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GABRIELA HAUBERT

**ECOLOGIA ALIMENTAR DO BIGUÁ *Nannopterum brasiliense* (AVES:
PHALACROCORACIDAE) EM UM ESTUÁRIO SUBTROPICAL DO SUL DO
BRASIL**

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PORTO ALEGRE

2019

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BRASIL**

Dissertação apresentada ao Programa de Pós-Graduação em Biologia Animal, Instituto de Biociências da Universidade Federal do Rio Grande do Sul, como requisito parcial à obtenção do título de Mestre em Biologia Animal.

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“Continue a nadar, continue a nadar...”

Dory

In Procurando Nemo

APRESENTAÇÃO

A presente dissertação de mestrado é apresentada conforme Resolução N°37/2018, deste Programa de Pós-Graduação em Biologia Animal (PPG-BAN) da Universidade Federal do Rio Grande do Sul, que institui procedimentos e normas para apresentação e avaliação da Dissertação de Mestrado e da Tese de Doutorado. O texto principal desta dissertação está estruturado sob a forma de um artigo científico, redigido em língua portuguesa, visando à submissão ao *Journal of Field Ornithology* (Qualis A2). O presente trabalho está de acordo com as “normas aos autores” do referido periódico, disponíveis no endereço eletrônico fornecido no item Referências Bibliográficas do capítulo introdutório e no Anexo 1. De acordo com o Artigo 43º do Regimento do PPG-BAN, o artigo, que compõe a parte central desta dissertação, está acompanhado de dois capítulos extras. O primeiro, a introdução geral, contém uma revisão sobre o problema abordado pelo presente trabalho, e traz os objetivos e os principais resultados obtidos no trabalho. O segundo, após o texto principal, apresenta as principais conclusões.

RESUMO

O Biguá (*Nannopterum brasiliense*) é uma das aves aquáticas mais abundantes no litoral do Rio Grande do Sul, utilizando o estuário da Laguna de Tramandaí como uma área de alimentação. Poucas informações a respeito da ecologia do Biguá no estado são conhecidas e o objetivo deste trabalho foi descrever a dieta e a relação dos itens alimentares com o ambiente. Foram coletados 391 regurgitos (pellets) de Biguá na Laguna de Tramandaí, durante o período de um ano (2017-2018) e os itens alimentares foram identificados a partir de estruturas diagnósticas resistentes ao processo de digestão, como otólitos de peixes. Foram encontrados 4.996 itens alimentares, dos quais 4914 eram peixes teleósteos, representando 98.34% da dieta, e distribuídos em 14 famílias e pelo menos 34 espécies. As outras 83 presas pertencem a duas espécies de crustáceos. O comprimento médio dos peixes na dieta foi de 98.70 mm. 85.80% dos quais apresentaram comprimento total entre 30 e 160 mm. Os peixes mais importantes na dieta do Biguá são espécies demersais, como os bagres (*Genidens* spp.) e a corvina (*Micropogonias furnieri*); porém, espécies pelágicas como as tainhas (*Mugil* spp.) também foram muito frequentes. Essas espécies são abundantes no estuário e principais alvos da pesca artesanal da região. A corvina (*Micropogonias furnieri*) esteve presente na dieta ao longo de todo o período de amostragem, variando em tamanho durante os meses e sendo representada por indivíduos juvenis e subadultos. O Biguá pode ser considerado uma espécie generalista e apresenta uma plasticidade alimentar, sendo capaz de ajustar seu comportamento em resposta as mudanças ambientais no estuário.

Palavras chave: aves, Laguna de Tramandaí, pellets, teleósteos

ABSTRACT

The Neotropic Cormorant (*Nannopterum brasilianus*) is one of the most abundant waterbirds along the coast of Rio Grande do Sul, using the Tramandaí Lagoon as a feeding area. Relatively few studies on the ecology of this bird species have been carried out in the State; therefore, this work aims at investigating the diet of Neotropic Cormorant from Tramandaí Lagoon, based on the analyses of pellets. A total of 391 pellets were collected during a year, 2017-2018 and prey items were identified from diagnostic undigested structures, such as fish otoliths. 4996 prey items were identified, of which 4,916 (98.34%) were fish from 14 families and at least 34 species. The remaining prey items were shrimps and crabs. Estimated average fish length were 98.70 mm. Nevertheless, most fish prey (85.80%) had estimated length of 30-160 mm. The most important fish prey were demersal species, such as catfish (*Genidens* spp.) and Whitemouth croaker (*Micropogonias furnieri*); nevertheless, pelagic species such as mullets (*Mugil* spp.) were also frequent. These fish species are abundant in the estuary and are the main fisheries targets. The Whitemouth croaker were present in the cormorant's diet year-round, with birds consuming juveniles and subadults. The Neotropic Cormorant can be considered as a generalist species, capable of adjusting its diet according to availability of prey.

