Specialist shorebird respond to prey and habitat availability through trophic plasticity

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Abstract

Spatiotemporal variations in food availability represent a challenge to the persistence of specialist species. The American oystercatcher (Haematopus palliatus) is a shorebird regarded as a bivalve specialist, although foraging habitats and prey species may vary along its distribution. Here, we studied American oystercatcher breeding in sites with variable landscapes to test the effect of temporal and spatial variations in food availability and dietary aspects. Between 2017 and 2021, we sampled oystercatchers (n = 100) and macroinvertebrates at the mesolitoral zone in five foraging areas in southern Brazil, three composed by sand and rock substrates (mixed), and two by sandy beach only. We obtained biological samples from oystercatchers and macroinvertebrates for carbon (13C) and nitrogen (15N) stable isotope analysis. In addition, we carried out systematic sampling of macroinvertebrates in sandy beaches at foraging areas to assess prey availability. Main findings showed the oystercatcher diet to be influenced both by the heterogeneity of foraging habitats and temporal fluctuations in availability of food resources. Bivalves contributed ~60% to the diet of oystercatchers, but differences in the preferred bivalve species were detected among areas. In sites with mixed substrates, oystercatchers had a wider isotopic niche, suggesting habitat heterogeneity induced a more varied diet. Finally, we also observed interannual variation in the diet that may be associated with variation in macroinvertebrate availability on sandy beaches, especially for non-bivalve prey. Therefore, both temporal variations in food availability and foraging habitat heterogeneity seem to shape the foraging ecology of oystercatchers in the coastal zone, evidencing trophic plasticity in this specialist shorebird.

Keywords: American oystercatcher, Benthic macroinvertebrates, Diet, Haematopus palliatus, Stable isotopes, Trophic ecology

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1 Introduction

Specialization promotes diversification and coexistence as it reduces interspecific competition by decreasing niche overlap between species (Chesson 2000). Specialist species have a narrow trophic niche, and characteristics which limit them to a particular habitat or food resource (Amundsen et al. 1996). However, spatiotemporal variations in food availability can influence dietary patterns and even species distribution ((Hughes 2000)). In this context, intraspecific ability to adjust the diet according to the variability of food resources in time and space has been referred to as trophic plasticity.

2 Material and methods

Fieldwork was carried out on five beaches along a 280 km coastline in southern Brazil, from 29o18'S/49o42'W to 31o21'S/51o02'W (Figure 1), which are used by oystercatchers as breeding and foraging sites. The southern areas, Praia das Cabras and Lagoa do Peixe, are composed by sandy substrate only, while the northern sites, Passo de Torres, Praia Grande and Itapeva are sandy beaches with the presence of natural or artificial rocky substrates adjacent or nearby, such as slabs and jetties, so we refer to these beaches as mixed substrate sites. These mixed substrate sites also hold additional landscape elements suggested to influence oystercatcher diet, such as a rocky island (Ilha dos Lobos) about 2 km offshore Praia Grande, which is a marine protected area used by oystercatchers for foraging (Linhares et al. 2022); and also an estuarine zone at Lagoa do Peixe, that present suitable foraging environments for oystercatchers, such as mudflats and saltmarshes (Fedrizzi 2008). There is also an estuary alongside Praia Grande in the mixed substrate area, but it does not present relevant foraging areas for oystercatchers, given that the estuary margins are mostly

urbanized. Finally, Praia Grande is an urban beach (Cristiano et al. (2016); Linhares et al. (2021)), Passo de Torres is scarcely urbanized nearby, Praia das Cabras is a preserved area due to its distance to urban sites, while Itapeva and Lagoa do Peixe are formally protected areas, as a State Park and a National Park, respectively.

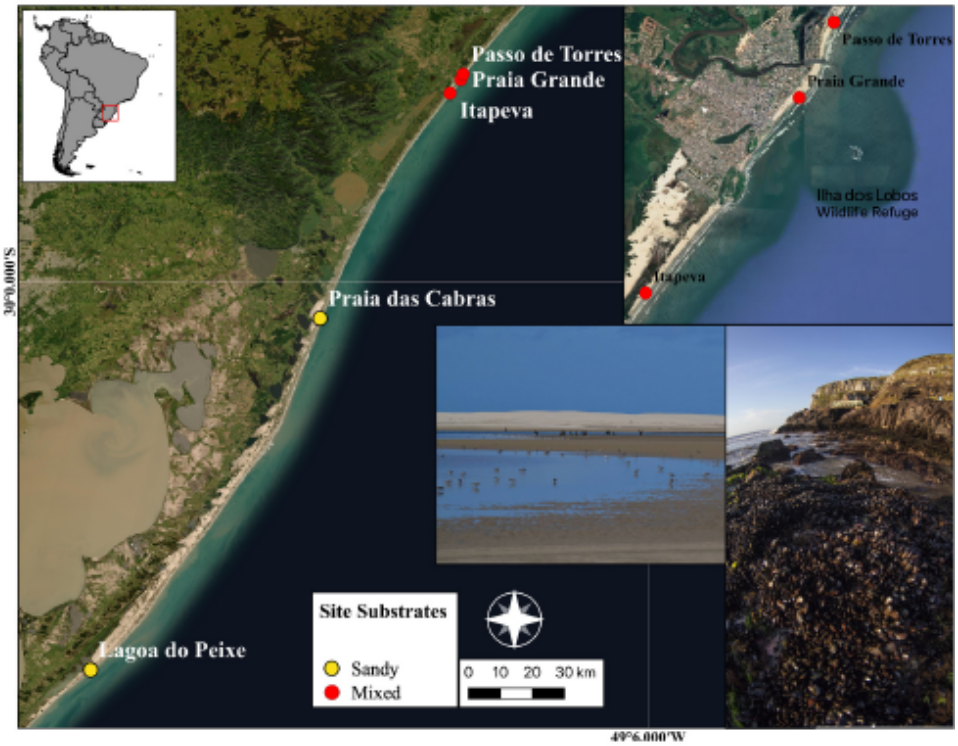

Figure 1: Breeding sites of the American oystercatcher (Haematopus palliatus) along the southern Brazilian coast. Rocky substrate with Perna perna near to Praia Grande (red arrow); fore dunes and mudflats at Lagoa do Peixe (yellow arrow). Photo: Mar Pedro de Abreu. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

3 Results

Not sure what will happen here

4 Discussion

Here we discuss results

5 Disclosure statement

No conflicts of interest exist).

6 BibTeX

We encourage you to use BibTeX. If you have, please feel free to use the package natbib with any bibliography style you're comfortable with. The .bst file agsm has been included here for your convenience.

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