

# Distribution and Trends in Kelp Gull (*Larus dominicanus*) Coastal Breeding Populations in South America

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**Abstract.**—In South America, Kelp Gulls (*Larus dominicanus*) breed from Chilean Tierra del Fuego north to Río de Janeiro, Brazil, on the Atlantic coast and to Piura, Peru, on the Pacific coast. This review presents the first synthesis of information on the distribution and size of Kelp Gull colonies at the country level in coastal environments of Uruguay, Chile and Peru; provides an update on the breeding situation of the species in Brazil and Argentina; and allows the first evaluation of the overall coastal breeding population in South America. The breeding population in South America is now estimated to number at least 160,000 pairs. The largest population (at least 106,000 breeding pairs) is found in Argentina. Colonies of more than 1,000 pairs are uncommon. Population trends differed among coastal sectors, and important increases in numbers and formation of new colonies were only observed in Argentina. Available information suggests that predictable and abundant anthropogenic food subsidies, such as fishery discards and urban waste, are key factors contributing to the population growth in some coastal sectors. There is no strong evidence that Kelp Gulls are currently expanding their breeding range. However, given the population expansion in some areas and the potential conflicts with humans, ongoing monitoring efforts and population evaluations are necessary as they will provide the information required to support management decisions. *Received 10 June 2014, accepted 20 July 2015.*

**Key words.**—Argentina, Brazil, breeding populations, Chile, Kelp Gull, *Larus dominicanus*, Peru, population trends, South America, Uruguay.

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The Kelp Gull (*Larus dominicanus*) is the most widespread and abundant gull (Lariidae) species in the Southern Hemisphere, breeding in South America, Africa, New Zealand, and Australia, and on sub-Antarctic Islands and the Antarctic Peninsula (Burger and Gochfeld 1996). Moreover, there are several recent records of its breeding in the Northern Hemisphere, both in Africa and the Americas (Jiguet *et al.* 2012). The total world population is estimated between 3.3 and 4.3 million individuals, and the overall population trend is considered to be increasing (BirdLife International 2014). However,

information on current breeding distribution and numbers is still lacking in many regions, and trends of some populations are unknown.

Five subspecies have been recently proposed, although the taxonomic status of this species is still a matter of debate (Jiguet *et al.* 2012). Kelp Gulls in South America belong to the nominate *Larus d. dominicanus*, and their current breeding range extends from Chilean Tierra del Fuego north to Río de Janeiro, Brazil, on the Atlantic coast and to Piura, Peru, on the Pacific coast. Despite the widespread distribution and potential

role of this species in coastal ecosystems, knowledge of its breeding distribution and abundance in South America is still incomplete, and few evaluations at the regional or country level are available (Yorio *et al.* 1998a; Simeone *et al.* 2003; Branco 2004; Lisnizer *et al.* 2011). Moreover, given the high level of uncertainty with the current population estimate for the overall population in South America (100,000-1,000,000 individuals; Wetlands International 2012), there is a need to integrate information about this species at the continental level. In addition, although most authors and conservation organizations consider the Kelp Gull to be a species with expanding populations, trends are unknown for many regions and, where available, information indicates that trends differ among coastal sectors (Lisnizer *et al.* 2011). Here, we review and integrate information obtained from published and unpublished sources on the coastal breeding distribution and abundance of Kelp Gulls in South America, and explore possible factors affecting their population trends.

#### METHODS

A literature search was carried out for all South American countries where Kelp Gulls are known to breed. We summarized the latest available information on breeding distribution and colony sizes. This review was complemented by information on colony location and nest counts from unpublished sources and from our own nest counts made during field work carried out in the context of other seabird studies. In this latter case, the size of colonies was determined by full counts of active nests during the incubation stage. We considered a nest active when it contained an egg or signs of recent use, such as fresh nesting material. For some colonies, we also used information on visual estimates of the number of nests.

#### RESULTS

##### Breeding Population Distribution, Abundance and Trends by Country

*Brazil.* In Brazil, Kelp Gulls breed only on islands along approximately 850 km of coastline (Sick 1997), from Laguna, Santa Catarina (28° 60' S, 48° 42' W), to Rio de Janeiro (23° 08' S, 43° 56' W) (Table 1; Fig. 1). A total of

35 sites have been reported during the past 14 years, and most of them (70%) were identified between 1999 and 2002. A colony reported at Ilhota de Galheta, Santa Catarina (28° 32' 13" S, 48° 45' 42" W), in the early 1990s (Soares and Schiefler 1995) no longer exists. The estimated breeding population on the Brazilian coast, considering the 12 colonies for which count data are available, is 2,270 pairs. Median colony size was 101 nests ( $n = 12$ ), with numbers ranging from 16 to 709 breeding pairs (Table 1). Six of these colonies (60%) have over 100 breeding pairs. Although the number of nests in most of the colonies along the coast of Sao Paulo is unknown, Campos *et al.* (2004) reported that the number of adult birds in all breeding locations was relatively low, between 30 and 350 individuals. This suggests that colony sizes in the rest of the Sao Paulo coastline are on the order of magnitude of those found in the Santa Catarina State.

The coastal islands of Santa Catarina State hold the largest known Kelp Gull colonies along the Brazilian coast (Branco *et al.* 2009). At these sites, populations show seasonal fluctuations determined by the movement of individuals from mainland beaches and estuaries to nesting islands during April and June, and their gradual return from October to December (Campos *et al.* 2004; Krul 2004; Branco *et al.* 2009; Dantas and Morgante 2010; Matta 2014). The limited information on Kelp Gull population sizes reflects the small number of researchers and sampling effort, which results in uncertainties related to the breeding population size of the Kelp Gull in coastal Brazil. Despite the limited information, studies along the coasts of Santa Catarina conducted from 1999 to 2013 suggest that Kelp Gull populations are expanding (Branco 2003, 2004; Branco *et al.* 2009; Prellvitz *et al.* 2009; Reis 2014). In the Paraná State, information gathered between 1995 and 2006 indicate that breeding numbers at Ilha Grapirá, Arquipélago de Currais, have remained somewhat stable (Krul 2004; Carniel and Krul 2010).

*Uruguay.* There is little information on Kelp Gull breeding distribution and abundance in Uruguay, and the first population

Table 1. Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Brazil. NC = current breeding not counted.

