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KELP GEESE (*CHLOEPHAGA HYBRIDA*) AND FLIGHTLESS STEAMER-DUCKS (*TACHYERES PTENERES*) IN THE BEAGLE CHANNEL: THE IMPORTANCE OF ISLANDS IN PROVIDING NESTING HABITAT

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ABSTRACT.—We describe the nest-site characteristics and breeding habitat use of Kelp Geese (*Chloephaga hybrida*) and Flightless Steamer-Ducks (*Tachyeres pteneres*) along 137 km of coastline on the northern shore of the Beagle Channel, Argentina, and 87 km of island coastline. We examined the importance of vegetation cover, predation, and tourism on the distribution of nests among islands. We found all nests only on islands and islets. Nesting sites for both species were strongly associated with higher proportions of high vegetation cover (shrubs). Kelp Geese were also associated with the absence of terrestrial predators. Tourist presence on islands was not associated with the occurrence of nests for either species. The northern coasts of the Beagle Channel and the islands and islets along the channel have similar habitat types. However, the islands and islets are relatively inaccessible to mammalian terrestrial predators compared to the coast of the channel where terrestrial predators are frequently recorded. Therefore, islands and islets seem to provide a relatively safe nesting habitat for Kelp Geese and Flightless Steamer-Ducks by offering refuge mainly from ground predators. Additionally, habitat changes caused by increased human disturbance along the northern shore of the Beagle Channel may also explain the presence of nests only on islands and islets, though further studies are needed to assess these effects. This study contributes new information on the breeding habitat and nesting sites of Flightless Steamer-Ducks and Kelp Geese in the Beagle Channel, to assist in the identification of priority breeding sites and habitats to protect. Also, it highlights the importance of islands and islets of the Beagle Channel as safe breeding refuge for these two ground nesting seabirds. *Received 10 February 2013. Accepted 19 April 2013.*

Key words: Beagle Channel, Flightless Steamer-Duck, islands, Kelp Goose, nesting habitat.

Birds select their breeding habitat based on factors that determine its quality, such as food resources, presence of predators, and microclimate (Bried and Jouventin 2002). For most species, breeding habitat must be located close to abundant food resources, provide adequate nesting substrate, and offer protection against predators (Furness and Monaghan 1987, García Borboroglu and Yorio 2004, Yasué 2006). From a conservation perspective, the determination of nesting habitat characteristics can be used to identify environments and habitat features to protect. This information is also critical for developing conservation strategies and effective management plans.

Most seabirds nest in relatively inaccessible sites in order to avoid or minimize the risk of ground predators and human disturbance (Partridge 1978, Buckley and Buckley 1980, García Borboroglu and Yorio 2007, Agüero et al. 2010). Additionally, many species nest in areas with greater vegetation cover which offers the advantage of increased concealment against predators and other benefits (Clark and Nudds 1991, Butler and Rotella 1998, Opermanis et al. 2001). Mammalian terrestrial predators represent an important threat for ground nesting coastal birds along the Beagle Channel, Tierra del Fuego. The introduced American mink (*Neovison vison*) and South American grey fox (*Pseudalopex griseus*), together with the native southern river otter or huillín (*Lontra provocax*), and the Fuegian culpeo fox (*Pseudalopex culpaeus lycoides*) are predators that have been recorded along the coast of the Beagle Channel (Atalah et al. 1980, Massoia and Chébez 1993, Lizarralde and Escobar 2000, Gomez et al. 2010, Valenzuela et al. 2013a). A recent study on the impact of the American mink on ground nesting seabirds on Navarino Island (south of the Beagle Channel) found that those species nesting solitarily, in coastal habitat with rocky outcrop shorelines and concealed nests, such as Kelp Geese (*Chloephaga hybrida*) and Flightless Steamer-Ducks (*Tachyeres pteneres*), were the most vulnerable to mink predation (Schüttler et al. 2009). On the Isla Grande de Tierra del Fuego (IGTF), along the

