

**NOTE**

# Recovery of South American fur seals from Fuegian Archipelago (Argentina)

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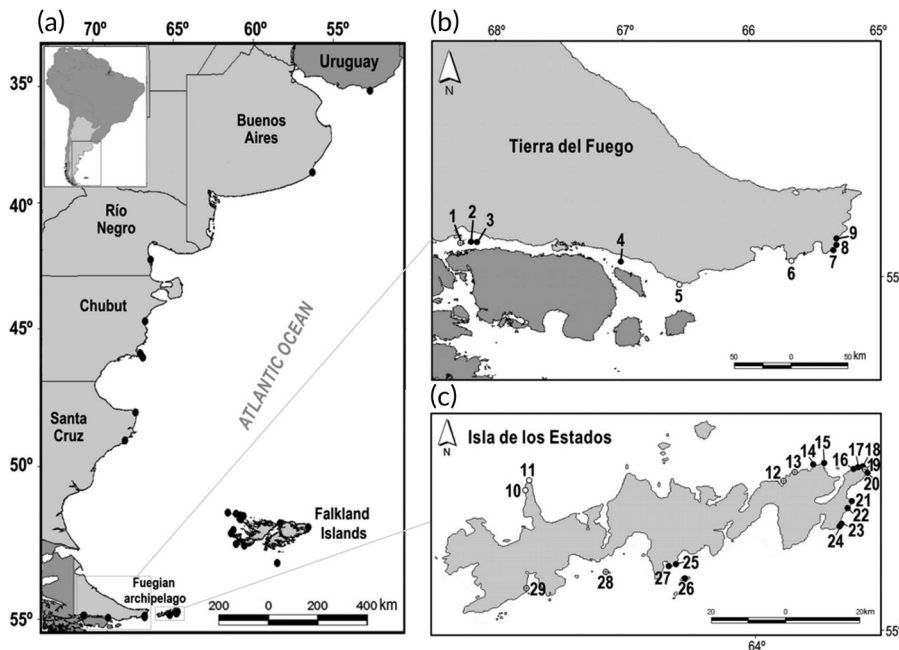
In order to understand the distribution and abundance of a given species, we need to know its evolutionary history, the resources it requires, its demographic vital rates, its interactions with conspecifics and other species, and the effects of environmental conditions (Begon, Townsend, & Harper, 2006). At the edges of the present distribution of a particular species, organisms are exposed to the extreme of variability in the environmental variables that define their natural habitat. In those environments, a small change of any of the variables can strongly affect the survivorship of a given species.

The South American fur seal (SAFS), *Arctocephalus australis*, is found along the Atlantic and the Pacific coasts of South America (Cárdenas-Alayza, Oliveira, & Crespo, 2016). As with several pinniped species, SAFS were exploited in the southwestern South Atlantic intensively during the 18th and 19th centuries, when most of the species of *Arctocephalus* along the sub-Antarctic seas were driven to the edge of extinction (Bonner, 1982; Gerber & Hilborn, 2001; Ponce de León, 2000). After the cessation of commercial sealing in the early 20th century, the overall population started to recover (Bastida, Rodríguez, Secchi, & Silva, 2007; Crespo et al., 2015). The process of recolonization includes changes in abundance, trend, and distribution of colonies through time (Roux, 1987). Moreover changes in social structure of colonies (i.e., development of haul-out sites, and their transition into rookeries) have been shown to be a characteristic of the "recolonization" phase of several fur seal and sea lion populations (e.g., Bradshaw, Lalas, & Thompson, 2000; Hofmeyr, Bester, Makhado, & Pistorius, 2006; Huisamen, Kirkman, Watson, Cockcroft, & Pistorius, 2011).

