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Perceptions of wild birds by coastal users in an Argentinean natural protected area and implications for management and conservation

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ABSTRACT

Assessing of local perception of wild birds may assist researchers and managers onto its material or utilitarian importance, either positive or negative. This study assessed perceptions and behaviours of coastal users attending a natural protected area in northern Argentine Patagonia towards wild birds; the ultimate goal was to generate information of socio-ecological value to be incorporated into provincial conservation instruments. A total of 390 structured questionnaires were performed on active coastal users attending open-ocean beaches from the San Matías Gulf, Argentina. Over 30 species or groups of bird species were denoted by the respondents; these encompassed 14 orders and 25 taxonomic families. Large and brightly coloured birds were highly selected by surveyed users. Bird colours, their songs and behaviours were the most salient features highlighted as part of the birds' attractiveness. Freedom and peace were the most prominent feelings bird caused to surveyed users. Coastal users were highly aware of a group of birds feeding or resting on the shoreline, with their main response being distancing far away while walking. This study is the first approach to a quantitative valuation of contemporary non-material benefits of wild birds in the target area. The information amassed in this study may assist in a better understanding of coastal users' profile about wild birds, and could be used to improve the administration included within the Management Plan of the natural protected area, particularly in a context of wildlife been declared of public interest four decades ago.

Keywords: Public perceptions; Coastal users; Wild birds; Northern Argentine Patagonia; Natural Protected Area Management.

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SIGNIFICANCE STATEMENT

Birds are valuable socio-economic resources and bio-indicators. In southern South America, particularly in Argentina the relationship between people and birds framed within an ecosystem services approach are focused on indigenous people and/or rural areas placed deep inside the continent. By far less information is available for other areas, particularly in coastal areas where is expected a positive bird contribution to people. We evaluated the perceptions, opinions and attitudes of coastal users about birds in a natural protected area in northern Argentine Patagonia. This study is the first approach to a quantitative valuation of contemporary non-material benefits of wild birds in the target area. The information amassed in this study may assist in a better understanding of coastal users' profile about wild bird, and could be used to improve administration management.

INTRODUCTION

Birds have remained in around human societies since countless time as they have the deepest connection with us given they are animate, fly and live in a shared landscape (Collar et al. 2007; Mynott 2018; Delfino 2024). Moreover, there is a well-established consensus in Western societies about birds being among the most prominent features of the natural world for humankind, readily visible and audible almost everywhere, and thus part of our daily experience (Chadd and Taylor 2016; Pope 2022). Several roles were given to these vertebrates in different cultures, with the available literature showing that birds have a high human value chiefly as divinity (Urton 1981; Alves and Barboza 2018; Sousa and Caplan 2020), food (Cooper 1995; Geldenhuys et al. 2013), falconry (Otsuka 2006; Mahmood et al. 2021), aviary specimens and pets (Roldán-Clarà et al. 2014), and for medicinal uses (Nikolaus 2001; Bezerra et al. 2013; Altaf et al. 2017). Birds are also recognised as one of the most important indicators of the state of the environment (Furness and Greenwood 1993; Amat and Green 2010). Thus, the available literature provides many examples of the value of birds as socio-economic resources and bio-indicators (Whelan et al. 2008; Green and Elmberg 2014).

Human welfare depends directly or indirectly on the various benefits derived from nature, often termed ecosystem services. Here we follow the ecosystem services concept towards Nature's Contribution to People (or simply NCPs) (Díaz et al. 2018), which recognizes the central role of culture in nature-people relationship, and embraces all contributions, both positive and negative, of nature to people's quality of life (ISPPBES 2017). Birds contribute directly or indirectly to the three types of NCP: 'Material NCP' (which apply to resources directly exploited for food, clothing or other uses), 'Regulating NCP' (such as pollination and dispersal of seeds), and 'Non-material NCP' (which apply to the recreational value or spiritual value of birds) (Díaz et al. 2018; Hill et al. 2021). There is no doubt about birds contributing to a large list of human needs, still the focus here is on Non-material NCP which concern the non-material benefits that people gain from ecosystems. Non-material NCP are indeed unique as these are considered as entirely related to human societies, turning very difficult to ascribe a monetary value to them (Pascual et al. 2017). Regardless, the assessment of local perception of wild birds may not only bring light onto its material or utilitarian importance – either positive or negative – but also provide alternative or complementary perceptions, including bird-human conflicts, among other representations (Bennet 2016).

The scientific study of the relationships between people and birds in cultures, often termed ethno-ornithology, may bring together nature conservation and local or traditional knowledge systems in ecological management (Berkes 1993; Bennet 2016). In fact, there is a strong suggestion towards the consideration of human values, perceptions, and attitudes among bird conservation efforts, thus studies that address on traditional ecological knowledge are highly encouraged (Dayer et al. 2020; Lindell 2020). This emphasis is such, given that the success or failure of many conservation initiatives is strongly dependant on local knowledge and attitudes towards natural resources (Bennet 2016). Despite some variations in its terminology, traditional ecological knowledge broadly refers to any form of knowledge and beliefs exclusive to a particular society or culture that relates to their surrounding environment (Berkes 1993; Gómez-Baggethun and Reyes-García 2013). In Latin America, birds are considered to have a significant value (Moleón et al. 2014; Anderson 2017; Ávila-Nájera et al. 2020; Alcántara-Salinas et al. 2022). However, the bulk of the studies are focused on indigenous people and/or rural areas placed deep inside the continent (Tidemann and Gosler 2012; Alcántara-Salinas et al. 2022). This is particular true for Argentina, a country holding 1.033 bird species (MADyS/AA 2017) and several indigenous ethnicities, many of which have been previously investigated regarding their perception towards wild birds (Hernández et al. 2015; Castillo and Ladio 2018; Salom et al. 2021; Tamburini et al. 2021; among others).

Coastal ecosystems supports large numbers of wild

birds and Argentina is of global importance for these species given its location on migratory flyways, and extensive, productive estuarine, mudflat and saltmarsh habitats (Gil et al. 2019). Many of these wetland sites are listed as Wetlands of International Importance under the Ramsar Convention or as protected areas like reserves or national parks, to provide protection to the bird populations that they support, especially overwintering species (de Clément 2011) or breeding species (Yorio et al. 2001). Only 5 riverine province faces the open ocean along 4.500 km of the Argentine coastline; still the emphasis here is given to the Rio Negro Province, in northern Patagonia, which holds ca. 30% of the national bird diversity (Llanos et al. 2011). Here, located in the northwest corner of the San Matías Gulf, the San Antonio Bay Natural Protected Area (hereinafter SABNPA) is an area of high primary productivity that hosts breeding sites for seabirds and other coastal birds along with resting and foraging sites of Nearctic and Patagonian migratory birds. In fact, the SABNPA is listed as a Site of International Importance (WHSRN 1993) and an Area of Importance for the Conservation of Birds (Devenish et al. 2009). Interestingly, the wildlife inhabiting this area – as with others at the provincial scale – were declared of public interest almost four decades ago (Provincial Law No. 2056/1985). Concomitantly, a body of local ranger's was created with aim of stationing personnel along certain sites within the SABNPA, while regularly patrolling others, due to local norms. Regarding social aspects, much of the area was amongst the landscape used by Mapuche-Tehuelche people, with modern population considering themselves to be of these original settlers with up to 7% at a provincial level (INDEC 2022). The most important economic activities currently in place are related to fishing (both artisanal and commercial), aggregate exploitation and tourism. The latter is comprised by sun and beach tourism and activities linked to the observation and appreciation of nature (Pierucci and Piantoni 2021).

