects that will be visited twice-monthly throughout the overwintering period in coordination with SSRS and other U.S. state partners.
- Using the WIFL habitat suitability map developed by researchers from the University of Nevada Reno through a past grant from USFWS NMBCA, we will conduct winter surveys at sites in eastern El Salvador with a predicted high-density of WIFL. This field work will help us to validate the map and through the process we will locate, map, and prioritize sites under threat from development or land use transformation.

**Budget:** AGFD will provide \$USD 9,500 to support completion of some of the conservation actions. Total need from Southern Wings is \$14,000.

**Table 7:** SGCN (considered NMBs\*) in the project area, listed by state.

Species	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
grasshopper sparrow			X	X	X							X
swainson's hawk		X	X	X					X			X
northern beardless-tyrannulet								X				
Swainson's thrush	X	X										
Vaux's swift			X									

Species	AK	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
yellow-billed cuckoo		X	X	X	X		X	X		X	X	X
olive-sided flycatcher	X	X	X	X	X		X	X	X	X		
western wood-pewee	X											
black swift			X	X	X	X		X		X		
alder flycatcher	X											
willow flycatcher			X						X			X
merlin												X
peregrine falcon	X						X	X		X	X	X
american kestrel	X											
macgillivray's warbler	X	X										
common yellowthroat	X											
barn swallow	X											
yellow-breasted chat		X	X									
mississippi kite		X										
belted kingfisher	X											
acorn woodpecker		X							X			
dusky-capped flycatcher		X										
brown-crested flycatcher		X	X									
sulphur-bellied flycatcher		X										
rose-throated becard		X										
harris' hawk		X										
savannah sparrow	X	X										
band-tailed pigeon		X		X						X	X	
summer tanager		X	X									
blue-gray gnatcatcher						X						
american redstart	X											
townsend's warbler	X											
dickcissel												X
chipping sparrow	X								X			
eastern meadowlark		X										
tree swallow	X											
elegant trogon		X						X				
Bell's vireo							X	X				
<b>Total</b>	<b>15</b>	<b>18</b>	<b>10</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>7</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>7</b>

\*SGCN Neotropical Migrants as defined by the Neotropical Migratory Bird Conservation Act Program.

## Marsh Bird Conservation: Identifying Threats and Implementing Conservation Actions in Northwest Mexico

**Partners:** Terra Peninsular, CICESE, Centro de Investigación en Alimentación y Desarrollo, A.C. (Guaymas, Sonora), GANO

**States that have participated to date:** Arizona.

**Overview:** Populations of marsh birds have declined in North America over the last decades. The main cause has been the drastic degradation of wetlands that has occurred on a continental scale, but that has been more severe on Western North America and in the Sonoran Desert. The status of marsh birds in Northwestern Mexico is unclear. Their reserved nature and nesting habits complicate their observation. However, the loss and degradation of wetlands in the region and data on a few wetlands suggest that populations of marsh birds in northwestern Mexico might be in reduced numbers and declining. The subspecies of the Lower Colorado River and delta, the Yuma Ridgeway's rail (RIRA) (*Rallus longirostris yumanensis*), is listed as Threatened in Mexico (Diario Oficial de la Federación 2002) and Endangered in the U.S (Eddleman and Conway 1998).

Many of Arizona's migratory bird species, including several considered SGCN, use the mainland coast of northwest Mexico during stopover migration and for wintering. These habitats consist of marshes, mangroves, bays and coastal lagoons which host significant number of migratory and resident bird species, thus making these habitats important for conservation.

One such species is RIRA, an Arizona SGCN and federally listed rail that occupies emergent vegetation. RIRA were considered non-migratory (Eddleman and Conway 2020), but recent research indicates that at least 40% of the population migrates from their breeding areas in the U.S. to mangrove forests in coastal Sonora and Sinaloa (Harrity and Conway 2020). This discovery in addition to a suite of other SGCN species already known to migrate though or occupy these coastal habitats highlights the need to work in understanding movement ecology, seasonal habitat use, ecological connectivity, and species threats. This information will lead to better understanding populations and suitable conservation actions for RIRA and other wetland dependent species.

