

## A GENERAL OVERVIEW OF WATERBIRD COMMUNITIES IN CUBA

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**Abstract:** The Cuban archipelago constitutes a territory of great importance for the development and maintenance of waterbird populations, both residents and migrants, due to Cuba's wide variety of wetlands and its privileged geographical situation. The actual status of these populations is incompletely understood, which is why we evaluated the composition of bird communities that use Cuban wetlands. Of the 371 bird species recorded for Cuba, 150 are waterbirds which use our freshwater, coastal, and marine wetlands. They represent all waterbird families of the Caribbean and 89.9% of the species. Eight orders and 27 families occur in Cuba, with the largest numbers of species in the families Anatidae, Scolopacidae, and Laridae. In general, 41 species are accidentals and, if we incorporate another 29 that are encountered in the categories "rare" and "very rare," only 80 species occur regularly. The best represented order is Charadriiformes, which includes 46% of the species, followed in importance by Anseriformes and Ciconiiformes, with 18% and 12%, respectively. Almost half of the species (48%) use two types of wetlands in alternating fashion, one as a refuge and the other as a foraging site. In relation to distribution, we observed that 64 species are present in less than 25% of the localities, 33 present in 25 to 50%, and only 24 species occur in more than 50% of the wetland areas studied.

**Key words:** composition, Cuba, distribution, habitat use, migration, waterbirds

**Resumen:** UN RESUMEN GENERAL DE COMUNIDADES DE AVES ACUÁTICAS EN CUBA. El archipiélago cubano constituye un sitio de gran importancia para el desarrollo y mantenimiento de las poblaciones de aves acuáticas, tanto residentes como migratorias, dada la gran variedad de humedales con que cuenta y su situación geográfica privilegiada. El estado actual de dichas poblaciones no es completamente conocido por lo que nos propusimos evaluar la composición de las comunidades de aves que utilizan los humedales cubanos. De las 371 especies de aves registradas para Cuba, 150 son acuáticas y utilizan nuestros humedales de agua dulce, costeros y marinos. Todas las familias de aves acuáticas del Caribe y 90% de las especies están presentes. Ocho órdenes y 27 familias agrupan a nuestras especies, aunque el mayor número está incluido en las familias Anatidae, Scolopacidae y Laridae. En términos generales 41 especies son accidentales y si le incorporamos otras 29 que se encuentran en las categorías de rara y muy rara se aprecia que solo 80 pueden observarse con cierta regularidad. El orden mejor representado es Charadriiformes que incorpora 46% de las especies y le siguen en importancia Anseriformes y Ciconiiformes con 18 y 12% respectivamente. El 48% de las especies utiliza dos tipos de humedales de manera alternativa, uno como refugio y otro como sitio de forrajeo. En relación con su distribución, se observa que 64 especies están presentes en menos de 25% de las localidades, 33 entre 25 y 50% y solo 24 especies se encuentran en más de 50% de las áreas acuáticas estudiadas.

**Palabras claves:** aves acuáticas, composición, Cuba, distribución, migración, uso de hábitat

**Résumé :** UNE VUE D'ENSEMBLE DES COMMUNAUTÉS D'OISEAUX D'EAU DE CUBA. Grâce à la diversité de ses zones humides et à sa position géographique privilégiée, l'archipel de Cuba constitue un territoire de grande importance pour le développement et le maintien des populations d'oiseaux d'eau sédentaires ou migrateurs. La connaissance du statut actuel de ces populations est incomplète et c'est la raison pour laquelle nous avons évalué la composition des communautés d'oiseaux d'eau utilisant les zones humides cubaines. Parmi les 371 espèces d'oiseaux de Cuba, 150 sont des oiseaux d'eau qui fréquentent les zones humides d'eau douce, côtières ou marines. Toutes les familles d'oiseaux d'eau et 89.9% des espèces de la Caraïbe sont représentées. Huit ordres et 27 familles ont été répertoriés à Cuba, les Anatidae, Scolopacidae et Laridae regroupant le plus grand nombre d'espèces. D'une manière générale, 41 espèces sont accidentelles et si l'on ajoute 29 espèces considérées comme "rares" et "très rares", seules 80 espèces sont observées régulièrement. L'ordre le plus représenté est celui des Charadriiformes qui comprend 46% des espèces, suivi par les Anseriformes et les Ciconiiformes, avec respectivement 18% et 12%. Près de la moitié des espèces (48%) utilisent alternativement deux types de zones humides, une zone de remise et une de gagnage. Concernant la distribution, nous avons observé que 64 espèces sont présentes dans moins de 25% des localités, 33 dans 25 à 50% et seulement 24 espèces fréquentent plus de 50% des zones humides étudiées.

