Journal of Threatened Taxa | www.threatenedtaxa.org | 26 July 2013 | 5(11): 4586–4597

ISSN
Online 0974–7907
Print 0974–7893

OPEN ACCESS

An inventory of wetland non-passerine birds along a southeastern Brazilian coastal area

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Abstract: This paper presents the list of non-passerine birds of coastal environments of the Quissamã municipality, northern Rio de Janeiro State, southeastern Brazil. The surveys were conducted monthly between June 2011 and May 2012. Additional *ad libitum* observations were made between February 2008 and July 2012. We recorded 76 waterbird species of 15 families, of which Scolopacidae was the most representative, with 15 species. The high Nearctic shorebird species richness observed in coastal lagoons in Quissamã (17 species) is an evidence of the important role of the region as staging site for migratory birds at national level. Also, nine of the species recorded are threatened at regional and one is threatened at national level. It should be emphasized that three species considered locally extinct in the municipality of Rio de Janeiro, the most extensively surveyed area in the State, were recorded in the present study. Additionally, we present a high number of previously unrecorded species in northern Rio de Janeiro, and report the first documented record of *Stercorarius pomarinus* in Rio de Janeiro State. The region has a notorious Waterbird richness including endangered and migratory species, when compared to other coastal areas of the state.

Keywords: Habitat diversity, northern Rio de Janeiro, Restinga de Jurubatiba, shorebirds, threatened environment, tropical coastal lagoons.

From the biological standpoint, mangroves, estuaries and coastal lagoons rank among the most productive environments, with undisputable importance in the life cycle of water birds (Knoppers 1994; Weller 2003; Alfaro & Clara 2007). However, compared to other environments, these ecosystems have been more intensely affected by anthropogenic activities (World Resources Institute 2005). In a conjoint effort by several nations to identify wetlands of transnational importance, the Ramsar Convention establishes goals and raises funds for recovery and conservation initiatives (Ramsar Convention 2009).

In Brazil, the Atlantic Forest is a priority area in biodiversity conservation strategies (Myers et al. 2000). Several wetland environments are observed in the biome, like rivers, marshes, floodable plains, mangroves, estuaries and coastal lagoons (Veloso et al. 1991). More

DOI: http://dx.doi.org/10.11609/JoTT.o3424.4586-97 | **ZooBank:** urn:lsid:zoobank.org:pub:1791462D-647E-4DA0-BB05-D5F6AF0741C1

Editor: Anonymity requested. **Date of publication:** 26 July 2013 (online & print)

Manuscript details: Ms # o3424 | Received 03 December 2012 | Final received 28 May 2013 | Finally accepted 02 July 2013

Citation: Tavares, D.C. & S. Siciliano (2013). An inventory of wetland non-passerine birds along a southeastern Brazilian coastal area. *Journal of Threatened Taxa* 5(11): 4586–4597; http://dx.doi.org/10.11609/JoTT.o3424.4586-97

Funding: State University of Northern of Rio de Janeiro (UENF); Oswaldo Cruz Foundation (FIOCRUZ); Prefeitura de Quissamã.

Competing Interest: None.

Acknowledgements: The authors are grateful to the municipal authorities of Quissamã and Carapebus, the Ecology and Natural Resources Post-graduation Program, Universidade Estadual do Norte Fluminense, to C. J. Carlos and F. Olmos for the confirmation of the record of *Stercorarius pomarinus* and J. F. Pacheco for kindly providing historically relevant literature. To M. Almeida, D. Awabdi, E. Zart, L. Valadares, M. Gonçalves and M. Sucunza for their enduring help in fieldworks. S.S. is supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico-CNPq. D.C.T. is supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior-CAPES.

specifically, anthropogenic practices as varied as the digging of canals, land filling for reclaiming, urbanization, industrial developments as well as unrestrained commercial fishing and hunting have reshaped coastal wetlands in southeastern Brazil, leading to an overall decline in the region's natural wetlands (Antas et al. 1986; Czech & Parsons 2002; Esteves 2011). These practices pose a real risk not only to bird populations, but also to the whole existing diversity in these coastal environments (Ma et al. 2010; Tavares et al. 2012).

The composition and distribution of bird species in coastal wetlands of Rio de Janeiro State, southeastern Brazil have been poorly investigated. Most inventories published till date have addressed bird assemblages in the state's central coastal area, especially the city of Rio de Janeiro (e.g., Sick & Pabst 1968; Mallet-Rodrigues et al. 2008; Maciel 2009). Although the state's northern coast is the most representative area in terms of coastal lagoons and other wet environments, systematic, long-term studies on the water bird assemblages in the area have not been published. In this sense, Pacheco et al. (1996), who made new bird records for the region, underscore the wide ornithological information gap in northern Rio de Janeiro State.

This study presents an inventory of non-passeriform birds sighted in wetlands along an area in the northern expanse of the coast of Rio de Janeiro, southeastern Brazil.

Study area

The study area covered 44km of the shoreline in the municipality of Quissamã (22^{0}12'22"S & 41^{0}24'29"W), northern Rio de Janeiro, southeastern Brazil, between João Francisco and Barra do Furado beaches (Fig. 1). This area has a chain of 17 shallow coastal lagoons whose size, vegetation and salinity, among other physicochemical parameters, are strongly influenced by rainfall precipitation (Hollanda-Carvalho et al. 2003; Bove & Paz 2009). The dry season spans from May to August, while the rainy season lasts from September to April (Quissamã-RJ 2006). Of the 44km of the transect assessed, 21km are part of the 'Restinga de Jurubatiba National Park', whose conservation area includes marshes, lagoons, floodable plains, beaches as such and 'restinga' vegetation. Restingas are characterized by mosaics of coastal plant communities under high fluvio-marine influence, which are included in the Atlantic Forest biome (See Assumpção & Nascimento 2000). Also, Feia lagoon, the second Brazilian freshwater lagoon in size, stands out as a remarkable natural feature. This lagoon communicates with the Atlantic Ocean through a channel locally known as 'Canal das Flechas', in Barra do Furado.