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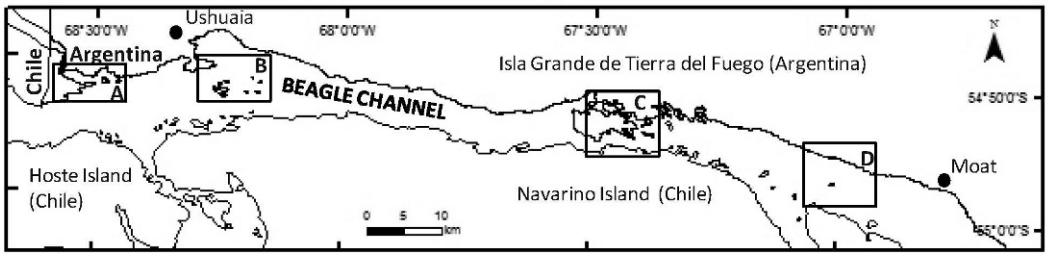

FIG. 1. Map showing study area, which included the coastline of the Isla Grande de Tierra del Fuego (IGTF) from the border with Chile in the west to Estancia Moat in the east, and 36 of the 45 islands and islets of the Argentine sector of the Beagle Channel.

northern coast of the Beagle Channel, Gomez et al. (2010) reported sea birds being a secondary prey in the mink's diet, though Valenzuela et al. (2013b) showed that in sympatry with the huillín, mink depend more on terrestrial prey.

The Argentinean coast of the Beagle Channel is currently subject to increasing human activity, including urban expansion, tourism, recreational activities and livestock grazing. The excursion to islands along the channel, mainly to observe breeding seabird colonies, is one of the main tourist attractions for people visiting Tierra del Fuego. Though the number of tour boats has increased markedly over the past years, their effect on nesting seabirds is poorly known, with the exception of a few studies on cormorants (Rosciano et al. 2013). Boats can approach the seabird colonies up to 10 m, and on a few islands, tourists are allowed to land (Schiavini and Yorio 1995). However, some islands and islets remain outside the regular tourist circuits.

The Kelp Geese and the Flightless Steamer-Ducks are strictly coastal species distributed from south-central Chile to Tierra del Fuego (Carboneras 1992). They nest solitarily and are frequently encountered along the Beagle Channel. Previous studies of these species in the channel provide qualitative records, recording species along the coast and describing their foraging and reproductive behavior (Humphrey et al. 1970, Weller 1975, Clark 1984), and most recently Raya Rey and Schiavini (2002) focused on their distribution and density along the channel. However, there is little information on the habitat requirements of these species during the breeding season. In this study, we describe nest site characteristics and the nesting habitat of Kelp Geese and Flightless Steamer-Ducks breeding along the Beagle Channel. Also, we examine the importance of vegetation cover, predation, and tourism on the distribution of nests among islands. We hypothesized that the presence of nests would be associated with islands with higher vegetation cover and absence of predators and tourists.

METHODS

Study Area.—The Beagle Channel is located at the southern tip of South America (54° S), within the Fuegian Archipelago, and extends in an east-west direction along the southern coast of the Isla IGTF, the largest island in the archipelago. Our study area included the Argentine coastline of the channel which extends along the IGTF for 220 km from the international border with Chile in the west to Estancia Moat in the east, and 36 of the 45 islands and islets of the Argentine sector of the channel (Fig. 1). The Argentine coastline of the Beagle Channel shows a rugged rocky shoreline with pocket gravel beaches that develop in the embayments (Bujalesky 2007). The typical habitats along the southern coast of the IGTF include: a) deciduous forests dominated by *Nothofagus pumilio* and *N. antarctica*, b) evergreen forests of *N. betuloides* and *Drimys winteri*, c) scrublands dominated by *Chilliotrichum diffusum* and *Berberis buxifolia*, d) grasslands, and e) peatlands and bogs dominated by *Sphagnum* spp. (Moore 1983). Habitats on the islands and islets of the Beagle Channel are similar: most islands have grasslands and scrublands dominated by *C. diffusum* and *B. buxifolia*, some of the islets are bare rock with no vegetation, and a few islands also have patches of evergreen forests of *N. betuloides* and *D. winteri* (Schiavini and Raya Rey 2001).

Nest surveys were conducted during the breeding season from November 2011–January 2012. Along the coast of the IGTF, we walked 1-km transects randomly selected in a strip 20–50 m inland, and parallel to the shore covering 137 km of the 220 km of coastline. We also

surveyed 36 islands and islets in the Beagle Channel covering the whole area of each island (87 km of island coastline, total area 231 ha). At each nesting site, we estimated average vegetation height and percentage of vegetation cover (tree, shrub, grass, or bare ground) within a 1-m radius around the nest. We also measured the distance to the nearest high-tide line, altitude above sea level, and slope of the substrate using a clinometer (Suunto type Tandem 360PC/360R).