**Mots clés :** composition, Cuba, distribution, migration, oiseaux d'eau, utilisation des habitats

The Cuban archipelago, located at the mouth of the Gulf of Mexico, is composed of two main islands, Cuba and the Isla de la Juventud. In addition, the Cuban archipelago includes some 4,000 smaller islands or cays distributed around Cuba, forming four important island groups: the Archipiélagos de los Colorados and Sabana-Camagüey along Cuba's northern coast, and the Archipiélagos de los Canarreos and Jardines de la Reina along the southern coast (Instituto Cubano de Geodesia y Cartografía 1978). Cuba extends 1,250 km from Punta de Maisí to Cabo de San Antonio, with an area of 110,922 km<sup>2</sup>. The greatest width of Cuba is 191 km, whereas the narrowest point measures 31 km. This long, narrow shape, together with the coastal shelf and numerous cays, provides expansive coastal shallows and mangroves, which results in a great extension of coast and mudflat (3,209 km along the north and 2,537 km on the southern coast) habitat, which is widely used by waterbirds. Among the wetlands are natural bodies of fresh water (127,137 ha), reservoirs (153,914 ha), and canals (29,626 ha).

The southern coast is lower and more marshy than the northern coast and, in fact, the largest wetlands are along Cuba's southern coast: Ciénaga de Zapata (37,500 ha) and Ciénaga de Birama (2,185 ha) (Comisión Nacional de Nombres Geográficos 2000). Similarly, the largest wetland in the Isla de la Juventud, Ciénaga de Lanier (3,740 ha), is along the southern coast (Comisión Nacional de Nombres Geográficos 2000). In general terms, wetlands represent ca. 15% of Cuba and its satellites, and their hydrological regime is dependent on seasonal precipitation. These wetlands are noted for their abundance of birds in mangrove coastal areas and in areas dedicated to rice cultivation.

The last 40 years have seen a marked quantitative and qualitative change in the composition of waterbird species that depend on our wetlands. This change has resulted from two fundamental causes: (1) development of a rice industry and construction of numerous reservoirs throughout the country, and (2) because of the increase in number of ornithologists dedicated to long-term study of waterbirds. The best-represented orders of Cuban waterbirds are Charadriiformes and Anseriformes, which constitute 62% of our waterbirds and have the largest populations of resident and migratory species known in our wetlands.

#### METHODS

We present information on the taxonomic and ecological composition of the aquatic avifauna of

Cuba. For the systematic analyses, we used data from Llanes *et al.* (2002), Garrido and Kirkconnell (2000), Raffaele *et al.* (1998), and del Hoyo *et al.* (1992, 1996). We used the criteria of Garrido and Kirkconnell (2000) to classify the abundance of waterbirds: abundant, 20 or more individuals seen per day in appropriate habitat and season; common, five to 19 individuals observed per day in appropriate habitat and season; uncommon, one to five individuals observed in a week in appropriate habitat and season; rare, one to five individuals observed per year in appropriate habitat and season; very rare, one individual observed every 5 yr in appropriate habitat and season; and accidental, observed in Cuba once every 10–20 yr. For some species we modified the categories of abundance given by authors to better correspond with the surveys we performed in various wetlands of Cuba.

For status categories, we used the highest level for each species, classifying each species as: transient, detected only during autumn and spring migration; summer resident, breeds in Cuba during summer but is otherwise absent; winter resident, resides in Cuba during winter; permanent resident, resides in Cuba throughout the year; and bimodal residents, populations of permanent residents as well as populations that migrate during the winter.

We considered three general habitats for our analyses of the distribution of ecosystems: marine, for all species that use mainly the sea for foraging; coastal, for species that use areas near the ocean, mainly coastal lagoons characterized by shallow depths and saline or brackish waters, protected by mangroves with at least some degree of development; and freshwater, includes reservoirs, rivers, lagoons, and rice fields, among other freshwater habitats.

We evaluated species frequency (presence of a species at a given locality) drawing upon the lists of birds from 24 localities representative of the entire country, as presented by Varona and Garrido (1970), Garrido (1973), Estrada and Novo (1984), Garrido *et al.* (1986), Llanes *et al.* (1987), Rams *et al.* (1987), Acosta *et al.* (1988), Cubillas *et al.* (1988), Kirkconnell and Posada (1988), Torres (1988), Posada *et al.* (1989), Torres *et al.* (1989), Garrido and Silva (1990), Rodríguez *et al.* (1991), Sánchez *et al.* (1991), Mugica and Acosta (1992), Kirkconnell *et al.* (1993), Melián and Ayarde (1994), Melián *et al.* (1994), and Melián (2000).

The similarities among frequencies of appearance for each species were calculated using the index of similarity of Sorenson (Odum 1959) and the index

Table 1. Families and number of species of waterbirds present in Cuba, the Caribbean, and world, with percent of Caribbean and world species that occur in Cuba.