Methods

Surveys were carried out once a month, from June 2011 to May 2012, covering a whole year's season cycle and totaling a sighting effort of about 68hr. Bird sightings were made along a 44-km linear continuous transect of beaches, preferably between 06:00 and 10:00 hr in a motor vehicle at a mean speed of 20km/hr (Bibby et al. 2000). More specifically, sighting covered 300m on either side of the transect. This afforded the ability to record birds in three different environments: coastal lagoons adjacent to the shoreline, the marine environment, and the beach as such (Veloso et al. 1991; Caris et al. 2009). Records were made using binoculars (Nikon Monarch 8x42) and a telescope (Celestron Ultima 80x20–60). Additionally, ad libitum observations were carried out during 72 beach patrols (totaling 204hr of field effort) for seabirds and marine mammal carcasses, between February 2008 and July 2012.

The species list included only non-passerine wetland birds, since this study is part of a larger waterbird monitoring project in the wetlands in northern Rio de Janeiro State. The taxonomic sequence and scientific nomenclature follow the most recent checklist of Brazilian birds (CBRO 2011). The final checklist was based on field work data as well as on current literature, in order to include species previously mentioned in the study area, as recommended by Carlos et al. (2002).

The species accumulation curve was plotted using the Jackknife 1 estimator of species richness, considering 1000 randomizations with replacements, using the software EstimateS (Colwell 2005), for data obtained during the monthly excursions between June 2011 and May 2012. Jackknife 1 is appropriate for the design of the present study, since it requires occurrence data only, instead of abundance information (Heltshe & Forrestor 1979). Variation of monthly species richness was tested by the chi-square test (Brandolin et al. 2007) using the software R 3.0.0.

Results and Discussion

In total, 76 bird species of 15 families were recorded (Appendix 1). Of these, the Comb Duck *Sarkidiornis sylvicola*, Pectoral Sandpiper *Calidris melanotos*, Wilson's Phalarope *Phalaropus tricolor*, South American Painted-Snipe *Nycticryphes semicollaris* and Franklin's Gull *Leucophaeus pipixcan* were recorded during ad libitum beach patrols. The inclusion of Wood Stork *Mycteria americana* and Clapper Rail *Rallus longirostris*