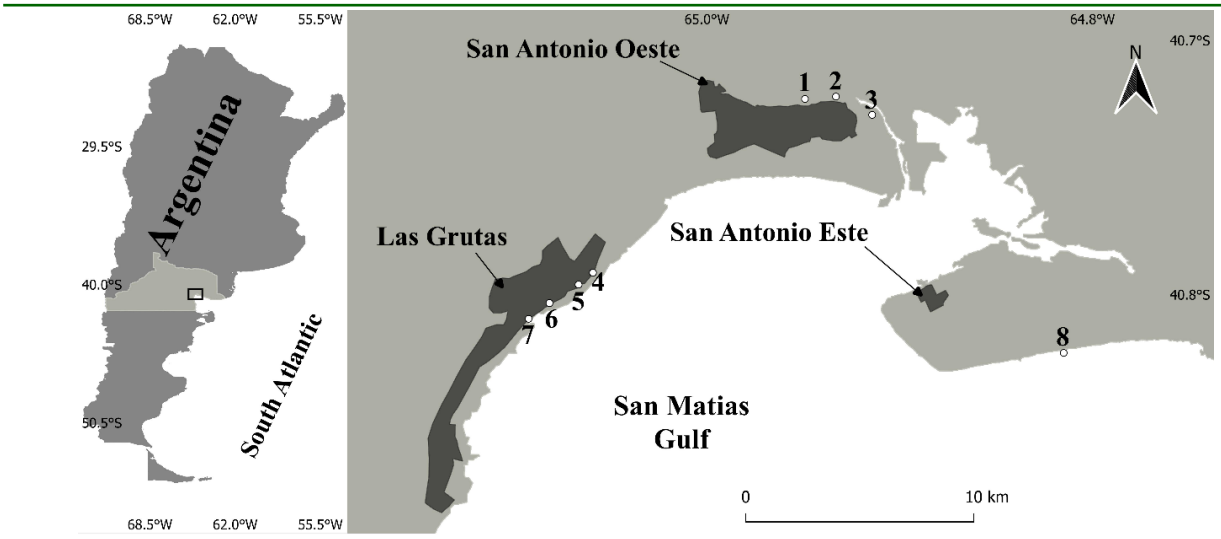
This study aims to evaluate the relationship between people and birds in the San Antonio Bay Natural Protected Area, northern Argentine Patagonia by analysing patterns of contemporary non-material benefits of wild avifauna. For this, we performed a public perception survey to assess coastal users' knowledge, perceptions and attitudes about wild birds -and their protection- attending the SABNPA. Coastal zones encompassed within the SABNPA are used as a recreational destination during the austral summer by beachgoers living in nearby Patagonian areas included within the Rio Negro Province (Tagliorette et al. 2008; Pierucci and Piantoni 2021). We hypothesized that the deeply-nature belief that wild birds brings positive health effects elicits a positive perception that leads to appreciation and fascination. Moreover, we expect this perception to be similar across demographic and social factors. Attitudes toward wildlife like birds are regularly related on the respondents' profile, including educational level, age, and gender and residence status, among others (Koval and Mertig 2004). Thus, main influencing demographic and socioeconomic factors like user's age, gender, residence status and level of education should be retrieved as baseline information. Finally, we hypothesized that general awareness regarding features of the biology and ecology of wild birds will not be affected by the respondents' profile given that there seems to be limited consideration of such issues among citizens of the Rio Negro Province, coupled with the limited signaling messages about this topic available in coastal areas.

MATERIAL AND METHODS

Study area

This study was performed in eight beaches distributed along the coasts of the SABNPA, Rio Negro Province, in northern Argentine Patagonia (Figure 1). The area holds three main human settlements (San Antonio Oeste, San Antonio Este and Las Grutas) that currently hold around 38000 inhabitants year-round (INDEC 2022). Still the area receives up to 450000 tourists during the summer months (January-March) (Municipal Agency for Tourism and Culture, personal comment). The study area is encompassed by sandy open beaches, shells and sandbars, as well as an extensive marsh. Given its latitude, the terrestrial component of the study area is comprised within the Monte Ecoregion of plains and plateaus (Cabrera 1976), whereas the marine domain falls within the Argentine Province North Patagonian Gulfs Ecoregion (Balech and Ehrlich 2008). The prevailing climate for the study area is considered temperate semi-arid, with well-localized features due to the influence of the sea. Local tides are characterized by being predominantly semidiurnal, with an amplitude ranging between 6 and 9 meters. The average surface water temperature is around 15°C (Saad et al. 2019).

From north to south the considered beaches included: 1) Playa Los Tamariscos (GPS coordinates -40.7260, -64.9402), 2) Costanera de los Ferroviarios (-40.7261, -64.9303), 3) Punta Verde (-40.7290, -64.9133), 4) Terrazas al Mar (-40.7983, -65.0618), 5) La Rinconada (-40.8006, -65.0645), 6) Bajada Pewans (-40.8072, -65.0799), 7) La Rueda (-40.8082, -65.0822), and 8) Las Conchillas (-40.8249, -64.8140) (Figure 1). The studied sandy beaches are ca. 50 m wide and stretches between 0.2 km and 7 km. All beaches except



Hình 1. Study area in relation to the Atlantic coast of the Rio Negro Province, in Argentina, South America. Shown are the beaches where the social survey was conducted. 1: Playa Los Tamariscos, 2: Costanera de los Ferroviarios, 3: Punta Verde, 4: Terrazas al Mar, 5: La Rinconada, 6: Bajada Pewans, 7: La Rueda, 8: Las Conchillas.

of three (Playa Los Tamariscos, Costanera de los Ferroviarios and Punta Verde) are exposed to the San Matías Gulf (South Atlantic). Regardless, all beaches were considered for analysis. The criteria for selecting a beach was based on several features: (1) very popular beach with high presence of users, (2) accessing the beach is only performed by foot, and (3) cars are not allowed to transit on the beach during the summer months. The criteria chosen to select the beaches were threefold: 1) easiness of accessing the beaches for sampling purposes, 2) augmenting possibilities of user engagement in the survey, and 3) controlling for certain environmental and management variables to aid in the establishment of a reliable sampling scheme for future studies.

Public perception survey

The survey method used was a structured (written) questionnaire. This is a well-established tool within social science research for attaining information on respondent demographic profile, its present and past experiences, standards of behaviour or attitudes and their beliefs and reasons relating to the issue under consideration (Bird 2009). Surveying contemporary non-material benefits of birds mainly include cognitive development, artistic and religious expression, bird watching, and photography (Whelan et al. 2008). Several aspects of these benefits provided by birds have be quantified to some degree, including recreation like bird watching (Navrud and Mungatana 1994; Larouche 2003; among others), photography (Slater et al. 2019; among others), and spiritual and/religious values (Anderson 2017; Aitcho et al. 2024; among others). Other quantitative benefits may encompass supporting bird conservation (Martín-López et al. 2007; among others). In this study, variables linked to some of the previously depict contemporary non-material benefits of wild avifauna (spiritual and/religious values, bird watching and issues related to bird conservation) among coastal users were divided into three dimensions, each containing specific queries in the questionnaires. Given the scarcity of cultural insights into this topic at a local or regional level, one of these dimensions was designed to first evaluate users' general knowledge about wild Patagonian birds. While another dimension was intended to in-depth analyze knowledge and awareness regarding a pre-selected group of wild Patagonian birds based on provided photographs. This group of birds included species locally and nationally resident, showing year-round occurrence within the study area, and belonging to different guilds. A final section or dimension was designed to gauge users' perception in relation to coastal environmental protection and its avifauna. This dimension was included given that a body of local ranger's stations guards certain sites within the protected natural area, while regularly patrolling others, due to local norms. Sections provided below summarizes queries divided by dimension.