State	Site	Location	Size	Year	Source
Rio de Janeiro	Ilha Comprida	23° 02' S, 43° 12' W	NC	2002	Alves <i>et al.</i> 2004
	Ilha Palmas	23° 01' S, 43° 10' W	NC	2002	Alves <i>et al.</i> 2004
	Ilha Cagarra	23° 01' S, 43° 12' W	NC	2002	Alves <i>et al.</i> 2004
	Ilha Trinta-réis	23° 01' 18" S, 43° 10' 59" W	NC	2002	Alves <i>et al.</i> 2004
	Ilha Guaratiba	23° 08' S, 43° 56' W	90	2013	Matta 2014
Sao Paulo	Ilha de Castilhos	25° 16' 24" S, 47° 57' 15" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha Guararitama	24° 23' S, 46° 59' W	97	2005	Dantas and Morgante 2010
	Ilha Bom Abrigo	25° 07' 20" S, 47° 51' 36" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha Peruíbe	24° 21' 40" S, 46° 58' 48" W	NC	1999	Campos <i>et al.</i> 2004
	Laje Conceição	24° 14' 13" S, 46° 41' 27" W	16	1999	Campos <i>et al.</i> 2004
	Ilhote Gaivotas	24° 22' S, 46° 48' W	46	1999	Campos <i>et al.</i> 2004
	Ilha Redonda	24° 22' 30" S, 46° 48' 17" W	NC	1999	Campos <i>et al.</i> 2004
	Queimada Grande	24° 29' S, 46° 41' W	NC	1999	Campos <i>et al.</i> 2004
	Laje dos Santos	24° 19' 11" S, 46° 10' 52" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha da Tartaruga <sup>1</sup>	24° 05' 36" S, 45° 42' 20" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha do Porto <sup>1</sup>	24° 05' 44" S, 45° 42' 10" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha da Caranha <sup>1</sup>	24° 06' 41" S, 45° 42' 27" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha do Oratório <sup>1</sup>	24° 06' 44" S, 45° 42' 21" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha Rasa <sup>1</sup>	24° 06' 39" S, 45° 42' 11" W	NC	1999	Campos <i>et al.</i> 2004
	Ilha dos Amigos <sup>1</sup>	24° 04' 29" S, 45° 39' 15" W	NC	1999	Campos <i>et al.</i> 2004
	Alcatrazes <sup>1</sup>	24° 06' 05" S, 45° 41' 34" W	NC	1999	Campos <i>et al.</i> 2004
	Ilhote Codó	23° 45' S, 45° 08' W	NC	1999	Campos <i>et al.</i> 2004
Ilha da Serraria	23° 48' 43" S, 45° 13' 37" W	NC	1999	Campos <i>et al.</i> 2004	
Ilha Cagadinha	23° 45' S, 45° 24' W	NC	1999	Campos <i>et al.</i> 2004	
Ilha Rapada	25° 43' S, 48° 20' W	NC	1999	Campos <i>et al.</i> 2004	
Paraná	Ilha Grapirá	25° 44' 08" S, 48° 21' 55" W	61	2006	Carniel and Krul 2010
	Ilha da Figueira	25° 21' 25" S, 48° 02' 13" W	NC	1995	Krul 2004

<sup>1</sup>Breeding sites often grouped as Arquipélago dos Alcatrazes.<sup>2</sup>Urban breeding colony.

Table 1. (Continued) Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Brazil. NC = current breeding not counted.

State	Site	Location	Size	Year	Source
Santa Catarina	Ilha Mandigituba	26° 12' 23" S, 48° 29' 07" W	270	2012	Reis 2014
	Ilha dos Lobos	28° 60' 50" S, 48° 42' 37" W	709	2002	Branco <i>et al.</i> 2009
	Ilha Tamboretas	26° 22' 10" S, 48° 31' 11" W	94	2000	Branco 2004
	Ilha Itacolomis	26° 42' 36" S, 48° 37' 06" W	104	1999	Branco 2004
	Balneário Camboriú Zoo <sup>2</sup>	27° 00' 56" S, 48° 36' 43" W	4	2003	Branco <i>et al.</i> 2008
	Ilhotas da Galé	27° 10' 00" S, 48° 26' 15" W	149	2000	Moritz-Júnior 2002
	Ilha Deserta	27° 16' 23" S, 48° 19' 53" W	362	2006	Prelwitz <i>et al.</i> 2009
	Arquipélago de Moleques do Sul	27° 51' S, 48° 26' W	277	2000	Branco 2004

<sup>1</sup>Breeding sites often grouped as Arquipélago dos Alcatrazes.

<sup>2</sup>Urban breeding colony.

estimates were made in 2005 (Lenzi *et al.* 2010). Since then, efforts have been made to continue evaluating the population status of the species. Along the 660 km of the Uruguayan coast, breeding takes place on eight coastal islands (Table 2). Three additional colonies were reported during the early 1950s at Isla de La Tuna in the Canelones Department (34° 48' S, 55° 34' W), Isla Encantada (34° 24' S, 53° 45' W), and El Isote (34° 24' S, 53° 44' W) (Vaz-Ferreira 1952; Teague 1955; Escalante 1991), but current breeding at these sites still needs to be confirmed. Population sizes have been assessed at only two colonies, Isla de las Gaviotas and Isla Verde, totaling 1,210 breeding pairs (Lenzi *et al.* 2010; Table 2). Recent visual estimates at the peak of the Kelp Gull breeding season at Isla de Flores and Isla de Lobos indicated they had over 5,000 and 2,500 breeding pairs, respectively, while at the rest of the colonies breeding numbers were relatively low (Table 2). For example, only a few hundred pairs breed on Isla Rasa, Isla Seca and Isla del Marco (Table 2). Current population trends in Uruguay are unknown.

*Argentina.* Breeding distribution along the coastline extends over 5,000 km, from San Clemente del Tuyú, southern Buenos Aires (36° 20' S, 56° 45' W), to Bahía Ushuaia, Tierra del Fuego (54° 51' S, 68° 16' W) (Table 3; Fig. 1). A total of 140 breeding colonies has been identified in the last 25 years (Table 3). Kelp Gulls no longer nest at four of these locations, while nesting at 21 new sites has been recorded since 1993 (Table 3). The total breeding population for the Argentine coast, considering only the 120 colonies for which the number of breeding pairs is available (86% of all sites), was estimated to be at least 106,230 breeding pairs. The median number of breeding pairs (considering the last available count for each site) was 222 ( $n = 120$ ), ranging from 1 to 12,260 (Table 3). Thirty-nine (33%) and 24 (20%) of these colonies had over 500 and 1,000 breeding pairs, respectively. Most colonies (89%) were on islands and islets.

Available information indicates that numbers have increased along several coastal sectors. Breeding numbers have doubled in the



Figure 1. Map of South America showing the jurisdictions where Kelp Gulls breed.

last 15 years at Bahía San Blas ( $n = 3$  colonies; Suárez *et al.* 2014) and, although accurate figures are lacking, observations indicate that they have also increased at the colony at the Isla del Puerto, Bahía Blanca Estuary

(Petracci *et al.* 2004), both sites in the Buenos Aires Province. An assessment of Kelp Gull population trends between 1994 and 2008 along 1,800 km of coastline of the Río Negro and Chubut Provinces showed that 68

Table 2. Location and size (in breeding pairs) of Kelp Gull colonies reported along the coast of Uruguay. Current nesting at an additional three locations used by Kelp Gulls in the past still needs to be confirmed. \* = visual estimate.