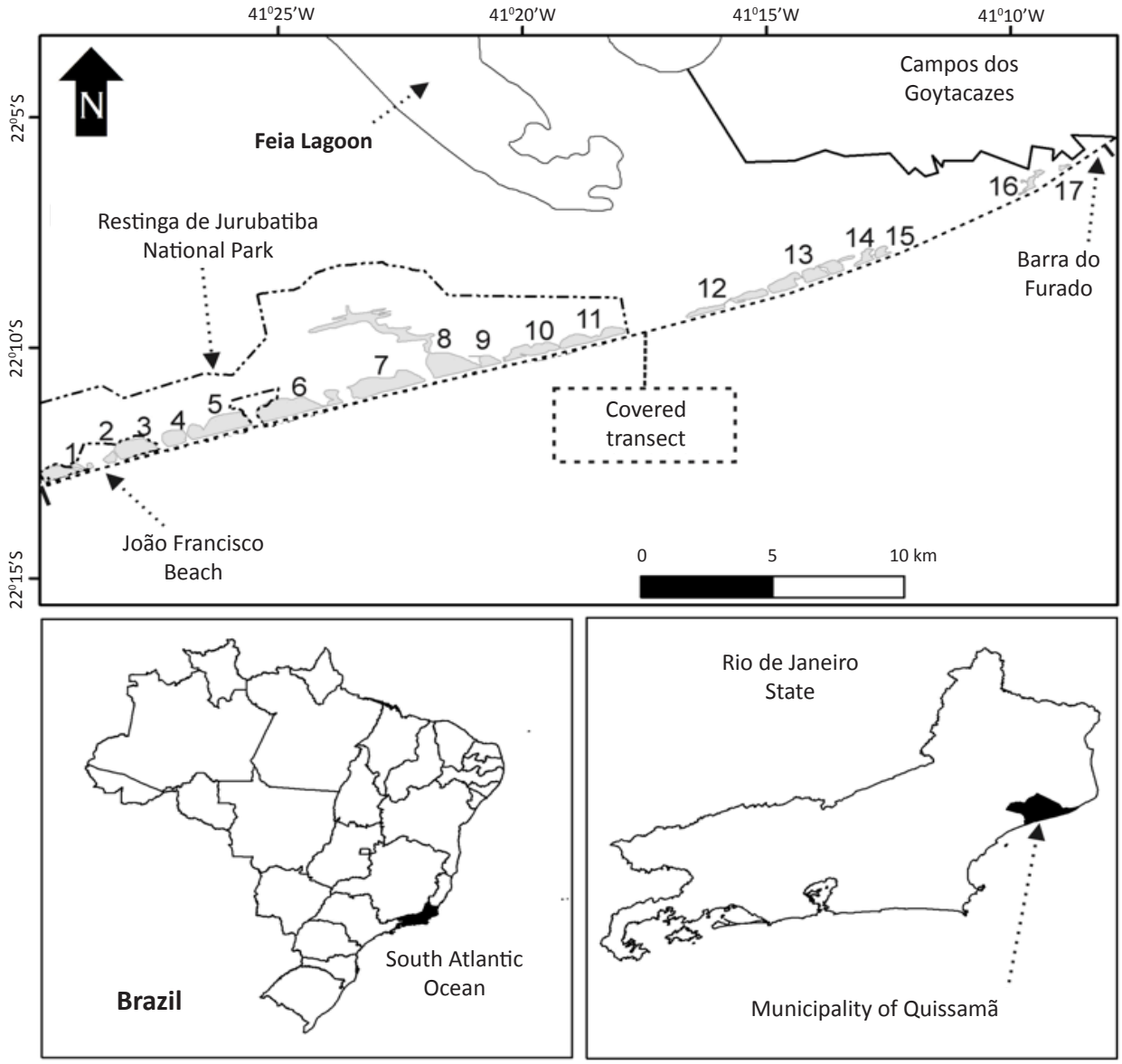

Figure 1. Location of the study site in northern Rio de Janeiro State, Brazil. Indication of the coastal lagoons adjacent to the shoreline. (1) Garças; (2) Piripiri I; (3) Piripiri II; (4) Maria-menina; (5) Robalo; (6) Visgueiro; (7) Pires; (8) Preta; (9) Barrinha; (10) Casa Velha; (11) Ubatuba; (12) Carrilho; (13) Canema; (14) Carvão, (15) Chica, (16-17) São Miguel. The dotted line indicates the covered transect.

was based on the Agroecological Zoning Reports of Restinga of Quissamã (Quissamã-RJ 1994). Therefore, 69 species were detected in the field excursions carried out between June 2011 and May 2012. It should be stressed that Blue-winged Teal *Anas discors*, previously observed by Antas et al. (1986) as a pseudo-vagrant species in wetlands of the Feia lagoon, was not recorded in the present survey. The majority of species recorded belonged to families Scolopacidae (15), Ardeidae (10), Rallidae (10) and Anatidae (9).

Of the total 76 species recorded, 24 (31.6%) were migrants, of which 22 breed in the northern hemisphere, and only two originate from southern South America, namely Magellanic Penguin *Spheniscus magellanicus*, recorded in August and September 2011, and Great Grebe *Podicephorus major*, observed in June 2011, February and December 2012. Remarkably, 17 (22.4%) Nearctic shorebird species were observed.

Nine species (11.8%) recorded are listed as threatened in Rio de Janeiro (Alves et al. 2000). The Maguari Stork *Ciconia maguari* and the Muscovy Duck *Cairina moschata* are Vulnerable, while the Black-bellied Whistling-Duck *Dendrocygna autumnalis*, Roseate Spoonbill *Platalea ajaja*, White-backed Stilt *Himantopus melanurus*, Grey-

hooded Gull *Chroicocephalus cirrocephalus*, Black Skimmer *Rynchops niger* and *N. semicollaris* are Near Threatened (Alves et al. 2000). Additionally, the Royal Tern *Thalasseus maximus* is nationally threatened (Silveira & Straube 2005) and *S. magellanicus* is a Near Threatened species at global level (IUCN 2012a). Interestingly, the list included three species currently considered locally extinct in the municipality of Rio de Janeiro, a region that has been comprehensively surveyed: *C. maguari*, *M. americana* and *Cairina moschata* (Maciel 2009). Besides, *D. autumnalis*, *H. melanurus* and *C. cirrocephalus*, considered rare in this municipality, were often observed in flocks of up to 100, 400 and 800 individuals, respectively, along the coastal lagoons in Quissamã. Also, of the 76 waterbird species recorded, 31 (40.8%) have special importance due to the lack of data necessary for a precise assessment of threatened status at regional level (Alves et al. 2000). Of these, 19 (61.3%) are nearctic migratory species.

Concerning environment use, 50 species were observed to take only one environment, 48 of which used lagoons and two (Brown Booby *Sula leucogaster* and Magnificent Frigatebird *Fregata magnificens*) the marine environment. No species used the beach in an exclusive fashion (Appendix 1). These findings reflect the important role of coastal lagoons and surrounding environments in the maintenance of regional biodiversity, possibly due to the wide variety and considerable abundance of food resources that result from the high biological production of these environments (Esteves 1998b; Hollanda-Carvalho et al. 2003; Enrich-Prast et al. 2004; Macedo-Soares et al. 2010). Also, nearctic shorebirds were more abundantly recorded in marshes and lagoons less than 20cm in depth. The Sanderling *Calidris alba*, White-rumped Sandpiper *Calidris fuscicollis* and Ruddy Turnstone *Arenaria interpres* were often sighted feeding on small gastropods associated with aquatic plants of the genus *Utricularia* (Lentibulariaceae) and puddles in the Casa Velha and Ubatuba lagoons (Fig. 1).

Of all the species recorded in the present study, only *Nycticryphes semicollaris*, Pomarine Jaeger *Stercorarius pomarinus* and Parasitic Jaeger *Stercorarius parasiticus* were not recorded inside Restinga de Jurubatiba National Park. However, remarkably high abundances of some species were recorded outside the limits of this protected area. Flocks of c. 600 Cabot's Terns *Thalasseus acuflavidus* were often sighted in Barra do Furado. Also, fledglings of *H. melanurus* and the largest flocks of *C. maguari* were inside that area and nearby (Image 1D). It should be emphasized that *F. magnificens*, *S. leucogaster* and *T. acuflavidus* were recorded feeding on fish waste disposed by artisanal fishing boats in areas nearing the terrestrial limits of the National Park. So far, no study has been published addressing the interaction between birds inhabiting the region and fishing activities.