Family	Species in Cuba	Species in Caribbean	% of Caribbean Species in Cuba	Species in World	% of World Species in Cuba
Anatidae	28	31	90.3	147	19.0
Scolopacidae	27	34	79.4	82	32.9
Laridae	22	25	88.0	90	24.4
Rallidae	12	12	100.0	133	9.0
Ardeidae	12	12	100.0	60	20.0
Charadriidae	9	10	90.0	64	14.1
Procellariidae	4	7	71.4	70	7.1
Threskiornithidae	4	4	100.0	32	12.5
Sulidae	4	4	100.0	9	44.4
Stercoraridae	4	4	100.0	5	80.0
Hydrobatidae	3	3	100.0	20	15.0
Phalacrocoracidae	2	2	100.0	39	5.1
Podicipedidae	2	2	100.0	22	9.1
Recurvirostridae	2	2	100.0	13	15.4
Pelecanidae	2	2	100.0	7	28.6
Phaethontidae	2	2	100.0	3	66.7
Alcidae	1	1	100.0	23	4.3
Ciconiidae	1	1	100.0	19	5.3
Gruidae	1	1	100.0	15	6.7
Jacaniidae	1	1	100.0	8	12.5
Haematopodidae	1	1	100.0	7	14.3
Fregatidae	1	1	100.0	5	20.0
Phoenicopteridae	1	1	100.0	5	20.0
Gaviidae	1	1	100.0	4	25.0
Rynchopidae	1	1	100.0	3	33.3
Anhingidae	1	1	100.0	2	50.0
Aramidae	1	1	100.0	1	100.0
TOTAL	150	167	89.8	888	16.8

of quantitative similarity of Acosta (1987) for three regions: western (including the provinces of Pinar del Río, Habana, Ciudad Habana, Matanzas, and Isla de la Juventud), central (Cienfuegos, Villa Clara, Sancti Spiritus, Ciego de Ávila, and Camagüey), and eastern (Las Tunas, Holguín, Granma, Santiago de Cuba, and Guantánamo).

#### RESULTS AND DISCUSSION

Given the wealth of wetland habitat and our island characteristics, waterbirds in Cuba represent a substantial faunal group, comprising 41% of bird species recorded for our territory. Nevertheless, it should be kept in mind that 27% of these wetland species have been classed as accidentals and, for that reason, these species do not constitute a major component in the function of our ecosystems.

Cuba constitutes 48% of the emergent insular area of the Caribbean; nevertheless it has all of the avian families recorded for this geographical area and 89.8% of the species. The high percentage of species represented is undoubtedly related to the large migrant component of our avifauna, including the North American species that pass through during autumn on their way toward the tropics, using the Mississippi and Atlantic corridors, and also including species that migrate in spring from South and Central America to breed in Cuba during the summer. The Cuban waterbird avifauna is composed of 150 species, representing eight orders and 27 families, of which the families Anatidae, Scolopacidae, and Laridae contain the largest number of species, and it is these families, along with the Procellariidae, which also have the smallest pro-

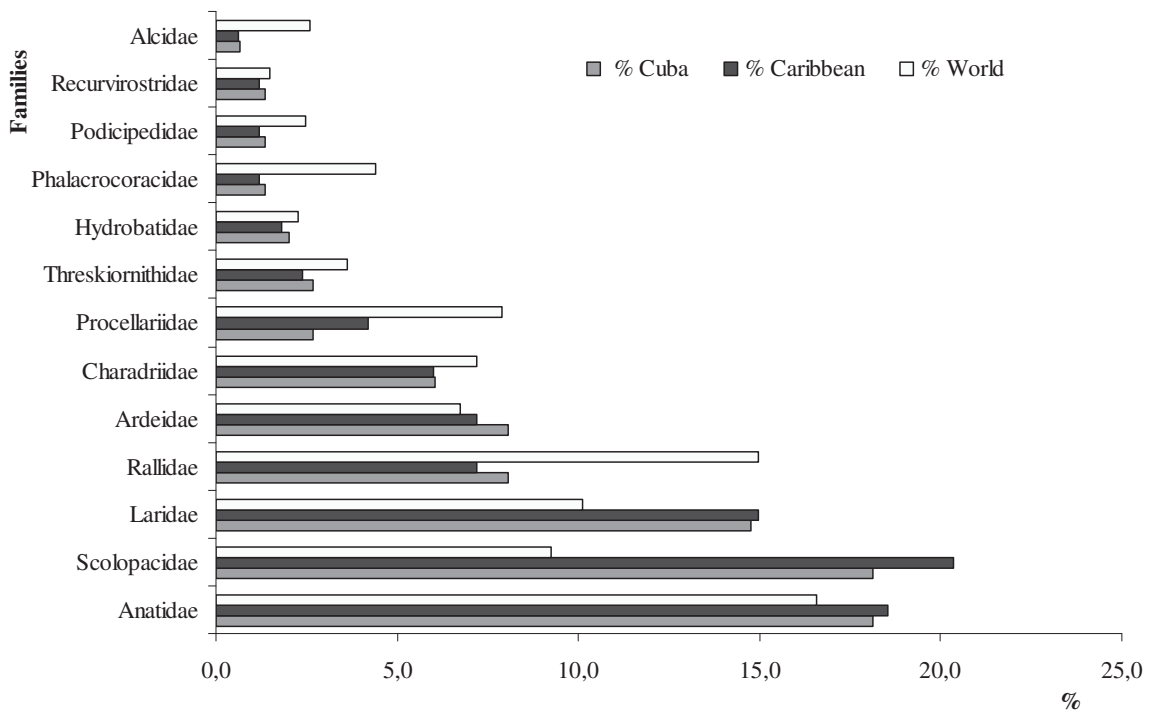


Fig.1. Percent of each family for waterbird species recorded for Cuba, the Caribbean, and the world.