Department	Site	Location	Size	Year	Source
Rocha	Isla Verde	33° 56' S, 53° 29' W	1,095	2005	Lenzi <i>et al.</i> 2010
	Islote Coronilla	33° 56' S, 53° 28' W	< 150*	2005	Asociación Averaves, unpubl. data
	Isla del Marco	34° 21' S, 53° 44' W	< 50*	2008	Asociación Averaves, unpubl. data
	Isla Seca	34° 21' S, 53° 45' W	< 100*	2008	Asociación Averaves, unpubl. data
	Isla Rasa	34° 24' S, 53° 46' W	< 100*	2008	Asociación Averaves, unpubl. data
Maldonado	Isla de Lobos	35° 02' S, 54° 52' W	> 2,500*	2007	A. Ponce de Leon, pers. commun.
Canelones	Isla de Flores	34° 56' S, 55° 55' W	> 5,000*	2011	this study
Montevideo	Isla de las Gaviotas	34° 54' S, 56° 06' W	115	2011	this study

(74%) evaluated colonies increased in numbers, and, while population numbers within some coastal sectors have remained stable, the overall population increased by 37% at an annual growth rate of 2.7% (Lisnizer *et al.* 2011). A total of 15 new breeding sites has been identified during the last 20 years along the coasts of these two Provinces (Lisnizer *et al.* 2011; R. Amado, pers. commun.). The analysis of information on the spatial distribution, size and growth rate of colonies in this region suggests that Kelp Gull population dynamics include emigration-immigration processes among colonies at a wide geographic scale (Lisnizer *et al.* 2015). In the Tierra del Fuego Province, Kelp Gulls were recorded breeding at six new locations, and overall numbers increased by 2.05% during the last 20 years (Raya Rey *et al.* 2014).

*Chile.* Kelp Gulls are found along all the coastal ecosystems in Chile, from the coast and islands of Magallanes to the desert coast of northern Chile (Jaramillo *et al.* 2005). The Kelp Gull is a common but not abundant seabird in Chile, with nesting mostly restricted to coastal islands except for urban colonies within coastal cities. Breeding has been reported in at least 26 coastal sites, from 23° 26' S to 55° 03' S (Table 4; Fig. 1). Additional colonies were reported at Isla Contramaestre in 1972 (52° 56' S, 70° 21' W) (Parmelee and MacDonald 1975), Isla Grevy in 1984 (55° 33' S, 67° 39' W) (Clark *et al.* 1992) and Isla Freycinet and Isla Herschel in 1932 (Reynolds 1935), but current breeding at these sites still needs to be confirmed. The size of colonies ranged from a few to 3,000 pairs (Table 4), adding to a total of ~8,200 breeding pairs. Only two colonies had over 1,000 pairs (Table 4). Given that thorough surveys are lacking at several coastal sectors and that Kelp Gulls can nest solitarily or in very small colonies, making detection difficult, the existence of additional breeding sites in coastal Chile cannot be ruled out. This is especially true for the XI and XII Regions in southern Chile, a large and relatively inaccessible coastal area from where there is little available information.

Little is known about Kelp Gull population trends, and studies are needed to

Table 3. Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Argentina during the last 25 years. Values presented are those obtained in the last count. \* = visual estimate; NC = current breeding not counted.

Province	Site	Location	Size	Year	Source
Buenos Aires	Bahía Samborombon	36° 20' S, 56° 45' W	54	2005	Mauco <i>et al.</i> 2007
	Arroyo Zabala	38° 45' S, 59° 28' W	0	2010	D. McLean, pers. commun.
	Isla del Puerto	38° 48' 47" S, 62° 16' 27" W	NC	2009	this study
	Islote Canal Tierra Firme	38° 53' 22" S, 62° 14' 05" W	99	2005	Sotelo and Massola 2008
	Islote Tres Brazas	38° 54' 42" S, 62° 12' 03" W	NC	2007	this study
	Isla Golfada Chica	38° 55' 30" S, 62° 10' 03" W	57	2006	Sotelo and Massola 2008
	Isla Luana	38° 56' 04" S, 62° 10' 25" W	NC	2007	this study
	Islote Canal Ancla	38° 56' 44" S, 62° 11' 27" W	NC	2007	this study
	Islote oeste del Canal del Embudo	38° 58' S, 62° 19' W	NC	1995	Yorio <i>et al.</i> 1998b
	Isla Embudo	38° 58' 48" S, 62° 11' 25" W	NC	2004	this study
	Islote Norte	39° 08' S, 61° 53' W	NC	2007	this study
	Islote Bastón	39° 08' S, 61° 53' W	NC	1995	Yorio <i>et al.</i> 1998b
	Islote Redondo	39° 08' S, 61° 53' W	1,500*	2004	this study
	Islote Sur	39° 09' S, 61° 53' W	1,200*	2004	this study
	Isla Brightman	39° 23' S, 62° 08' W	NC	2004	this study
	Islote norte de Isla Morro de Indio	39° 56' S, 62° 09' W	NC	1995	Yorio <i>et al.</i> 1998b
	Banco Mancini	40° 00' S, 62° 08' W	NC	2007	this study
	Isla Gaviota	40° 01' S, 62° 09' W	NC	2009	this study
	Isla Puestos	40° 03' 02" S, 62° 18' 52" W	330*	2004	this study
	Isla de los Riachos	40° 10' S, 62° 05' W	350*	2004	this study
Isla Gama	40° 29' S, 62° 14' W	NC	1990	Yorio and Harris 1997	
Banco Nordeste	40° 32' 44" S, 62° 10' 06" W	1,602	2013	Suárez <i>et al.</i> 2014	
Isla Arroyo Jabalí Este	40° 32' 51" S, 62° 16' 47" W	1,275	2013	Suárez <i>et al.</i> 2014	
Isla Arroyo Jabalí Oeste	40° 32' 43" S, 62° 17' 23" W	542	2013	Suárez <i>et al.</i> 2014	
Islote Fondo Medialuna	40° 37' 27" S, 62° 14' 20" W	216	2013	Suárez <i>et al.</i> 2014	
Río Negro	Isla Novaro	40° 45' S, 64° 50' W	288	2008	Lisnizer <i>et al.</i> 2011
	Islotes del Canal Escondido	40° 47' S, 64° 47' W	265	2007	Lisnizer <i>et al.</i> 2011
	Islote La Pastosa	41° 25' S, 65° 02' W	2,935	2008	Lisnizer <i>et al.</i> 2011
	Islote Redondo	41° 26' S, 65° 01' W	941	2007	Lisnizer <i>et al.</i> 2011
	Islote de los Pájaros	41° 27' S, 65° 02' W	1,163	2007	Lisnizer <i>et al.</i> 2011

Table 3. (Continued) Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Argentina during the last 25 years. Values presented are those obtained in the last count. \* = visual estimate; NC = current breeding not counted.