**Threats:** The current threats are ongoing habitat degradation and information gaps.

**Birds:** marsh birds include species from two families: Rallidae and Ardeidae. For this project, the target species includes: RIRA, American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), black rail (*Laterallus jamaicensis*), Virginia rail (*Rallus limicola*), and sora (*Porzana carolina*). The sites used by RIRA during the non-breeding season are also important for other migratory waterbirds, including shorebirds and waterfowl.

**Goal(s):** The overall goal is to improve the efficiency of conservation and management for marsh birds (particularly wintering RIRAs) and other waterbirds (e.g., shorebirds and waterfowl) in coastal wetlands of northwest Mexico through the integration of data and prioritization in decision-making. This will be achieved by conducting the following actions.

1. Determine the relative abundance of marsh birds in southern Sonora and northern Sinaloa, and compile these survey data into the Borderlands Avian Data Center.
2. Determine the distribution of marsh birds in 11 priority mangrove wetlands in northwest Mexico.
3. Determine the extent and quality of marsh bird habitat in the region.
4. Identify threats and conservation opportunities for marsh birds and their habitats in the region.
5. Establish the baseline for a long-term monitoring program for marsh birds in northwestern Mexico.
6. Develop the capacity in northwestern Mexico to conduct marsh bird surveys and establish a network of

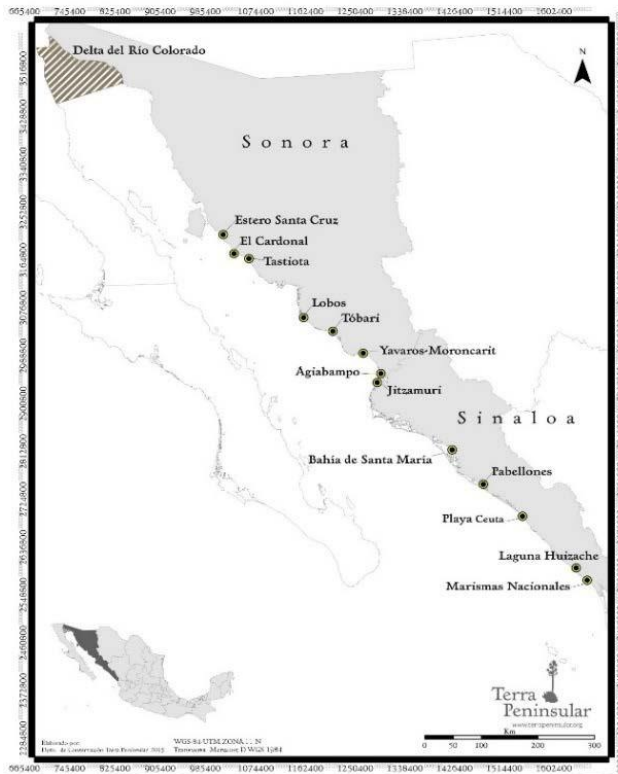


trained Mexican biologists that could implement the long-term monitoring program for marsh birds.

#### Conservation Actions:

- Conduct two marsh bird surveys during winter season and two surveys during breeding season at 11 priority coastal wetlands located in southern Sonora and northern Sinaloa (follow the Standardized Protocols to Survey Marshbirds in North America) and compile survey data into the Borderlands Avian Data Center..
- Conduct a three-day training workshop at the Ejido Luis Encinas Johnson, Sonora.

**Budget:** AGFD will contribute \$8,000USD.



**Figure 22:** Part of the network of sites of the Pacific Flyway Shorebird Survey in Sonora and Sinaloa Mexico, where marsh bird surveys and conservation actions may be implemented.

#### Literature cited:

Eddleman, W. R. and C. J. Conway. 2020. Ridgway's rail (*Rallus obsoletus*). In: Birds of the World (P. G. Rodewald, ed.). Cornell Lab of Ornithology. Ithaca, NY.

Harrity, E. J. and C. J. Conway. 2020. Satellite transmitters reveal previously unknown migratory behavior and wintering locations of Yuma Ridgway's rails. *Journal of Field Ornithology*. 91:300–312.

