

Records of Risso's dolphin, *Grampus griseus*, in coastal waters of southern Argentina

Registros del delfín gris, *Grampus griseus*, en aguas costeras del sur de Argentina

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Abstract.- We review the records of published and unpublished sightings and strandings for Risso's dolphin (*Grampus griseus*) in subantarctic waters of the Southwestern South Atlantic Ocean. Based on 59 sighting (n = 521 individuals) and 33 stranding records (n = 88 individuals), we identified three main areas of Risso's dolphin concentration in Patagonian waters, which have been observed mostly during the austral summer. We were unable to find published or unpublished reports of Risso's dolphin in offshore or over deep-water areas in this region. Future studies covering other potential areas of the species' distribution are important to improve the scarce information known for this dolphin in this area.

Key words: Stranding, sightings, Southwestern South Atlantic Ocean

INTRODUCTION

The subantarctic waters of the Southwestern South Atlantic Ocean are one of the most productive regions of the world (Campagna *et al.* 2006). These waters are found between two frontal systems, the Subtropical (~40°S) and the Antarctic (~50-60°S) Convergences, which provide unique conditions of high nutrient levels and primary production therefore constituting feeding areas for many species of marine mammals (Campagna *et al.* 2006, Bastida *et al.* 2007, Piola & Falabella 2009).

Risso's dolphin, *Grampus griseus* (Cuvier, 1812), is a small cetacean species which inhabits this area (Bastida *et al.* 2007), although in other parts of the world it is mostly found in temperate and tropical waters (Baird 2008). Due to its offshore habits, few sighting and stranding records have been documented along these coasts (Würsig & Würsig 1980, Goodall & Schiavini 1992¹, Reyes 2006, Goodall *et al.* 2008). While knowledge

of other small cetacean and coastal species has increased in recent years (*e.g.*, Commerson's dolphin, *Cephalorhynchus commersonii*; dusky dolphin, *Lagenorhynchus obscurus*; and Franciscana dolphin, *Pontoporia blainvillei*; among others), very little is known about the distribution, movements, seasonal occurrence and feeding habits of Risso's dolphin in this region.

Stable isotope analyses suggest that in the Southwestern South Atlantic, Risso's dolphin is mainly an offshore predator (Riccialdelli *et al.* 2010), as it is in other parts of the world (Shane 1995a, b, Baird 2008, Bearzi *et al.* 2010). Nevertheless, its isotopic similarities to inshore species such as the Burmeister's porpoise, *Phocoena spinipinnis* (Riccialdelli *et al.* 2010), and several published coastal sighting records (Würsig & Würsig 1980, Reyes 2006), suggest that Risso's dolphin groups

¹Goodall RNP & ACM Schiavini. 1992. Varamientos de delfín gris, *Grampus griseus*, en las costas del extremo sur sudamericano, p. 31. 5ta Reunión de Especialistas en Mamíferos Acuáticos de América del Sur, SOLAMAC, Buenos Aires.

may move between inshore and offshore habitats, as noted near the Santa Catalina Islands (Shane 1995a, b) and in the NE Pacific Ocean (Leatherwood *et al.* 1980). According to bone collagen $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values analyzed in Riccialdelli *et al.* (2010), the Risso's dolphin population in the Southwestern South Atlantic Ocean seems to prefer squid as a prey item, which has been recorded for other regions (Sekiguchi *et al.* 1992, Cockcroft *et al.* 1993, Blanco *et al.* 2006). The movements observed by Shane (1995a, b) near the Santa Catalina Islands in the NE Pacific were related to feeding activities, whereas the ones registered by Leatherwood *et al.* (1980) appeared to be related to surface temperatures. Therefore, distribution and seasonal movements of the species' main prey (squid) may influence its own distribution and movement patterns in Argentine waters.

The aim of this work is to update sighting and stranding information for Risso's dolphin of Patagonian Argentine waters to clarify the presence of this species in the Southwestern South Atlantic Ocean.

MATERIALS AND METHODS

The study region was divided into three areas: 1) Area I, north Patagonian waters (Península Valdés area, $\sim 42^\circ\text{S}$), 2) Area II, central Patagonian waters (Golfo San Jorge area, $\sim 45^\circ\text{S}$) and 3) Area III, southern Patagonian waters (southern Santa Cruz-Strait of Magellan-Tierra del Fuego area, $\sim 50\text{-}54^\circ\text{S}$) (Fig 1). We compiled and reviewed previously published records and interviewed colleagues for information on Risso's dolphin in Argentine waters as well as reviewing unpublished sighting and stranding events of the species in the study region (Table 1, Fig. 1). Most of the sightings were recorded opportunistically from the shore or small boats, and only sightings reported by Reyes (2006) were made by dedicated surveys at sea. Sighting reports were expressed as the total number of individuals recorded but also as a range of animals sighted. For the latter, we considered the midpoint of each group size estimated. When the midpoint was a non-integer, we used the lower integer.