The effect of three explanatory variables (vegetation cover, predator presence, and touristic activity) on the presence of nests for each species was assessed by generalized linear models (GLM). Because all nests were found exclusively on islands or islets (see Results), we studied island use in detail. Based on the habitat characteristics of nesting sites (see Results), we determined that the type of vegetation cover seemed to have the greatest ecological relevance for both species and used this habitat variable in the analysis. We analyzed habitat information from the 36 islands and islets surveyed. Using satellite images and field recognition, we assigned islands to one of two broad vegetation cover categories based on the dominant vegetation type: high vegetation or low vegetation cover. The ''high vegetation'' category included islands that had more than 40% of shrub vegetation, and the ''low vegetation'' category included islands with a higher percentage of grasses (which offer less nest concealment compared to shrubs) or of bare ground. Predator presence on islands and islets of the channel was assessed by means of the presence of signs (scats, tracks, sightings). Islands where signs of terrestrial predators were found were considered as ''predators-present'' islands, otherwise they were considered as ''predators-absent.'' Tourist activity was assessed assigning tourism as ''present'' in islands that are within the itinerary of tourist vessels and are either approached by these vessels or where tourists are allowed to land.

Statistical Analyses.—Two GLM analyses were conducted: the first used the presence of nests of Kelp Geese as the response variable, and the second used the presence of nests of Flightless Steamer-Ducks. We used a binomial family distribution and a logit link function (Crawley 2007). Both analyses included the following fixed effects: vegetation cover (low/high), predators (presence/absence of terrestrial predators), and tourism (presence/absence). Our candidate model set consisted of all additive combinations of our three explanatory variables and a null model resulting in eight candidate models. We used an information-theoretic approach to guide model selection. For each model in the candidate set, we calculated Akaike's Information Criteria corrected for small sample size (AIC_c) and Akaike weights (w_i) and used ΔAIC_c and w_i to infer model support. Models with lower AIC_c values have more support from the data (Burnham et al. 2011). Based on the entire model set, we calculated model-averaged parameter estimates, unconditional standard errors and 95% CI for each explanatory variable. To determine the relative importance of each explanatory variable within a candidate model set, we summed w_i for all candidate models containing the explanatory variable under consideration, producing parameter-likelihood values scaled from zero (not-supported) to one (well-supported). Statistical analyses were performed using R software (MASS, MuMIn and lme4 packages), version 2.13.2 (R Core Development Team 2009). All values indicated are mean ± standard error (SE), unless otherwise noted.

RESULTS

We found a total of 37 nests of Kelp Geese and 18 nests of Flightless Steamer-Ducks, all on islands and islets off the coast of the IGTF (Fig. 2). Average habitat attributes of nesting sites for each species are listed in Table 1. For both species, over 50% of the vegetation cover within a 1-m distance from the nest consisted of shrubs. Kelp Geese also nested within a high percentage of grass cover. Nests of Kelp Geese were generally found closer to the high-tide line and at a lower altitude than nests of Flightless Steamer-Ducks, but these differences were not significant (Wilcoxon rank sum test, both $P > 0.05$; Table 1). Slope of the substrate on which nests were built was similar for both species (Wilcoxon rank sum test, $P = 0.69$).

The best-supported model for describing variation in the presence of nests of Kelp Geese on islands contained the explanatory variables vegetation cover and predators (Table 2). The model containing vegetation cover, predators, and tourism also received substantial support. However, only vegetation cover and predators had large parameter likelihood values and 95% CI that did not include zero, indicating their importance for explaining variation in the presence of Kelp Geese nests (Table 3). Nests of Kelp Geese were present on islands with high vegetation cover and absence of predators. Tourist presence on islands offered