## Protection of Wintering Habitats in the Dominican Republic Septentrional Birdscape

**Partners:** Fundación Loma Quita Espuela (FLQE), Zorzal Cacao (DBA Rainforest Chocolate), ABC

**States that have participated to date:** NEAFWA

**Overview:** The northern coastal mountains of the Dominican Republic provide an important wintering habitat for numerous neotropical migratory species. This area, which has been incorporated into ABC's BirdScape Initiative as the Septentrional BirdScape, represents a priority conservation focus particularly because it is one of the few wintering habitats of the Bicknell's Thrush whose population overwinters predominantly in the Dominican Republic where forest habitat is under threat from agricultural expansion and fire. The Bicknell's Thrush has one of the smallest breeding and wintering ranges of any NMB species and has suffered steady population declines.

ABC has been working in the Dominican Republic to advance Bicknell's Thrush habitat conservation since 2015. In the Septentrional, partner is Fundación Loma Quita Espuela (FLQE), supports four reserves in the northern Dominican Republic: the Loma Quita Espuela Scientific Reserve 3,743 acres (1,514ha), Guaconejo Scientific Reserve 943 acres (381ha), La Salcedoa Scientific Reserve 1,668 acres (675ha) and Monumento Natural Pico Diego de Ocampo 1,035 acres (419ha). FLQE has been working to decrease illegal activity by expanding park personnel, adding/improving park guard stations across the four reserves, facilitating the reforestation and restoration of over 57 acres (23ha), and improving tourism infrastructure and promotion to increase visitation and visitor security. FLQE's efforts have already resulted in a 30% increase in protection in its Loma Quite Espuela Scientific Reserve alone, and it has supported a substantial increase in the production of shade cacao within the reserve, which benefits both migratory birds and the long-term financial sustainability of the reserve.

This region includes key coffee and cacao growing regions, ABC has been working with Zorzal Cacao, a cacao company to identify landowners interested in conservation actions, such as implementing agroforestry systems on their properties. ABC and Zorzal Cacao were able to identify ~2,500 acres (1,012ha) of land between Loma Quita Espuela and Guaconejo Scientific Reserves that could be improved through the implementation of shade coffee, cacao, and silvopasture. Zorzal Cacao builds local capacity focused on farm management, pest infestation and organic insecticides, pruning, organic composting, weed control, farm management and administration, among other topics. Together ABC and Zorzal Cacao are enhancing 30 acres (12ha) of cacao farms with native shade trees. These enhancements will help the participants' farms get Bird-Friendly certified as part of a certification being developed by the Smithsonian Migratory Bird Center and supported by ABC.

**Threats:** The preferred habitat of the Bicknell's Thrush in the Dominican Republic is mesic to wet broadleaf montane forests. Unfortunately, montane forests have been identified as one of the most endangered habitats on the island of Hispaniola, which the Dominican Republic shares with Haiti, as very little native forest cover is left due to land conversion for agricultural production and cattle grazing.

**Birds:** Nearly 150 neotropical migratory bird species have been identified in the Dominican Republic, many of which are found in the Septentrional BirdScape, including the Bicknell's thrush; Louisiana waterthrush; prairie, cape may, black-throated blue, and worm-eating warbler; northern parula; ovenbird; and baltimore oriole.

**Goal:** The goal is to increase FLQE's impact on reserve management and community development in order to protect habitat for the Bicknell's Thrush and other migratory species in the Septentrional BirdScape. Work will focus on the Loma Quita Espuela Scientific Reserve and will include activities such as reforesting 75 acres (30ha)

of the reserve, training 25 local farmers and reserve personnel to help them better understand the environmental services that the forest provides for both people and biodiversity in order to improve conservation and sustainable agricultural practices in the BirdScape, and improving signage along the borders of the reserve to help prevent incursions. This work will be complemented by work with Zorzal Cacao whose long-term goal is to restore ~2,500 acres (1,000ha) of land between Loma Quita Espuela and Guaconejo Scientific Reserves that could be improved through the implementation of shade coffee, cacao, and silvopasture. In 2022, Zorzal Cacao aims to restore and enhance 75 of cacao farms with at least 30,000 native shade trees.