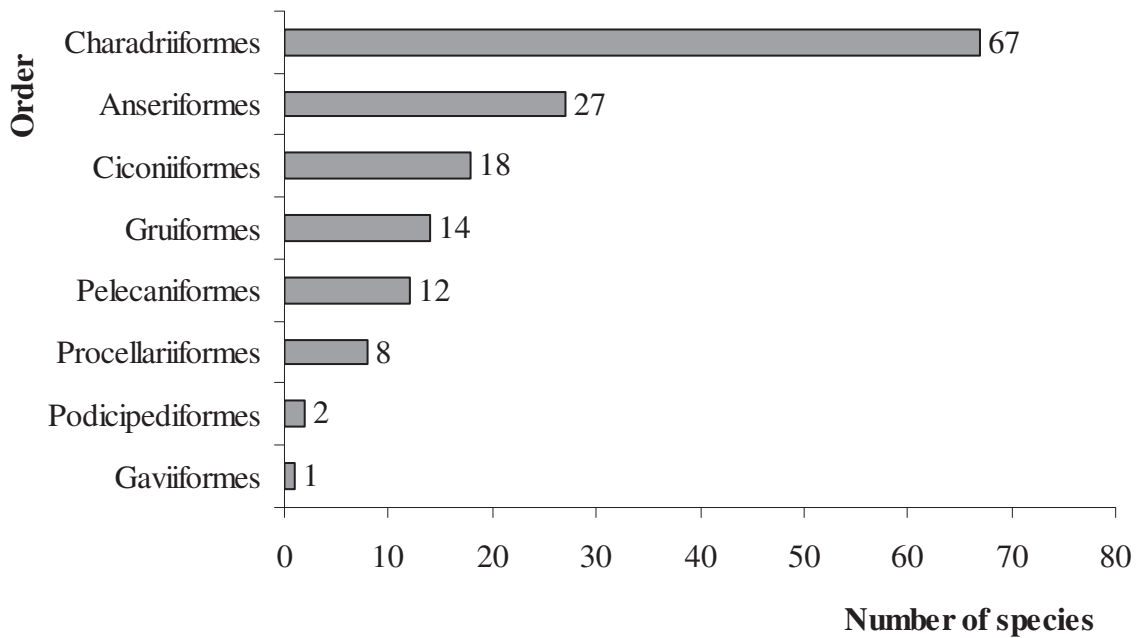


Fig. 2. Number of species for each order of waterbirds present in Cuba.

Table 2. Number of species of waterbird orders present in Cuba for each abundance category.

Order	Abundant	Common	Uncommon	Rare	Very Rare	Accidental
Charadriiformes	8	19	7	9	9	15
Anseriformes	4	7	1	2	2	12
Ciconiiformes	8	5	3	1	1	-
Gruiformes	2	5	2	1	2	2
Pelecaniformes	2	3	2	1	0	4
Procellariiformes	-	-	-	-	1	7
Podicipediformes	-	1	1	-	-	-
Gaviiformes	-	-	-	-	-	1
TOTAL	24	40	16	14	15	41

portion of species in the Caribbean that occur in Cuba (Table 1). However, 16 families are poorly represented in Cuba, with only one or two species in each (Table 1).

Of the 27 families present in Cuba, we took those with counts of more than 10 species worldwide and calculated the proportion that each represents within their corresponding geographical realm (Cuba, Caribbean, worldwide). The families Anatidae and Ardeidae are similarly represented, relatively, in the three geographical scales, whereas the families Scolopacidae and Laridae are present in a much greater proportion in the Caribbean and Cuban zones, which is the result of ample wetland habitats, freshwater as well as saline and brackish, with various water depths present as a consequence of the island nature of the area (Fig. 1). These ecosystems, in turn, offer refuge and food for species in these families, which have a great diversity of body sizes

and shapes representing morphological adaptations to different ecological requirements. On the other hand, families such as Rallidae, Procellariidae, and Phalacrocoracidae are poorly represented, proportionately, in Caribbean and Cuban geographical areas (Table 1).

With regard to orders, the Charadriiformes was the best represented, comprising 46% of the species, followed in importance by the Anseriformes and Ciconiiformes, with 18% and 12%, respectively, of the species (Fig. 2).

An important aspect of the analysis is the presence of accidental species (Table 2). In this category, we have 15 species in the order Charadriiformes, 12 in Anseriformes, two in Gruiformes, four in Pelecaniformes, seven in Procellariiformes, and one in Gaviiformes. This group of 41 species is responsible for the high number of ornithological records and, possibly, the analysis of geographical distribution, but is not an important element from an ecological point of view.