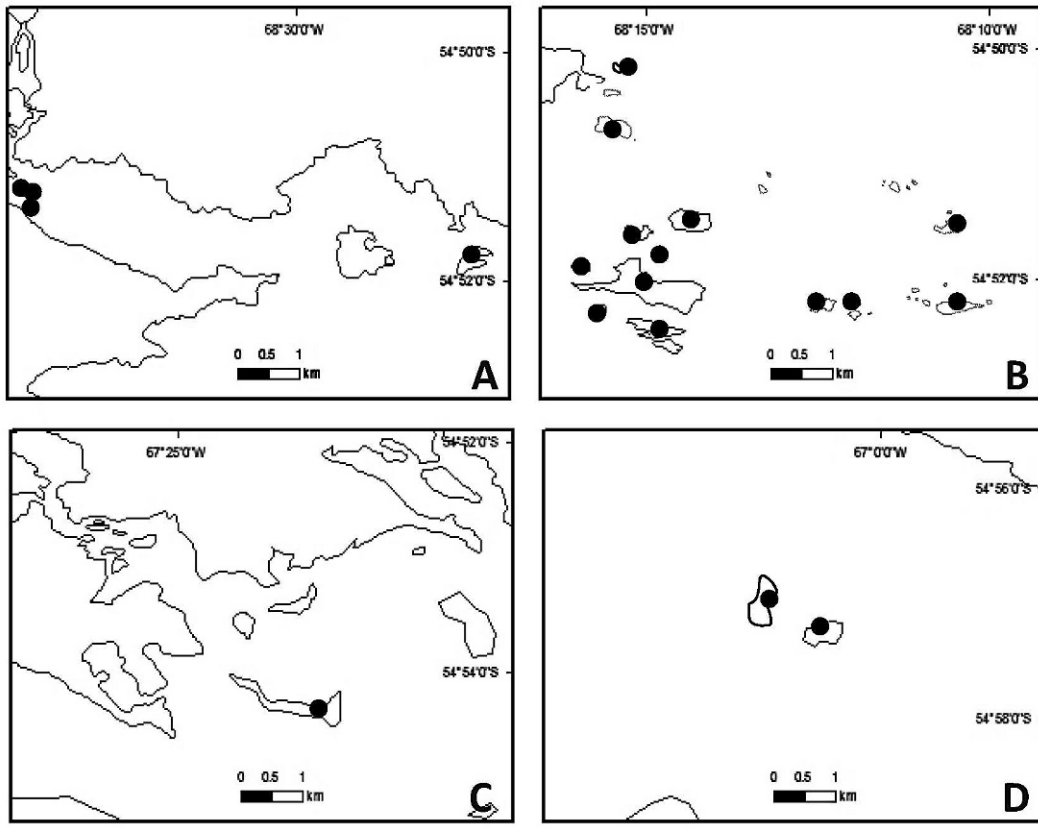

FIG. 2. Nests of Kelp Geese and Flightless Steamer-Ducks were found only on islands and islets of the Beagle Channel. A-D show in detail sectors of our study area (see Fig. 1) and black solid circles indicate islands and islets in which nests of Kelp Geese and Flightless Steamer-Ducks were present.

little value for explaining variation in the presence of nests of Kelp Geese (Table 3).

The only well-supported model to describe variation in the presence of nests of Flightless Steamer-Ducks on islands contained the explanatory variables of vegetation cover and tourism (Table 2). Both, vegetation cover and tourism had large parameter likelihood values (Table 3), but only vegetation cover had a 95% CI that did not include zero and was present in the top four models. The explanatory variable predators was not well-supported and its model-averaged parameter estimate has a SE larger in magnitude than the actual estimate (Table 3).

TABLE 1. Mean ± SE and, in parenthesis, minimum and maximum values of habitat attributes of nesting sites of Kelp Geese (n = 37) and Flightless Steamer-Ducks (n = 17).

Habitat characterisitics	Kelp Geese	Flightless Steamer Ducks
Tree cover within 1 m (%)	1.3 ± 1.3 (0, 50)	0 ± 0 (0, 0)
Shrub cover within 1 m (%)	53.4 ± 5.4 (0, 100)	84.1 ± 5.0 (50, 100)
Grass cover within 1 m (%)	34.6 ± 5.2 (0, 90)	12.3 ± 4.7 (0, 50)
Bare (%)	10.7 ± 3.4 (0, 100)	3.5 ± 3.0 (0, 50)
Distance to high-tide line (m)	11 ± 1.0 (1, 40)	17.1 ± 3.0 (2, 50)
Altitude above sea level (m)	4.6 ± 0.7 (0, 19)	6.4 ± 0.9 (2, 12)
Slope (degrees)	16.5 ± 1.3 (7, 43)	17.1 ± 1.7 (9, 35)

TABLE 2. Generalized linear models evaluating variation in the presence of nests of Kelp Geese and Flightless Steamer-Ducks on islands and islets of the Beagle Channel. K, number of estimated parameters; AIC_c, Akaike's information Criterion corrected for small samples; ΔAIC_c, differences in AIC_c; w_i, Akaike weight. All candidate models and the null model are presented, listed in decreasing order of ΔAIC_c. The explanatory variables are vegetation cover (low, high), predators (present, absent), and tourism (present, absent).