In this study, the questionnaire overall included five sections or dimensions (1) a first general section centered in human parameters and aimed at identifying the users' profile; (2) a second section aimed at assessing user's perception about the use and attendance to the beach environment; and the

three dimensions described above. The questionnaire included 1) open-ended questions (the respondent expressed its opinion), 2) close-ended questions (yes, no or no answer), 3) a choice between open- and close-ended questions (hereinafter referred to mix-ended questions), and 4) a score from 1 (not important) to 5 (very relevant) depending on the level of importance that each bird attributes represent. The latter can be treated as a five-point Likert scale (Croasmun and Ostrom 2011).

Public perception survey was undertaken between mid-January to late March of 2023, with a total sampling effort of 10 days (starting on February 4th, and ending on March 15th). These months fall well within the peak of the tourist season. Each beach was sampled by one or two operators (i.e. the authors working alone or in pairs) per day between 10:00 am and 20:00 pm local time during weekdays and weekends. Every ten person on the beach was reached by the operators, either on a shore-parallel of shore-normal manner (Tudor and Williams, 2006) was requested to take part in the survey. The questionnaire was collected after 10–15 min of being completed. Our research protocol complied with the guidelines of the Declaration of Helsinki and Tokyo for research with humans. Through the survey confidentiality of the respondents was prioritized.

Demographic profile of the users

This section included five variables on demographic profile of the users such as age, gender, level of education, residence status and pet (bird) ownership. Parameters related to users' age and residence status were offered as open-ended questions. The gender of the user, its level of education and pet (bird) ownership were set as a close-ended questions.

Attendance, use and perception of the beach

This part encompassed information about the users' perception regarding five parameters including frequency of beach attendance, means of beach accessing, beach attractiveness features, ways the beach is part of the user life, and ways the beach provides support for wildlife. Users were asked to rank each item (variable) from 1 (less important) to 5 (very important) depending on the level of importance they represented. The exception being parameters related to ways the beach is part of the user life; this was offered as an open-ended question.

Perception about coastal Patagonian wild birds

This section covered the users' perception regarding five parameters which encompassed general knowledge about bird diversity and the spatial location of their breeding sites at a provincial scale, attractiveness of bird traits, feelings caused by birds, and frequency of engagement in birdwatching activities. Parameters related to users' knowledge about bird diversity and spatial location of their breeding sites at a provincial scale along with feelings caused by birds were offered as open-ended questions. Whereas parameters related to attractiveness of bird traits was set as a closed-ended question. Finally, users were asked to rank frequency of engagement in birdwatching activities from 1 (never of once a year) to 5 (very frequently or on a daily basis) depending on the level of importance this variable represented.

Acknowledgement about a pre-selected group of wild Patagonian birds

This part included information related to the users' perception concerning five parameters around specific knowledge centered in a pre-selected group of wild birds including their recognition from photographs (see Figure 2), main attractiveness features, location of main breeding sites, resident status, and types of nest materials. Parameters related to users' knowledge regarding their recognition, main attractiveness features and location of main bird breeding sites were included as open-ended questions. While parameters related to residence status and types of nests materials were offered as closed-ended questions.

RESULTS AND DISCUSSION

Coastal user's profile

Here, the average respondent encompassed a coastal user of the beaches of Rio Negro Province around 40 years old (range = 18–82 years old), mainly living within nearby Patagonian areas embedded within the Rio Negro Province and attending the studied area chiefly during the summer months. Women respondents outnumbered men. Besides, the bulk of the respondents declared to have completed the secondary school. Not keeping wild bird as pets was a general feature among the respondents' profile (90%, n = 312). Table 1 shows relevant information on the demographic profile on the coastal users gathered through the survey.

Hình 2. Photographs of a pre-selected group of wild birds delivered within the questionnaire for the inquiry of coastal users' knowledge regarding aspects centered in these species of wild birds.

Users' perception of the beach

In our study, the usage coastal users make of the beach environment seems to be temporally localized, i.e. chiefly once a year (during the austral summer). This is in line with the many tourist attractions the province offers, countless of which are temporary in nature including sun and beach or wildlife watching (Tagliorette et al., 2008; Pierucci and Piantoni, 2021). Further, the temporal usage of this environment during the austral summer was significantly more important for local residents than tourists. Coastal users', particularly residents from nearby cities and towns, are known for selecting coastal beaches of the Rio Negro Province like the one included in our study as a recreational destination during this time

Bång 1. Demographic profile of the coastal users gathered in the survey conducted in beaches of San Antonio Bay, Argentina. In parenthesis is the number of respondents.

Variable	%
Gender ($n = 390$)	
Female	58.97
Male	40.51
Do not want to report it	0.51
Education ($n = 386$)	
Primary school	10.36
Secondary school	38.08
Technical level	23.05
University	28.49
Place of residence ($n = 388$)	
From Rio Negro Province	43.90
From Buenos Aires Province	26.83
Neither from Rio Negro nor from Buenos Aires provinces	29.26

of the year (Pierucci and Piantoni, 2021). Based on our results, being in contact with the sea environment (32%), the ability to enjoy such natural environment (28%) and the overall beauty of a beach (21%) were the most attractive features of a beach for coastal users. A small proportion of respondents claimed feeling a sense of belonging toward the beach (10.4%). Besides, vacation and relaxation were the most salient beach aspects of coastal users' part of life. Coastal users are known for connecting with the beach environment in such ways, along with experiencing such traits of beaches either at a local, regional or global basis (Williams and Micallef, 2009; Pilkey et al., 2011). Finally, the beach was considered of relative mean importance for the sustenance of wildlife, including birds for the majority of the respondents (mean Likert value: 4.31 ± 0.68). This parameter was not explained by any predictor variables (i.e. users' age, gender and residence status) (CLM, all $p > 0.05$) (Table 2).

Bång 2. Relationship of predictor variables pertaining to the respondent´s profile on the users´ perception about several topics within the four dimensions included in our survey. In all models, male (gender), from Buenos Aires Province (place of residence) and elemental education (primary education level) were set as reference variables. In parenthesis is the number of respondents. Significant values are depicted in bold.

Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Importance of the beach for sustaining wildlife (n = 371)	Age		-0.02 ± 0.00	-0.575	0.565
	Gender	Female	0.12 ± 0.11	1.070	0.285
	Place of residence	From Rio Negro Province	0.81 ± 0.15	0.522	0.602
		Not from Rio Negro or Buenos Aires provinces	-0.03 ± 0.17	-0.213	0.831
	Education level	Secondary	-0.25 ± 0.56	-0.446	0.656
		Technical	-0.25 ± 0.56	-0.449	0.654
		University	-0.08 ± 0.56	-0.150	0.880
Frequency of birdwatching (n = 386)	Age		0.00 ± 0.00	0.175	0.861
	Gender	Female	-0.15 ± 0.11	-1.371	0.170
	Place of residence	From Rio Negro Province	0.13 ± 0.15	0.854	0.393
		Not from Rio Negro or Buenos Aires provinces	-0.24 ± 0.16	1.467	0.142
	Education level	Secondary	0.18 ± 0.55	0.322	0.748
		Technical	0.28 ± 0.56	0.506	0.613
		University	0.15 ± 0.56	0.272	0.786
Frequency of visiting bird nesting areas (n = 383)	Age		-0.00 ± 0.00	-0.805	0.420
	Gender	Female	-0.25 ± 0.13	**-1.984**	**0.047**
	Place of residence	From Rio Negro Province	0.29 ± 0.17	1.686	0.091
		Not from Rio Negro or Buenos Aires provinces	-0.27 ± 0.20	-1.363	0.173
	Education level	Secondary	0.48 ± 0.69	0.699	0.484
		Technical	0.57 ± 0.69	0.819	0.413
		University	0.41 ± 0.69	0.588	0.556
Coexistence between wildlife and human activities (n = 380)	Age		0.00 ± 0.00	0.392	0.695
	Gender	Female	0.03 ± 0.11	0.288	0.773
	Place of residence	From Rio Negro Province	-0.08 ± 0.15	-0.595	0.552
		Not from Rio Negro or Buenos Aires provinces	0.07 ± 0.16	0.429	0.668
	Education level	Secondary	-0.63 ± 0.54	-1.165	0.244
		Technical	-0.56 ± 0.54	-1.038	0.299
		University	-0.69 ± 0.54	-1.283	0.199

