



Scientific Note

Notes on records of *Ciconia maguari* (Gmelin, 1789) (Aves, Ciconiidae) on northern Rio de Janeiro State, Southeast Brazil

DAVI C. TAVARES^{1*} & SALVATORE SICILIANO²

¹Universidade Estadual do Norte Fluminense Darcy Ribeiro - UENF. Av. Alberto Lamego, 2000, Parque Califórnia. 28013-602. Campos dos Goytacazes, RJ, Brazil. *Corresponding author: wetlandbirdsbrasil@gmail.com

²Escola Nacional de Saúde Pública, FIOCRUZ. Av. Leopoldo Bulhões, 1480, 6^o andar, sala 611, Manguinhos. 21041-210. Rio de Janeiro, RJ, Brazil.

Abstract. We present a total of 28 records of maguari stork *Ciconia maguari* on northern Rio de Janeiro State, providing data on counting, behavior and type of environment used, for each record. Flocks of up to 26 storks were sighted, aggregations never before reported for the state.

Key words: bird counting, coastal lagoons, endangered species, wetlands

Resumo. Notas sobre registros de *Ciconia maguari* (Gmelin, 1789) (Aves, Ciconiidae) no norte do estado do Rio de Janeiro, sudeste do Brasil. Apresentamos um total de 28 registros do maguari *Ciconia maguari* ao norte do estado do Rio de Janeiro, fornecendo para cada um, dados de contagens, comportamento e tipo de ambiente utilizado. Grupos de até 26 cegonhas foram avistados, agregações nunca antes relatadas para o Estado.

Palavras chave: contagem de aves, lagoas costeiras, espécie ameaçada, áreas úmidas

Among American stork species, the unmistakable maguari stork (*Ciconia maguari* Gmelin, 1789) has the narrowest distribution. The species occurs only in the South American continent, east of the Andes Cordillera and from Venezuela to Argentina (Kahl 1987, Hancock *et al.* 1992). In Brazil, it is more common in Rio Grande do Sul state, and is rarely sighted in the Amazon and northeast states (Sick 1997). More specifically in southeastern Brazil, the species' conservation scenario raises concerns, mainly due to the decrease in marsh areas claimed by agricultural activities and possibly due to hunting (Sick 1997, Rodrigues & Michelin 2005). The species is considered critically endangered in the states of Espírito Santo (Simon 2009) and São Paulo (Bressan *et al.* 2009), rare in Minas Gerais (Rodrigues & Michelin 2005), and vulnerable in Rio de Janeiro (Alves *et al.* 2000). Although ornithological records in Rio de Janeiro state are comparatively consistent, the lack of information on bird species abundance is an obstacle in the accurate evaluation of conservation status

(Alves *et al.* 2000), and in the characterization of Important Bird Areas for these species (Bencke *et al.* 2006). This scenario becomes worse in northern Rio de Janeiro state, considered an important area regarding wetland bird's assemblages (Maciel 1984, Antas *et al.* 1986, Tavares *et al.* 2012). As for past records of *C. maguari* in Rio de Janeiro, Pacheco *et al.* (2010) reported a few scattered individuals in the Juturnaíba dam, municipality of Silva Jardim. In turn, Pacheco *et al.* (1996) sighted one individual in Campos dos Goytacazes, in 1987. For this last municipality, in 1785, Manoel Martinz do Couto Reys quoted "Tabuyáyás", referring to *C. maguari*, which was an appreciated bird of prey back then (Reys 1997, Straube 2000, Straube 2001). Curiously, the maguari stork is not listed in the bird inventory of the Restinga de Jurubatiba National Park (Alves *et al.* 2004), or in other works that bear some representativeness in the region's ornithological history (Wied-Neuwied 1821, Pelzeln 1871, Antas *et al.* 1986). In addition, according to Maciel (2009) the maguari stork is extinct in the city of Rio de

Janeiro, the region most extensively surveyed in Rio de Janeiro state. In this context, the present study provides data on *C. maguari* counting, behavior and type of environment used in wet coastal environments in Rio de Janeiro state.

