ORNITHOLOGICAL RESEARCH AND CONSERVATION EFFORTS IN PUERTO RICO

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Abstract.—Previous to the 1970s, ornithological work in the Puerto Rico was limited to observations and collections done by visiting or resident ornithologists, naturalists, and hunters. However, a different approach began in the 1970s when projects were designed for research and conservation purposes. In this overview, I focus on the work currently conducted in Puerto Rico by government (i.e., State and United States) agencies, universities, and non-governmental organizations (NGOs). Even though Puerto Rico's Department of Natural and Environmental Resources plays the main role monitoring bird populations, it also works with universities and United States agencies, such as Fish and Wildlife Service and Forest Service. Local and United States universities have graduate students developing thesis work in avian ecology throughout the island. Moreover, several long-term research projects provide important data on the ecology of resident species and Neotropical migrants. A local NGO, the Puerto Rican Ornithological Society, is active in inventorying shorebird populations and designating important bird areas. Despite the knowledge about the Puerto Rican avifauna, however, little is known about the breeding biology of many resident species, particularly endemics. The major threats to the local avifauna are fragmentation and habitat loss because of the demands of a sprawling human population.

Key words: *bird conservation*, *Puerto Rican Ornithological Society*, *Puerto Rico*

Resumen.—INVESTIGACIÓN ORNITOLÓGICA Y ESFUERZOS DE CONSERVACIÓN EN PUERTO RICO. Previo a la década de 1970, el trabajo ornitológico en Puerto Rico se limitó a observaciones y colecciones hechas por ornitólogos visitantes o residentes, naturalistas y cazadores. Sin embargo, un acercamiento diferente comenzó en la década de 1970 cuando se diseñaron proyectos con propósitos de investigación y conservación. En este inventario enfatizo el trabajo llevado a cabo actualmente en Puerto Rico por agencias de gobierno (del Estado Libre Asociado de Puerto Rico y del gobierno federal de Estados Unidos), universidades y organizaciones no gubernamentales (ONG). Aunque el Departamento de Recursos Naturales y Ambientales de Puerto Rico juega el rol principal en el monitoreo de las poblaciones de aves, también trabaja con universidades de los Estados Unidos continentales y agencias federales como el Servicio de Pesca y Vida Silvestre y el Servicio Forestal. Universidades locales y del continente tienen estudiantes graduados desarrollando trabajos de tesis en ecología de aves a través de la isla. Además, varios estudios de investigación a largo plazo proveen datos importantes sobre la ecología de especies residentes y de migrantes neotropicales. Una ONG local, la Sociedad Ornitológica Puertorriqueña, está activa inventariando las poblaciones de limícolas y designando áreas importantes para las aves. Sin embargo, a pesar del conocimiento de la avifauna puertorriqueña, se conoce poco sobre la biología reproductiva de muchas especies residentes, en particular las endémicas. Las mayores amenazas a la avifauna local son la fragmentación y la pérdida de hábitat debido a las demandas de una desparramada población humana.

Palabras clave: conservación de aves, *Puerto Rico*, *Sociedad Ornitológica Puertorriqueña*

Résumé.—RECHERCHE EN ORNITHOLOGIE ET EFFORTS DE CONSERVATION À PORTO RICO. Porto Rico est l'habitat de 354 espèces d'oiseaux. Avant 1970, les études sur l'île étaient limitées aux observations et collectes faites par des ornithologues visiteurs ou résidents, des naturalistes et des chasseurs. Cependant, une approche nouvelle débuta dans les années 1970 quand des projets ont été développés dans un but de recherche et de conservation. Dans cet aperçu, je me contrerai sur le travail conduit actuellement par les agences gouvernementales (c'est-à-dire au niveau de l'Etat et des Etats-Unis), les universités et les ONG. Même si le département des ressources naturelles et environnementales de Porto Rico joue le rôle principal de suivi des populations d'oiseaux, il travaille aussi avec les universités et les agences d'Etat, comme le Fish and Widlife Service et le Forest Service. Les universités locales et des Etats-Unis forment des étudiants préparant des thèses sur l'écologie des oiseaux à travers l'île. De plus, plusieurs études à long terme fournissent des données importantes sur l'écologie des espèces résidentes et des migrants néotropicaux. Une ONG locale, La Société d'Ornithologie de Porto Rico, est active dans les inventaires des populations d'oiseaux de bord de mer et dans l'identification des zones importantes pour les oiseaux. Toutefois, malgré la connaissance de l'avifaune de Porto Rico, la biologie de la reproduction de nombreuses espèces résidentes est peu connue, en particulier en ce qui concerne les endémiques. Les menaces les plus importantes pesant sur l'avifaune locale sont la fragmentation et la disparition des habitats dues aux demandes d'une population humaine croissante.