Overall perception regarding coastal Patagonian wild birds

The survey confirmed that coastal users' were highly aware of the wild bird diversity of the coasts of the Rio Negro Province, with up to 30 species or groups of species being recognized by the respondents. However, this number of species is small when compared to the diversity of birds in the region (290 species) (Povedano 2016). It is common to find in social studies that the diversity of ethno species (i.e. the name of a species used by people in its locality) is lower than the taxonomic diversity revealed by ecological bird surveys (Belaire et al. 2015). This is because there are different groupings in which an ethno species can contain two or more biological species and the existence of species that stand out from the rest, both for their prototypical value and for their utility or symbolic value (Zamudio and Hilgert 2015). In our study, the knowledge about wild birds was fairly equivalent among aquatic and non-aquatic birds. The birds or groups of birds mentioned by the respondents were grouped into 14 orders and 25 taxonomic families (Table SM1). The most represented orders included Charadriiforms, Psittaciforms, Sphenisciforms, Phoenicopteriforms, Passeriiforms, Anseriforms, and Falconiforms. A personal experience and/or the familiarity with birds from different habitats cannot be ruled out, as the bulk of the surveyed users were restricted to the Rio Negro Province.

Based on our results, gulls (26.5%), parrots (19.2%), penguins (8.9%) and flamingos (8.7%) was the most salient bird species or groups of species as highlighted by the respondents (Table SM1). These are large (gulls, penguins and flamingos) and brightly coloured (parrots and flamingos) birds. This strong bias towards phenotypic features such as larger and more colourful species has been previously depicted in the literature (Lišková et al. 2015; Andrade et al. 2022). In our study, the main birds' attraction to coastal users included their colours (36%), songs and behaviours (around 24% each metric) (Figure 3). Our findings are in line with those of other studies in different social and ecological contexts that show that traits such as colour, song and behaviours drive public perception (Wyndham and Park 2018; Andrade et al. 2022), including in Argentina (Maggi et al. 2021). There, the available literature show opposite opinions of people against a large number of wild birds pending their presumed negative (Sarasola and Maceda 2006; Canavelli et al. 2013; Sánchez et al. 2016; Cailly Arnulphi et al. 2017) or positive (Hernández et al. 2015; Arias Toledo and Trillo 2017; Tamburini et al. 2021; Muiño et al. 2023) effect on human activities and environmental features. Interestingly, this study adds to the potential positive health effects (Ratcliffe et al. 2013; Aerts et al., 2013; Gray et al. 2024) on coastal users as the most prominent feelings birds cause to surveyors included freedom (21.2%) and peace (16.2%) (Figure 4). Interestingly, these feelings were only affected by the educational level of the respondents (GLM, all $p < 0.05$) (Table 3). Our findings are line with those of other studies in different social en ecological context (Mohorič et al. 2024); still other studies have showed that formal education does not interfere on feelings about wild birds (Santos et al. 2020).

Hình 3. Word cloud plot in coastal users' responses to the query "What aspects of wild birds attracts you?".

Hình 4. Word cloud plot in coastal users' responses to the query "Name feelings caused by observing or watching wild birds".

Bång 3. Relationship of predictor variables pertaining to the respondent´s profile on the users´ perception about prominent feelings caused by wild birds within one of the four dimensions included in our survey. In all models, male (gender), from Buenos Aires Province (place of residence) and elemental education (primary education level) were set as reference variables. In parenthesis is the number of respondents. Significant values are depicted in bold.

Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Freedom as prominent feeling (n = 354)	Age		-0.00 ± 0.00	-1.305	0.192
	Gender	Female	0.05 ± 0.15	0.371	0.710
	Place of residence	From Rio Negro Province	0.06 ± 0.21	0.323	0.746
		Not from Rio Negro or Buenos Aires provinces	-0.25 ± 0.22	-1.143	0.252
	Education level	Secondary	-0.50 ± 0.34	-1.465	0.142
		Technical	-0.77 ± 0.35	**-2.218**	**0.026**
		University	-0.66 ± 0.34	-1.895	0.058
Peace as prominent feeling (n = 353)	Age		0.00 ± 0.00	0.077	0.938
	Gender	Female	-0.19 ± 0.16	-1.149	0.250
	Place of residence	From Rio Negro Province	-0.19 ± 0.21	-0.887	0.374
		Not from Rio Negro or Buenos Aires provinces	0.15 ± 0.24	0.635	0.525
	Education level	Secondary	-0.54 ± 0.39	-1.389	0.164
		Technical	-0.83 ± 0.39	**-2.126**	**0.033**
		University	-0.86 ± 0.39	**-2.199**	**0.027**

A similar proportion of the respondents claimed to be aware (49%, n = 318) and unaware (50.6%) about the location of nesting sites of wild birds on the Rio Negro coast. Thus, knowledge regarding nesting sites of wild birds on the Rio Negro coast was ambiguously distributed among respondents. This ambiguity can be explained considering the residence status of the respondents, who despite having claimed to reside in the territory of the province of Rio Negro, a large proportion stated residing in non-coastal areas. Regardless, cliffs (60%) were the main salient nesting areas for wild birds, included those considered as belonging to a pre-selected group of birds, as per highlighted by surveyed users (Table SM2), along with certain coastal human settlements like the villages of Las Grutas, San Antonio Bay and El Cóndor. This was somehow expected as two of these settlements (Las Grutas and San Antonio Oeste) are placed within the San Antonio Bay, a semicircular bay framed by cliffs. There, cliffs are by far the most outstanding features of the local coastal landscape, representing the highest forms along the coast (Kokot and Favier Dubois 2017). In fact, this bay is a breeding ground for ca. 35% of the birds' Province avian diversity (Llanos et al. 2011). Also along coastal cliffs, in El Cóndor, is placed the largest extant colony of the Burrowing Parrot globally (Masello et al. 2006). Interestingly, though, a few percentage of the respondents (37%) expressed engaging in birdwatching activities throughout the year and the perception of coastal users' regarding this activity was not affected by residence status, gender or age (CLM, all $p > 0.05$) (Table 2). The lack of effect of socio-demographic attributes over participating in birdwatching activities has been previously reported (Vázquez-Plass and Wunderle Jr 2010; Cole et al. 2024). Birdwatching can be considered among the several recreational activities that take place at coastal Patagonian cities, with a special emphasis at seabird breeding sites (Yorio et al. 2001). Still, a very low percentage of coastal users – both residents and tourists – are known for engaging in birdwatching activities at a local (Failla et al. 2015) or even at a national scale.