The study area is located in northern Rio de Janeiro state, between the municipalities of Araruama (22°52'51"S, 42°20'47"W) and São Francisco de Itabapoana (21°26'37"S, 41°03'38"W) (Figure 1). Salt ponds and flooded areas are very common southwards in the study area, where Lagoa de Araruama, one of the world's largest hypersaline lagoons, stands out as a remarkable natural feature (Kjerfve 1986). A chain of coastal lagoons that are part of the Restinga de Jurubatiba National Park (see Esteves 2011), the only federal conservation unit that substantially protects wetlands in the region, is observed north of the study area. Numerous mid-sized and large marshes and muddy lands, as well as the mouth of river Paraíba do Sul and the lagoon Lagoa Feia, the second largest freshwater lagoon in

Brazil are also located in the region. Its climate has two periods, the dry season (between April and September) and the rainy season (from October to March) (Carmouze *et al.* 1991, Macedo-Soares *et al.* 2010), although the year 2012 has been exceptionally dry, which led some water bodies to dry out. In total, a 423-h sighting effort was made between February 2009 and November 2012 along the margins of wetlands in a buggy car, affording visual records of maguari stork. Scheduled monthly excursions were carried out between the municipalities of Araruama and São Francisco de Itabapoana, northern Rio de Janeiro state, mainly in coastal areas from October 2011 to November 2012 (332-h). Though the municipalities of Arraial do Cabo and Armação dos Búzios were surveyed only occasionally (23-h), as well as all the other areas before October 2011 (68-h). Birds were recorded using Nikon Monarck (8x42) binoculars, and a telescope Celestron Ultima 80 (20-60x80).