**Previous Southern Wings Successes in Dominican Republic:** In 2011-2012, ABC worked with our partner, Sociedad Ornitológica de la Hispaniola, to protect migratory and endemic avifauna at Sierra de Bahoruco, Dominican Republic. This project advanced the main strategies of the Sierra de Bahoruco National Park Management Plan and created and supported conservation actions in the newly-created Loma Charco Azul Biological Reserve, while expanding eco-tourism to reduce pressure on natural resources in the protected areas. Project activities included the following.

- Train park guards, implement patrols, and acquire adequate equipment to undertake patrols.
- Increase patrol routes and frequency to maximize guard presence in areas particularly threatened by damaging incursions.
- Construct a new cabin for the guards to establish a permanent presence on the new reserve.
- Identify damaged areas in the Park and Refuge for reforestation and restoration projects in the future.
- Develop an outreach project for the surrounding community to reduce illegal logging and harvest of wood for charcoal production.
- Conduct endemic and migratory bird monitoring.

#### **Conservation Actions:**

- In order to improve the ecological connectivity across private lands in the Septentrional BirdScape, FLQE and Zorzal Cacao will work with landowners to reforest 150 acres (61ha) with shade cacao and trees that prioritize native tree species. Some seedlings will be produced in an FLQE nursery and others will be provided by the Dominican Republic Ministry of Environment. Some of these areas will be considered for inclusion in a program for payments for environmental services that will help promote the long-term conservation of these reforested areas.
- Conduct a workshop with 25 local farmers and reserve personnel will focus on habitat conservation for biodiversity and livelihoods. Emphasis will be placed on the threats that producers face that affect migratory birds and other plant and animal species. This workshop is highly relevant for updating reserve personnel – including four new staff – about the advances and challenges in the “Bicknell’s Thrush Conservation Action Plan.” It will also help demonstrate advantages to agroforestry production for cacao and honey production versus intensive agriculture, dependency on agrochemicals, and cattle ranching.
- Identification of reserve boundaries is essential for monitoring and preventing reserve incursions. Fifteen signs placed in cement will be placed in the western part of the reserve, as this area recently has been at a higher risk due to construction of vacation homes in the vicinity. As such, identifying the reserve boundaries will help current neighbors and land buyers be able to distinguish the reserve from private properties.

The activities in the Septentrional BirdScape are essential in helping avoid the loss and degradation of wintering habitat for the Bicknell’s Thrush, numerous other migratory species, and Hispaniola’s endemic birds. They also help address other important opportunities such as reforestation to mitigate the impacts of climate change while also contributing to the sustainability of local livelihoods. ABC’s collaboration with its partners in the will promote critical habitat connectivity in this mountain range to both maintain existing forest habitat and restore forest cover on private lands where it has been lost.

**Budget:** To implement conservation actions such as reforestation and workshops the project needs \$81,050. \$5,000 to \$10,000 contributions would be useful to implement some actions.

**Matching funds:** Matching funds will come from FLQE, Zorzal Cacao, and ABC investments in these properties, related management costs and other associated activities within the BirdScape.

**Figure 23:** The Septentrional BirdScape (in blue), encompassing the Loma Quita Espuela Scientific Reserve (in red), other national protected areas (in green), Reserva Zorzal (in orange), and other reforestation sites and cacao producing properties (in white and red).



## Restoration of Wetland Hydrology in the Marismas Nacionales of Nayarit, Mexico to benefit migratory waterfowl and shorebirds.

**Partners:** Ejidos, farmers and ranchers, fisheries cooperatives, Marismas Nacionales Biosphere Reserve, CONANP, ONAFOR, Municipality of Tecuala and OVIS.

**Overview:** Marismas Nacionales is a complex of wetlands that form a mixture of marine waters and 11 powerful rivers, creating a very varied mosaic of ecosystems such as meanders, river deltas, marshes, freshwater lagoons, estuaries, coastal lagoons, intertidal wetlands and coastal dunes. It supports the largest mangrove area on the Pacific coast. The "Functional Diagnosis of Marismas Nacionales" document drafted in 2011 provides interdisciplinary information which is spatially explicit, enabling the systematic and integral analysis of the current state of the wetlands. That year began the design of the first pilot projects for the restoration of wetlands in the area. Ongoing work on wetland restoration has provided us with extensive experience in developing and implementing effective techniques of hydrological restoration.