Monthly richness values differed significantly from June 2011 to May 2012 (χ^2 = 19.98; df= 11; P<0.05). The highest richness value was recorded in May 2012, with 47 species, while the lower ones were observed in September and November 2011, with 22 species sighted in each month (Fig. 2). The contribution represented by the arrival of nearctic migrants between December 2011 and May 2012 for the increased richness values observed is evident (Fig. 2). However, contrary to expectations, relatively high species richness values were observed in June, due to the simultaneous sighting of bird species not customarily seen in the region, like *C. moschata*, Rufescent Tiger-Heron *Tigrisoma lineatum*, South American Tern *Sterna hirundinaceae* and *P. major*. High species richness is expected in the summer, when shorebirds, the main representatives of these bird assemblages, arrive at the study area.

Since at least one species was sighted in each of the last three months during field excursions, it is not possible to state that species numbers stabilized, as the species accumulation curve shows (Fig. 3). When the 69 species sighted between June 2011 and May 2012 are considered, the Jackknife 1 estimator of species richness foresaw the occurrence of 71 (±3) species in the area surveyed, similar to the richness observed (76 species), after 72 ad libitum excursions to the surveyed area for additional sightings. These results indicate that the estimator was effective in predicting species richness in the present survey.

The sightings reported herein enlarge the list of nearctic shorebirds species in the coastal area of Quissamã, from 5 to 17 (Santos & Alves 2011) (Appendix 1). However, it should be emphasized that Santos & Alves (2011) surveyed a 2-km transect of Restinga de Jurubatiba National Park, considerably shorter than the transect covered in the present study. The numerous shallow water bodies and low anthropogenic influence in the region surveyed, compared to other areas of Rio de Janeiro, make it a suitable site for Nearctic shorebirds (Isola et al. 2000; Holm & Clausen 2006; D.C. Tavares pers. obs. 2008–2012).

The staging sites along the Atlantic Flyway are important in terms of molting and renovation of energy supplies required during migration (Leu & Thompson 2002). Twenty eight shorebird species (CBRO 2011) use staging areas along the Brazilian coast, mainly in the north and the south regions of the country, where

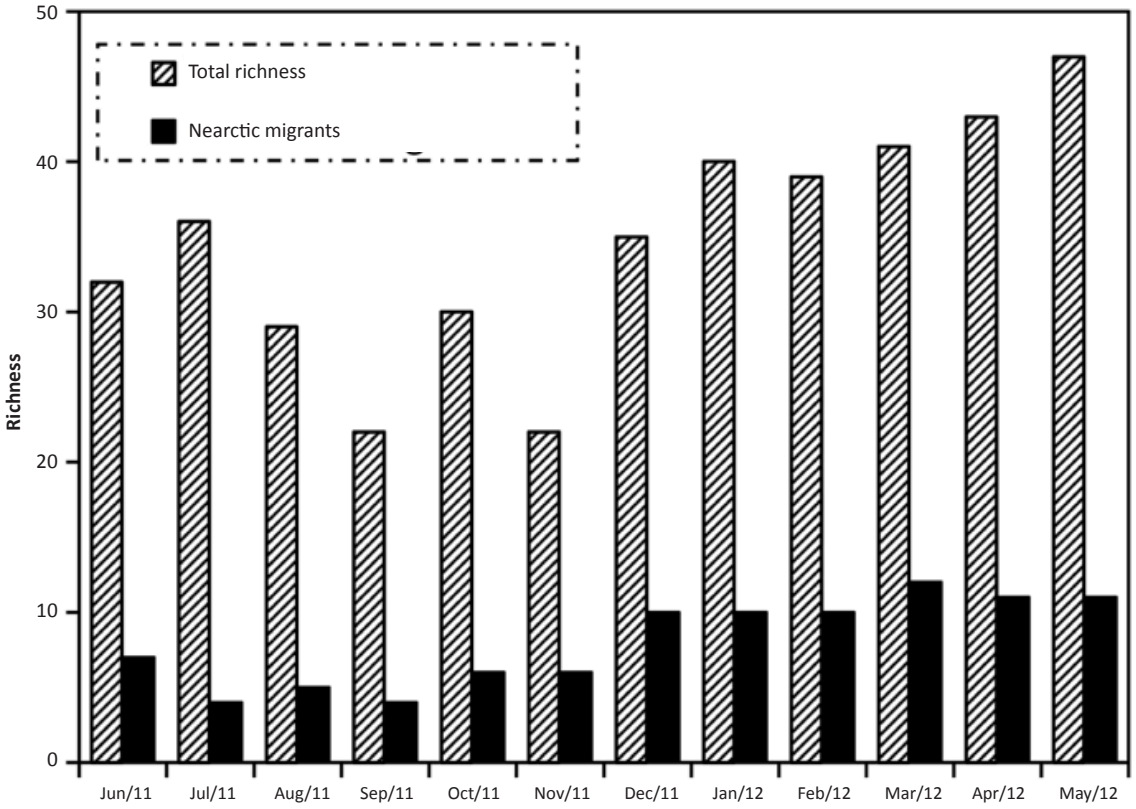

Figure 2. Monthly richness of waterbird assemblages on the coastal area of Quissamã municipality, northern coast of Rio de Janeiro State, Brazil, between June 2011 and May 2012.