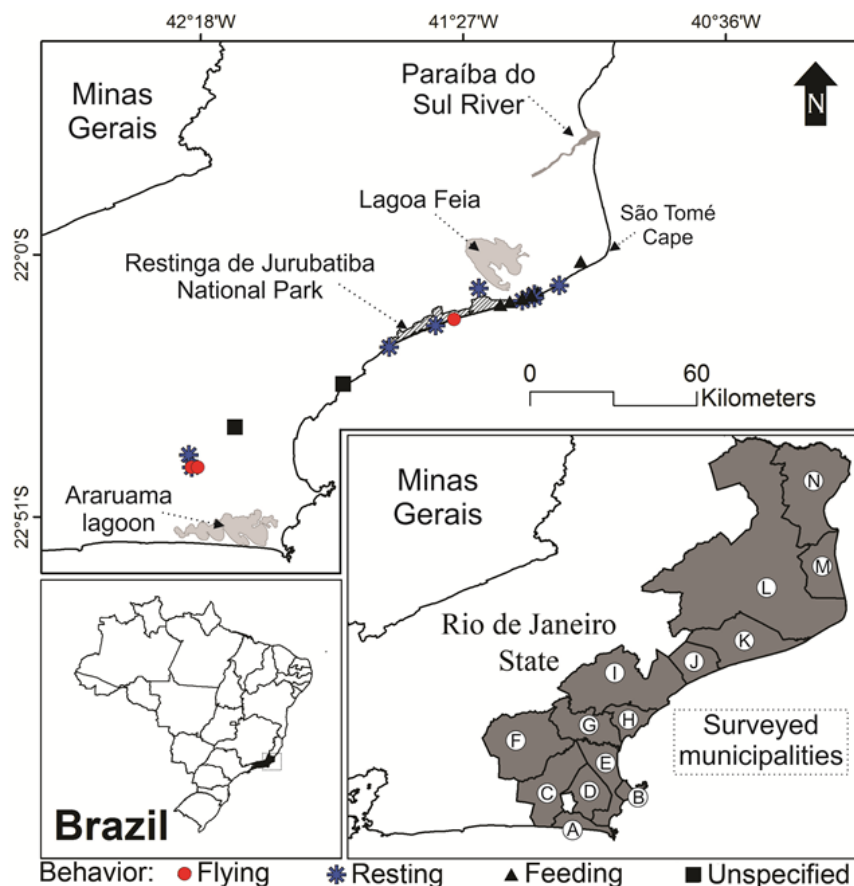


Figure 1. Maguari stork *Ciconia maguari* (Gmelin, 1789) record sites in upstate Rio de Janeiro, Southeast Brazil, and behavior observed as of sighting. Surveyed municipalities: (A) Arraial do Cabo, (B) Armação dos Búzios, (C) Araruama, (D) São Pedro da Aldeia, (E) Cabo Frio, (F) Silva Jardim, (G) Casimiro de Abreu, (H) Rio das Ostras, (I) Macaé, (J) Carapebus, (K) Quissamã, (L) Campos dos Goytacazes, (M) São João da Barra, (N) São Francisco de Itabapoana.

Field surveys allowed 28 *C. maguari* sightings (Figure 2) in upstate Rio de Janeiro, distributed between April 2009 and November 2012 (Table I). Of these, 18 were recorded in the municipality of Quissamã (64.3%). Also, the highest abundance numbers observed in this study were recorded for the wetlands of the same municipality. On April 27th 2012 we sighted 40 maguari storks in Quissamã, sorted as two flocks: one with 26 individuals in the lagoon Ubatuba, and one with 14 individuals in the lagoon Casa Velha, which is adjacent to the first lagoon (Table I). We believe that the species builds nests in the region since, although

individuals roam mainly alone (Venturini & Paz 2003, Pacheco *et al.* 2010), they assemble as flocks during pre-reproductive and post-reproductive periods (González 1996). It should be said that *C. maguari* was recorded essentially throughout the year (Table I). Also important is the fact that there is no updated information on reproduction sites taken by this species in Rio de Janeiro state, and that, from the conservationist standpoint, its reproduction success is higher when these birds assemble as social flocks (Thomas 1986). Moreover, of the total sightings recorded, only five were inside the Restinga de Jurubatiba National Park (17.9%).