Key words: birds, Laguna de Tramandaí, pellets, teleósteos

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INTRODUÇÃO GERAL

O estudo da dieta das aves é importante para a compreensão de diversos aspectos relacionados à vida desses animais e fundamentais para um melhor entendimento dos processos ecológicos nos quais estão envolvidos, tais como competição e predação e no papel desempenhado por elas nos ecossistemas (Mallet-Rodrigues 2010). A dieta das aves é bastante diversificada e diferentes espécies utilizam técnicas distintas para a obtenção dos recursos alimentares através de diferenças nos métodos e nos locais de forrageio (Morrison et al. 1979).

O Biguá *Nannopterum (Phalacrocorax) brasilianus* (Gmelin 1789; Phalacrocoracidae) é uma ave aquática de médio porte (63.5 – 68.5 cm de comprimento e 102 cm de envergadura), que se distribui amplamente na Região Neotropical, desde o sul dos Estados Unidos da América até o extremo sul da América do Sul (Telfair e Morrison 1995). Pode ser encontrado tanto em regiões costeiras, como em lagoas, rios, açudes e outros locais de água doce (Sick 1997, Orta 1992).

Figura 1. Biguá (*Nannopterum brasilianus*). Laguna de Tramandaí. Rio Grande do Sul.



Foto: Yuri R. R. Camargo.

Os Biguás forrageiam no ambiente aquático, tanto na coluna d'água quanto na zona bentônica e podem empreender caça solitária ou coletiva (Leopold e Van Damme 2003). O forrageio ocorre, mais frequentemente, por meio da “perseguição subaquática” (Shealer 2001), que é intercalada com períodos de repouso (Cooper 1986).

As partes das presas que não podem ser digeridas pelos Biguás, como ossos e otólitos, são compactadas, recobertas com muco e regurgitadas diariamente, formando pelotas que podem ser facilmente coletadas próximas aos ninhos, ou em locais de repouso das aves (Orta 1992, Mallet-Rodrigues 2010).

Figura 2. a) Pellet coletado na Laguna de Tramandaí. b) Exemplo de otólito *sagitta*.



Fonte: Autora 2019

Otólitos são estruturas compostas por carbonato de cálcio, matéria orgânica e elementos traço (Campana 2004), presentes no ouvido interno dos peixes ósseos, que auxiliam no sistema relacionado aos mecanismos de equilíbrio e audição (García et al. 2004, Moyle e Cech 1996). Os peixes ósseos apresentam três pares de otólitos, denominados *sagitta*, *lapillus* e *asteriscos*. Os otólitos *sagittae* são maiores e apresentam características que diferem de espécie para espécie, possibilitando a identificação (Assis 2004), e são os mais utilizados para estudos diversos.

Entre as metodologias utilizadas nos estudos de dietas de aves, estão a análise dos conteúdos gastrointestinais, análise dos excrementos, coleta de pelotas de regurgito, e observações diretas (González-Sólis et al. 1997, Barrett et al. 2007, Alonso et al. 2013). A coleta e análise das pelotas de regurgito, por ser um método simples, não invasivo e que permite a coleta de uma grande quantidade de amostras ao longo do tempo, é vantajosa e pode fornecer informações importantes sobre a composição e a variação da dieta, assim como a quantidade de alimento ingerido (Moniz 2015). Além disso, esta análise não difere e representa muito bem a dieta das aves, em composição de espécies e reconstituição de tamanhos e massas, quando comparada à análise dos conteúdos gastrointestinais (Derby e Lovvorn 1997).