The global SAFS population estimate is 210,000 individuals (Cárdenas-Alayza et al., 2016), with numbers in the different regions as follows: Argentina at least 20,000 (Crespo et al., 2015), Uruguay an estimated 130,000 (Franco-Trecu, 2015), 10,500 in Peru, 28,000 in southern Chile, (Oliva et al., 2012; Venegas et al., 2002), and 20,000 in the Falkland Islands (Malvinas) (Cárdenas-Alayza et al., 2016). However, the present global population estimate would be

greater since a recent study of only SAFS pup abundance has almost doubled prior estimates, from 39,000 to 76,000 pups (36,425 Falkland Islands (Malvinas), 31,160 Uruguay, ~6,000 Chile, <2,500 Argentina; see Baylis et al., 2019). Rookeries have a discontinuous distribution along the Atlantic coast, located only on the northern and southern extremities of their range (Crespo et al., 2015; Túnez, Cappozzo, & Cassini, 2008), with 48% of the pup production located in the Falkland Islands (Malvinas) and 41% in Uruguay (Baylis et al., 2019). The present pattern of distribution has been attributed to natural factors (e.g., distance to the continental shelf break and availability of islands; see Túnez et al., 2008), although it is more likely the result of abundance depletion from intense commercial sealing suffered by the species in the past (Ximénez, 1964), because archaeological evidence shows there were many more colonies with a continuous distribution (Vales, 2015 and references therein).

The population along the coast of Argentina is distributed across 19 colonies (rookeries and haul-out sites), mainly located at Isla Rasa, Isla Arce and Isla Escondida (Chubut province, Figure 1), where a rough estimation of the rate of increase was calculated at about 8% (Crespo et al., 2015). Fur seal colonies across Tierra del Fuego and Isla de los Estados (Fuegian archipelago) were surveyed in 1997, at which time 4,200 SAFS were estimated (including 358 pups). However, the estimated population trend for Fuegian archipelago is not available due to the lack of data (Crespo et al., 2015). There are indications of a population increase in Uruguay (Franco-Trecu et al., 2019), central Patagonia (Crespo et al., 2015), and Falkland Islands (Malvinas) (Baylis et al., 2019). In contrast, the population in southern Chile (Magallanes Region) has experienced a decline between 1978 and 2001 (Venegas et al., 2002). Different studies (morphometrics, genetics, and foraging behavior) support the connectivity among southern Chile and Atlantic regions (Uruguay, mainland Argentina, and Falkland Islands (Malvinas); (Baylis, Tierney, Orben, Staniland, & Brickle, 2018a; Oliveira, 2004; Rodríguez, Seguel, Gutierrez, Pavés, & Verdugo, 2018; Túnez, Capozzo, Pavés, Albareda, & Cassini, 2013), suggesting that the specimens from these areas belong to the same population. In this context, of a recovering population of SAFS in the southwestern Atlantic and an interconnection between areas with different trends, the aim



**FIGURE 1** (a) Current distribution of *Arctocephalus australis* colonies along the southwestern Atlantic coast. Detailed study area of Fuegian archipelago: (b) Colonies in Tierra del Fuego; (c) Colonies in Isla de los Estados. (●: colony with SAFS; ○: colony without fur seals at the time of the survey; ⊕: colony not visited during the survey); see text for further explanations.

of the present study is to estimate the abundance and trend of SAFS in the Fuegian archipelago and analyze and describe changes in the social composition and spatial distribution of colonies through time (1997–2012).

The study area comprises the extreme south of South America, consisting of the southern coast on the Atlantic side of Tierra del Fuego and Isla de los Estados (Figure 1). Given that the coast topography is very complicated (many islands, rocky coast, and high cliffs that make beaches inaccessible), a decision was made to carry out an aerial survey and count fur seals on digital photographs. The flight was done with a twin-engine high-wing aircraft, Cessna 337 Push-Pull, at an altitude of 100–150 m and a speed of 90–120 knots (Schiavini, Crespo, & Szapkievich, 2004; Wright, 2005). All sites previously noted to be SAFS rookeries (Carrara, 1952; Crespo et al., 2015; Parera, Schiavini, & Frere, 1997) were included in the survey. Each colony was photographed using a digital camera Canon EOS Rebel XT of 8 megapixels with an 80–200 mm telephoto lens. Georeferencing of pictures was done by synchronizing the camera with an I-GotU GPS logger (from Mobile Action) and georeferencing pictures using the @Trip PC software ([http://global.mobileaction.com/download/i-gotU\\_download1.jsp](http://global.mobileaction.com/download/i-gotU_download1.jsp)). The reproductive activities of SAFS occur in austral spring-summer, within a short period of time known as the reproductive synchronization period (Majluf, 1987, 1992; Pavés & Schlatter, 2008; Pavés, Schlatter, & Espinoza, 2005; Pavés, Schlatter, Franco-Trecu, et al., 2016). This period goes from mid-October to mid-January (Ponce de León & Pin, 2006). A single flight took place on January 7, 2012, under optimal weather conditions, and at the end of the SAFS breeding season when all pups were already born (Franco-Trecu, Tassino, & Soutullo, 2010; Pavés et al., 2016).