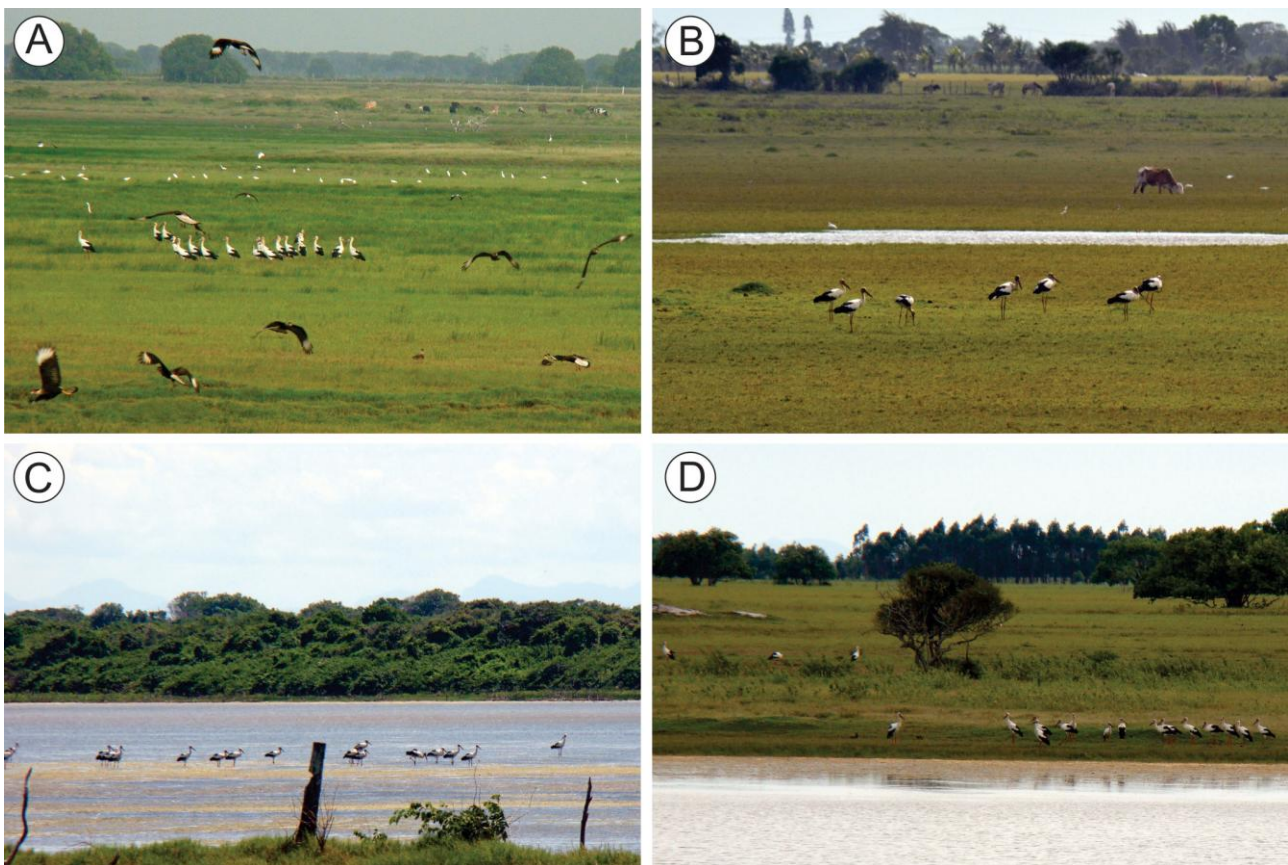


Figure 2. A. Flock of maguari storks recorded near Barra do Furado village, Quissamã municipality on 3rd June 2012. B. Maguari storks feeding in flooded grassland on 3rd April 2012. C. Flock feeding in the Ubatuba lagoon on 27th April 2012. D. Maguari storks resting at the Canema coastal lagoon on 19th October 2012. (Photos: D. C. Tavares)

It is believed that the maguari stork migration patterns are influenced mainly by rainfall, with higher abundance numbers in the rainy season, when water levels rise (Thomas 1986, Antas 1994, Romano *et al.* 2005). However, we recorded the most numerous *C. maguari* assemblages in the dry season, even in October 2012, an atypically dry month (Table I). We noticed maguari storks foraging actively in shallow water puddles, as reported by

Tavares *et al.* (2012) for large numbers of other birds, like grey-headed gulls (*Chroicocephalus cirrocephalus* Lichtenstein, 1823) and the white-backed stilt (*Himantopus melanurus* Vieillot, 1817). As a rule, shallow waters concentrate greater abundance of food resources that can be easily captured during the dry season (Macedo-Soares *et al.* 2010, Lisboa *et al.* 2011), attracting the maguari stork and other birds that likewise feed on fish and

aquatic prey, even though this species' feeding habits are quite varied (Thomas 1984, Elliott 1992, Tozetti *et al.* 2011).

As for the type of environment used, of the total 28 *C. maguari* sightings recorded, most were in marshes (39.2%) and flooded grasslands (25%). The species uses these environments as feeding and resting sites (Table I). In fact, marshes are the main environment the maguari stork takes as reproduction sites, and are a source of a variety of organisms the species feeds on, mainly concerning the feeding of maguari fledglings (Thomas 1984, 1986). Nevertheless, the species was recorded feeding mainly in shallow water bodies in the municipalities

of Quissamã and Campos dos Goytacazes. Generally, these environments are rich in nutrients and dissolved organic carbon, apart from presenting high productivity (Knoppers 1994, Farjalla *et al.* 2001, Esteves *et al.* 2008), which are factors that may increase food availability for organisms at higher trophic levels, like aquatic birds. Yet, these environments have been exposed to considerable anthropic pressure, especially due to the digging of canals to claim land for agriculture, land filling practices, sewage discharges and the construction of seaport facilities on the northern Rio de Janeiro coast (Soffiati Netto 1985, Tavares *et al.* 2012).