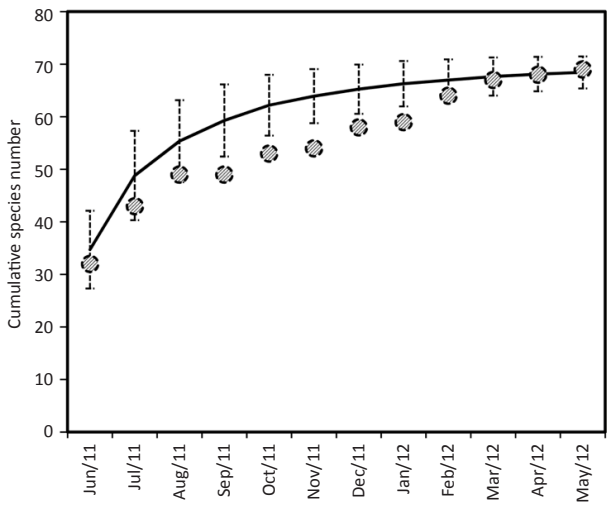

Figure 3. Accumulation curve of waterbird species recorded on the coastal area of the Quissamã Municipality, northern coast of Rio de Janeiro State, Brazil. Continuous line: Jackknife 1 estimator values, considering 1000 randomizations with replacement.

high bird abundance and richness are observed (Sick 1997; Mestre et al. 2010). As for richness, the most representative areas have been shown to be in the states of Maranhão, with 15 species (Rodrigues 2000), Sergipe, with 16 species (Barbieri 2007), and Rio Grande do Sul, with 16 species (Dias et al. 2011; Petry et al. 2012). The high nearctic shorebird species richness observed in coastal lagoons in Quissamã (17 species) gives evidence of the important role of the region as a staging area for migratory birds at national level. Nevertheless, abundance data should be included in sampling efforts, comparing data collected in these areas with other sites in Brazil, and assessing their potential to be recognized as an Important Bird Area (IBA).

The total richness observed was higher than the value reported by Alves & Pereira (1998) in Rodrigo de Freitas Lagoon, located on the central coast of Rio de Janeiro, more specifically, in the city of Rio de Janeiro, the state's capital. Alves & Pereira (1998) reported only nine waterbirds in that environment, a number that reflects the high degree of environmental degradation and historic anthropogenic influence in its natural hydrological conditions. This difference in richness values highlights the negative impact changes in hydrological regimens and water quality have on waterbird populations (Ma et al. 2010).

Based on a literature review and weekly field excursions, Mallet-Rodrigues et al. (2008) listed 77 aquatic birds for Baixada de Jacarepaguá, Rio de Janeiro, of which 41 (53.2%) were not recent records. Among these 41 species, at least 30 (73.2%) were also sighted in the Quissamã coastline, underlining the important role the region plays in the species conservation scenario in Rio de Janeiro.

The higher species richness reported in the Quissamã coastline is probably due to the vast chain of coastal lagoons, marshes and flooded patches in sites nearby, closely located in a rather large area, compared to what is seen in other regions of Rio de Janeiro (Paracuellos & Tellería 2004). The diversity of hydrochemical patterns, water depth and vegetation features increases the available resource variability as well as waterbird species diversity (Esteves 1998a; Esteves 1998b; Taft et al. 2002; Hollanda-Carvalho et al. 2003; Enrich-Prast et al. 2004; Bove & Paz 2009). This is because the high richness of waterbirds is linked with the variety of habitat conditions (Ma. et al 2010). In this sense, it has been shown that lagoons deeper than 1m attract diving birds, while lagoons as shallow as 15cm are suitable feeding sites for small, medium and large shorebirds (Ntiamoa-Baidu et al. 1998).

In the area surveyed in the present study, the digging of canals caused most sites to dry out completely during the dry season. Large flocks of *C. cirrocephalus* and *T. acuflavidus* were observed feeding in at least eight coastal lagoons along the transect, except in the dry season, when these species concentrated mainly in Robalo and Visgueiro Lagoons (Fig. 1). Among the lagoons with favorable feeding conditions for these species, like abundant food resources and appropriate depth, Robalo and Visgueiro were the only water bodies that did not dry out due to canal digging. In spite of that, small flocks were sighted in the Canema and Piripiri Lagoons (Fig. 1) which, though richer in potential prey for *C. cirrocephalus* during the dry season (Macedo-Soares et al. 2010), is located in an urbanized area, a less advantageous aspect for this species, when compared to Robalo and Visgueiro Lagoons.

Despite the importance of the present inventoried coastal lagoons for waterbirds' stopover, these environments have experienced intense pressure from development, especially due to the digging of canals to claim land for agriculture, land filling practices and sewage discharges (Esteves 2011; Tavares et al. 2012). The construction of new ports and shipyards on the northern coast of the state of Rio de Janeiro brought a great new conservation concern regarding these lagoons, which are under risk of salinization due to the dredging of sea sand and its use for grounding practices. The salinization of water bodies may result in negative impacts on the habitat quality for shorebirds and other waterbirds (Rubega & Robinson 1996; Weller 2003; Ma et al. 2010).

Bird abundance data for the wetlands in the studied region is essential in the comparison with other areas in South America and in the assessment of its importance for the conservation of migratory and globally threatened bird species. More studies should be carried out on bird populations in these environments to define important and priority areas concerning use by water- and migratory birds in Rio de Janeiro State. It should be mentioned that other regions in Rio de Janeiro seem to provide suitable habitats for many water bird species, among which the area around Araruama Lagoon, where several existing salt ponds are used as staging areas (Santos & Alves 2011), and swamp areas to the north, like the water bodies in São João da Barra and São Francisco de Itabapoana.

Noteworthy records

Podicephorus major (Boddaert, 1783): Occurrence restricted to South America (Sick 1997). In Brazil, it occurs between the states of Rio Grande do Sul and Espírito Santo (Sick 1997; Simon et al. 2005). Here recorded in sea waters from 22 to 28 December 2011; 3, 9, 16 and 19 January 2012; 8 and 18 February 2012. Recorded also in June 2011 in Pires Lagoon (Fig. 1). Number of records and permanence figures lend strength to the species' geographic expansion hypothesis proposed by Simon et al. (2005) and its character of regular visitor in the region surveyed. Not previously recorded in northern Rio de Janeiro.