Province	Site	Location	Size	Year	Source
Chubut	Islote Notable	42° 25' S, 64° 31' W	4,044	2008	Lisnizer <i>et al.</i> 2011
	Estancia San Lorenzo <sup>1</sup>	42° 05' S, 63° 51' W	47	2013	M. Bertelotti, pers. commun.
	Isla Primera (Caleta Valdés)	42° 21' S, 63° 37' W	1,917	2008	Lisnizer <i>et al.</i> 2011
	Isla Gaviota (Caleta Valdés)	42° 17' S, 63° 39' W	0	2007	Lisnizer <i>et al.</i> 2011
	Punta Delgada	42° 43' S, 63° 38' W	106	2008	Lisnizer <i>et al.</i> 2011
	Playa La Pastosa	42° 50' S, 63° 59' W	682	2008	Lisnizer <i>et al.</i> 2011
	Punta Pirámide	42° 35' S, 64° 17' W	453	2008	Lisnizer <i>et al.</i> 2011
	Punta Loma <sup>1</sup>	42° 48' S, 64° 53' W	240	2012	Lisnizer <i>et al.</i> 2011
	Punta León	43° 04' S, 64° 29' W	5,813	2007	Lisnizer <i>et al.</i> 2011
	Punta Clara	43° 58' S, 65° 15' W	39	2013	this study
	Punta Tombo	44° 02' S, 65° 11' W	6,457	2007	Lisnizer <i>et al.</i> 2011
	Punta Tombo Norte <sup>1</sup>	44° 02' S, 65° 11' W	NC	2001	Lisnizer <i>et al.</i> 2011
	Punta Gutiérrez	44° 24' S, 65° 16' W	338	2006	Lisnizer <i>et al.</i> 2011
	Cabo San José	44° 31' S, 65° 17' W	194	2006	Lisnizer <i>et al.</i> 2011
	Isla Sur Cabo San José	44° 31' S, 65° 18' W	131	2006	Lisnizer <i>et al.</i> 2011
	Isla Acertada	44° 32' S, 65° 19' W	249	2006	Lisnizer <i>et al.</i> 2011
	Isla Cumbre	44° 35' S, 65° 22' W	1,195	2006	Lisnizer <i>et al.</i> 2011
	Isla Blanca Mayor	44° 46' S, 65° 38' W	1,453	2007	Lisnizer <i>et al.</i> 2011
	Isla Blanca Menor Oeste	44° 46' S, 65° 39' W	287	2005	Lisnizer <i>et al.</i> 2011
	Isla Blanca Menor Este	44° 46' S, 65° 38' W	15	2005	Lisnizer <i>et al.</i> 2011
	Isla Moreno	44° 54' 30" S, 65° 32' 29" W	35	2007	Lisnizer <i>et al.</i> 2011
	Isla Sola	44° 58' 48" S, 65° 33' 47" W	641	2007	Lisnizer <i>et al.</i> 2011
	Isla Aguilón del Norte	44° 59' 24" S, 65° 34' 20" W	42	2008	Lisnizer <i>et al.</i> 2011
Isla Aguilón del Sur <sup>1</sup>	45° 00' 00" S, 65° 33' 45" W	74	2008	Lisnizer <i>et al.</i> 2011	
Isla Arce	45° 00' 15" S, 65° 31' 07" W	786	2007	Lisnizer <i>et al.</i> 2011	
Isla Rasa	45° 05' 50" S, 65° 26' 23" W	NC	2013	N. García, pers. commun.	
Isla Leones <sup>1</sup>	45° 03' 02" S, 65° 36' 17" W	78	2007	Lisnizer <i>et al.</i> 2011	
Península Lanaud	45° 03' 43" S, 65° 35' 00" W	688	2007	Lisnizer <i>et al.</i> 2011	
Isla Buque	45° 03' 20" S, 65° 37' 27" W	1,323	2007	Lisnizer <i>et al.</i> 2011	
Isla Valdés <sup>1</sup>	45° 03' 18" S, 65° 42' 53" W	2	2011	R. Amado, pers. commun.	
Isla Cayetano <sup>1</sup>	45° 02' 14" S, 65° 45' 37" W	605	2008	Lisnizer <i>et al.</i> 2011	
Isla Pan de Azúcar	45° 04' S, 65° 49' W	1,822	2007	Lisnizer <i>et al.</i> 2011	

<sup>1</sup>Colony established in the last two decades.



Table 3. (Continued) Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Argentina during the last 25 years. Values presented are those obtained in the last count. \* = visual estimate; NC = current breeding not counted.

Province	Site	Location	Size	Year	Source
	Islote Puente <sup>1</sup>	45° 02' S, 65° 50' W	118	2001	Lisnizer <i>et al.</i> 2011
	Islotes Arellano	45° 03' S, 65° 51' W	182	2007	Lisnizer <i>et al.</i> 2011
	Islotes Massa	45° 02' S, 65° 51' W	30	2007	Lisnizer <i>et al.</i> 2011
	Islote Laguna	45° 02' S, 65° 53' W	523	2007	Lisnizer <i>et al.</i> 2011
	Islote Galfráscoli	45° 02' S, 65° 51' W	37	2007	Lisnizer <i>et al.</i> 2011
	Islote Luisoni	45° 02' S, 65° 51' W	102	2007	Lisnizer <i>et al.</i> 2011
	Isla Patria	45° 03' S, 65° 51' W	526	2007	Lisnizer <i>et al.</i> 2011
	Islote frente a Patria	45° 02' S, 65° 51' W	0	2007	Lisnizer <i>et al.</i> 2011
	Isla Blanca	45° 03' S, 65° 58' W	1	2007	Lisnizer <i>et al.</i> 2011
	Isla Larga <sup>1</sup>	45° 02' 52" S, 65° 55' 06" W	50	2011	R. Amado, pers. commun.
	Isla Tova	45° 06' S, 66° 00' W	152	2007	Lisnizer <i>et al.</i> 2011
	Isla Tovita	45° 07' S, 65° 57' W	263	2007	Lisnizer <i>et al.</i> 2011
	Isla Gaviota	45° 06' S, 65° 58' W	1,873	2007	Lisnizer <i>et al.</i> 2011
	Isla Este	45° 07' S, 65° 56' W	981	2007	Lisnizer <i>et al.</i> 2011
	Isla Sur	45° 07' S, 65° 59' W	724	2007	Lisnizer <i>et al.</i> 2011
	Islotes Goëland	45° 05' S, 66° 03' W	550	2007	Lisnizer <i>et al.</i> 2011
	Isla Pequeño Robredo	45° 07' S, 66° 06' W	439	2007	Lisnizer <i>et al.</i> 2011
	Isla Gran Robredo	45° 08' S, 66° 03' W	1,110	2007	Lisnizer <i>et al.</i> 2011
	Isla Sin Nombre <sup>1</sup>	45° 00' 15" S, 66° 04' 15" W	118	2008	Lisnizer <i>et al.</i> 2011
	Isla Cuadrícula <sup>1</sup>	45° 01' 54" S, 66° 14' 58" W	3	2012	R. Amado, pers. commun.
	Isla Lobos Oeste	45° 05' S, 66° 18' W	0	2006	Lisnizer <i>et al.</i> 2011
	Isla Felipe	45° 04' S, 66° 19' W	836	2006	Lisnizer <i>et al.</i> 2011
	Isla Ezquerria <sup>1</sup>	45° 04' S, 66° 20' W	42	2006	Lisnizer <i>et al.</i> 2011
	Isla Galiano Norte	45° 05' S, 66° 24' W	654	2006	Lisnizer <i>et al.</i> 2011
	Isla Galiano Central	45° 06' S, 66° 25' W	317	2006	Lisnizer <i>et al.</i> 2011
	Isla Galiano Sur	45° 06' S, 66° 25' W	317	2006	Lisnizer <i>et al.</i> 2011
	Isla Isabel Norte	45° 07' S, 66° 30' W	227	2006	Lisnizer <i>et al.</i> 2011
	Isla Isabel Sur	45° 07' S, 66° 30' W	144	2006	Lisnizer <i>et al.</i> 2011
	Isla Cevallos	45° 09' S, 66° 22' W	1,911	2006	Lisnizer <i>et al.</i> 2011
	Islote Puerto Projo <sup>1</sup>	45° 10' 08" S, 66° 30' 04" W	488	2013	this study
	Isla Vernaci Este	45° 11' S, 66° 29' W	2,762	2006	Lisnizer <i>et al.</i> 2011
	Isla Vernaci Norte 1	45° 11' S, 66° 30' W	260	2006	Lisnizer <i>et al.</i> 2011

<sup>1</sup>Colony established in the last two decades.