Estudos anteriores sobre a ecologia alimentar do Biguá indicam uma alimentação eminentemente composta por “peixes ósseos” (Actinopterygii), mas que também inclui crustáceos e moluscos (Barquete et al. 2008, Petracci et al. 2009, Alarcón et al. 2012). Além disso o Biguá é uma espécie muito versátil e que responde bem à variação dos recursos disponíveis no ambiente (Barquete et al. 2008).

Embora *Nannopterum brasilianus* tenha uma ampla distribuição por toda a Região Neotropical (Telfair e Morrison 1995) e seja muito abundante, os estudos com a espécie são escassos, e assim vários aspectos de sua biologia permanecem desconhecidos (Telfair e Morrison 1995, Kalmbach et al. 2001). Os ambientes nos quais o Biguá ocorrem vêm sendo cada vez mais ameaçados pelos impactos antrópicos (Dorfman e Kingsford 2001). Diversas espécies de aves aquáticas e marinhas, por exemplo, acabam ingerindo quantidades consideráveis de resíduos sólidos encontrados flutuando na água (Morris 1980, Ryan 1987), incluindo-se plásticos que podem lesionar ou até mesmo obliterar as paredes do estômago (Ryan 1988, Sick 1997).

Situada na costa norte do Rio Grande do Sul, a Bacia Hidrográfica do Rio Tramandaí ocupa uma área de aproximadamente 2700 km², dos quais 115 km² estão localizados na faixa

litorânea, e cerca de 450 km² equivalem a lagos, lagoas, rios e canais (Plano da Bacia Hidrográfica do Rio Tramandaí, 2015). As águas oriundas dos subsistemas da Bacia Hidrográfica do Rio Tramandaí carrega consigo diversos nutrientes, sais e sedimentos, tornando o estuário do Rio Tramandaí um ambiente fértil e importante no ciclo de vida de diversas espécies de fauna e flora (Castro e Mello 2013) de importância ecológica e econômica, e que vem sendo ameaçado e impactado pela pesca e poluição urbana (Tomazelli 1990).

O complexo lagunar de Tramandaí constitui um importante local de criação e alimentação de diversas espécies de peixes (Castro e Mello 2013), propiciando um ótimo ambiente para o forrageio de diversas espécies de aves aquáticas, incluindo-se o Biguá (Muller 2013). A análise da ecologia alimentar desta ave na região é essencial para entendermos como a espécie utiliza os recursos existentes no ambiente.

Nosso trabalho identificou 4996 presas, das quais 4914 eram peixes teleósteos, distribuídos em 14 famílias e 34 espécies, além de 28 morfótipos. Os principais peixes predados foram os bagres, a corvina e as tainhas. Também identificamos 83 presas pertencentes a, pelo menos, duas espécies de crustáceos (Tabela 2). O número médio de presas ingeridas por pellet foi de 12.78, variando entre 1 e 119 e a amplitude de nicho trófico calculada para a dieta o Biguá na Laguna de Tramandaí foi de $B_s = 0,25$.

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CONCLUSÕES GERAIS

A partir da análise dos pellets do Biguá (*Nannopterum brasilianus*) coletados na Laguna de Tramandaí, verificou-se que os principais itens alimentares são espécies de teleósteos (*Genidens spp*, *Micropogonais furnieri* e *Mugil spp*) abundantes no estuário durante todo o ano (Robles e Vieira 2017) e que os crustáceos (camarão e siri) também fazem parte, mesmo que em pequenas quantidades, da dieta dessa ave.

O Biguá predou diversas espécies durante o estudo alterando a composição da dieta e a abundância relativa das presas ao longo dos meses. Como demonstram os estudos anteriores o biguá alimenta-se principalmente por peixes demersais, mas apresenta plasticidade alimentar e pode ser considerada uma espécie bastante generalista (Barquete et al. 2008, Petracci et al. 2009, Alarcón et al. 2012).

Embora o Biguá seja uma ave comum nos ambientes estuarinos, lacunares e costeiros e bastante reconhecida popularmente, muitos aspectos da sua ecologia ainda permanecem desconhecidos. O presente estudo constituiu-se no primeiro trabalho realizado com o Biguá na Laguna de Tramandaí, fornecendo subsídios para a compreensão da suas preferências alimentares e suas implicações na conservação desta espécie.

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