Response variable	Model	K	AIC_c	ΔAIC_c	w_i
Presence of	vegetation cover + predators	3	46.80	0.00	0.45
Kelp Goose	vegetation cover + predators + tourism	4	47.61	0.81	0.30
nests	vegetation cover	2	50.82	4.03	0.06
	predators + tourism	3	51.23	4.43	0.05
	predators	2	51.36	4.56	0.05
	null	1	51.58	4.78	0.04
	tourism	2	52.25	5.45	0.03
	vegetation cover + tourism	3	52.33	5.53	0.03
Presence of	vegetation cover + tourism	3	34.96	0.00	0.61
Flightless Steamer-	vegetation cover + predators + tourism	4	37.44	2.48	0.18
Duck nests	vegetation cover	2	37.83	2.87	0.14
	vegetation cover + predators	3	39.94	4.98	0.05
	tourism	2	43.26	8.29	0.01
	predators + tourism	3	43.38	8.42	0.01
	predators	2	46.80	11.84	0.00
	null	1	47.95	12.98	0.00

DISCUSSION

It is remarkable that nests of Kelp Geese and Flightless Steamer-Ducks were observed only on islands and islets of the Beagle Channel. This finding contrasts observations on Navarino Island (Schüttler et al. 2009), on the opposite coast of the channel, where nests of Flightless Steamer-Ducks have been found in surveys conducted during the breeding seasons 2005–2006 and 2006–2007. One difference between these two coasts is that the American mink arrived in the IGTF in the late 1940s and was first recorded on the coast of the Beagle Channel in 1990 (Lizarralde and Escobar 2000); whereas in Navarino, there were no records of mink until 2001 (Jaksic et al. 2002, Rozzi and Sherriffs 2003). Another difference is that in the IGTF, native terrestrial predators were present even before mink introduction; whereas, Navarino Island lacks native terrestrial mammalian predators. Several ground predators have been recorded in the study area of the IGTF, such as the introduced American mink and the South American grey fox, the native huillín or southern river otter and the Fuegian culpeo fox, and feral dogs

TABLE 3. Parameter likelihoods, weighted parameter estimates ± unconditional standard error (SE), and 95% confidence interval limits (CL) for explanatory variables describing variation in the presence of nests of Kelp Geese and Flightless Steamer-Ducks on islands and islets in the Beagle Channel. Explanatory variables with CL excluding zero are in bold.

Response variable	Explanatory variable	Parameter likelihood	Parameter estimate ± SE	CL	
				Lower	Upper
Presence of	Intercept		−0.57 ± 0.68	−1.90	0.76
Kelp Goose nests	Vegetation cover[a] high	**0.84**	**1.96 ± 0.92**	**0.16**	**3.77**
	Predators[b] present	**0.84**	**−2.79 ± 1.39**	**−5.52**	**−0.07**
	Tourism[c] present	0.41	−1.07 ± 0.87	−2.78	0.64
Presence of	Intercept		−2.25 ± 1.14	−4.49	−0.008
Flightless Steamer	Vegetation cover[a] high	**0.98**	**3.09 ± 1.23**	**0.67**	**5.5**
Duck nests	Predators[b] present	0.24	0.39 ± 1.20	−1.95	2.74
	Tourism[c] present	0.80	−2.24 ± 1.27	−4.92	0.07

[a] Vegetation cover is a categorical variable (high, low) with low as the reference value.
[b] Predators is a categorical variable (present, absent) with absent as the reference value.
[c] Tourism is a categorical variable (present, absent) with absent as the reference value.