The project is in the Chugüin-Chuig Tidal Basin (12,429 acres, 5,030ha), in Marismas Nacionales Biosphere Reserve. This wetland has been impacted and transformed by agricultural activity. This is observed in terms of low water volume, low water permanence (hydroperiod), hypersalinity and no productivity. This proposal aims to rehabilitate the 14-km/8.7 miles of the Río Viejo (a tributary of the Acaponeta River delta) to harvest surplus water from agricultural activity, rainwater and hurricanes and transport this surplus water to the wetland, to restore much of the hydrological pattern and increase habitat for waterfowl and shorebirds. The channel is currently full of sediment and a collapsed bridge, which does not allow water to flow into the tidal basin.

The project addresses specific needs of the North American Waterfowl Management Plan and the Pacific Shorebird Conservation Strategy (Senner et al. 2016) and synergizes with 9 species-specific conservation plans of target species (American and black oystercatchers, Wilson's plover, whimbrel, long-billed curlew, and marbled godwits, red knot, sanderling, dunlin and western sandpiper).

**Threats:** Marismas Nacionales is affected by the cumulative impact of multiple threats. Mainly due to alterations in the hydrological pattern, which has been modified by the retention and excessive use of water for agricultural and livestock purposes, establishment of shrimp farms and a poorly planned communications infrastructure network with scarce sewage systems that impede and reduce the natural hydrological flow. The emergence and establishment of invasive alien plants has become a concern. All these threats have resulted in drastic mangrove mortality, higher lagoon salinity, and reduced habitat for wetland dependent bird species.

**Birds:** Marismas Nacionales is one of the most important energy resupply sites for waterfowl on the Mexican Pacific Flyway, providing high quality foraging and resting sites for 15 migratory species (> 250,000). The area is notable for its concentration of northern shoveler (130,000), green-winged teal (25,000), pintail (12,000), lesser scaup (4,450) and mallard (1,200). It also provides habitat for more than 427,000 wintering shorebirds of 28 species, including: American avocet (137,000-20% of its total population), and western sandpiper (145,000). Other priority species include marbled godwit (13,000), long-billed curlew (400), Wilson's plover and short and long-billed dowitcher (72,000) and black-necked Stilt (26,000). Notably, over 1,300 red knot feed in the area on their way to the Arctic and migratory (200) and resident populations of snowy plover (93 pairs) use the area (Table 8).

**General Strategies:** The project focuses on restoring hydrological flows for the recovery and conservation of mangrove ecosystems, which provide foraging sites and energy resupply for thousands of waterfowl and shorebirds that migrate along the Pacific Flyway.



**Past Successes 2016-2020:** In coordination with CONANP, CONAFOR, ejidos and fisheries cooperatives between 2016 - 2020, the following achievements were accomplished.

- Establishment of a 12,355-acre (5,000 ha) Ejidal Reserve in the Agua Brava Tidal Basin, through a Conservation Agreement between the Paso Hondo Ejido and OVIS for a period of 20 years.
- Training of 300 local people in restoration and monitoring actions.
- Clearing of dead wood and removal of sediment from 45 km of natural water channels to reestablish freshwater flows to the restoration sites, benefitting more than 24,710 acres (10,000 ha).
- Use of sediment material to build 70 islands to recover resting habitat for waterfowl.
- Establish and operate UMAs for the conservation, management and monitoring of aquatic birds.
- Monitoring waterfowl and shorebird populations 2019-2021 (363,114 birds) across 85 species. The area had the highest densities, particularly high for western sandpiper, with 757 individuals / km<sup>2</sup>; northern shoveler, with 460 individuals / km<sup>2</sup>; American avocet, with 439 individuals / km<sup>2</sup>; and for green-winged teal, with 328 individuals / km<sup>2</sup>.