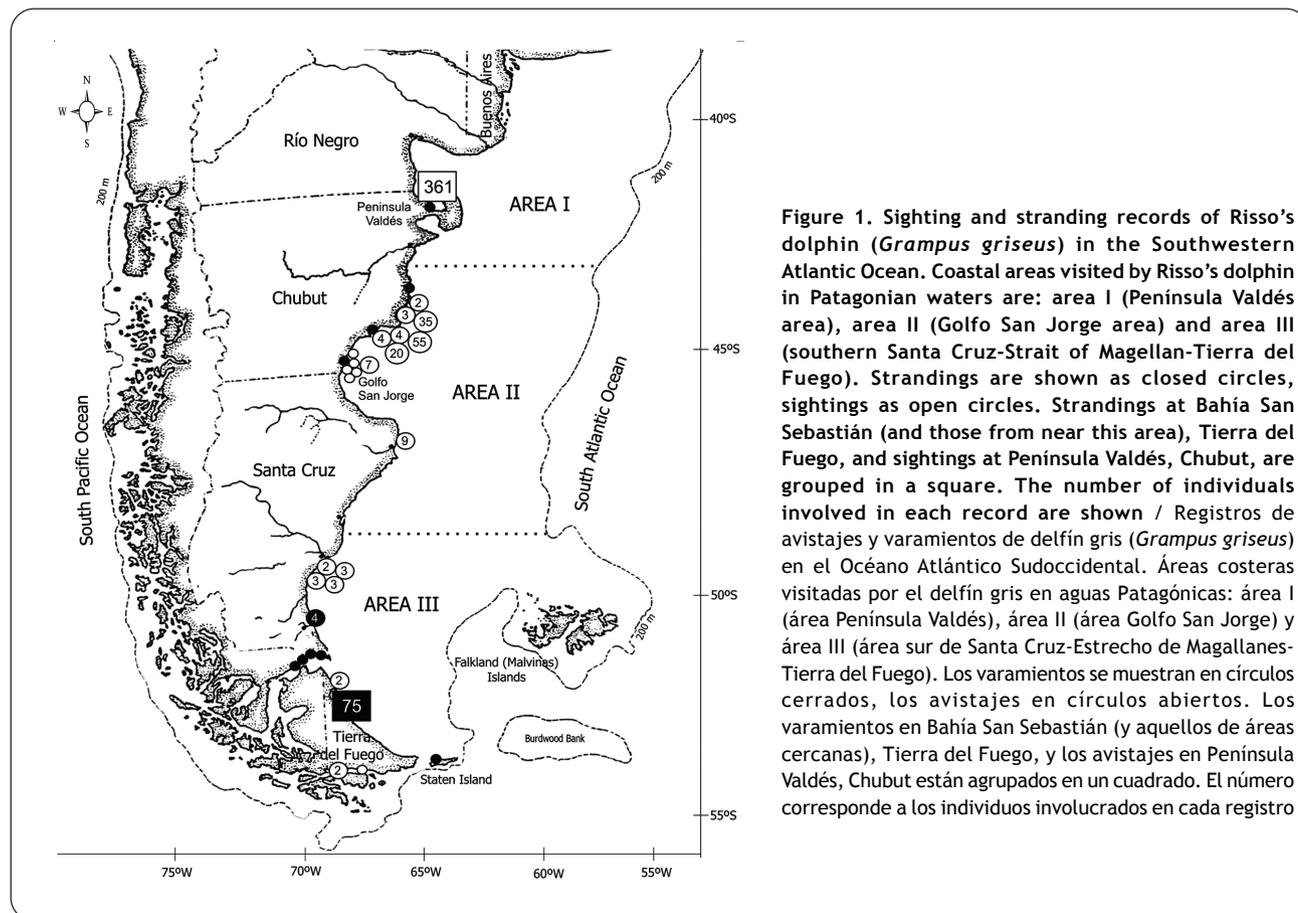


Figure 1. Sighting and stranding records of Risso's dolphin (*Grampus griseus*) in the Southwestern Atlantic Ocean. Coastal areas visited by Risso's dolphin in Patagonian waters are: area I (Península Valdés area), area II (Golfo San Jorge area) and area III (southern Santa Cruz-Strait of Magellan-Tierra del Fuego). Strandings are shown as closed circles, sightings as open circles. Strandings at Bahía San Sebastián (and those from near this area), Tierra del Fuego, and sightings at Península Valdés, Chubut, are grouped in a square. The number of individuals involved in each record are shown / Registros de avistajes y varamientos de delfín gris (*Grampus griseus*) en el Océano Atlántico Sudoccidental. Áreas costeras visitadas por el delfín gris en aguas Patagónicas: área I (área Península Valdés), área II (área Golfo San Jorge) y área III (área sur de Santa Cruz-Estrecho de Magallanes-Tierra del Fuego). Los varamientos se muestran en círculos cerrados, los avistajes en círculos abiertos. Los varamientos en Bahía San Sebastián (y aquellos de áreas cercanas), Tierra del Fuego, y los avistajes en Península Valdés, Chubut están agrupados en un cuadrado. El número corresponde a los individuos involucrados en cada registro

A few stranding records were opportunistic, but most strandings were found during periodic beach surveys by the R. Natalie P. Goodall team from 1974/75 to the present, which primarily took place during austral spring-summer months (October to April). We considered each sighting and stranding event as a record.

RESULTS AND DISCUSSION

Fifty-nine sighting and 33 stranding records were available (Table 1, Fig. 1). We found 29 sighting and 16 stranding records which were previously published, and 30 new sighting records and 17 unpublished stranding records.

Sightings were made between the years 1962 and 2006. Of the total definite sightings ($n = 57$, excluding two possible sightings of Risso's dolphin), 67% corresponded to area I, 24% and 9% corresponded to areas II and III, respectively. The number of animals sighted ranged from one to an estimated 100 individuals, with a mean of $9.1 (\pm 16.2 \text{ SD})$, a mode of 1 and a median group size of 4. The mean group size of sighted animals is lower than average for the species, ~ 30 animals, which can increase to tens or even hundreds in response to abundant food resources (Baird 2008, Bearzi *et al.