Table 3. (Continued) Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Argentina during the last 25 years. Values presented are those obtained in the last count. \* = visual estimate; NC = current breeding not counted.

Province	Site	Location	Size	Year	Source
	Isla Vernaci Norte 2	45° 11' S, 66° 30' W	628	2006	Lisnizer <i>et al.</i> 2011
	Isla Vernaci Sudoeste	45° 11' S, 66° 31' W	7,445	2006	Lisnizer <i>et al.</i> 2011
	Isla Vernaci Oeste	45° 11' S, 66° 31' W	106	2006	Lisnizer <i>et al.</i> 2011
	Isla Vernaci Noroeste	45° 10' S, 66° 31' W	455	2006	Lisnizer <i>et al.</i> 2011
	Isla Vernaci Oeste Noroeste <sup>1</sup>	45° 11' S, 66° 30' W	79	2003	Lisnizer <i>et al.</i> 2011
	Isla Viana Mayor	45° 11' S, 66° 24' W	1,819	2006	Lisnizer <i>et al.</i> 2011
	Isla Viana Menor <sup>1</sup>	45° 11' 53" S, 66° 24' 27" W	26	2006	Lisnizer <i>et al.</i> 2011
	Isla Quintano	45° 15' S, 66° 42' W	11,296	2006	Lisnizer <i>et al.</i> 2011
Santa Cruz	Monte Loayza	47° 05' S, 66° 09' W	30	1995	Gandini and Frere 1998
	Cabo Blanco	47° 12' S, 65° 45' W	27	1993	Gandini and Frere 1998
	Punta Guanaco	47° 48' S, 65° 52' W	24	1994	Gandini and Frere 1998
	Isla Chaffers	47° 46' S, 65° 52' W	3,270	1992	Gandini and Frere 1998
	Isla Larga	47° 45' S, 65° 56' W	208	1994	Gandini and Frere 1998
	Isla Quiroga	47° 45' S, 65° 56' W	400	1994	Gandini and Frere 1998
	Islote Burlotti	47° 46' S, 65° 57' W	297	1996	Gandini and Frere 1998
	Isla de los Pájaros	47° 45' S, 65° 58' W	110	1995	Gandini and Frere 1998
	Islote Cañadón del Puerto	47° 45' S, 66° 00' W	128	1994	Gandini and Frere 1998
	Isla del Rey	47° 46' S, 66° 03' W	178	1993	Gandini and Frere 1998
	Isla Pingüino	47° 54' S, 65° 43' W	200	1994	Gandini and Frere 1998
	Isla Schwarz	48° 04' S, 65° 54' W	50	1994	Gandini and Frere 1998
	Isla Liebres	48° 06' S, 65° 54' W	210	1994	Gandini and Frere 1998
	Islote del Bajío	48° 21' S, 66° 21' W	100	1994	Frere and Gandini 1998
	Isla Rasa Chica	48° 22' S, 66° 20' W	75	1995	Frere and Gandini 1998
	Islote Sin Nombre	48° 22' S, 66° 21' W	190	1994	Frere and Gandini 1998
	Banco Cormorán	49° 16' S, 67° 40' W	6,978	1993	Frere and Gandini 1998
	Banco Justicia I	49° 17' S, 67° 41' W	20	1994	Frere and Gandini 1998
	Banco Justicia II	49° 17' S, 67° 41' W	14	1994	Frere and Gandini 1998
	Isla Leones	50° 04' S, 68° 26' W	200	1994	Frere and Gandini 1998
	Isla de Monte León	50° 20' S, 68° 53' W	85	1995	Frere and Gandini 1998
	Isla Deseada	51° 34' S, 69° 02' W	12,260	1995	Frere and Gandini 1998
	Cabo Vírgenes	52° 22' S, 68° 24' W	50	1993	Frere and Gandini 1998

<sup>1</sup>Colony established in the last two decades.

Table 3. (Continued) Location and size (in breeding pairs) of Kelp Gull colonies identified along the coast of Argentina during the last 25 years. Values presented are those obtained in the last count. \* = visual estimate; NC = current breeding not counted.

Province	Site	Location	Size	Year	Source
Tierra del Fuego	Islas Becasses <sup>1</sup>	54° 58' S, 67° 01' W	62	2011	Raya Rey <i>et al.</i> 2014
	Islote Lucas Mayor	54° 52' S, 68° 12' W	8	2011	Raya Rey <i>et al.</i> 2014
	Islote Willie Mayor	54° 52' S, 68° 10' W	15	2011	Raya Rey <i>et al.</i> 2014
	Islote Bertha Mayor <sup>1</sup>	54° 52' S, 68° 11' W	16	2011	Raya Rey <i>et al.</i> 2014
	Isla H	54° 53' S, 68° 15' W	3	2011	Raya Rey <i>et al.</i> 2014
	Isla Bridges	54° 53' S, 68° 15' W	1	2011	Raya Rey <i>et al.</i> 2014
	Isla Reynolds	54° 52' S, 68° 16' W	31	2011	Raya Rey <i>et al.</i> 2014
	Isla Leclom	54° 52' S, 68° 15' W	48	2011	Raya Rey <i>et al.</i> 2014
	Isla Mary Ann	54° 52' S, 68° 15' W	256	2011	Raya Rey <i>et al.</i> 2014
	Isla Thomas <sup>1</sup>	54° 53' S, 68° 15' W	74	2011	Raya Rey <i>et al.</i> 2014
	Isla Mary <sup>1</sup>	54° 53' S, 68° 15' W	3	2011	Raya Rey <i>et al.</i> 2014
	Isla Casco <sup>1</sup>	54° 50' S, 68° 16' W	56	2011	Raya Rey <i>et al.</i> 2014
	Isla Chata	54° 51' S, 68° 16' W	49	2011	Raya Rey <i>et al.</i> 2014
	Isla Concejo	54° 51' S, 68° 16' W	336	2011	Raya Rey <i>et al.</i> 2014
	Bahía Franklin <sup>1</sup>	54° 53' S, 64° 39' W	NC	2011	Raya Rey <i>et al.</i> 2014

<sup>1</sup>Colony established in the last two decades.

Table 4. Location and size (in breeding pairs) of Kelp Gull colonies reported along the coast of Chile. Current nesting at an additional four locations used by Kelp Gulls in the past needs to be confirmed. The four city sites listed in the table are urban breeding colonies; at Coquimbo city, gulls nest at several different buildings. \* = visual estimate; NC = current breeding not counted.