**Conservation Actions:** OVIS and partners will implement the following conservation actions;

**Objective 1. Increase the available habitat for waterfowl and shorebirds in the Chugüin-Chuig Tidal Basin**

- Consult with fishermen's cooperatives and ejidos to define work plan and establish agreements.
- Coordinate meetings with different productive sectors (fishermen, farmers, and cattlemen) and natural resources managers (municipalities and federal agencies) to seek their integration into the project.
- Train 60 people and organize labor brigades that will participate in dredging and cleaning activities.
- Improve the connectivity of the water systems by restoring the hydraulic period through dredging and cleaning of 14 km / 8.7 miles of the Canal Viejo River (Figures 24 and 25), using machinery and community labor and support from different producers and local agencies. Also manually remove obstructive material (wood of dead mangroves) from the natural channels in the wetland.
- Reforest mangroves to facilitate restoration by collecting and dispersing 50,000 mangrove seeds.
- Rebuild a collapsed culvert that has been obstructing the flow of water.
- Produce communications and outreach materials for key audiences to raise awareness and encourage their participation.
- Strengthen the operation of UMAs (Antonio R. Laureles 10,254 acres (4,150ha), Francisco Villa 23,287 acres (9,424.48ha) and Pericos 9110 acres (3,687 ha), for the conservation, management and monitoring of waterfowl populations, created in the first phase of the project (2016-2020).
- Establish new UMAs at the restored sites (UMA La Libertad 5,683 acres (2,300 ha)). The UMA is a legal requirement for the removal of dead mangroves, and requires the preparation of a Management Plan, which includes the collection of mangrove propagules that are protected by Mexican law.

The result will be building local capacity for restoration efforts (60 people), the cleaning and dredging of the Canal Viejo river, benefiting 12,429 acres (5,030 ha), the strengthening of 3 already established UMAs 42,662 acres (17,265.48 ha) and the creation of one or more additional UMAs.

**Objective 2. Establish the biological baseline of the restored sites, to track progress in rehabilitation of the Chugüin-Chuig Tidal Basin (12,429 acres/5,030 ha)**

- Evaluate water quality (physicochemical parameters, hydro-period and water column) using robust digital data recorders.
- Conduct winter monitoring of waterfowl and shorebird populations to determine abundance of populations at the species level and by habitat type using the Pacific Shorebird Survey Protocol. We will monitor the annual reproductive productivity of two colonies of snowy plover (Figure 26).
- Evaluate the restoration of plant communities (mangroves) and fisheries, using fixed parcels.

- Analyze data and develop management recommendations.
- Distribute information to global information sources (DATAZONE, Blue Point and CONABIO) for use in making decisions at different scales.

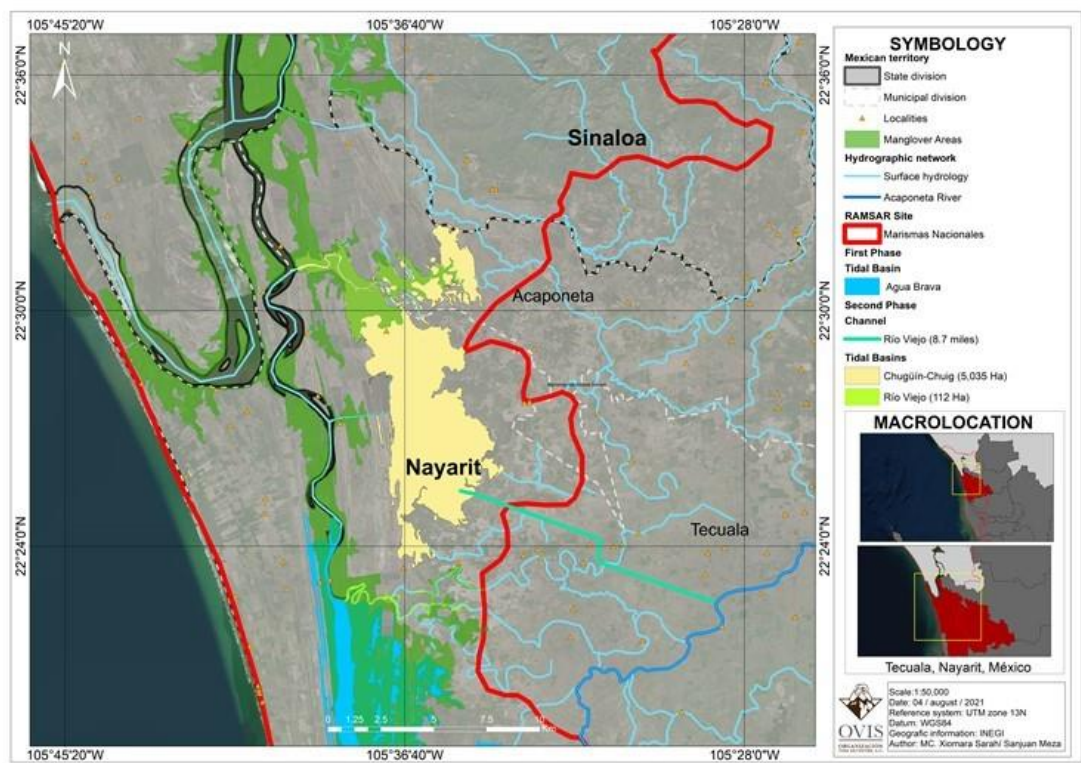
At the end of the project, the protection, restoration and monitoring activities will continue in the long-term, with the support of the institutions involved. In the case of established conservation agreements, reference sites will be established for annual monitoring through photographs. Seasonal maintenance of the restored areas and continuous monitoring of water quality and annual internal reports will also be carried out.