During the aerial survey 1,096 photographs were taken and then analyzed in the laboratory to select the best photos based on the optimal focus, clarity and coverage. For each colony, a mosaic was constructed by editing and mounting the best shots. Counts from each colony were done by two experienced observers using OTARIIDAE software (Bartheld, Pavés, Contreras, & Vera, 2008). Individuals were counted and tabulated into the following age and sex categories: adult males (AM, territorial and peripheral), subadult males (SAM), females (F), pups (P), juveniles (J), and indeterminate individuals (F + J). These categories were based on body shape and color, location in the rookery, and other behavioral cues of the species (Vaz-Ferreira, 1982; Vaz-Ferreira & Sierra de Soriano, 1963). Each photo mosaic was independently counted once by observers and an additional blind count was undertaken whenever there was more than 10% difference between counts. Then the mean and standard deviation of these estimates were calculated for each colony (Crespo, 1988; Reyes, Crespo, & Szapkievich, 1999).

The colonies were classified as breeding (i.e., rookeries with  $\geq 10\%$  of pups in the colony and adult reproductive males and females), haul-out colonies (no pups), and mixed (i.e., colonies with small breeding areas and a large number of juveniles or nonreproductive animals in groups nearby).

The annual rate of population increase ( $r$ ) was estimated by linear regression between  $\log_e$  of the total number of individuals counted in the three different censuses (1995, 1997 and 2012; according to Parera et al., 1997; Crespo et al., 2015, and the present study). We also calculate  $r$  for number of pups using the formula  $r = (\ln N_t - \ln N_0)/t$ , where  $N_0$  is the number of pups at time  $t_0$ ,  $N_t$  is the number of pups at time  $t$ , and  $t$  is the time elapsed between counts (Caughley, 1977). This trend was calculated using pup counts from 1997 and 2012 breeding seasons. The 1995 census was not taken into account, because pups and nonpups were not discriminated. The finite rate of increase ( $\lambda$ ) is related to  $r$  by  $\lambda = e^r$  (Caughley, 1977), and this rate can be expressed as a mean annual percentage of population change in order to facilitate between-year and between-population comparisons. The conversion is done by subtracting 1 from  $\lambda$  and then multiplying this value by 100 (Caughley, 1977).

To analyze if there were changes in the social composition of colonies through time, we compared the present census with available data from the literature (Crespo et al., 2015; Parera et al., 1997). As the 1997 census only distinguished 2 age classes (i.e., pups and nonpups), age classes from 2012 data were grouped to compare the proportion of pups and nonpups between 1997 and 2012, using a normal approximation of the chi-square test (Zar, 1996).

The flight took five hours and covered 900 km. Of the 29 sites previously recorded in the literature (Carrara, 1952; Crespo et al., 2015; Parera et al., 1997), favorable weather conditions allowed us to survey 23 of them: 19 colonies of SAFS (6 in Tierra del Fuego and 13 in Isla de los Estados), of which 17 were shared with South American sea lions, *Otaria byronia*<sup>1</sup> and 2 were exclusive of SAFS, and 4 were surveyed but no individuals were found (Table 1).

**TABLE 1** South American fur seal colonies of Fuegian archipelago, comparing sites previously recorded with those of the present study.