Administrative Region	Site	Location	Size	Year	Source
II	Isla Santa María	23° 26' S, 70° 34' W	NC	2013	this study
III	Isla Grande	27° 14' S, 70° 58' W	31	2013	this study
	Isla Chañaral	29° 01' S, 71° 34' W	500	2000	Simeone <i>et al.</i> 2003
IV	Isla Damas	29° 13' S, 71° 31' W	100	2001	Simeone <i>et al.</i> 2003
	Isla Choros	29° 15' S, 71° 32' W	< 10	2000	Simeone <i>et al.</i> 2003
	Isla Pájaros 2	29° 32' S, 71° 33' W	100	2000	Simeone <i>et al.</i> 2003
	Isla Pájaros 1	29° 35' S, 71° 33' W	2,000	2001	Simeone <i>et al.</i> 2003
	La Serena city	29° 54' S, 71° 15' W	NC	2013	this study
V	Coquimbo city	29° 57' S, 71° 20' W	NC	2013	this study
	Isla Cachagua	32° 35' S, 71° 27' W	50	2001	Simeone <i>et al.</i> 2003
	Isla Concón	32° 53' S, 71° 31' W	50	2000	Simeone <i>et al.</i> 2003
	Con Con city	32° 55' S, 71° 30' W	1	2002	A. Fernández Ajó, pers. commun.
	Viña del Mar city	33° 01' S, 71° 33' W	NC	2014	A. Simeone, pers. commun.
	Pájaro Niño	33° 21' S, 71° 41' W	450	2000	Simeone <i>et al.</i> 2003
	Algarrobo	33° 30' S, 71° 48' W	NC	1995	Muñoz and Becker 1999
	Faro Hualpen	36° 40' S, 73° 26' W	NC	1994	Muñoz and Becker 1999
	Isla Quiriquina	36° 37' S, 73° 03' W	NC	1995	Muñoz and Becker 1999
	X	Maiquillahue Bay	39° 30' S, 73° 36' W	NC	1995
Isla Doña Sebastiana		41° 40' S, 73° 48' W	< 1,000	1993	Espinosa and von Meyer 1994
Punta Chocoy		41° 44' S, 73° 45' W	150	1993	Espinosa and von Meyer 1994
Islas Puniñuil		41° 55' S, 74° 02' W	552	2003	Simeone 2004
Islote Pingüinos		41° 56' S, 73° 54' W	10*	2008	Cursach <i>et al.</i> 2009
Isla Metalqui		42° 12' S, 74° 10' W	NC	unknown	Saavedra 1980
Isla Guafo		43° 35' S, 74° 43' W	NC	NC	Cursach <i>et al.</i> 2009
XII	Isla Magdalena	52° 55' S, 70° 34' W	3,000	unknown	Martinic 2012
	Isla Navarino	55° 03' S, 67° 37' W	204	2006	Schüttler <i>et al.</i> 2009

update the existing information. It seems that numbers at colonies in central (33° 21' S) and northern (27° 16' S) Chile have remained relatively stable (Simeone *et al.* 2003). Preliminary data suggest an increase in the number of pairs breeding on rooftops in coastal cities.

*Peru.* Kelp Gulls in Peru occur on sandy and rocky beaches, estuaries, coastal lagoons and fishing ports along the entire coastline from Tacna (18° 22' S; Hidalgo and Chipana 2012) to Tumbes (3° 25' S; Sagot 1997). Although Kelp Gulls are found at most of the protected sites of the Guano Islands, Isles and Capes National Reserve System, their presence at these locations is rather occasional (Agrorural, Peruvian Ministry of Agriculture, unpubl. data).

Fifteen Kelp Gull breeding sites have been identified in Peru since the early 1900s (Murphy 1936; Tovar 1968; Duffy *et al.* 1984; Figueroa 2010a). Nowadays, Kelp Gulls breed on at least six of these locations (Table 5). The absence of gulls noted by the island guards on Isla Don Martín (11° 02' S; Agrorural, Peruvian Ministry of Agriculture, unpubl. data) indicates that this site is no longer a nesting ground. It is uncertain whether the remaining eight localities have persisted as breeding colonies because they have not been checked since the early 1960s (e.g., Virrilá Estuary (5° 48' S), Isla Blanca (9° 08' S), Cocoli (11° 17' S), Isla San Lorenzo (12° 05' S) and San Gallán (13° 50' S)) or there have not been reports of nesting despite the presence of birds during the breeding season (e.g., Isla Santa (9° 02' S), Isla Ferrol (9° 10' S) and Punta Atico (16° 44' S)). There have been no attempts to determine Kelp Gull breeding population sizes, and cur-

rent numbers are rough estimations based on the best information available. Breeding numbers at the currently existing six nesting grounds in Peru were estimated at approximately 5,500-7,200 pairs (Table 5). Although there are eight locations identified as nesting sites in the past that need to be inspected to confirm breeding, the small numbers of Kelp Gulls seen at these sites (e.g., Isla Santa, Isla Ferrol and Punta Atico; Agrorural, Peruvian Ministry of Agriculture, unpubl. data) would not significantly increase the total estimation.

Punta Campana is the species' northernmost breeding site in Peru. Two pairs were discovered nesting here on two inaccessible islets located 10 m from the shore in 2004 (Figueroa 2010a). It is suspected that Kelp Gulls may be colonizing this new site as a result of human disturbance and egg collection at the adjacent colony of Isla Foca. Isla Foca, located 2.4 km southwest of Punta Campana, is an inshore island located 1 km west of La Isilla port (Figueroa 2010b). In December 2004, 27 nests with eggs were counted (Figueroa 2010b). Isla Foca is not a protected site, and egg collection is still a common practice, keeping the breeding population low and prone to local extirpation.

In the early 1900s, Forbes (1914), Coker (1919) and Murphy (1936) identified Isla Lobos de Tierra in northern Peru as one of the main Kelp Gull breeding sites. Population estimates were not provided, but Murphy (1936) recognized this island as the Kelp Gull's most important center of abundance. His impression that "the island had fully as many of these gulls as they were capable of supporting" suggests the presence

**Table 5. Location and size (in breeding pairs) of Kelp Gull colonies reported along the coast of Peru. Current nesting at an additional eight locations used by Kelp Gulls in the past needs to be confirmed.**

Department	Site	Location	Size	Year	Source
Piura	Punta Campana	5° 11' S, 81° 11' W	2	2004	Figueroa 2010a
	Isla Foca	5° 12' S, 81° 12' W	27	2004	Figueroa 2010b
	Isla Lobos de Tierra	6° 27' S, 80° 50' W	< 650	2014	this study
	Isla Lobos de Afuera	6° 55' S, 80° 41' W	50-100	2007	this study
Ica	Isla La Vieja	14° 17' S, 76° 11' W	4,500-6,000	2008	this study
Moquegua	Punta Coles	17° 43' S, 71° 21' W	315-420	2008	this study

of a significant number of Kelp Gulls considering that Isla Lobos de Tierra has an area of 1,426 ha. The scattered distribution of breeding groups (Figueroa 2013) and the small numbers of nesting birds observed in recent years suggest that Kelp Gull numbers at Isla Lobos de Tierra have declined drastically since the beginning of the last century. The number of birds has remained stable between 500 and 1,300 individuals in the last 13 years (Figueroa 2013; Agrorural, Peruvian Ministry of Agriculture, unpubl. data), which suggests that the current breeding population on Isla Lobos de Tierra should not exceed 650 pairs. There are no historical records of numbers of Kelp Gulls on Isla Lobos de Afuera, but Coker (1919) pointed out that the numbers were much lower than those at Isla Lobos de Tierra. In November and December 2004, 73 nests were counted at Isla Lobos de Afuera (Figueroa 2010b); in December 2007, between 50 and 100 nests were estimated (Table 5).