**Budget:** Total project budget is \$160,618. Project funding needs requested to Southern Wings (\$10,000) = Total \$160,618

**Table 8.** SGCN (\*NMBs defined by the North American Wetlands Conservation Act (NAWCA) listed by state.

<i>Species</i>	<b>AK</b>	<b>AZ</b>	<b>CA</b>	<b>CO</b>	<b>ID</b>	<b>MT</b>	<b>NV</b>	<b>NM</b>	<b>OR</b>	<b>UT</b>	<b>WA</b>	<b>WY</b>
Cinnamon Teal											X	
Northern Pintail							X					X
Eared Grebe								X				
Sora		X										
American Avocet							X					
Snowy Plover			X					X		X	X	
Whimbrel	X											
Long-billed Curlew				X	X		X	X	X			X
Marbled Godwit											X	
Ruddy Turnstone			X									
Red Knot	X		X								X	
Stilt Sandpiper												
Dunlin	X											
Western Sandpiper	X						X					
Lesser Yellowlegs	X											
Wilson's Phalarope							X					
Ring-billed Gull					X							
Least Tern				X		X		X				
Gull-billed Tern												
Caspian Tern					X	X			X	X		X
Forster's Tern												X
Wood Stork			X									
Neotropic Cormorant								X				
American White Pelican				X	X		X		X	X	X	
Brown Pelican											X	
Great Egret		X										
Snowy Egret		X							X			X
<b>Total</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>6</b>	<b>5</b>

**Figure 24.** Dredging and cleaning of 14 km /8.7 miles of the natural flow of the Viejo River to restore the Chugüin tidal basin (5,030 ha / 12,429 acres of estuaries).



**Figure 25.** Photographs depicting hydrological Restoration in Marismas Nacionales, Nayarit, Mexico










Aerial photos showing the sewer that is obstructing the water flow of the Río Viejo (left) and mosaic of images obtained with drone of the section of Río Viejo that will be cleaned and dredged (right)



Photo of hydraulic excavator removing sediment and dead wood that obstructs the flow of water in Río Viejo

	
<p>Paso Hondo Ejidal Reserve (5,000 ha)</p>	<p>Hydrological rehabilitation by cleaning sediments and removing dead wood in the Tidal Basin of Agua Brava</p>

**Figure 26. Photographs depicting various bird species in Marismas Nacionales, Nayarit, Mexico**

	
<p>Shorebirds mixed flock: american avocet (<i>Recurvirostra americana</i>), black-necked stilt (<i>Himantopus mexicanus</i>) and marbled godwit (<i>Limosa fedoa</i>) in Marismas Nacionales, Nayarit</p>	<p>Shoveler ducks</p>