Considering the categories of abundance, only 80 species occur in our wetlands with regularity (abundant, common, or uncommon) whereas 69 species are either rare, very rare, or accidental. Most species of the order Ciconiiformes have large and well-distributed populations that permit frequent observation of a high number of species in our wetlands, whereas only half of the species in the Charadriiformes show this pattern (Table 3). Species in the Anseriformes show an inverse pattern, resulting from the high proportion of accidental species in this order. All species in the Procellariiformes are oceanic and, for that reason, records are sporadic and all are categorized as accidental or very rare. Owing to their small size and use of vegetated areas or flooded rice fields, species of the family Rallidae in the order Gruiformes are quite diffi-

Table 3. Percent of species, based on abundance categories, in each waterbird order in Cuba. A = abundant, C = common, U = uncommon, R = rare, VR = very rare, Ac = accidental.

Order	A+C+U (%)	R+VR+Ac (%)
Charadriiformes	51	49
Anseriformes	43	57
Ciconiiformes	89	11
Gruiformes	64	36
Pelecaniformes	58	42
Procellariiformes	0	100
Podicipediformes	100	0
Gaviiformes	0	100

Table 4. Number of species in each status category for waterbird orders in Cuba.

Order	Transient	Summer Resident	Winter Resident	Permanent Resident	Bimodal Resident
Charadriiformes	6	8	30	5	5
Anseriformes	0	0	10	5	1
Ciconiiformes	0	0	1	3	12
Gruiformes	0	0	2	6	4
Pelecaniformes	0	1	1	1	5
Procellariiformes	0	1	0	0	0
Podicipediformes	0	0	0	2	0

cult to detect. For that reason, rails are under recorded in surveys in Cuba.

Disregarding the accidental species, 60 species are migrants, either wintering or summering, and 49 maintain permanent populations throughout the year, with many such populations increasing with the addition of migrants arriving in winter (Table 4).

The Charadriiformes and Anseriformes are mostly migrants, whereas the Ciconiiformes, Gruiformes, and Pelecaniformes are mostly residents (Fig. 3). This demonstrates the importance of Cuba for the maintenance of migratory birds from North America. The disproportionate composition of the Charadriiformes in favor of migratory species is dependent on fluctuations in our hydrological regime. In September or October, when migratory species arrive in Cuba, we are at the end of our

rainy season, and the wetland systems are at their highest water levels, with the largest expanses and greatest variety of depths resulting from the highest zones being flooded.

Many of these areas are covered by shallow water, which are favored by a large group of species, mainly Scolopacidae and Charadriidae, that occupy a habitat not used by resident species and which offers considerable food availability. The Anseriformes, on the other hand, sometimes take advantage of the zones that have been flooded, at times as a result of hurricanes passing near or through Cuba; these areas provide refuge and food, depending on the type of plant composition present. In general, Cuba has a variety of permanent wetlands, with the most important being the fringe areas of the south, marshy and low for the major part

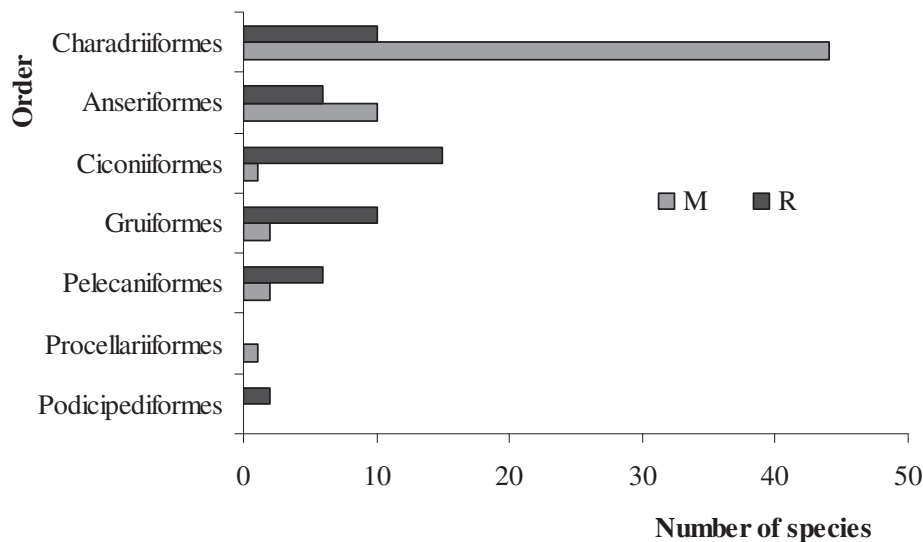


Fig. 3. Number of species in each order with resident (R) or migratory populations (M).