* 2010). Most sightings (85.2%) occurred between October and April ($n = 46$ records, 377 individuals sighted), with 25.9% occurring in November, 14.8% in January and 24.1% in February. Only 14.8% of the sightings were in winter months ($n = 8$ records, 25 individuals sighted) between May and September. Although Risso's dolphin occurs mainly in tropical and temperate waters, we found no sighting records for north of Península Valdés in Argentina, despite numerous marine mammal surveys in the area (Bastida & Lichtschein 1984, 1986², Würsig & Bastida 1986, Bastida *et al.* 1992³). We believe this could be related to the lack of their main prey (squid) in these waters or it may indicate that their movements at northern latitudes are mainly in offshore waters.

Due to the lack of dedicated offshore studies we were unable to find any reports of sightings in offshore and deep waters and in the slope edge area of Argentina (Bastida & Lichtschein 1984, Lovrich 2010⁴, Van

Waerebeek *et al.* 2010), as is the case for other regions such as Chile, the Azores Archipelago, Gulf of Mexico and the Mediterranean Sea (Baumgartner 1997, Olavarria *et al.* 2001, Cañadas *et al.* 2002, Pereira 2008, Bearzi *et al.* 2010). The lack of records for this species around the Falkland (Malvinas) Islands might be due to the insufficient data available for most species of marine mammal in the area (Otley *et al.* 2008).

Stranding events were recorded between the years 1960 and 2003. Of the total strandings, 3% corresponded to area I, 9% and 88% corresponded to areas II and III, respectively. The coasts of Area III, where most stranding records (29 records including 84 individuals) of Risso's dolphins occurred, are characterized by high tides, reaching over 10m (*e.g.*, Bahía San Sebastián, $53^{\circ}18'S$ - $68^{\circ}16'W$) and wide, shallow intertidal zones that provide ideal areas for stranding events (Goodall 1978). In northeastern Tierra del Fuego at least 75 animals were stranded from 1980 to 1999 (Goodall 1989, Goodall *et al.* 2008, Goodall unpublished data). Some of these events involved a high number of animals being stranded (15 individuals, Table 1). Mass stranding of this species is considered rare (Baird 2008), but there are a few records of mass stranding events in other regions, such as the west coast of South America (Olavarria *et al.* 2001, García-Godos & Cardich 2010).