At Isla La Vieja, daily records of egg collection and chick culling undertaken between 1978 and 1998 indicate that several thousand birds nested on this island. During this period, 158,026 eggs were collected and 69,047 chicks were culled on Isla La Vieja alone. It is difficult to estimate the exact number of nests based on the total number of eggs and chicks collected in a given season, but by assuming modal clutch sizes of two and three eggs (Figueroa 2010b) and modal brood sizes of one and two chicks, the maximum number of nests during this period may have been 15,000. In 1999, the culling was banned, and birds were seen breeding in 1999 and 2000 (Flores 2005). In November 2009, 117 nests with eggs were counted within a geo-referenced area of 7.8 ha. By extrapolating this density to the 300 to 400-ha area occupied by Kelp Gulls (approximately 20% of the total island area), we estimated a total of 4,500-6,000 nests (Table 5).

Punta Coles was first reported as an important nesting site by Tovar (1968), but no numbers were provided. It is likely that Kelp Gulls started breeding in the mid-1950s after the implementation of a management

policy of walling-off many capes along the coast to increase the available nesting area for guano birds by isolating them from human disturbance and terrestrial predators (Duffy 1994). Counts of Kelp Gulls by the headland guards between 2012 and 2014 reveal that the local population did not exceed 500 birds (Agrorural, Peruvian Ministry of Agriculture, unpubl. data), which suggests that the current maximum number of breeding pairs may be smaller than 250 breeding pairs.

*Other breeding populations in South America.* In the rest of South America, Kelp Gulls have been reported breeding in the Malvinas (Falkland) Islands and Ecuador (Burger and Gochfeld 1996). Kelp Gulls nest at many of the islands and islets of the Malvinas (Falkland) archipelago (Croxall *et al.* 1984; Woods and Woods 1997), but detailed information on breeding locations and numbers is incomplete and partially outdated (last published counts made between 1983-1992). Available information indicates that they nest in colonies of up to several hundred pairs, mostly in coastal areas, and the total population has been estimated at between 24,000 and 44,000 pairs (Woods and Woods 1997). There are no recent estimates of the current number of breeding pairs (D. Doxford, pers. commun.). In Ecuador, Kelp Gulls were recorded breeding in the Ecuasal salt lakes at Salinas (2° 15' S, 80° 58' W) in the mid-1990s (Haase 1996). A total of 17 nests were reported on a small island in one of the lakes in January 1994. Gulls bred there again in the following season, when an additional few pairs were recorded nesting on an adjacent small island (Haase 1996). However, Kelp Gulls have not been reported to breed in Ecuador since then (B. Haase, pers. commun.).

## DISCUSSION

The review of records of breeding distribution and abundance indicates that Kelp Gulls in the five South American countries considered here nest on at least 215 locations, totaling a minimum of 131,360 breeding pairs (Table 6). Argentina has the bulk

**Table 6. Number of colonies and estimated breeding population size by country in South America (the population estimate for the Malvinas (Falkland) Islands is not included). The values for country and overall breeding population size are a minimum estimate as information on the number of pairs is not available for all existing colonies.**

Country	Estimated Breeding Pairs	Number of Colonies	% Pairs	% Colonies
Brazil	2,270	35	1.73	16.28
Uruguay	9,110	8	6.94	3.72
Argentina	106,230	140	80.87	65.12
Chile	8,210	26	6.25	12.09
Peru	5,540	6	4.22	2.79
Total	131,360	215		

of the population (81% of breeding pairs and 65% of colonies) (Table 6). There are few colonies exceeding 1,000 pairs in size anywhere on the South American coast, most being found in Argentina. Interestingly, colonies in Brazil are consistently small throughout its large expanse of coastline, explaining the smallest contribution of this country to overall numbers despite having the second highest number of colonies. Throughout their breeding range in South America, Kelp Gulls nested mostly on coastal islands and islets, presumably to escape predation by mammals and humans. Kelp Gull preference for nesting on islands, with the use of mainland sites only in coastal sectors where islands are not available, has been shown in central Patagonia, Argentina (García Borboroglu and Yorio 2004). Kelp Gulls may also nest at freshwater locations, although little is known about their populations in these environments throughout South America. Inland breeding has been reported in Argentina (Bo *et al.* 1995; Frixione *et al.* 2012) and Uruguay (J. Cravino, pers. commun.), but further studies are needed in these and other countries to adequately assess the total breeding population of this species at the continental scale.

When evaluating regional patterns of distribution and abundance, it should be noted that knowledge of the location and size of Kelp Gull colonies in Chile is incomplete. Little is known from the coasts of southern Chile, especially the Fuegian archipelago, where this gull species is fairly common. It also should be noted that breeding distribution and abundance in Peru may have been drastically altered by human intervention during the 20th century. Kelp Gulls in Peru

have been subject to continuous collection and destruction of eggs, chicks and adults since the early 1900s as part of a governmental plan to control the population size of predators of guano-producing seabirds on the majority of guano islands and headlands (Ballén 1917; Tovar and Cabrera 2005). This control persisted for over a century until it was banned in 1999-2000. The persistent collection of eggs and killing of chicks and adults on many islands and headlands of the Peruvian coast have undeniably exerted a strong influence on the current distribution and number of Kelp Gulls and have been perhaps the major cause of the population decline. However, it appears that on some islands (e.g., Isla La Vieja) the banning of egg destruction and chick killing, together with the temporal cessation of guano harvest (last harvest in 1995; Agrorural, Peruvian Ministry of Agriculture, unpubl. data) and better food conditions, has benefited Kelp Gulls with a population increase since 1998, although the population size is lower than levels prior to the 1990s.

Kelp Gull population growth and geographic expansion has been reported in the past in Australia, New Zealand and Africa (Fordham and Cormack 1970; Blakers *et al.* 1984; Coulson and Coulson 1998; Whittington *et al.* 2006, 2016; but see Crawford *et al.* 2009). The information presented here shows a similar population growth in Argentina, Brazil and Chile, although, as previously observed for the central coast of Argentina (Lisnizer *et al.* 2011), population trends differ depending on the coastal sector considered. Moreover, relatively important increases in numbers were only observed in Argentina, specifically in northern and cen-

tral Patagonia. As observed on the African continent (Bergier *et al.* 2009), evidence suggested a recent northward breeding range expansion of the species with breeding records in northern South America and North America (BirdLife International 2014). Breeding was first recorded in Ecuador in 1993 (Haase 1996), and Kelp Gulls were first recorded nesting in Louisiana, USA, in 1989 (Dittmann and Cardiff 1998). However, Kelp Gulls no longer breed in Ecuador and, in Louisiana, they hybridized with Herring Gulls (*Larus argentatus*) and were last seen in 2000 (Dittmann and Cardiff 2003). Therefore, although the information reported in this review shows an increase in numbers and the formation of new colonies at several coastal sectors in South America, there is no strong evidence that Kelp Gulls are currently expanding their breeding range.