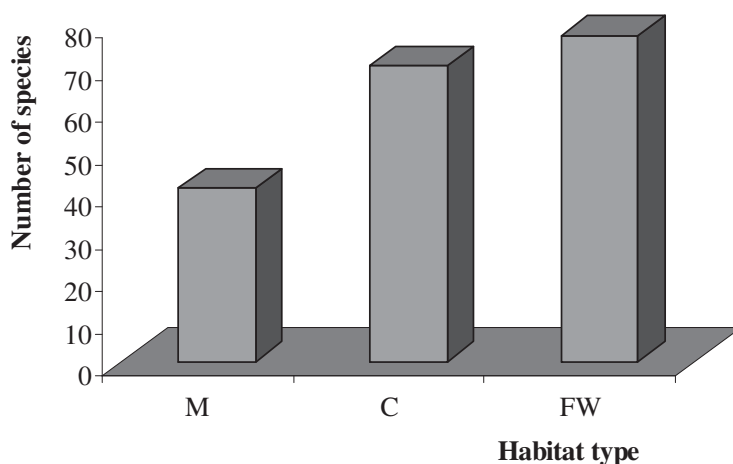


Fig. 4. Number of waterbird species that can be found in each one of general aquatic ecosystem present in Cuba. M = marine; C = coastal; FW = freshwater.

of its coast, with numerous coastal lagoons of varying depths, making them favorite habitats of the Anseriformes and Charadriiformes.

The most common resident species are Brown Pelican (*Pelecanus occidentalis*), Double-crested Cormorant (*Phalacrocorax auritus*), Great Egret (*Ardea alba*), Snowy Egret (*Egretta thula*), Little Blue Heron (*E. caerulea*), Cattle Egret (*Bubulcus ibis*), Black-crowned Night-Heron (*Nycticorax nycticorax*), White Ibis (*Eudocimus albus*), Glossy Ibis (*Plegadis falcinellus*), American Flamingo (*Phoeni-*

*copterus ruber*), Fulvous Whistling-Duck (*Dendrocygna bicolor*), Common Gallinule (*Gallinula galeata*), and American Coot (*Fulica americana*); whereas the most abundant migratory species are Blue-winged Teal (*Anas discors*), Northern Shoveler (*Anas clypeata*), Ring-necked Duck (*Aythya collaris*), Black-necked Stilt (*Himantopus mexicanus*), Lesser Yellowlegs (*Tringa flavipes*), Semipalmated Sandpiper (*Calidris pusilla*), Least Sandpiper (*C. minutilla*), Stilt Sandpiper (*C. himantopus*), Short-billed Dowitcher (*Limnodromus griseus*), Laughing

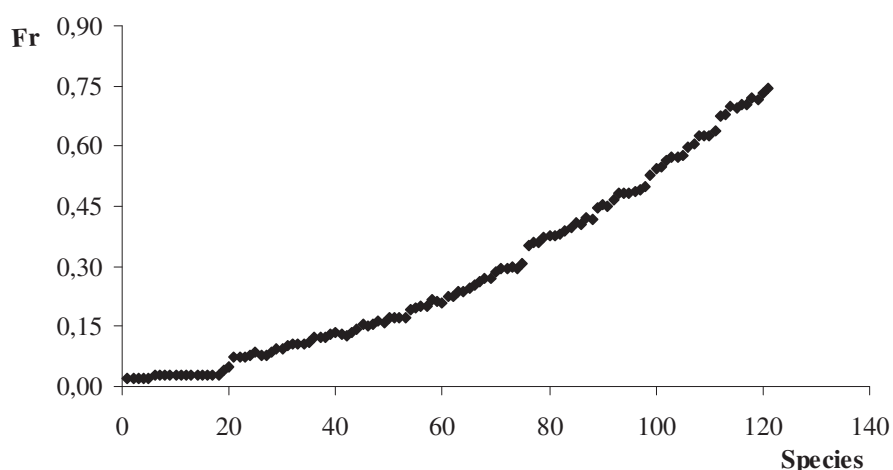


Fig. 5. Frequency (Fr) of the 121 best represented species of waterbirds in the Cuban literature.

Table 5. Similarity among observed frequencies of aquatic birds present in the three Cuban regions.

Regions	Qualitative Similarity	Quantitative Similarity
Western vs Central	0.81	0.77
Western vs Eastern	0.78	0.75
Central vs Eastern	0.77	0.74

Gull (*Leucophaeus atricilla*), and Royal Tern (*Thalasseus maximus*).

An appreciable number of waterbird species are dependent on marsh habitat, which in Cuba is extensive because of the proximity that exists between freshwater bodies and coastal areas. The analysis of use of various wetlands in Cuba revealed a wide use of freshwater wetlands and coastal lagoons (Fig. 4), which are enhanced by the great variety of water depths and habitat structure. These varied wetland habitats provide refuge and foraging areas for many species, mainly of the orders Charadriiformes, Anseriformes, and Pelecaniformes.