Mots-clés: Conservation des oiseaux, Société d'Ornithologie de Porto Rico, Porto Rico

INTRODUCTION

BEFORE THE 1970S, ornithological work in Puerto Rico was limited to collections, observations, and descriptions by visiting or resident ornithologists, naturalists, and hunters (Wiley 1996). However, a different approach began in the 1970s, when projects were designed for research and conservation purposes. The extensive knowledge acquired since then makes the Puerto Rican avifauna one of the best studied in the Caribbean region. In this overview I focus on the work currently conducted in the island by ornithologists in government (i.e., State and United States) agencies, universities, and non-governmental organizations (NGOs).

GOVERNMENT AGENCIES ENGAGED IN ORNITHOLOGICAL RESEARCH

Puerto Rico's Department of Natural and Environmental Resources

Puerto Rico's Department of Natural and Environmental Resources (DNER) is the State agency responsible for the conservation of the island's biodiversity. It is in charge of monitoring bird populations in nature reserves and throughout the island. Among its projects are the following:

Puerto Rican Parrot project.—The Puerto Rican Parrot (*Amazona vittata*) is one of the most endangered species in the Caribbean, with only about 150 extant individuals. The US Fish and Wildlife Service (USFWS), in collaboration with the DNER and US Forest Service, started a captive breeding project in the early 1970s in the Luquillo Mountains to increase progeny for future release and as a genetic reserve (Snyder *et al*. 1987). The DNER established a second captive population in Río Abajo State Forest in the north-central region of the island.

Yellow-shouldered Blackbird recovery project.—By the 1970–80s, Shiny Cowbirds (*Molothrus bonariensis*) were reported to parasitize 95% of the endemic Yellow-shouldered Blackbird (*Agelaius xanthomus*) nests (Wiley 1985, Wiley *et al*. 1991). A recovery project was begun to improve the blackbird's reproductive success through management and thus avoid further population declines. Artificial nest structures are monitored to protect blackbirds from nest predators and nest parasites, as well as controlling the Shiny Cowbird population in the nesting area.

Gap Analysis.—DNER, along with personnel from North Carolina State University, the International Institute of Tropical Forestry, USFWS, and US Geological Survey, collaborate in an island-wide inventory of the flora and fauna, including birds. This project, named the Gap Analysis, will produce a series of maps showing species distribution. One of the goals of this project is to predict the presence of the species according to the characteristics of the habitat occupied.

Columbid surveys.—The DNER surveys columbid populations along 101 routes throughout the island to study their status, distribution, and abundance. Species included in the surveys are Scaly-naped Pigeon (*Columba squamosa*), Zenaida Dove (*Zenaida aurita*), White-winged Dove (*Z. asiatica*), Mourning Dove (*Z. macroura*), White-crowned Pigeon (*Columba leucocephala*), Plain Pigeon (*C. inornata*), Common Ground-Dove (*Columbina passerina*), Ruddy Quail-Dove (*Geotrygon montana*), Key West Quail-Dove (*G. chrysia*), and Bridled Quail-Dove (*G. mystacea*). Emphasis is on the first four species because they are legally hunted, and in the White-crowned Pigeon which has sharply declined in the island (Wiley 1979, Bonilla 2001).

Waterfowl surveys.—Since 1990 DNER staff annually conduct aerial counts of waterfowl in 14 of the island's major ponds. The purpose of the counts is to survey the populations of migratory duck species that are hunted in the island (Departamento de Recursos Naturales y Ambientales 2001).

US Fish and Wildlife Service

Biologists of the US Fish and Wildlife Service survey seabird populations throughout the island and surrounding islets and cays (J. Saliva, pers. comm.). Species surveyed include the Masked Booby (*Sula dactylatra*), Red-footed Booby (*S. sula*), Magnificent Frigatebird (*Fregata magnificens*), Brown Pelican (*Pelecanus occidentalis*), Red-billed Tropicbird (*Phaethon aethereus*), White-tailed Tropicbird (*P. lepturus*), Roseate Tern (*Sterna dougallii*), Sandwich Tern (*S. sandvicensis*), Least Tern (*S. antillarum*), Sooty Tern (*S. fuscata*), and Brown Noddy (*Anous stolidus*).