Ciconia maguari (Gmelin, 1789): Flocks of up to 26 individuals along large coastal lagoons under 30cm in depth, suitable for the species' feeding habits (Sick 1997). Carrilho Lagoon (Fig. 1 and Image 1D), outside Restinga de Jurubatiba National Park, seems to be the main area used by the species in the region.

Limosa haemastica (Linnaeus, 1758): Recorded on 13 May 2011 feeding in Pires Lagoon (Fig. 1 and Image 1C). Listed as locally rare along the Atlantic coastline by O'Brien et al. (2006) and in Rio de Janeiro state (Gagliardi 2011). However, it may occur as regular or abundant along Rio Grande do Sul state coastline during migration (Scherer & Petry 2012). Few scattered records in Central Amazônia (Sick 1997).

Calidris canutus rufa (Linnaeus, 1758): Recorded in flocks of 3 to 18 individuals feeding at lagoons inside

Jurubatiba National Park in March, April and May 2012 (Image 1F). In Brazil, only the Canadian-breeding population, subspecies *rufa* occurs, most abundantly in Rio Grande do Sul and northern coasts (Harrington et al. 1986; Rodrigues & Lopes 2000). Heavy decline, commenced in the late 1990's (Niles et al. 2008). However, not listed as globally threatened because the IUCN does not consider subspecies (IUCN 2012b). Depleted food resources considered relevant threat to populations (Morrinson et al. 2004).

Himantopus melanurus (Vieillot, 1817): Eight adult individuals near a nest with two fledglings recorded on the 20 of June 2012 in a floodable plain in the mangrove São Miguel, cut by the road connecting downtown Quissamã to Barra do Furado (Image 1B). This record confirms the species' breeding on the coast of Rio de Janeiro, as previously suggested by Novelli (1997).

Nycticryphes semicollaris (Vieillot, 1816): Recorded on 19 July 2010 in a flooded area outside Restinga de Jurubatiba National Park, near Barra do Furado. Also recorded in June and July 2011 in Carrilho Lagoon (Fig. 1), in whose vegetation Cyperaceae prevail. Considered near threatened in Rio de Janeiro State (Alves et al. 2000). Mistakenly reported as winter visitor in banks of Feia Lagoon (Antas et al. 1986), probably due to usual concentrations of flocks of c.100 individuals in northern Rio de Janeiro State after post-breeding movements (Sick 1997; Maciel 2009).

Phalaropus tricolor (Vieillot, 1819): One individual sighted on 17 December 2010 in Ubatuba Lagoon (Fig. 1) next to a mixed flock of *C. fuscicollis*, *Calidris alba* and *Pluvialis squatarola*. Though not photographed, sighting by telescope was possible. Listed as relatively common in southern Brazil, floodable plains of Amazônia, and Campos dos Goytacazes lowlands, Rio de Janeiro State (Sick 1997). Not cited in the list of birds occurring in the state, until present record (Gagliardi 2011), possibly due to the lack of published records in the past 10 years.

Chroicocephalus cirrocephalus (Lichtenstein 1823): Flocks of 300–1000 individuals have been recorded during the dry season, when using the coastal lagoons as feeding and resting sites, mainly Robalo, Visgueiro and Barra do Furado Lagoons (Fig. 1 and Image 1A). Considered threatened in Rio de Janeiro (Alves et al. 2000). Possible breeds in the region.

Stercorarius pomarinus (Temminck, 1815): One individual resting on a beach on 27 January 2012 was the first record in Rio de Janeiro (Image 1E). Though difficult to identify in its winter resting areas (Olmos 2000), the species differs from *S. parasiticus* and *S. longicaudus* by a more robust and bi-colored bill (Lima et al. 2004; Perlo 2009). Previously considered rare in western Atlantic

Image 1. Noteworthy species recorded on the coastal area of Quissamã municipality, northern Rio de Janeiro state, Brazil, between June 2011 and May 2012. (A) *Chroicocephalus cirrocephalus*; (B) *Himantopus melanurus*; (C) *Limosa haemastica*; (D) *Ciconia maguari*; (E) First documented record of *Stercorarius pomarinus* for the Rio de Janeiro state; (F) *Calidris canutus rufa* (Photos: D.C. Tavares).

(Olsen & Larsson 1997). More recent data by Olmos (2000) suggests that this species is a regular visitor in the coast of Brazil and that the status of rare species in the country is due to the lack of regular observation efforts.

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Appendix 1. Checklist of Non-passerine birds recorded from coastal wetlands of the Quissamã Municipality, southeastern Brazilian coast. Legend (Taxonomy and species nomenclature follow the Brazilian Ornithological Records Committee (CBRO 2011)).