In general, almost half (48%) of the species use two wetland types, in many cases alternating between them, with one mainly for refuge and the other for foraging, as with most of the ducks and many species of Charadriiformes. The Ciconiiformes, on the other hand, use the coastal lagoons as permanent habitat for roosting and temporarily for breeding, forming large colonies. Most Ciconiiform species, however, prefer freshwater areas for foraging, thereby avoiding excessive intake of salts. The marine species, with a higher degree of foraging specialization, such as those in the Procellariiformes, use mainly the marine zone and only come close to the coasts to roost or breed. Conversely, most species of the order Gruiformes use freshwater ecosystems for all of their activities. These and some species of other orders that are generally poorly represented among our aquatic avifauna comprise 40% of species, overall. Only 12% of the species manifest a generalist niche and they are able to use the three categories of aquatic habitats.

Our analysis of reports in 24 publications revealed that 64 species are present in < 25% of the wetland areas, 33 are present in 25–50%, and only 24 species are present in > 50% of the wetland areas considered (Fig. 5; Appendix). The 10 species most often recorded were Laughing Gull, Tricolored Heron (*Egretta tricolor*), Great Egret, Green Heron

(*Butorides virescens*), Royal Tern, White Ibis, Magnificent Frigatebird (*Fregata magnificens*), Great Blue Heron (*Ardea herodias*), Double-crested Cormorant, and Brown Pelican. Some of these species, such as Green Heron and Great Blue Heron, are not typically gregarious; nevertheless, either for the call they give when they fly, as with the first species, or for the large size in the second, they are easily detected in all places they inhabit. The remaining species have gregarious behaviors which makes their activities obvious in their foraging areas, which is where most inventories have been made.

The distribution of the species recorded for Cuba follows the same pattern as noted for abundance of the species among communities, with a poorly represented group of species that generally are more restricted to certain ecosystems or geographical areas, another group that forms the bulk of the community, and a third group that is composed of the best-represented species well distributed throughout the country. A sample, collected by inventories of the waterbirds that inhabit 24 wetland areas throughout Cuba (Appendix), revealed that the frequencies with which each species appears are similar, both qualitatively and quantitatively, between the western and central regions of Cuba, and both have a lesser similarity with the eastern region (Table 5). This result is apparently related to the differences in topography among the regions, with the eastern region having the greatest area of mountainous terrain throughout the entire region, whereas the other two regions have smaller and more localized mountain chains, resulting in more wetland habitats that attract waterbirds.

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Appendix 1. Observed frequency of the 121 species of waterbirds best represented in the Cuban ornithological literature.

White-tailed Tropicbird (*Phaethon lepturus*), 0.02; Marbled Godwit (*Limosa fedoa*), 0.02; South Polar Skua (*Stercorarius maccormicki*), 0.02; Black-headed Gull (*Chroicocephalus ridibundus*), 0.02; Lesser Black-backed Gull (*L. fuscus*), 0.02; Red-footed Booby (*Sula sula*), 0.03; Tundra Swan (*Cygnus columbianus*), 0.03; Greater White-fronted Goose (*Anser albifrons*), 0.03; Snow Goose (*Chen caerulescens*), 0.03; Greater Scaup (*Aythya marila*), 0.03; White-faced Whistling-Duck (*Dendrocygna viduata*), 0.03; Black-bellied Whistling-Duck (*D.*

*autumnalis*), 0.03; American Golden-Plover (*Pluvialis dominica*), 0.03; Virginia Rail (*Rallus limicola*), 0.03; Yellow-breasted Crake (*Porzana flaviventer*), 0.03; Zapata Rail (*Cyanolimnas cerverai*), 0.03; Spotted Rail (*Pardirallus macularius*), 0.03; Upland Sandpiper (*Bartramia longicauda*), 0.03; Canvasback (*Aythya valisineria*), 0.04; Red-necked Phalarope (*Phalaropus lobatus*), 0.05; Long-billed Curlew (*Numenius americanus*), 0.07; Pomarine Jaeger (*Stercorarius pomarinus*), 0.07; Parasitic Jaeger (*S. parasiticus*), 0.07; Forster's Tern (*Sterna forsteri*), 0.08; Black Tern (*Chlidonias niger*), 0.08; Long-billed Dowitcher (*Limnodromus scolopaceus*), 0.08; Masked Duck (*Nomonyx dominica*), 0.08; Green-winged Teal (*Anas crecca*), 0.08; Great Black-backed Gull (*Larus marinus*), 0.09; Brown Booby (*Sula leucogaster*), 0.10; White-rumped Sandpiper (*Calidris fuscicollis*), 0.10; American Bittern (*Botaurus lentiginosus*), 0.11; Black Rail (*Laterallus jamaicensis*), 0.11; Sandhill Crane (*Grus canadensis*), 0.11; Roseate Tern (*Sterna dougallii*), 0.11; Scarlet Ibis (*Eudocimus ruber*), 0.12; Gadwall (*Anas strepera*), 0.12; Sooty Tern (*Onychoprion fuscatus*), 0.12; Mallard (*Anas platyrhynchos*), 0.13; Piping Plover (*Charadrius melodus*), 0.13; Pectoral Sandpiper (*Calidris melanotos*), 0.13; Sora (*Porzana carolina*), 0.13; Common Tern (*Sterna hirundo*), 0.13; Dunlin (*Calidris alpina*), 0.14; American White Pelican (*Pelecanus erythrorhynchos*), 0.15; Red-breasted Merganser (*Mergus serrator*), 0.15; Ring-necked Duck (*Aythya collaris*), 0.16; American Avocet (*Recurvirostra americana*), 0.16; Red Knot (*Calidris canutus*), 0.16; Lesser Scaup (*Aythya affinis*), 0.17; American Oystercatcher (*Haematopus palliatus*), 0.17; Brown Noddy (*Anous stolidus*), 0.17; Black Skimmer (*Rynchops niger*), 0.17; Bridled Tern (*Onychoprion anaethetus*), 0.19; Wood Stork (*Mycteria americana*), 0.20; Whimbrel (*Numenius phaeopus*), 0.20; Western Sandpiper (*Calidris mauri*), 0.20; Least Grebe (*Tachybaptus dominicus*), 0.20; Least Bittern (*Ixobrychus exilis*), 0.21; King Rail (*Rallus elegans*), 0.21; Pied-billed Grebe (*Podilymbus podiceps*), 0.22; Ring-billed Gull (*Larus delawarensis*), 0.22; Northern Pintail (*Anas acuta*), 0.24; Ruddy Duck (*Oxyura jamaicensis*), 0.24; American Wigeon (*Anas americana*), 0.25; Stilt Sandpiper (*Calidris himantopus*), 0.26; Gull-billed Tern (*Gelochelidon nilotica*), 0.26; Neotropic Cormorant (*Phalacrocorax brasilianus*),