Location	Summer 1948 <sup>a</sup>	Summer 1995 <sup>b</sup>	Summer 1997 <sup>c</sup>					Summer 2012					Total (mean ± SD)	Type of colony		
			Non-P	P	AM	SAM	F	J	F + J	P						
Tierra del Fuego																
1 Isla Bridges	100												—			
2* Islet NE of Isla Despard					54.88°S, 68.25°W	54.87°S, 68.16°W			0	0	0	0	1	0	1 ± 1.41	Haul-out
3* Islet Les Eclaireurs W					54.87°S, 68.1°W			0	0	0	0	0	9	0	9 ± 2.12	Haul-out
4* Islas Becasses					54.96°S, 67.01°W			0	0	0	0	0	16	0	16 ± 2.12	Haul-out
5 Islet Blanco		14			55.06°S, 66.55°W										0	
6* Islets S of Cabo Hall	70	D	100	0	54.98°S, 65.67°W										0	
7* Islet Veleros			411	0	54.92°S, 65.32°W			0	1	0	0	0	0	0	1 ± 0.7	Haul-out
8* Ensenada Patagones South					54.9°S, 65.31°W			0	0	0	0	0	2	0	2 ± 2.12	Haul-out
9* Cave in Ensenada Patagones #					54.88°S, 65.31°W			0	0	0	0	0	2	0	2 ± 2.12	Haul-out
Isla de los Estados																
10 Bahía Flinders	1,500				54.73°S, 64.55°W										0	
11* Cabo San Antonio	100				54.73°S, 64.54°W										0	
12 Punta E of Punta Shank		100	31		54.74°S, 63.96°W										—	
13 Punta Dorgambide and Punta Shank		86			54.73°S, 63.94°W										—	
14* Cabo Brizuela #					54.72°S, 63.9°W			0	2	0	0	0	14	1	17 ± 12.2	Mixed
15* Cabo Fourniux	50	318	734	0	54.72°S, 63.89°W			15	103	32	55	1,130	183	1,518 ± 55	Breeding	
16* Punta Zapata #					54.72°S, 63.83°W			1	14	1	1	185	4	206 ± 20	Mixed	
17* Cabo San Juan		20			54.72°S, 63.82°W			3	36	1	4	133	0	177 ± 20.2	Haul-out	
18* Islet San Juan					54.72°S, 63.81°W			11	15	5	7	191	22	251 ± 40.6	Mixed	
19 Caleta Ojeda		205	333	0	54.72°S, 63.81°W										—	
20* Punta Leguizamo		315	155	45	54.73°S, 63.8°W			12	64	24	47	624	56	827 ± 52	Mixed	

TABLE 1 (Continued)

Location	Summer 1948 <sup>a</sup>	Summer 1995 <sup>b</sup>	Summer 1997 <sup>c</sup>										Total (mean ± SD)	Type of colony
			Non-P	P	AM	SAM	F	J	F + J	P				
21* Punta Jira	54.75°S, 63.8°W	1,758	1,385	358	75	339	178	183	3,863	701	5,339 ± 235	Breeding		
22 South of Punta Pañuelo #	54.77°S, 63.83°W				8	21	0	0	13	0	42 ± 2.12	Haul-out		
23* Roca Tevez #	54.79°S, 63.84°W				7	11	1	30	215	10	274 ± 22.2	Mixed		
24* Punta Falows	54.79°S, 63.85°W				4	34	1	0	73	2	114 ± 12.4	Mixed		
25 Islet Siri #	54.83°S, 64.15°W				7	23	4	3	236	5	278 ± 39	Mixed		
26 Isla Barrionuevo	54.85°S, 64.16°W	100	130	168	54	0	21	3	4	216	9	253 ± 33.3	Mixed	
27 Punta Achaval	54.84°S, 64.18°W	200	400	311	89	1	21	2	1	193	5	223 ± 38.6	Mixed	
28 Islets Menzies	54.84°S, 64.33°W		2								—			
Bahía Capitán Cánepa	54.87°S, 64.52°W										—			
Grand total		2,120	3,348	3,628	546	144	705	252	335	7,116	998	9,550 ± 125		

Note. Census data by age classes: adult males (AM, territorial and peripheral), subadult males (SAM), females (F), juveniles (J), indeterminate individuals (F + J), and pups (P). Numbers on the left refer to the position in Figure 1.