	Scientific name	English name	Status	Record type	Conservation status	Environment type		
						Lagoon	Beach	Sea
	Anseriformes Linnaeus, 1758							
	Anatidae Leach, 1820							
1	*Dendrocygna viduata* (Linnaeus, 1766)	White-faced Whistling-Duck	R	FoX		●		
2	*Dendrocygna autumnalis* (Linnaeus, 1758)	Black-bellied Whistling-Duck	R	FoX	Pe	●		
3	*Cairina moschata* (Linnaeus, 1758)	Muscovy Duck	R	RV	V	●		
4	*Sarkidiornis sylvicola Ihering & Ihering, 1907**	Comb Duck	R	RV	En	●		
5	*Amazonetta brasiliensis (Gmelin, 1789)*	Brazilian Teal	R	FoX		●		
6	*Anas bahamensis Linnaeus, 1758*	White-cheeked Pintail	R	FoX		●	●	
7	*Netta erythrophthalma (Wied, 1832)*	Southern Pochard	R	FoX	DD	●		
8	*Netta peposaca (Vieillot, 1816)*	Rosy-billed Pochard	V	RV	DD	●		
9	*Nomonyx dominica (Linnaeus, 1766)*	Masked Duck	R	RV	DD	●		
	Podicipedidae Bonaparte, 1831							
10	*Tachybaptus dominicus* (Linnaeus, 1766)	Least Grebe	R	RV		●		
11	*Podilymbus podiceps* (Linnaeus, 1758)	Pied-billed Grebe	R	FoE		●		
12	*Podicephorus major* (Boddaert, 1783)	Great Grebe	VS	FoE		●		●
	Sphenisciformes Sharpe, 1891							
	Spheniscidae Bonaparte, 1831							
13	*Spheniscus magellanicus* (Forster, 1781)	Magellanic Penguin	VS	FoE	Ne		●	●
	Ciconiiformes Bonaparte, 1854							
	Ciconiidae Sundevall, 1836							
14	*Ciconia maguari (Gmelin, 1789)*	Maguari Stork	R	FoE	V	●		
15	*Mycteria americana Linnaeus, 1758**	Wood Stork	R	Lit	DD			
	Suliformes Sharpe, 1891							
	Fregatidae Degland & Gerbe, 1867							
16	*Fregata magnificens* Mathews, 1914	Magnificent Frigatebird	R	FoE				●
	Sulidae Reichenbach, 1849							
17	*Sula leucogaster* (Boddaert, 1783)	Brown Booby	R	RV				●
	Phalacrocoracidae Reichenbach, 1849							
18	*Phalacrocorax brasilianus* (Gmelin, 1789)	Neotropic Cormorant	R	FoX		●		
	Pelecaniformes Sharpe, 1891							
	Ardeidae Leach, 1820							
19	*Tigrisoma lineatum (Boddaert, 1783)*	Rufescent Tiger-heron	R	FoX	DD	●		
20	*Botaurus pinnatus (Wagler, 1829)*	Pinnated Bittern	R	FoX	DD	●		
21	*Ixobrychus involucris (Vieillot, 1823)*	Stripe-backed Bittern	R	FoX	DD	●		
22	*Nycticorax nycticorax (Linnaeus, 1758)*	Black-crowned Night-Heron	R	FoX		●		
23	*Butorides striata (Linnaeus, 1758)*	Striated Heron	R	FoX		●		
24	*Ardea cocoi Linnaeus, 1766*	Cocoi Heron	R	FoX		●		
25	*Ardea alba Linnaeus, 1758*	Great Egret	R	FoX		●	●	
26	*Syrigma sibilatrix (Temminck, 1824)*	Whistling Heron	R	FoX		●		
27	*Egretta thula (Molina, 1782)*	Snowy Egret	R	FoX		●	●	
28	*Egretta caerulea (Linnaeus, 1758)*	Little Blue Heron	R	FoX		●		
	Threskiornithidae Poche, 1904							
29	*Platalea ajaja Linnaeus, 1758*	Roseate Spoonbill	R	FoE	Pe	●		

	Scientific name	English name	Status	Record type	Conservation status	Environment type		
						Lagoon	Beach	Sea
	Gruiformes Bonaparte, 1854							
	Aramidae Rafinesque, 1815							
30	*Aramus guarauna (Linnaeus, 1766)*	Limpkin	R	FoX	DD	●		
	Accipitriformes Bonaparte, 1831							
	Pandionidae Bonaparte, 1854							
31	*Pandion haliaetus (Linnaeus, 1758)*	Osprey	VN	FoX		●	●	
	Rallidae Rafinesque, 1815							
32	*Rallus longirostris Boddaert, 1783**	Clapper Rail	R	Lit	Rr			
33	*Aramides cajanea (Statius Muller, 1776)*	Gray-necked Wood-Rail	R	AsP		●		
34	*Aramides saracura (Spix, 1825)*	Slaty-breasted Wood-Rail	R	Voc		●		
35	*Laterallus melanophaius (Vieillot, 1819)*	Rufous-sided Crake	R	Voc		●		
36	*Porzana albicollis (Vieillot, 1819)*	Ash-throated Crake	R	Voc		●		
37	*Pardirallus maculatus (Boddaert, 1783)*	Spotted Rail	R	RV	DD	●		
38	*Pardirallus nigricans (Vieillot, 1819)*	Blackish Rail	R	Voc		●		
39	*Gallinula galeata (Lichtenstein,1818)*	Common Gallinule	R	FoX		●		
40	*Gallinula melanops (Vieillot, 1819)*	Spot-flanked Gallinule	R	RV		●		
41	*Porphyrio martinica (Linnaeus, 1766)*	Purple Gallinule	R	FoX		●		
	Charadriiformes Huxley, 1867							
42	*Pluvialis dominica* (Statius Muller, 1776)	American Golden-Plover	VN	RV	DD	●	●	
43	*Pluvialis squatarola* (Linnaeus, 1758)	Black-bellied Plover	VN	FoX	DD	●	●	
44	*Charadrius semipalmatus* Bonaparte, 1825	Semipalmated Plover	VN	FoX	DD	●	●	
45	*Charadrius collaris* Vieillot, 1818	Collared Plover	R	FoX	DD	●	●	
	Haematopodidae Bonaparte, 1838							
46	*Haematopus palliatus* Temminck, 1820	American Oystercatcher	R	FoX		●	●	
	Recurvirostridae Bonaparte, 1831							
47	*Himantopus melanurus* Vieillot, 1817	White-backed Stilt	R	FoE	Pe	●		
	Scolopacidae Rafinesque, 1815							
48	*Gallinago paraguaiae* (Vieillot, 1816)	South American Snipe	R	RV		●		
49	*Numenius phaeopus* (Linnaeus, 1758)	Whimbrel	VN	FoX		●	●	
50	*Limosa haemastica* (Linnaeus, 1758)	Hudsonian Godwit	VN	FoE	DD	●		
51	*Actitis macularius* (Linnaeus, 1766)	Spotted Sandpiper	VN	FoX	DD	●		
52	*Tringa solitaria* Wilson, 1813	Solitary Sandpiper	VN	RV	DD	●		
53	*Tringa melanoleuca* (Gmelin, 1789)	Greater Yellowlegs	VN	FoX	DD	●		
54	*Tringa semipalmata*(Gmelin, 1789)	Willet	VN	RV	DD	●		
55	*Tringa flavipes* (Gmelin, 1789)	Lesser Yellowlegs	VN	FoX	DD	●	●	
56	*Arenaria interpres* (Linnaeus, 1758)	Ruddy Turnstone	VN	FoX	DD	●	●	
57	*Calidris canutus rufa* (Linnaeus, 1758)	Red Knot	VN	FoE	DD	●		
58	*Calidris alba* (Pallas, 1764)	Sanderling	VN	FoX	DD	●	●	
59	*Calidris pusilla* (Linnaeus, 1766)	Semipalmated Sandpiper	VN	RV	DD	●		
60	*Calidris fuscicollis* (Vieillot, 1819)	White-rumped Sandpiper	VN	FoX	DD	●	●	
61	*Calidris melanotos* (Vieillot, 1819)*	Pectoral Sandpiper	VN	FoX	DD	●		
62	*Phalaropus tricolor* (Vieillot, 1819)*	Wilson's Phalarope	VN	RV	DD	●		
	Jacanidae Chenu & Des Murs, 1854							
63	*Jacana jacana* (Linnaeus, 1766)	Wattled Jacana	R	FoX		●		