Table I. Records of *Ciconia maguari* (Gmelin, 1789) in northern Rio de Janeiro State, Southeast Brazil, between February 2009 and November 2012 Area (municipality): (CG) Campos dos Goytacazes, (Cp) Carapebus, (Qi) Quissamã, (SJ) Silva Jardim, (Ar) Araruama, (CA) Casimiro de Abreu, (Mc) Macaé. Asterisk indicates storks sighted inside the Restinga de Jurubatiba National Park.

Date	Locality	Area	Number of birds	Environment	Behavior
20.04.09	Farol de São Tomé. Near of Heliport.	CG	1	Flooded grassland	Feeding
20.02.10	Lagoa do Paulista.*	Cp	1	Flooded grassland	Resting
04.05.10	Lagoa da Ribeira.	Qi	1	Marsh	Resting
04.05.10	Lagoa da Garça.*	Qi	1	Grassland	Flying
06.10.10	Lagoa da Ribeira.	Qi	1	Marsh	Resting
02.02.11	Juturnaíba dam, Rio São João basin.	SJ	2	Grassland	Resting
05.02.11	Juturnaíba dam, Rio São João basin.	Ar	1	Flooded grassland	Resting
20.03.11	Unknown.	CA	1	Marsh	Unspecified
05.09.11	Juturnaíba dam, Rio São João basin.	SJ	1	Flooded grassland	Resting
02.10.11	Lagoa de Imboassica.	Mc	1	Coastal lagoon	Unspecified
01.10.11	Lagoa de Jurubatiba.*	Mc	1	Flooded grassland	Resting
03.04.12	Lagoa da Chica.	Qi	9	Flooded grassland	Feeding
27.04.12	Lagoa da Casa Velha	Qi	14	Coastal lagoon	Feeding
27.04.12	Lagoa de Ubatuba.*	Qi	26	Coastal lagoon	Feeding
03.06.12	Barra do Furado.	Qi	18	Grassland	Resting
19.06.12	Lagoa do Carrilho.	Qi	2	Marsh	Feeding
19.06.12	Lagoa do Canema.	Qi	4	Grassland	Resting
19.06.12	Lagoa da Chica.	Qi	2	Flooded grassland	Feeding
21.07.12	Lagoa do Carrilho.	Qi	3	Marsh	Feeding
21.07.12	Lagoa do Canema.	Qi	7	Marsh	Feeding
08.08.12	Juturnaíba dam, Rio São João basin.	SJ	2	Grassland with forest edge	Flying
24.08.12	Lagoa do Canema.	Qi	8	marsh	Resting
24.08.12	Lagoa de Ubatuba.*	Qi	5	Coastal lagoon	Feeding
21.09.12	Lagoa do Carrilho.	Qi	5	Marsh	Resting
21.09.12	Lagoa do Canema.	Qi	1	Marsh	Resting
19.10.12	Lagoa do Canema.	Qi	24	Marsh	Feeding
19.10.12	Lagoa do Carrilho.	Qi	4	Marsh	Feeding
28.10.12	Juturnaíba dam, Rio São João basin.	SJ	3	Grassland with forest edge	Flying

Acknowledgments

The authors are grateful to the municipal authorities of Quissamã and ICMBio, the Ecology and Natural Resources Post-graduation Program,

Universidade Estadual do Norte Fluminense and to C.E. Amorim and P. Tinoco for share of reliable data. To F. Nonnenmacher for valuable suggestions

on the manuscript. S.S. is supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico-CNPq (Processo no. 301544/2008-5). D.C.T. is supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior-CAPES.