<sup>a</sup>Data from Carrara (1952); <sup>b</sup>data from Parera et al. (1997) and Crespo et al. (2015); <sup>c</sup>data from Crespo et al. (2015); [\*] colonies with presence of *Otaria flavescens* in 2012; [#] new location recorded for SAFs; D: fur seals detected but not counted; [–] colony not visited during the survey.

The total number of SAFS recorded for Fuegian archipelago in 2012 was  $9,550 \pm 125$  (including 144 adult males, 705 subadult males, 252 females, 335 juveniles, 7,116 female + juvenile, and 998 pups; Table 1). The majority of the SAFS was found at Isla de los Estados colonies. Punta Jira and Cabo Funeaux (colony numbers 21 and 15; Figure 1) were the sites with the highest number of fur seals and number of pups (Table 1).

The 2012 census confirmed the presence of pups in 11 colonies, all of them in Isla de los Estados. Colonies in Tierra del Fuego were haul-out sites with a small number of animals, whereas Isla de los Estados contained the breeding activity of the region, distributed in two big rookeries and several mixed colonies (Table 1).

The South American fur seal population in Fuegian archipelago increased from 4,174 animals counted in the 90s (Crespo et al., 2015; Parera et al., 1997) to 9,550 estimated in 2012. This census allows calculating a population growth rate  $r = 0.059$  for the period between 1995 and 2012 ( $r^2 = 0.98$ ,  $n = 3$ ). Considering only pup counts, the intrinsic rate of increase was  $r = 0.040$ . These trends correspond to mean annual percentages of population increase of 6.1% and 4.1% (total and pup population, respectively).

When comparing the census conducted in 2012 with that of 1997 (Crespo et al., 2015; Parera et al., 1997), there was an evident increase in the number of individuals in almost all registered colonies, except in two (colonies 7 and 27, Table 1). This comparison also reveals changes in the spatial distribution of colonies. There were six new sites recorded for SAFS (i.e., colonies not registered in the 1948, 1995, and 1997 surveys, holding individuals in the 2012 census), one in Tierra del Fuego and five in Isla de los Estados (colony numbers 9, 14, 16, 22, 23, and 25; Table 1, Figure 1). Most of the new colonies showed a mixed social structure and represented 8.23% of the total abundance of fur seals in the area. There were four sites that are now abandoned (i.e., colonies where sea lions were present in 1948 and/or 1995–1997 but without fur seals in 2012) (colony numbers 5, 6, 10, and 11; Table 1, Figure 1).

Compared to the last aerial census performed in the 1997 breeding season, there was a change in the social composition of five colonies analyzed. The proportion of pups and nonpups was significantly different between 1997 and 2012 ( $Z_c > 4.3$ ,  $df = 1$ ,  $p < .05$ ). Changes of social composition differed among colonies. Cabo Funeaux (colony 15; Figure 1) was a haul-out site of nonbreeding individuals but has now become a breeding colony. Punta Leguizamo and Punta Jira (colonies 20 and 21; Figure 1) had some pup production in the past (45 and 358 pups, respectively) and in 2012 increased the number of individuals of all age classes (nonpups and pups). However, Punta Leguizamo presented a mixed structure of small breeding areas with many nonreproductive animals while Punta Jira maintained its breeding structure. Isla Barrionuevo and Punta Achaval (colonies 26 and 27, Figure 1) had increased the nonpup age classes and pup production decreased, maintaining a mixed structure with small breeding areas with groups of nonreproductive animals.