A mist-netting project was started in 2001 by Leopoldo Miranda and Stephen Earsom to create a dataset on the diversity and abundance of native and migratory landbirds in different habitats in Puerto Rico. They work in six locations, including dry and moist forest, and a shade coffee plantation. In addition, José Colón surveys shorebird populations and Rolando Figueroa studies the nesting success of the Snowy Plover (*Charadrius alexandrinus*) at the Cabo Rojo salt flats.

US Forest Service

Research conducted by scientists of the US Forest Service have provided important knowledge on the island's avifauna. For instance, Joseph M. Wunderle's work has shown bird population fluctuations following hurricanes (Wunderle 1995a) and habitat use segregation by males and females of the Black-throated Blue Warbler (*Dendroica caerulescens*) while wintering in the island (Wunderle 1995b). His current research interests include the effects of hurricanes on fruit and seed production, fruit phenology as related to food resource for birds in the Luquillo Mountains, studies on the population biology of the Puerto Rican Parrot, and microhabitat selection by a nest predator, the Puerto Rican boa (*Epicrates inornatus*; J. Wunderle, pers. comm.).

Wayne J. Arendt works on several long-term projects in Puerto Rico. He assesses bird populations in the Luquillo Mountains and studies the biology of the Pearly-eyed Thrasher (*Margarops fuscatus*). Results of the thrasher project have provided an insight to the role of dipteran ectoparasites on the bird's reproductive success. Arendt also works with colleague John Faaborg, of the University of Missouri, Columbia, on a project monitoring avian populations in Guánica State Forest (Faaborg *et al*. 2001; see United States Universities, below).

LOCAL UNIVERSITIES

University of Puerto Rico, Río Piedras

Students from the University of Puerto Rico (UPR), Río Piedras campus, have worked or are currently working in ornithological research under the supervision of Robert B. Waide, Joseph Wunderle, John Thomlinson, and James Wiley. Theses include work with the Shiny Cowbird (Núñez García 1988), the avian community in the Luquillo Mountains (Pagán 1995), Puerto Rican Parrot (Thompson Baranello 2000), Bananaquit (*Coereba flaveola*; Hernández 2002), and Puerto Rican Vireo (*Vireo latimeri*; Tossas 2002). At present, students work with the consequences and mechanisms responsible for the habitat segregation between sexes of the Black-throated Blue Warbler (E. Vásquez), feeding response of adult Pearly-eyed Thrashers to nestlings infested with botflies (A. Toledo), relationship between fruit abundance and home range size in the Pearly-eyed Thrasher (W. Beltrán), and bird distribution in fragments within a urban landscape (M. Suárez).

Moreover, Waide has been directing a mist-netting project in the Luquillo Mountains since 1989 (Waide 1991). His main interest is in assessing hurricane effects on native bird populations.

University of Puerto Rico, Humacao

The Department of Biology of UPR, Humacao, has consistently offered an ornithology course since 1980 taught by Raúl Pérez. Pérez's research interest deals mainly with the life cycle of endemic birds and the distribution of exotic species. He also works on a comparison of the avian community along an elevational gradient. Enrique Hernández studies plant-bird interactions, particularly the ecology of hummingbirds. He also works on a list of plant species that provide fruit or nectar to birds. This list will be used to make recommendations on species to be considered in habitat restoration plans. Hernández coordinates the Breeding Bird Surveys in Puerto Rico.

University of Puerto Rico, Cayey

Carlos Ricart works on a project, originated with colleague Emilio Font, on the density and diversity of bird species in dry forest fragments in southwestern Puerto Rico. Along with his students, Ricart is designing a project on the distribution and seed dispersal of mistletoes in Guánica State Forest.