(*Canis lupus familiaris*) (Massoia and Chébez 1993, Lizarralde and Escobar 2000, Gomez et al. 2010). In our study area, the huillín feeds mainly on marine resources and its distribution is rather patchy along the IGTF coast, but the more distributed mink and both fox species are generalists and include seabirds in their diet, among other prey items (Gomez et al. 2010, Valenzuela et al. 2013b). Of these predators, the American mink, the huillín, and the Fuegian culpeo fox have been recorded only on six out of 36 of the surveyed islands and islets of the Beagle Channel (4 islands with mink, 1 island with mink and huillín, 1 island with mink and fox). Therefore, islands and islets of the Beagle Channel provide a relatively safe nesting habitat for Kelp Geese and Flightless Steamer-Ducks compared to the coast of the IGTF.

During our surveys on the IGTF, and consistent with other studies (Raya Rey and Schiavini 2002), we did find adult Flightless Steamer-Ducks and Kelp Geese on the beach or swimming in protected bays, but no nests were found. Historically, Flightless Steamer-Ducks have been reported to nest on the coasts of the IGTF (Humphrey et al. 1970, Weller 1975), when the populations of the two introduced predators (American mink and South American grey fox, introduced to the IGTF in the late 1940s; Atalah et al. 1980, Fabbro 1989, Lizarralde and Escobar 2000) along the coast were incipient and when levels of human disturbance were lower. Experimental predator removal studies in the outer archipelago of the Baltic Sea have shown that predation by mink can have locally limiting effects on the breeding densities and community structure of waterfowl (Nordström et al. 2002), and can markedly affect the distribution of bird species (Nordström and Korpimäki 2004). The absence of nests of Kelp Geese and Flightless Steamer-Ducks on the IGTF, but their presence there in the past, suggests that introduced predators may be responsible, in part, for these changes. Additionally, habitat changes caused by increased human disturbance may also explain the absence of both species on the IGTF. Human presence can lead to restricted access to resources such as nesting sites (which occurs through animals avoiding areas where humans are present), and could result in changes in the quality of sites. Along the Argentinean coast of the Beagle Channel in the IGTF, many areas are highly urbanized, and those habitats are now used for industries, construction, livestock grazing, tourism, and recreational activities. Also from our surveys, we know that island habitats are represented along the coast of the IGTF, but unfortunately we have no qualitative data on changes in vegetation cover as a result of human activities. Further work measuring changes in habitat variables (e.g., vegetation cover along the coast of the IGTF) and experimental studies such as those conducted by Nordström et al. (2002) and Nordström and Korpimäki (2004) are needed to assess the effects of human disturbance and introduced predators on the abundance and distribution of coastal breeding bird species on the IGTF.

Several human activities take place along the coast of the IGTF, including recreational activities and tourism, together with increased urbanization affecting the coast. On the other hand, many of the islands and islets of the Beagle Channel, unlike other islands which may be more remote or inaccessible, are also subject to intense human activity from daily tourist boat visits.

Islands provide a relatively safe place for nesting, because they generally offer greater protection against ground predators and human disturbance than continental sites (Lack 1968). Islands and islets of the Beagle Channel are not far from the coast of the IGTF (distances range between 0.1–7 km) where ground predators are more abundant. However, the lack of fresh water sources (in all but one of the islands), the reduced island coastline (median perimeter of islands is 0.6 km, compared for example to the 2–5 km home range of mink; Harrington et al. 2009), and the scarce food resources during winter may prevent ground predators from establishing year-round on these islands even though they could potentially reach them. Therefore, islands of the Beagle Channel may offer more protection against ground predators compared to the IGTF, but not all of them necessarily offer more protection against human disturbance.

Our study showed that vegetation cover was an important variable in explaining the variation in the presence of nests of Flightless Steamer-Ducks and Kelp Geese on islands. Actually, nests were absent on islands with low vegetation cover. This finding agrees with previous studies in the area which have also found nests of Flightless Steamer-Ducks and Kelp Geese to be associated with bushes or other concealment (Humphrey et al. 1970, Clark 1984). This is consistent with a study on a related species along the coast of Chubut, Patagonia, Argentina (Agüero et al. 2010), where nesting sites of White-headed