With this work, we updated the status of SAFS in the Fuegian Archipelago after 15 years without surveys. The 2012 survey gives an abundance estimate and population trend for this area. However, present estimation should be considered as a minimum population estimate for three reasons. First, due to weather conditions, some sites (6 of the 29 previously recorded colonies) could not be surveyed. On the other hand, it should also be considered that at the time of the census there is a proportion of animals of the population that are in the water, so some age classes could be underestimated. Females at the end of the breeding season start to alternate feeding trips (which can last for 2–15 days) (Ponce de León & Pin, 2006; Thompson, Moss, & Lovell, 2003), while adult and subadult males start to migrate to other resting areas during the last week of January (Pavés et al., 2016). Finally, pup counts from aerial surveys are underestimated because, despite all pups being on shore at the time of the flights, their small size, the topography of the shore and the tendency of pups to form dense aggregations hinder distinguishing individuals (Baylis et al., 2019; Franco-Trecu et al., 2019). Even though Franco-Trecu et al. (2019) developed a correction for SAFS pups from Uruguay, it was not applied to counts at the Fuegian archipelago because pup density is unlikely to be comparable between Uruguay and the study area. When studying the population abundance of marine mammals that inhabit places of difficult access or throughout a broad territory, the best option is to perform aerial surveys and counts on aerial photographs, which provide a permanent record of the distribution and the number of individuals (Mathews et al., 2011).

Changes in the social structure of the colonies may represent a tendency to recover the organization they had before the exploitation (Torres-García, 1991). Breeding colonies are used repeatedly by individuals, so many of the

colonies occupied in the present could have been used in the past for breeding. When the population increases the use of the colonies can vary, starting new colonies, expanding existing ones, or vanishing others (Roux, 1987; Pomeroy, Twiss, & Redman, 2000). Baker (1978) suggested that young individuals, due to their nomadic behavior, extend their movements over very large areas and thus migrate from one reproductive colony to another, implying that they become the dominant age category in the newly colonized areas. Therefore, a small and growing population will be composed primarily of young individuals with a distribution skewed to younger age categories. The Atlantic population of SAFS has increased notably in the course of the last 25 years (Baylis et al., 2019; Crespo et al., 2015; Franco-Trecu et al., 2019). In the present study, most of the individuals registered were juveniles and females, showing these categories are dominant in the processes of recolonization (Baker, 1978). Moreover, it must be considered that the high number of young individuals can be a determining factor in the rate of population growth (Lima & Páez, 1997).

There are several factors that can affect the selection of breeding sites, such as the gregarious behavior of the species (Bonner, 1968), site fidelity (Boyd, 1993; Lunn & Boyd, 1991), the proximity and availability of food sources (Boyd, 1991; Harcourt & Davis, 1997), the degree of human disturbance (Taylor, Barton, Wilson, Thomas, & Karl, 1995), the topography and physical nature of the beaches, ambient temperatures and solar radiation, exposure to wind and sea spray (Bester, 1982; Gentry, 1998), and the adequate physiographic conditions to exercise the typical reproductive strategies of the species (Esperón-Rodríguez & Gallo-Reynoso, 2012; Gallo-Reynoso, 1994). In the case of Fuegian archipelago SAFS, there was not only an increase of individuals in the number of colonies but also changes in the social structure. Once a new site was occupied there was a change of its social composition through time. This recovery process observed for SAFS in the present study was also observed in other Otariids (Grandi, Dans, & Crespo, 2008, 2015; Raum-Suryan, Pitcher, Calkins, Sease, & Loughlin, 2002) and in other *Arctocephalus* species, like *A. tropicalis* on Amsterdam Island (Roux, 1987), *A. gazella* on the Shetland Islands (Hucke-Gaette, Osman, & Moreno, 2004) or *A. townsendi* on San Benito archipelago (Esperón-Rodríguez & Gallo-Reynoso, 2012), all species that have recovered of an intense harvest.

Population abundance and distribution (variation in abundance from place to place) are determined by the balance between birth, death, immigration, and emigration (Begon et al., 2006). In the case of SAFS from Fuegian archipelago, even though the estimated pup growth rate is very high (4.1%), the number of pups produced is small compared to other breeding areas of the Atlantic, so the 6.1% of total population increase observed cannot be due only to births. A possible explanation could be by migration from surrounding areas (Central and Southern Patagonia, Magallanes Region of Chile, and/or Falkland Islands [Malvinas]). It is known that, juveniles from Uruguay after weaning move up to 1,000 km away from the place of birth to Chubut colonies (Crespo et al., 2015), and adult males and females can move as far as 900 km in feeding trips (Baylis et al., 2018a,b; Franco-Trecu, 2015; Thompson et al., 2003). The distance between SAFS nearest surrounding areas and the study area does not exceed 1,000 km, so it is reasonable to consider migration as an important factor for increasing populations.