University of Puerto Rico, Mayagüez

Carlos Delannoy has focused his research interest on the biology and conservation of raptors. His population surveys of the Puerto Rican Sharp-shinned Hawk (*Accipiter striatus venator*) and Puerto Rican Broad-winged Hawk (*Buteo platypterus brunnescens*) have helped include these endemic subspecies in the list of endangered species. Students under his supervision have completed Master's theses dealing with raptors, as well as passerine birds (Rodríguez-Santiago 1988, Rivera Irizarry 1990, Bonilla Martínez 1992, Fernández 1993, Tossas 1995, Jiménez-Rodríguez 1996). Delannoy's current students work on Shiny Cowbird effects on the breeding success of the Yellow Warbler (*Dendroica petechia*; M. Vicenty); the abundance, distribution, and foraging ecology of the Puerto Rican Tody (*Todus mexicanus*; E. Rodríguez); and the ecology of the Elfin Woods Warbler (*Dendroica angelae*; V. Anadón). Moreover, Allen Lewis has led graduate students to complete Masters theses on subjects ranging from the feeding behavior of frugivorous birds (Vázquez-Plass 1992) to the ecology of the Yellow-shouldered Blackbird (Cruz-Burgos 1999) and the migratory Semipalmated Sandpiper (*Calidris pusilla*) and Western Sandpiper (*Calidris mauri*; Rice 1995).

UNITED STATES UNIVERSITIES

University of Nevada

Aaron Shiels completed a Master's degree at the University of Nevada, with a thesis on the role of avian seed dispersers in the plant succession process in landslides (J. Wunderle, pers. comm.).

University of Colorado, Boulder

Tomás Carlo, a Ph.D. student at the University of Colorado, Boulder, studies how the distribution and presence of different plant species affect seed dispersal patterns by birds.

North Carolina State University

Jaime Collazo directs several projects dealing with the avian community in the karst region in north-central Puerto Rico. His research interests include the abundance and distribution of birds in relation to habitat features in the landscape, and the demographic and foraging patterns of various species. Collazo also works on an improved protocol to census the wild population of the Puerto Rican Parrot, a genetic assessment of the species, the selection of potential release sites, and estimating the densities of fruiting trees and the population sizes of its predators (J. Collazo, pers. comm.).

Mississippi State University

Mississipi State University is actively involved in ornithological research in Puerto Rico through the work done by students of Francisco Vilella. The students' research interests range from the assessment of management practices on waterfowl populations to the ecology of raptors (F. Vilella, pers. comm.). José Cruz constructed impoundments in lagoons of the Humacao Wildlife Refuge to determine the diversity, abundance, and activity of waterbirds. Marisel López examined the use of these lagoons by the West Indian Whistling-Duck (*Dendrocygna arborea*), Ruddy Duck (*Oxyura jamaicensis*), and White-cheeked Pintail (*Anas bahamensis*). Meanwhile, Derek Hengstenberg studies the movements of the Puerto Rican Broad-winged Hawk in the karst region to understand habitat use and selection, and Wyatt Nimitz studies the abundance and distribution of the Red-tailed Hawk (*Buteo jamaicensis*), a known predator of the Puerto Rican Parrot, in the Luquillo Mountains.

University of Missouri, Columbia

John Faaborg, along with Wayne Arendt (US Forest Service), has been monitoring bird populations in a dry forest in southwestern Puerto Rico since 1972. This long-term effort has provided data on declines of Neotropical migrants wintering in the island, as well as the survival and longevity of resident species (Faaborg *et al*. 2001).

NON-GOVERNMENTAL ORGANIZATIONS

Puerto Rican Ornithological Society

Field trips and surveys conducted by members of the Puerto Rican Ornithological Society (PROS) have provided new records to the list of bird species in the island. Important observations include rare sightings such as the Piping Plover (*Charadrius melodus*) in three locations since 2001, and evidence of the first breeding attempt of a migratory species, the Willet (*Catoptrophorus semipalmatus*), in Puerto Rico in 2002. Further contributions of the PROS include monthly shorebird surveys in 13 locations, and active participation in Christmas Bird Counts and Breeding Bird Surveys. In 2002 the PROS joined BirdLife's International's Important Bird Areas Program. This project will allow a thorough study of the diversity and distribution of bird species in the island while developing a list of highly prioritized sites for their conservation.

RESEARCH AND CONSERVATION NEEDS

Despite the numerous studies done with the Puerto Rican avifauna, little is known about the breeding biology of many resident species, particularly endemics. The major threats to the local avifauna are the introduction of exotic species, and fragmentation and habitat loss resulting from the demands of a sprawling human population. Research needs should emphasize work on the demography of endemic species and to determine whether these parameters are affected by the numerous exotics dwelling in the island. Projects focusing on the effects of habitat fragmentation on the avifauna and management plans to restore native forests and wetlands are also needed. Moreover, measures to maintain sustainable agricultural practices, such as shade coffee plantations, should be promoted.

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