Coastal users' knowledge about a group of pre-selected wild birds

Over two thirds of the respondents (69.5%, n = 389 respondents) claimed acknowledging all species included within the offered photographs (see Figure 2). Fewer respondents stated not being able to identify them (5%). Besides, the overall percentage of bird species misidentification among respondents was very low (0.3%-10.5%, n = 379). Hence, the overall mismatch between the official name of a pre-selected species and the name given by surveyed respondents was very low. This may indicate that coastal users pay attention to certain wild avian fauna in coastal settings of the Rio Negro Province, may deceive certain birds by name and have information and/or education to strongly differentiate species. The Kelp gull, the Magellanic penguin, the Chilean flamingo and the Burrowing parrot were the four species most recognised in the survey among a group of pre-selected species (84%-91%, n = 379). Certain attributes previously commented like colour (35%), beauty (8.4%) and behavior (6.3%), may have favoured their selection by surveyed respondents. Another explanation may be their relative abundance and statuses, as all these species are abundant, permanent residents and confirmed breeders at the provincial scale (Povedano 2016). At a national level, the San Matías Gulf hosts (in terms of breeding pairs) 5.3% of the Kelp gull population, 2.1x10-4% of the Magellanic penguin population and 1.3% of the Burrowing parrot population (Schiavini et al. 2005; Yorio et al. 2005; Masello et al. 2006). The number of generations these species have been present in the study area coupled with the time of settlement of several villages along the coast of Rio Negro Province cannot be ruled out. For example, dozens or more generations of birds from these pre-selected species have used the San Matías Gulf as nesting site (Yorio et al. 2005; Masello et al. 2006). The oldest coastal settlement included within the study area – San Antonio Oeste – dates back 120 years ago. Still, the selection of local, charismatic species tends to be governed by local cultural, religious and social values site (Kellert 1986); some of these values were explored in this study.

Interestingly, the least recognised species by participants included the Brown oystercatcher and the Chimango caracara. On one hand, the Chimango caracara was misidentified as the Red-backed hawk; whereas in the case of the Brown oystercatcher, this species was wrongly portrayed as the Black-necked stilt. All these species are widely distributed in Argentina and in the Rio Negro Province (Povedano 2016). The relatively similar plumage coloration between these pairs of species may have played a key role in the misidentification among surveyed coastal users. Regardless, common, urban and most noticeable species were identified, whereas less conspicuous and/or cryptic species were miss-identified; this was somehow expected.

The survey confirmed that sandy beaches (31%, n = 375 respondents) and cliffs (22.6%) were highlighted as regular areas in which to spot overall pre-selected species, though the perception on the spatial use by these birds varied on a species basis. Interestingly, in the San Antonio Bay, the coast of the sea is the main habitat used by both residents and migrant wild birds (Llanos et al. 2011). In our study, three

species (i.e. Kelp gull, Magellanic penguin and Brown oystercatcher) were assigned to environments like sandy beaches and cliffs, while two species were allocated to the marsh environment (i.e. Chimango caracara and Chilean flamingo) and a single species (i.e. Burrowing parrot) was classified as pertaining to the cliff environment (Table 4). Such environments are regularly used by these pre-selected species both at a local (Llanos et al. 2011) and at a regional scale (Povedano 2016). This strongly suggests that coastal users have information or education to actively depict the environment use by a pre-selected group of birds. However, the knowledge concerning the residence status of a pre-selected group of birds was unevenly distributed among respondents. This was somehow expected as nesting grounds for birds in the whole area of San Antonio Bay are spatially located on Novaro Island and Canal Escondido Islet, two small islands deep into the bay away from roads and human activities. Besides, both Novaro Island and Canal Escondido Islet encompasses one of the intangible zones within the San Antonio Bay, meaning that no human activities except monitoring and scientific research are allowed within this management unit (Gobierno de la provincia de Río Negro 2014). In spite of the ambiguity mentioned earlier, the survey indicated that users were highly aware of the main nest constituents of a pre-selected group of birds, with sticks and twigs (ca. 50%, n = 236 respondents) followed by algae (12.4%) being the predominant types of nest constituents as per the respondents' answers (Table 4). These nest materials have been previously reported by other authors (Yorio and García-Borboroglu 2002; de la Peña 2015) for the same species assessed by coastal users. The influence of the socio-demographic profile on these metrics was highly variable among species within the group of pre-selected wild birds (Table SM3), hence the difficulty in establishing a clear pattern. Still, chiefly the Kelp gull and the Magellanic penguin, among the other species listed as a pre-selected group of wild birds, were significantly affected by overall explanatory variables derived from the surveyors profile. This can be explained by a considerate experience and/or the familiarity with these two bird species given that the bulk of the surveyed users was restricted to the Rio Negro Province, whom concomitantly selected certain traits of the birds (e.g. coloration, gorgeousness, and behavior) which in turn are considered abundant, permanent residents and established breeders at the provincial scale (Schiavini et al. 2005; Yorio et al. 2005; Povedano 2016).

Awareness regarding the protection of the coastal environment and its birds

In this study, surveyed coastal users were highly aware (65.5%, n = 368 respondents) of attending a coastal setting included within a natural protected area. This can be explained by the fact that the whole San Antonio Bay – where this study was performed – was declared a Natural Protected Area over three decades ago by Provincial Law N° 2670/1993. Besides, surveyed respondents -regardless of their residence status, gender or age- granted as relatively important the coexistence between birds and social activities on the Rio Negro coast. The same was true for the self-perceived importance of a beach for the sustenance of wildlife including wild birds. Still, nearly half of the surveyed coastal users (46%, n = 387 respondents) was aware of the level of protection nesting areas of wild birds on the Rio Negro coast (Table 5). This can be explained by a combination of the spatially constrained location of birds' breeding colonies along with the absence of proper signaling messages about this issue at the study area scale (authors, personal comment). Following proper interpretative sign design techniques may assist in enhancing the education on beach users regarding beach-nesting birds (Ormbsy and Forys 2010). Interestingly, extant research and educational efforts toward bird ecology and conservation at the local scale have been largely focused against wintering shorebirds, particularly sandpipers and plovers (González et al. 2004; D'Amico et al. 2014). In fact, the SABNPA has been recently listed within the National Plan of Conservation – Shorebirds. Some recent studies are centred on the behavioural and breeding ecology of the Burrowing Parrott nesting in Las Grutas (Amione et al. 2024). Likewise, in El Cóndor, located 200 km east of San Antonio Bay, efforts were directed toward the largest breeding colony of C. patagonus (Masello and Quillfeldt 2004).

In spite of visiting nesting areas not being a major interest among surveyed respondents (mean Likert value: 1.40 ± 0.66), our study indicates that men do visit this area more regularly when compared to women (CLM z = 0.259, $p < 0.05$) (Table 2). This study cannot indicate the basis for the difference, but a study on anthropogenic debris incorporated into nests of the Kelp Gull breeding in Novaro Island, showed that fisheries followed by recreational activities were the main source of marine debris on the beaches surrounding the colony (Seco Pon and Pereyra 2021). Likewise, the latter study cannot discern the gender from which the encountered anthropogenic debris derived, but it is well known that men are regularly engaged in fishing activities at a local scale (Caille 1996). Thus, monitoring activities like the

Bång 4. Respondents' acknowledgement regarding several features about a pre-selected group of wild birds within one of dimensions (Specific knowledge about a pre-selected group of wild birds) included in our survey. KG: Kelp gull, MP: Magellanic penguin; CF: Chilean flamingo; CC: Chimango caracara; BO: Brown oystercatcher; BP: Burrowing parrot. In parenthesis is the number of respondents.