	Scientific name	English name	Status	Record type	Conservation status	Environment type		
						Lagoon	Beach	Sea
	Rostratulidae Mathews, 1914							
64	*Nycticryphes semicollaris* (Vieillot, 1816)*	S. American Painted-Snipe	R	RV	Pe	●		
	Stercorariidae Gray, 1870							
65	*Stercorarius pomarinus* (Temminck, 1815)	Pomarine Jaeger	VN	FoE	DD		●	●
66	*Stercorarius parasiticus* (Linnaeus, 1758)	Parasitic Jaeger	VN	RV	DD		●	●
	Laridae Rafinesque, 1815							
67	*Chroicocephalus cirrocephalus* (Vieillot, 1818)	Grey-headed Gull	R	FoE	Pe	●		
68	*Leucophaeus pipixcan* (Wagler, 1831)*	Franklin's Gull	VA	FoX	DD		●	●
69	*Larus dominicanus* Lichtenstein, 1823	Kelp Gull	R	FoX			●	●
	Sternidae Vigors, 1825							
70	*Sterna hirundo* Linnaeus, 1758	Common Tern	VN	FoX	DD		●	●
71	*Sterna hirundinacea* Lesson, 1831	South American Tern	R	RV			●	●
72	*Thalasseus acuflavidus* (Cabot, 1847)	Cabot's Tern	R	FoE	DD	●		●
73	*Thalasseus maximus* (Boddaert, 1783)	Royal Tern	R	FoE	Tn	●		●
	Rynchopidae Bonaparte, 1838							
74	*Rynchops niger* Linnaeus, 1758	Black Skimmer	R	FoE	Pe	●		
	Coraciiformes Forbes, 1844							
	Alcedinidae Rafinesque, 1815							
75	*Megaceryle torquata (Linnaeus, 1766)*	Ringed Kingfisher	R	FoE		●		
76	*Chloroceryle amazona (Latham, 1790)*	Amazon Kingfisher	R	FoX		●		

Record type: (FoX) photograph in private library; (RV) visual record; (FoE) photography in institutional library; (AsP) playback in private library; (Voc) record of vocalization; (Lit) obtained from the Agroecological Zoning reports of the Quissamã Municipality (Quissamã-RJ 1994). Conservation status at regional level (Alves et al. 2000): (DD) deficient data; (En) endangered; (Pe) probably endangered; (V) vulnerable; (Rr) rare; (Tn) threatened at national level (Silveira & Straube 2005); (Ne) near threatened at global level (IUCN 2012a). Ocurrence status: (R) resident; (VS) austral visitant; (VN) boreal visitant; (VA) vagrant. Species documented out of systematic samples period are identified by the symbol *.

Resumo Abstract: Este artigo apresenta a lista de aves não passeriformes de ambientes costeiros do município de Quissamã, norte fluminense, sudeste do Brasil. As amostragens foram conduzidas mensalmente entre junho de 2011 e maio de 2012. Observações *ad libitum* adicionais foram realizadas entre fevereiro de 2008 e julho de 2012. Registramos um total de 76 espécies de aves aquáticas, distribuídas em 15 famílias, das quais Scolopacidae foi a mais representativa, com 15 espécies. A elevada riqueza de limícolas neárticas observada nas lagoas costeiras de Quissamã (17 espécies) é uma evidência do importante papel da região como área de parada para aves migratória em nível nacional. Além disso, nove espécies registradas estão sob ameaça em nível regional e uma em nível nacional. Ressalta-se que três espécies consideradas localmente extintas no município do Rio de Janeiro, a região mais pesquisada do estado, foram registradas no presente estudo. Adicionalmente, apresentamos um elevado número de espécies inéditas para a região norte fluminense e o primeiro registro documentado de *Stercorarius pomarinus* para o estado do Rio de Janeiro. A região possui notória riqueza de aves aquáticas incluindo espécies migratórias e ameaçadas, quando comparada com outras áreas costeiras do estado.