The Kelp Gull is a generalist feeder that uses diverse feeding methods and consumes a wide variety of prey both during the breeding and non-breeding seasons, as shown by studies from Argentina (Bertellotti and Yorío 1999; Silva Rodríguez *et al.* 2000; Petracci *et al.* 2004; Yorío *et al.* 2013), Brazil (Branco 2001; Silva-Costa and Bugoni 2013), Chile (Bahamondes and Castilla 1986; Ruiz and Simeone 2001; Ludynia *et al.* 2005; Simeone and Luna-Jorquera 2012) and Peru (Coker 1919; Flores 2005; Tovar and Cabrera 2005; Figueroa 2010b). Studies along its breeding range in South America have also shown that Kelp Gulls regularly take advantage of human-derived food sources, mainly fishery discards and urban waste, throughout the year.

Kelp Gulls throughout South America associate with various types of fisheries, mainly trawl fisheries, which discard large amounts of waste due to the low selectivity of fishing gear. Along the Santa Catarina coast in Brazil, Kelp Gulls regularly take advantage of discards provided by artisanal trawl vessels in numbers that vary between four and 30 birds (Branco 2001; Branco *et al.* 2006). The estimated amount of fish discarded during the 8-month fishing season by this coastal fishery was 1,100 tons (Branco 2001). In addition, relatively small numbers of Kelp

Gulls have been reported to take advantage of discards provided by small boats using trawl and driftnets along the coast of Paraná State (Carniel and Krul 2012a) and of offal and discards dumped on the shoreline as a result of driftnet fishing operations (Carniel and Krul 2012b). Kelp Gulls also feed on demersal fish discarded by coastal trawlers in waters of Rio Grande do Sul (Soares Traversi and Vooren 2010), in agreement with diet studies in this coastal sector that show that during the non-breeding season Kelp Gulls feed primarily on fishery discards (Silva-Costa and Bugoni 2013).

In Uruguay, observations on board a coastal trawl vessel showed that Kelp Gull adults and juveniles take advantage of discards in numbers estimated between a few and 260 individuals (Dirección Nacional de Recursos Acuáticos, unpubl. data). According to landings from this fishery (Dirección Nacional de Recursos Acuáticos 2012), discards during 2012 ranged between 2,800 and 6,700 tons (Rey *et al.* 2000; Kelleher 2005). In addition, Kelp Gulls were recorded feeding on discards at the small-scale shrimp artisanal fishery operating from Punta del Diablo port (34° 02' S, 53° 32' W) (Segura *et al.* 2008).

In coastal Argentina, adult and young Kelp Gulls in flocks of up to 1,700 individuals regularly associate with trawl fisheries (Bertellotti and Yorío 2000; González-Zevallos and Yorío 2006; Marinao and Yorío 2011; Seco Pon *et al.* 2013). Although the seasonality of the fishing activity varies according to the coastal sector and target species, some relatively important fisheries operate year-round and provide gull populations with up to several thousand tons of discarded fish per year, mostly demersal species not normally available to these surface-feeding birds (Romero *et al.* 2009; Góngora *et al.* 2012). Adult and young Kelp Gulls can also take advantage of large amounts of waste generated by fish processing plants that dispose of waste in open landfills within or close to urban waste landfills in several coastal cities. However, the availability of this waste to gulls is irregular and depends on the use of this waste for fish meal (Yorío and Caille 2004).



To a lesser extent, Kelp Gulls also take advantage of waste provided by artisanal longline vessels (Bertellotti and Yorio 2000) and shore-based recreational fisheries (Yorio *et al.* 2013).

In Chile, Kelp Gulls have been reported to associate with fishing trawlers operating relatively inshore between 29° 08' S and 30° 11' S (Coquimbo Coastal System) in flocks of up to 600 individuals (Weichler *et al.* 2004; Villablanca *et al.* 2007). Discards obtained at the fishing harbor appear to be particularly important for gulls nesting at urban colonies (Ludynia *et al.* 2005). Kelp Gulls also associate in relatively low numbers with artisanal longline fisheries along the coasts of the X and XI Regions (Moreno *et al.* 2006) and with artisanal longline fishing taking place in the fjords and channels of the XII Region (Ojeda *et al.* 2011).

Urban waste is also an important component in Kelp Gull feeding ecology, as waste is disposed of in open landfills and not immediately covered in most coastal cities across the region. Kelp Gulls of all age classes have been recorded year-round at urban landfills (Silva Rodríguez *et al.* 2000; Yorio and Giaccardi 2002; Lobos *et al.* 2011), often in numbers that reach several thousand individuals in a single count (Giaccardi *et al.* 1997; Giaccardi and Yorio 2004). Kelp Gulls from several colonies forage at landfills during the different stages of the breeding cycle (Bertellotti and Yorio 1999; Bertellotti *et al.* 2001; Petracci *et al.* 2004; Ludynia *et al.* 2005), with larger amounts of garbage in the diet the closer the colony to the nearest landfill (Bertellotti and Yorio 1999).

Predictable and abundant anthropogenic food subsidies can have different effects at the individual and population levels, enhancing individual fecundity and survival and favoring population growth (Oro *et al.* 2013). The increased availability of these supplementary food sources has been considered a key factor determining the population expansion of several gull species, including the Kelp Gull across its southern hemispheric range (Fordham and Cormack 1970; Blokpoel and Spaans 1991; Coulson and Coulson 1998; Whittington *et al.* 2006;

Duhem *et al.* 2008). Monitoring of Kelp Gull populations in northern and central Patagonia, Argentina, demonstrated that the observed trends varied among coastal sectors, and sectors that showed significant population growth were those with higher availability of anthropogenic food in the form of fishery discards and urban waste (Lisnizer *et al.* 2011).

Another factor possibly favoring Kelp Gull colonization of new areas and population expansion is the plasticity in its habitat requirements. A high diversity in the use of habitat types has been recorded throughout its distributional range in the Southern Hemisphere, including Argentina (García Borboroglu and Yorio 2004; Suárez *et al.* 2010), Chile (Simeone and Bernal 2000) and Uruguay (Lenzi *et al.* 2010). Plasticity in habitat requirements has also allowed Kelp Gulls to colonize urban areas.

This review presents the first synthesis of information on the distribution and size of Kelp Gull colonies at the country level in Uruguay, Chile and Peru; provides an update on the breeding situation of the species in Brazil and Argentina; and allows the first evaluation of the overall breeding population in South America. Despite being considered a widely distributed species with expanding breeding populations, the information presented here indicates that trends are variable and that the species is not expanding northward as previously thought. However, the increase in Kelp Gull numbers observed at some coastal sectors may increase conflicts with humans, as growing activity in or near cities may result in hazards to aircraft (Yorio *et al.* 1998a; González-Acuña *et al.* 2006; Croce 2011) and threats to human health (Yorio *et al.* 1996; Frere *et al.* 2000; Albarnaz *et al.* 2007; Rodríguez *et al.* 2012). Kelp Gulls have also been reported to feed on the skin and blubber of southern right whales (*Eubalaena australis*) (Rowntree *et al.* 1998) and to prey upon eggs and/or chicks of threatened coastal birds (Yorio and Boersma 1994; La Sala and Martorelli 2010; Lenzi *et al.* 2010; Simeone and Luna-Jorquera 2012). Ongoing monitoring efforts and population evaluations are needed as they

may be valuable in the event information is needed to support management decisions.

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