Variable	KG (%)	MP (%)	CF (%)	CC (%)	BO (%)	BP (%)
Recognition of listed species (n = 363)						
Positive	83.80	91.00	87.40	38.56	27.50	88.94
Negative	13.88	8.22	9.51	52.95	58.35	9.76
No answer	2.31	0.77	3.08	8.48	14.13	1.28
Acknowledgement of areas/sites where to observe listed species (n = 375)						
Sandy beach	39.25	26.37	31.65	17.90	49.71	13.89
Cobble beach	16.04	24.13	17.08	14.86	11.86	6.69
Cliff	16.19	19.15	7.28	25.67	10.45	59.05
Shell beach	19.05	15.67	5.88	9.12	20.05	3.22
Marsh	9.45	14.67	38.09	32.43	7.90	17.12
Awareness regarding the residence status of listed species (n = 378)						
Aware	73.01	32.53	28.83	37.56	48.15	73.01
Not aware	1.05	21.69	10.31	5.02	0.79	2.11
Not sure	25.92	45.76	60.84	57.40	51.05	24.86
Acknowledgement of nest material used by listed species (n = 236)						
Sticks and twigs	44.44	37.87	42.33	73.03	33.91	62.22
Algae	20.94	10.10	20.43	2.24	21.63	1.77
Shelves	9.40	13.63	6.56	1.68	26.90	1.77
Artificial debris	14.10	4.04	0.72	14.04	5.26	5.33
None	11.11	34.34	29.92	8.98	12.28	28.88

latter referred when performed by males should be strengthened in intangible zones by the management and control body of the natural protected areas. Based on our results, coastal users were highly aware (88%) of a group of birds feeding or resting on the shoreline, with their main response being distancing far away while walking (Table 5). Our findings are in line with those of other studies in different social and ecological contexts (Ormbsy and Forys 2010), including in Argentina (Hevia et al. 2023). Staying away from groups of wild birds should enhance the feeding and breeding prospects of those attending the beach area (Stillman and Goss-Custard 2002; Yasué 2006; Comber and Dayer 2024). Still, changes in the behavioural and reproductive response of wild birds to human disturbance are scarce at the local scale, but see a study case in Las Grutas (Amione et al. 2024). Finally, coexistence between birds and social activities on the Rio Negro coast was considered of relative mean importance for the majority of the respondents (mean Likert value: 3.48 ± 1.14). The perception of this is metric was not affected by any explanatory variables (CLM, all $p < 0.05$) (Table 2).

Bång 5. Respondents´ perception regarding some issues related to one of the dimensions (Knowledge regarding the protection of the coastal environment and its birds) included in our survey. In parenthesis is the number of respondents.

Variable	%
Attitude toward a feeding or resting group of birds (n = 385)	
Try to get as far away as the respondent can	88.05
Do not mind disturbing them	7.53
Not to avoid them neither get closer	4.41
Awareness regarding the level of protection of bird colonies (n = 387)	
Aware	46.51
Not aware	20.51
Not sure	33.33

CONCLUSION

Over the last half century, the human view of nature protection has shifted gradually from an 'anthropocentric' view towards a 'nature for people', and more recently entered a new stage of 'nature and people' (Constanza et al. 1997; Mace 2014). In this sense, for nature's contribution to people to be truly ensured it is paramount the integration of biodiversity and its conservation in the governance of human societies (Díaz et al. 2018; Cumming et al. 2023). This is particularly pressing as the management of NCPs may impact on the well-being of human societies, given that up to 5 billion people can be at risk from lowered NCPs (Chaplin-Kramer et al. 2019). Hence, our study is not only innovative but also timely, as up to our knowledge, this is the first approach to a quantitative valuation of certain contemporary non-material benefits of wild birds (like spiritual values, recreation including bird watching, and bird conservation) in a natural protected area in the Rio Negro Province, northern Argentine Patagonia, a province that has undergone a 18% increment in its inhabitants in the last decade (INDEC 2022). Further, this study provides novel information as to the effect of the respondent's profile on the perception of wild coastal birds in the target area, and elsewhere along the Argentine maritime coastline. Few perceptions regarding some topics within the explored dimensions vary according to the coastal users' profile, with overall surveyed users being highly aware of the wild bird diversity of the coasts of the Rio Negro Province, and their knowledge seemed fairly similar when considering aquatic and non-aquatic birds. The main birds' attraction to coastal users included their colours, songs and behaviours, with large and brightly coloured birds strongly selected among coastal users. These birds may have a potential positive health effects among surveyed users as they exert feelings like freedom and peace. Studies such as this generate bottom-up information readily available to assist in understanding coastal users' profiles about wild birds. Addressing social valuation of natural resources like birds linked to the responsible and sustainable use of the environment within this natural protected area should include the opinions and attitudes of other users (e.g. owners and personnel of adjacent commercial and public facilities, lifeguards, anglers, among others), as these may also assist in improving the local environment plan along with assisting managers and stakeholders to identify key species in environmental policy to be implemented.

The results of this study may aid the Management Plan of the San Antonio Bay Natural Protected Area (Giaccardi and Reyes 2012), as well as the city council in addressing issues related to users' perception of natural resources like wild coastal birds in the surrounding areas. In particular, our results may assist in a better understanding of the state of the birds inhabiting the natural protected area - with a focus on a provincial scale - and could be used to improve local administration management and to augment the effectiveness of interpretative sign design for enhancing awareness on beach users regarding beach attending birds. This is particularly relevant as there is currently a weak legal arena in terms of regulation or policies regarding the improvement of the coastal scenery, thus limiting the management of the protected area (Morea 2019). Moreover, the wildlife inhabiting this area were declared of public interest almost forty years ago. Our survey may allow the establishment of a baseline of coastal users' perception regarding wild birds and thus the evaluation of variation in such metrics over time.

Although the coastal biomes of the Río Negro Province currently provide an outstanding bird diversity when compared to other areas locally, few studies have address a management question (but see Sánchez et al. 2016; Amione et al. 2024). In this sense, our results highlighted the need to include human dimensions and attitudes in biodiversity plans (Bocchi 2024). Thus, our study will ultimately aid in broadening the Management Plan of the San Antonio Bay Natural Protected Area addressing the user behavior against wild birds while attending this protected coastal area.

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DATA AVAILABILITY

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

CONTRIBUTION STATEMENT

Conceived of the presented idea: JPSP.
Carried out the experiment: LLDA, VMP, ATG, PJP.
Carried out the data analysis: JPSP, MPB, LLDA, VMP.
Wrote the first draft of the manuscript: JPSP.
Review and final write of the manuscript: LLDA, VMP, ATG, MPB, PJP.
Supervision: JPSP, PJP.

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Additional Files

Add File 1. Contribution (in percentage) of birds' orders and families to the knowledge of wild bird diversity among surveyed coastal users. Overall contribution per order is highlighted in bold.

Order	Family	%
Charadriiformes	Laridae	26.56
	Charadriidae	4.91
	Scolopacidae	4.02
	Haematopodidae	2.23
	Total	**37.72**
Psittaciformes	Psittacidae	**19.20**
Sphenisciformes	Spheniscidae	**8.93**
Phoenicopteriformes	Phoenicopteridae	**8.71**
Anseriformes	Anatidae	**5.14**
Falconiformes	Cathartidae	1.56
	Accipitridae	0.45
	Falconidae	3.13
	Total	**5.14**
Passeriformes	Furnariidae	0.45
	Mimidae	0.89
	Emberizidae	1.12
	Tyrannidae	0.22
	Icteridae	0.67
	Turdidae	1.34
	Icteridae	0.45
	Total	**5.14**
Columbiformes	Columbidae	**4.24**
Procellariiformes	Diomedeidae	1.12
	Procellaridae	0.90
	Total	**2.02**
Pelecaniformes	Phalacrocoracidae	**1.56**
Strigiformes	Strigidae	**1.34**
Rheiformes	Rheidae	**0.45**
Ardeiformes	Ardeidae	**0.22**
Piciformes	Picidae	**0.22**

Add File 2. Contribution (in percentage) of natural and non-natural sites or locations to knowledge of surveyed coastal users about nesting areas of wild birds in the Río Negro Province.