References

- Alves, M. A. S., Storni, A., Almeida, E. M., Gomes, V. S. M., Oliveira, C. H. P., Marques, R. V. & Vecchi, M. 2004. A comunidade de aves na restinga de Jurubatiba. Pp. 199-214. *In*: Rocha, C. F. D., Esteves, F. A. & Scarano, F. R. (Eds.). **Pesquisas de longa duração na restinga de Jurubatiba: ecologia, história natural e conservação**. Rima, Rio de Janeiro.
- Alves, M. A. S., Pacheco, J. F., Gonzaga, L. A. P., Cavalcanti, R. B., Raposo, M. A., Yamashita, C., Maciel, N. C. & Castanheira, M. 2000. Aves. Pp. 117-124. *In*: Bergallo, H. G., Rocha, C. F. D., Alves, M. A. S. & Sluys, M. V. (Eds.). **A fauna ameaçada de extinção do estado do Rio de Janeiro**. edUERJ, Rio de Janeiro.
- Antas, P. T. Z. 1994. Migration and other movements among the lower Paraná River Valley wetlands, Argentina, and the south Brazil/Pantanal wetlands. **Bird Conservatin International**, 4: 181-190.
- Antas, P. T. Z., Silva, F., Alves, M. A. S. & Lara-Resende, S. M. 1986. Brazil. Pp. 60-104. *In*: Scott, D. A. & Carbonell, M. (Eds.). **A directory of neotropical wetlands**. International Union for Conservation of Nature and Natural Resources, Cambridge.
- Bencke, G. A., Maurício, G. N., Develey, P. F. & Gerck, J. M. 2006. **Áreas importantes para a conservação das aves no Brasil: parte 1 - estados do domínio da Mata Atlântica**. São Paulo, SAVE Brasil, 494 p.
- Bressan, P. M., Kierulff, M. C. M. & Sugieda, A. M. 2009. **Fauna ameaçada de extinção no estado de São Paulo - Vertebrados**. São Paulo, Fundação Parque Zoológico de São Paulo, Secretaria do Meio Ambiente, 645 p.
- Carmouze, J. P., Knoppers, B. & Vasconcelos, P. 1991. Metabolism of a subtropical brazilian lagoon. **Biogeochemistry**, 14(2): 129-148.
- Elliott, A. 1992. Family Ciconiidae (Storks). Pp. 436-465. *In*: del Hoyo, J., Elliott, A. & Sargatal, J. (Eds.). **Handbook of the birds of the world. volume 1. ostrich to ducks**. Lynx Edicions, Barcelona.
- Esteves, F. A. 2011. **Do índio goitacá à economia do petróleo: uma viagem pela história e ecologia da maior restinga protegida do Brasil**. Campos dos Goytacazes, Essentia Editora, 232 p.
- Esteves, F. A., Caliman, A., Santangelo, J. M., Guariento, R. D., Farjalla, V. F. & Bozelli, R. L. 2008. Neotropical coastal lagoons: an appraisal of their biodiversity, functioning, threats and conservation management. **Brazilian Journal of Biology**, 68(4): 967-981.
- Farjalla, V. F., Faria, B. M., Esteves, F. A. & Bozelli, R. L. 2001. **Bacterial density and biomass and relations with abiotic factors, in 14 coastal lagoons of Rio de Janeiro State**. Rio de Janeiro, Oecologia Brasiliensis, 65-76 p.
- González, J. A. 1996. Densidad y dinamica espacio-temporal de las poblaciones de cigüenas (Ciconiidae) em los llanos inundables de Venezuela. **Neotropical Ornithology**, 7: 177-183.
- Hancock, J. A., Kushlan, J. A. & Kahl, M. P. 1992. **Storks, Ibises and Spoonbills of the World**. New York, Academic Press, 385 p.
- Kahl, M. P. 1987. An overview f the Storks of the world. **Colonial Waterbirds**, 10(2): 131-134.
- Kjerfve, B. 1986. Comparative oceanography of coastal lagoons. Pp. 63-81. *In*: Wolfe, D. A. (Ed.). **Estuarine variability**. Academic Press, New York.
- Knoppers, B. 1994. Aquatic primary production in castal lagoons. Pp. 243-286. *In*: Kjerfve, B. (Ed.). **Coastal lagoon processes**. Elsevier Oceanography, Amsterdam.
- Lisboa, L. K., Silva, A. L. L. & Petrucio, M. M. 2011. Aquatic invertebrate's distribution in a freshwater coastal lagoon of southern Brazil in relaton to water and sediment characteristics. **Acta Limnologica Brasiliensia**, 23(2): 119-217.
- Macedo-soares, P. H. M., Petry, A. C., Farjalla, V. F. & Camaraschi, E. P. 2010. Hydrological connectivity in a coastal inland systems: lessons from a Neotropical fish metacommunity. **Ecology of Freshwater**, 19(1): 7-18.
- Maciel, E. 2009. **Aves do município do Rio de Janeiro**. Rio de Janeiro, Technical Books, 407 p.
- Maciel, N. C. 1984. Fauna das restingas do estado do Rio de Janeiro: levantamento histórico. **Anais do Simpósio sobre Restingas Brasileiras**, Niterói, Rio de Janeiro, Brazil, 285-304