Steamer-Ducks (*Tachyeres leucocephalus*) were positively associated with higher proportions of shrub vegetation cover. One advantage of vegetation cover is increased concealment from predators, and its importance differs depending on the type of predator (e.g., Clark and Nudds 1991, Butler and Rotella 1998, Opermanis et al. 2001). Avian predators visually locate nests; whereas, mammalian predators depend on olfactory cues and may prey upon nests regardless of their concealment (Guyn and Clark 1997, Shüttler et al. 2009). Hence, in the majority of ground-nesting birds, vegetation may provide protection mostly from avian predators (Clark and Nudds 1991). On islands off the coast of Chubut province in Argentina, Kelp Gulls (*Larus dominicanus*) and Southern Caracaras (*Caracara plancus*) were observed taking eggs of White-headed Steamer-Ducks, which also select nest sites with higher proportion of shrub vegetation (Agüero et al. 2010). Though we did not observe any avian predators taking eggs of Flightless Steamer-Ducks or Kelp Geese in our study area, several potential avian predators breed on the islands such as Kelp Gulls, Dolphin Gulls (*Leucophaeus scoresbii*) and Chilean Skuas (*Stercorarius chilensis*) (Schiavini and Yorio 1995, Raya Rey and Schiavini 2000). Another advantage of vegetation cover is related to thermal properties of the nests; those shielded by plants have increased protection from wind and reduced convective heat loss (Gloutney and Clark 1997). These risks may be especially important under the ambient conditions experienced in the Beagle Channel area, where average ambient temperature during the breeding season ranges between 5–13 °C and winds have an average speed of 31 km/hr (Bujalesky 2007).

The presence of ground predators was an important factor in explaining the variation in the presence of nests of Kelp Geese on islands; however, it did not have enough support in explaining the variation in the presence of nests of Flightless Steamer-Ducks. This is consistent in part with a study on Navarino Island, south of the IGTF, which suggests that species nesting solitarily, in coastal habitat with rocky outcrop shores and concealed nests, such as Kelp Geese and Flightless Steamer Ducks, are most vulnerable to predation by minks (Schüttler et al. 2009). The differences we found between Kelp Geese and Flightless Steamer-Ducks may be related to differences in the type of vegetation cover at their nest sites. Though mammalian predators may depend primarily on olfactory cues, and therefore prey on nests irrespective of their concealment (Guyn and Clark 1997), other authors have suggested that tall, dense vegetation acts as a visual and scent barrier between nests and predators (Duebbert and Kantrud 1974, Duebbert and Lokemoen 1976, Livezey 1981, Hines and Mitchell 1983) and restricts mammalian movement (Schrank 1972). Several studies demonstrated that nest predation by mammalian predators decreased with increased lateral cover density and understory height (Crabtree et al. 1989, DeLong et al. 1995). Similarly, Johnson et al. (2005) suggest that higher vertical cover may help protect nests from avian predators, and that higher lateral cover may conceal nests from mammalian predators. If so, and considering that the percentage of shrub cover was higher for nests of Flightless Steamer-Ducks than for those of Kelp Geese (Table 1), a greater vegetative scent barrier may better protect Flightless Steamer-Ducks than Kelp Geese from ground predators. Alternatively, the reason why predators are important in explaining variation in the presence of nests of Kelp Geese on islands but not of nests of Flightless Steamer-Ducks may be related to the highly aggressive behavior of the latter species. Steamer-ducks are known to be strongly aggressive towards their own and other species (Weller 1976; Livezey and Humphrey 1985; ARR, pers. obs.), and many instances of interspecific aggression by steamer-ducks can be explained as anti-predator actions (Livezey and Humphrey 1985).

Our study provides new information on the breeding habitat and nesting sites of Kelp Geese and Flightless Steamer-Ducks in the Beagle Channel, which in the future may contribute to the identification of priority breeding sites, habitats, and specific habitat features to protect. Further research trying to identify their main nest predators, examining to what extent nest predation might influence the breeding success of Kelp Geese and Flightless Steamer-Ducks, and determining if vegetation cover of the nests influences breeding success would provide greater knowledge on the biology of these poorly studied species. Finally, the absence of nests of Kelp Geese and Flightless Steamer-Ducks on the coast of the IGTF but their presence there in the past, when levels of human disturbance and when the population of introduced predators was lower, suggests that introduced predators, human dis-

turbance, and coastal development may be responsible, in part, for these changes. In this context, it is important to highlight the importance of islands and islets of the Beagle Channel as a safe breeding refuge for these two ground nesting seabirds.

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