Variable	**%**
Natural features or structures	
Cliff	57.69
Sandy beach	4.48
Shell beach	3.80
Island	1.28
Locations or areas	
Las Grutas	17.94
El Cóndor	4.48
Caleta los Loros	1.92
Punta Verde	1.28
San Antonio Oeste	7.05

Add File 3. Relationship of predictor variables pertaining to the respondent's profile on the users' perception about several topics within one dimension (e.g. users' knowledge about a group of pre-selected wild birds) included in our survey. In all models, male (gender), from Buenos Aires Province (place of residence) and elemental education (primary education level) were set as reference variables. In parenthesis is the number of respondents. Significant values are depicted in bold.

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Kelp gull	Recognition of the species (n = 375)	Age		0.01 ± 0.00	**2,089**	**0,036**
		Gender	Female	0.39± 0.18	**2,168**	**0,03**
		Place of residence	From Rio Negro Province	-0.03± 0.25	-0,137	0,89
			Not from Rio Negro or Buenos Aires provinces	-0.57 ± 0.27	**-2,115**	**0,034**
		Education level	Secondary	0.24 ± 0.29	0,849	0,395
			Technical	0.86 ± 0.34	**2,531**	**0,011**
			University	0.54 ± 0.31	1,749	0,08
	Acknowledgement of areas/ sites where to observe the species (n = 375)	Age		0.00 ± 0.00	0,206	0,836
		Gender	Female	0.65 ± 0.15	**2,423**	**0,015**
		Place of residence	From Rio Negro Province	0.21 ± 0.19	1,133	0,257
			Not from Rio Negro or Buenos Aires provinces	-0.26 ± 0.20	-1,261	0,207
		Education level	Secondary	0.06 ± 0.25	0,25	0,802
			Technical	0.02 ± 0.26	0,078	0,937
			University	0.02 ± 0.26	0,113	0,909
	Awareness regarding the residence status of the species (n = 294)	Age		0.00 ± 0.00	0,777	0,437
		Gender	Female	-0.00 ± 0.19	-0,039	0,968
		Place of residence	From Rio Negro Province	-0.12 ± 0.27	-0,441	0,659
			Not from Rio Negro or Buenos Aires provinces	-0.03 ± 0.29	-0,113	0,909
		Education level	Secondary	0.02 ± 0.26	-0,132	0,894
			Technical	-0.04 ± 0.33	-1,04	0,298

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
			University	-0.37 ± 0.36	-0,894	0,371
Magellanic penguin	Acknowledgement of nest material used by the species (n = 375)	Age		-0.00 ± 0.00	**-2,008**	**0,044**
		Gender	Female	0.18 ± 0.13	1,335	0,181
		Place of residence	From Rio Negro Province	0.48 ± 0.19	**2,528**	**0,011**
			Not from Rio Negro or Buenos Aires provinces	0.08 ± 0.20	0,394	0,693
		Education level	Secondary	0.14 ± 0.24	0,589	0,555
			Technical	0.25 ± 0.25	0,996	0,319
			University	0.39 ± 0.25	1,567	0,117
	Recognition of the species (n = 382)	Age		-0.01 ± 0.00	-1,778	0,075
		Gender	Female	0.37 ± 0.20	1,8	0,071
		Place of residence	From Rio Negro Province	0.42 ± 0.24	1,74	0,081
		Place of residence	Not from Rio Negro or Buenos Aires provinces	0.39 ± 0.27	1,441	0,149
		Education level	Secondary	0.47 ± 0.24	1,566	0,117
			Technical	0.83 ± 0.34	**2,422**	**0,015**
			University	0.65 ± 0.32	**2,035**	**0,041**
	Acknowledgement of areas/ sites where to observe the species (n = 382)	Age		-0.00 ± 0.00	-1,02	0,307
		Gender	Female	0.03 ± 0.14	0,272	0,785
		Place of residence	From Rio Negro Province	0.31 ± 0.18	1,636	0,101
			Not from Rio Negro or Buenos Aires provinces	0.22 ± 0.20	1,088	0,276
		Education level	Secondary	0.04 ± 0.24	0,177	0,859
			Technical	0.51 ± 0.26	1,951	0,051
			University	0.57 ± 0.25	**2,242**	**0,025**

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Chilean flamingo	Awareness regarding the residence status of the species (n = 227)	Age		0.00 ± 0.00	0,274	0,783
		Gender	Female	-0.42 ± 0.18	**-2,347**	**0,018**
		Place of residence	From Rio Negro Province	-0.08 ± 0.25	-0,335	0,737
			Not from Rio Negro or Buenos Aires provinces	-0.15 ± 0.29	0,515	0,606
		Education level	Secondary	-0.12 ± 0.32	-0,367	0,714
			Technical	-0.58 ± 0.36	-1,614	0,106
			University	-0.35 ± 0.34	-1,022	0,306
	Acknowledgement of nest material used by the species (n = 382)	Age		-0.00 ± 0.00	-1,673	0,094
		Gender	Female	0.12 ± 0.13	0,882	0,377
		Place of residence	From Rio Negro Province	0.35 ± 0.18	1,946	0,051
			Not from Rio Negro or Buenos Aires provinces	0.05 ± 0.20	0,267	0,789
		Education level	Secondary	0.54± 0.25	**2,104**	**0,035**
			Technical	0.79 ± 0.27	**2,951**	**0,003**
			University	0.74 ± 0.26	**2,808**	**0,004**
	Recognition of the species (n = 383)	Age		-0.01 ± 0.00	-1,700	0,089
		Gender	Female	-0.19 ± 0.17	-1,104	0,269
		Place of residence	From Rio Negro Province	0.10 ± 0.23	0,418	0,675
			Not from Rio Negro or Buenos Aires provinces	0.09 ± 0.26	0,378	0,705
		Education level	Secondary	0.07 ± 0.29	0,268	0,788
			Technical	0.25 ± 0.32	0,794	0,427
			University	-0.04 ± 0.30	-0,133	0,893

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
	Acknowledgement of areas/ sites where to observe the species (n = 383)	Age		-0.00 ± 0.00	-0,885	0,376
		Gender	Female	-0.09 ± 0.14	0,651	0,515
		Place of residence	From Rio Negro Province	0.32 ± 0.19	1,71	0,087
			Not from Rio Negro or Buenos Aires provinces	-0.10 ± 0.20	-0,497	0,619
		Education level	Secondary	0.03 ± 0.24	0,154	0,877
			Technical	0.32 ± 0.26	1,233	0,217
			University	0.25 ± 0.25	1,001	0,316
	Awareness regarding the residence status of the species (n = 161)	Age		0.00 ± 0.00	0,758	0,448
		Gender	Female	-0.19 ± 0.23	-0,836	0,403
		Place of residence	From Rio Negro Province	0.68 ± 0.38	1,77	0,076
			Not from Rio Negro or Buenos Aires provinces	0.61 ± 0.41	1,473	0,14
		Education level	Secondary	0.90 ± 0.56	1,623	0,104
			Technical	0.60 ± 0.58	1,045	0,296
			University	1.48 ± 0.56	**2,632**	**0,008**
	Acknowledgement of nest material used by the species (n = 383)	Age		0.00 ± 0.00	1,533	0,125
		Gender	Female	0.00 ± 0.14	0,054	0,956
		Place of residence	From Rio Negro Province	-0.35 ± 0.19	-1,801	0,071
			Not from Rio Negro or Buenos Aires provinces	-0.26 ± 0.21	-1,244	0,213
		Education level	Secondary	-0.49 ± 0.27	**-1,766**	**0,077**
			Technical	-0.66 ± 0.28	**-2,284**	**0,022**
			University	-0.60 ± 0.28	**-2,123**	**0,033**