It is possible to observe groups of juveniles as well as adults in gulfs, channels, and bays open to the Pacific Ocean. The Beagle Channel, the Strait of Magellan, and the Cockburn and Magdalena canals seem to be important routes for the movement of specimens of SAFS (Crespo et al., 2015; Venegas et al., 2002). The last data recorded in southerner Chile (Region XII), (Venegas et al., 2002) showed a decrease in the number of fur seals compared to the censuses carried out by Sielfeld, Venegas, Atalah and Torres (1978) and Vargas and Torres (1976). Moreover, based on pup abundance, the Falkland Islands (Malvinas) is presently the largest population of SAFS (Baylis et al., 2019). Bearing in mind that these regions are very close to Fuegian archipelago, we can infer that animals travel throughout the Atlantic and between the Atlantic and Pacific Oceans. Genetic studies support the hypothesis of connectivity between both oceans (i.e., there are no barriers to gene flow; Rodrigues et al., 2018), and also among different areas of the Atlantic (Abreu, 2011; Crespo et al., 2015).

Change in population growth in fur seals is likely to be a function of several factors including the availability of local food resources, terrestrial breeding space, and migration, amongst others (Hofmeyr et al., 2006). Migration between areas may occur due to different productivity between them or to temporal changes in the availability of food resources. Otherwise, it may occur because of a high increase in a particular population (Rodrigues et al., 2018). Southern

Patagonia is an area of high marine productivity that sustains great biodiversity of marine resources (Campagna, 2008; Fallabella, Campagna, & Croxall, 2009) and could be used by SAFS to sustain its population recovery.

In the southwestern Atlantic, the overall dynamics of SAFS would be determined to a large extent by the size and trend of the colonies in the Falkland Islands (Malvinas) and Uruguay (Baylis et al., 2019; Franco-Trecu et al., 2019). The total production of pups in those areas is much higher than in any other area of the distribution (Crespo et al., 2015; Oliva et al., 2012; Venegas et al., 2002). Pup rate from Falkland Islands (Malvinas) is not available (Baylis et al., 2019). The estimated value of the average trend of pups in Uruguay is 1.5% (Franco-Trecu et al., 2019). The estimated pup rate for Fuegian archipelago was 4.1%, indicating a fast increase in the number of individuals in this age group, even though the production of pups (i.e., number of pups born per breeding season) was still very low if we compare it with the stock from Uruguay and Falkland Islands (Malvinas).

Finally, the present population estimate from Fuegian archipelago gives at least 25,000 individuals for the SAFS Argentina population (considering ~15,000 estimated during the breeding season from 2010 to 2013 by Crespo et al., 2015). This estimation updates the SAFS from the Atlantic Ocean to more than 255,000 animals, considering at least 125,000 individuals in the Argentine Sea (Vales et al., 2019) plus 130,000 from Uruguay (Franco-Trecu, 2015).

In conclusion, SAFS from the Fuegian archipelago are recovering. This process includes the establishment of new colonies, and the change of the social structure of others. The high rates of increase estimated are possibly due to a combination of immigration and intrinsic population growth. Therefore, considering that the changes observed in the colonies shows that the fur seals are going through a recolonization process, it is essential to keep monitoring the species and its population trend. The results of the present study and future counts will contribute in this effort, providing data for SAFS in the Fuegian archipelago to evaluate future modifications of the abundance and structure of the colonies at the southern limit of its distribution. Not only is such long-term monitoring of value for the conservation and management of this species, but marine mammal population trend can serve as indicators of the general health of an ecosystem (Moore, 2008, 2018).

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## ENDNOTE

<sup>1</sup> The authors consider *Otaria flavescens* (Shaw 1800) as the valid specific name for the South American sea lion, following most South American marine mammalogists and the last work published by Lucero, Rodríguez, Teta, Cassini, & D'Elia (2019).

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