- Pacheco, J. F., Astor, I. N. C. & Cesar, C. B. 2010. Avifauna da Reserva Biológica de Poço das Antas, Silva Jardim, RJ. **Atualidades Ornitológicas**, 157: 55-74.
- Pacheco, J. F., Parrini, R., Fonseca, P. S. M., Whitney, B. M. & Maciel, N. C. 1996. Novos registros de aves para o estado do Rio de Janeiro: região norte. **Atualidades Ornitológicas**, 72: 10-12.
- Pelzeln, A. 1871. **Zur Ornithologie Brasiliens: Resultate von Johann Natterers Reisen in den Jahren 1817 bis 1835**. Viena, A. Picher's Witwe & Sohn, 462 p.
- Reys, M. M. C. 1997. **Manuscritos de Manoel Martinz do Couto Reys, 1785**. Transcrição do manuscrito original. Rio de Janeiro, Arquivo Público do Estado do Rio de Janeiro, 88 p.
- Rodrigues, M. & Michelin, V. B. 2005. Riqueza e diversidade de aves aquáticas de uma lagoa natural no sudeste do Brasil. **Revista Brasileira de Zoologia**, 22(4): 928-935.
- Romano, M., Barberis, I., Pagano, F. & Maidagan, J. 2005. Seasonal and interannual variation in waterbird abundance and species composition in the Melincué saline lake, Argentina. **European Journal of Wildlife Research**, 51(1): 1-13.
- Sick, H. 1997. **Ornitologia Brasileira**. Rio de Janeiro, Nova Fronteira, 912 p.
- Simon, J. E. 2009. A lista de aves do estado do Espírito Santo. **XVII Congresso Brasileiro de Ornitologia**, Aracruz, Espírito Santo, Brasil, 55-88.
- Soffiati Netto, A. A. 1985. A agonia das lagoas do Norte Fluminense. **Ciência e Cultura**, 37(10): 1627-1638.
- Straube, F. C. 2001. Dicionário vernacular dos Ciconiidae do Brasil. **Atualidades Ornitológicas**, 99: 10-11.
- Straube, F. C. 2000. Questões linguísticas em Ornitologia, IV: a carta de Ferreira Penna e os nomes populares dos Ciconiidae brasileiros. **Atualidades Ornitológicas**, 98: 10-11.
- Tavares, D. C., Moura, J. F. & Siciliano, S. 2012. As aves das áreas úmidas. **Ciência Hoje**, 50(299): 42-47.
- Thomas, B. T. 1986. The behavior and breeding of adult maguari storks. **The Condor**, 88: 26-34.
- Thomas, B. T. 1984. Maguari Stork nesting: juvenile growth and behavior. **The Auk**, 101(4): 812-823.
- Tozetti, A. M., Fontana, C. S., Oliveira, R. B. & Fontes, G. M. F. 2011. Diet of a Maguari Stork (*Ciconia maguari*, Aves, Ciconiidae) in southern Brazil: the opportunist predation of snake like preys? **Pan-American Journal of Aquatic Sciences**, 6(1): 65-67.
- Venturini, A. C. & Paz, P. R. 2003. Registros documentados de aves inéditas ou de ocorrência rara no Espírito Santo. **Ararajuba**, 11(1): 95-99.
- Wied-Neuwied, M. 1821. **Reise nach Brasilien in den Jahren 1815 bis 1817**. Frankfurt, Heinrich Ludwig Bronner, 345 p.

Received January 2013

Accepted February 2013

Published online December 2013