0.27; Sandwich Tern (*Thalasseus sandvicensis*), 0.27; Wood Duck (*Aix sponsa*), 0.29; Herring Gull (*Larus argentatus*), 0.30; Wilson's Snipe (*Gallinago delicata*), 0.30; Northern Jacana (*Jacana spinosa*), 0.30; Snowy Plover (*Charadrius nivosus*), 0.30; Purple Gallinule (*Porphyrio martinica*), 0.31; Short-billed Dowitcher (*Limnodromus griseus*), 0.35; Northern Shoveler (*Anas clypeata*), 0.36; West Indian Whistling-Duck (*Dendrocygna arborea*), 0.45; Anhinga (*Anhinga anhinga*), 0.44; Blue-winged Teal (*Anas discors*), 0.45; Semipalmated Plover (*Charadrius semipalmatus*), 0.47; Clapper Rail (*Rallus longirostris*), 0.48; Yellow-crowned Night-Heron (*Nyctanassa violacea*), 0.48; Limpkin (*Aramus guarauna*), 0.48; American Flamingo (*Phoenicopterus ruber*), 0.49; Greater Yellowlegs (*Tringa melanoleuca*), 0.49; Least Sandpiper (*Calidris minutilla*), 0.50; Spotted Sandpiper (*Actitis macularia*), 0.53; Black-crowned Night-Heron (*Nycticorax nycticorax*), 0.54; Snowy Egret (*Egretta thula*), 0.55; Willet (*Tringa semipalmata*), 0.56; Little Blue Heron (*Egretta caerulea*), 0.57; Roseate Spoonbill (*Platalea ajaja*), 0.57; Killdeer (*Charadrius vociferus*), 0.58; White-cheeked Pintail (*Anas bahamensis*), 0.36; Glossy Ibis (*Plegadis falcinellus*), 0.37; Fulvous Whistling-Duck (*Dendrocygna bicolor*), 0.38; American Coot (*Fulica americana*), 0.38; Least Tern (*Sternula antillarum*), 0.38; Caspian Tern (*Hydroprogne caspia*), 0.39; Semipalmated Sandpiper (*Calidris pusilla*), 0.40; Lesser Yellowlegs (*Tringa flavipes*), 0.41; Solitary Sandpiper (*T. solitaria*), 0.41; Common Gallinule (*Gallinula galeata*), 0.42; Sanderling (*Calidris alba*), 0.42; Reddish Egret (*Egretta rufescens*), 0.60; Wilson's Plover (*Charadrius wilsonia*), 0.60; Ruddy Turnstone (*Arenaria interpres*), 0.63; Black-bellied Plover (*Pluvialis squatarola*), 0.63; Cattle Egret (*Bubulcus ibis*), 0.63; Black-necked Stilt (*Himantopus mexicanus*), 0.64; Laughing Gull (*Larus atricilla*), 0.67; Tricolored Heron (*Egretta tricolor*), 0.68; Great Egret (*Ardea alba*), 0.70; Green Heron (*Butorides virescens*), 0.70; Royal Tern (*Thalasseus maximus*), 0.70; White Ibis (*Eudocimus albus*), 0.71; Magnificent Frigatebird (*Fregata magnificens*), 0.72; Great Blue Heron (*Ardea herodias*), 0.72; Double-crested Cormorant (*Phalacrocorax auritus*), 0.73; Brown Pelican (*Pelecanus occidentalis*), 0.75.