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Chimango caracara	Recognition of the species (n = 348)	Age		0.00 ± 0.00	0,391	0,695
		Gender	Female	-0.44 ± 0.14	**-3,058**	**0,002**
		Place of residence	From Rio Negro Province	0.23 ± 0.19	1,195	0,231
			Not from Rio Negro or Buenos Aires provinces	-0.33 ± 0.22	-1,473	0,14
		Education level	Secondary	0.43 ± 0.25	1,746	0,08
			Technical	0.37 ± 0.18	**2,027**	**0,042**
			University	0.37 ± 0.17	**2,107**	**0,035**
	Acknowledgement of areas/ sites where to observe the species (n = 382)	Age		-0.00 ± 0.00	-0,425	0,67
		Gender	Female	0.01 ± 0.13	0,086	0,932
		Place of residence	From Rio Negro Province	0.21 ± 0.18	1,177	0,239
			Not from Rio Negro or Buenos Aires provinces	-0.12 ± 0.19	-0,651	0,515
		Education level	Secondary	-0.25 ± 0.23	-1,056	0,291
			Technical	0.16 ± 0.17	0,959	0,122
			University	0.25 ± 0.16	1,547	0,338
	Awareness regarding the residence status of the species (n = 156)	Age		0.00 ± 0.00	-0,329	0,743
		Gender	Female	-0.37 ± 0.30	-1,222	0,222
		Place of residence	From Rio Negro Province	0.45 ± 0.35	0,013	0,99
			Not from Rio Negro or Buenos Aires provinces	0.54 ± 0.35	0,015	0,988
		Education level	Secondary	0.47 ± 0.39	0,012	0,99
			Technical	0.51 ± 0.39	0,013	0,99
			University	0.48 ± 0.38	0,012	0,99

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Brown oystercatcher	Acknowledgement of nest material used by the species (n = 382)	Age		-0.00 ± 0.00	-1,427	0,153
		Gender	Female	-0.13 ± 0.13	-0,993	0,32
		Place of residence	From Rio Negro Province	0.44 ± 0.18	**2,353**	**0,018**
			Not from Rio Negro or Buenos Aires provinces	0.10 ± 0.20	0,511	0,609
		Education level	Secondary	-0.33 ± 0.24	-1,357	0,174
			Technical	0.02 ± 0.17	0,134	0,893
			University	0.00 ± 0.16	0,031	0,975
	Recognition of the species (n = 328)	Age		0.01 ± 0.00	**2,981**	**0,002**
		Gender	Female	0.16 ± 0.15	1,033	0,301
		Place of residence	From Rio Negro Province	0.71 ± 0.22	**3,127**	**0,001**
			Not from Rio Negro or Buenos Aires provinces	-0.29 ± 0.27	-1,076	0,282
		Education level	Secondary	-0.03 ± 0.26	-0,124	0,901
			Technical	-0.04 ± 0.27	-0,018	0,985
			University	0.13 ± 0.27	0,489	0,624
	Acknowledgement of areas/ sites where to observe the species (n = 382)	Age		-0.00 ± 0.00	-0,212	0,832
		Gender	Female	0.13 ± 0.13	0,966	0,334
		Place of residence	From Rio Negro Province	0.18 ± 0.18	0,998	0,318
			Not from Rio Negro or Buenos Aires provinces	-0.44 ± 0.20	**-2,195**	**0,028**
		Education level	Secondary	0.42 ± 0.24	1,776	0,075
			Technical	0.54 ± 0.25	**2,128**	**0,033**
			University	0.80 ± 0.25	**3,194**	**0,001**

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
Burrowing parrot	Awareness regarding the residence status of the species (n = 180)	Age		-0.01 ± 0.02	-0,755	0,45
		Gender	Female	0.01 ± 0.58	0,031	0,975
		Place of residence	From Rio Negro Province	-0.40 ± 0.59	-0,671	0,502
			Not from Rio Negro or Buenos Aires provinces	-0.47 ± 0.35	-0,005	0,996
		Education level	Secondary	-0.17 ± 0.18	0	1
			Technical	0.46 ± 0.17	0,003	0,998
			University	0.41 ± 0.17	0,002	0,997
	Acknowledgement of nest material used by the species (n = 382)	Age		0.00 ± 0.00	1,69	0,091
		Gender	Female	-0.28 ± 0.14	**-1,991**	**0,046**
		Place of residence	From Rio Negro Province	-0.41 ± 0.19	**-2,144**	**0,032**
			Not from Rio Negro or Buenos Aires provinces	0.11 ± 0.21	0,541	0,588
		Education level	Secondary	-0.38 ± 0.26	-1,463	0,143
			Technical	-0.42 ± 0.27	-1,546	0,122
			University	-0.55 ± 0.26	**-2,063**	**0,039**
	Recognition of the species (n = 377)	Age		0.00 ± 0.00	-0,051	0,959
		Gender	Female	-0.20 ± 0.19	-1,056	0,291
		Place of residence	From Rio Negro Province	0.59 ± 0.24	**2,444**	**0,014**
			Not from Rio Negro or Buenos Aires provinces	0.02 ± 0.24	0,112	0,91
		Education level	Secondary	0.52 ± 0.31	1,666	0,095
			Technical	0.56 ± 0.33	1,699	0,089
			University	0.38 ± 0.31	1,219	0,222

Species	Variable	Explanatory variable	Category	Estimate (± SD)	z	P
	Acknowledgement of areas/ sites where to observe the species (n = 377)	Age		0.00 ± 0.00	0,723	0,469
		Gender	Female	-0.06 ± 0.15	-0,394	0,693
		Place of residence	From Rio Negro Province	0.46 ± 0.20	**2,237**	**0,025**
			Not from Rio Negro or Buenos Aires provinces	-0.13 ± 0.21	-0,606	0,544
		Education level	Secondary	0.42 ± 0.25	1,649	0,099
			Technical	0.66 ± 0.28	**2,364**	**0,018**
			University	0.65 ± 0.27	**2,395**	**0,016**
	Awareness regarding the residence status of the species (n = 279)	Age		-0.03 ± 0.01	-1,906	0,056
		Gender	Female	-0.68 ± 0.46	-1,464	0,143
		Place of residence	From Rio Negro Province	0.44 ± 0.85	0,005	0,995
			Not from Rio Negro or Buenos Aires provinces	0.61 ± 0.85	0,007	0,994
		Education level	Secondary	-0.50 ± 0.10	-0,005	0,996
			Technical	-0.33 ± 0.45	-0,736	0,461
			University	-0.35 ± 0.38	-0,012	0,99
	Acknowledgement of nest material used by the species (n = 377)	Age		0.00 ± 0.00	0,864	0,387
		Gender	Female	-0.02 ± 0.13	-0,174	0,861
		Place of residence	From Rio Negro Province	-0.25 ± 0.18	-1,41	0,158
			Not from Rio Negro or Buenos Aires provinces	0.03 ± 0.20	0,16	0,873
		Education level	Secondary	-0.48 ± 0.24	**-2,011**	**0,043**
			Technical	-0.61 ± 0.25	**-2,387**	**0,017**
			University	-0.45 ± 0.25	-1,827	0,067