The information about Risso's dolphin presented in this study advances our understanding of the species for this region. However, there are two gaps (areas with no sighting or stranding records) in its occurrence between the three coastal areas studied: one of ~ 300 km between Area I and II, and another of ~ 350 km between Areas II and III. These gaps may represent the actual absence of the species, or more likely, a limited survey effort carried out in those areas. Off Península Valdés, diving activities and whale watching surveys have taken place earlier than in any other areas (since 1957 and 1980, respectively). For these reasons, cetacean records have always been more numerous than for other areas. In Area II, few research programs have been carried out. In Area III, beach surveys began in 1974-75 for stranded or incidentally caught marine mammals, but sightings of live

²Bastida R & V Lichtschein. 1986. Capturas incidentales de pequeños cetáceos en el área de Mar del Plata (Prov. de Bs. As., Argentina). Actas de la 1ra Reunión de Trabajo de Expertos en Mamíferos Acuáticos de América del Sur, Buenos Aires, Argentina, Junio 1984.

³Bastida R, D Rodríguez, V Moreno, A Pérez, J Marcovecchio & M Gerpe. 1992. Varamientos de pequeños cetáceos durante el período 1984-1988 en el área de Mar del Plata (Provincia de Buenos Aires, Argentina). Anales de la III Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur. Montevideo, Uruguay, Julio 1988.

⁴Lovrich G (compiler). 2010. Estudios biológicos en plataforma patagónica austral. Informe de campaña CONCACEN II. p.131.

Table 1. Sighting and stranding records of Risso's dolphin (*Grampus griseus*) in the Southwestern Atlantic Ocean. RNP Goodall = R. Natalie P. Goodall Collection, Museo Acatushún de Aves y Mamíferos Marinos Australes, Tierra del Fuego, Argentina; IPPA = Instituto de la Patagonia, Punta Arenas, Chile; MRMB = Museo Regional 'Mayorino Borgatello' de la Congregación Salesiana, Punta Arenas, Chile / Registros de avistajes y varamientos de delfín gris (*Grampus griseus*) en el Océano Atlántico Sudoccidental. RNP Goodall = Colección R. Natalie P. Goodall, Museo Acatushún de Aves y Mamíferos Marinos Australes, Tierra del Fuego, Argentina; IPPA = Instituto de la Patagonia, Punta Arenas, Chile; MRMB = Museo Regional 'Mayorino Borgatello' de la Congregación Salesiana, Punta Arenas, Chile

Date	Latitude and Longitude	N	Observations	Reference or Observer
Area I: Península Valdés area				
14 February 1960	~42°20'S, 64°20'W	1	Stranding. Total length 375cm	R. Bastida obs.
10 February 1963	~42°20'S, 64°20'W	+10	Sighting from shore	R. Bastida obs.
3 February 1963	~42°20'S, 64°20'W	6-8	Sighting diving near shore	R. Bastida obs.
4 February 1963	~42°20'S, 64°20'W	±20	Sighting from shore	R. Bastida obs.
5 February 1963	~42°20'S, 64°20'W	5-6	Sighting from boat	R. Bastida obs.
8 February 1963	~42°20'S, 64°20'W	6	Sighting diving near shore	R. Bastida obs.
20 January 1964	~42°45'S, 65°01'W	+4	Sighting diving 600m from shore	R. Bastida obs.
Winter 1972	~42°20'S, 64°20'W	1	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
January 1973	~42°20'S, 64°20'W	4-5	Sighting from shore	Daciuk 1974
January 1973	~42°20'S, 64°20'W	10-15	Sighting from shore	Daciuk 1974
October to March 1975	~42°20'S, 64°20'W	45	Five sightings of 5, 6, 7, 12 and 15 <i>Grampus</i> , respectively	Wüsig & Wüsig 1980
January 1977	~42°20'S, 64°20'W	8	Three sightings of 1, 3 and 4 <i>Grampus</i> , respectively	Brower & Curtsinger 1979
May 1979	~42°23'S, 64°33'W	1	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
15 October 1980	~42°20'S, 64°20'W	1	Sighting from shore	R. Bastida obs.
16 February 1987	~42°20'S, 64°20'W	2	Sighting from shore	G. Harris obs. ²
18 February 1987	~42°20'S, 64°20'W	3	Sighting from shore, photographs	G. Harris obs. ²
22 February 1987	~42°20'S, 64°20'W	3	Sighting from kayak	G. Harris obs. ²
24 February 1987	~42°20'S, 64°20'W	3	Sighting from boat, photographs	G. Harris obs. ²
25 February 1987	~42°20'S, 64°20'W	3	Sighting from shore	G. Harris obs. ²
26 February 1987	~42°20'S, 64°20'W	3	Sighting from shore	G. Harris obs. ²
8 March 1987	~42°20'S, 64°20'W	±15	Sighting from shore	G. Harris obs. ²
8 November 1988	~42°20'S, 64°20'W	±15	Sighting from boat	A. Arias, G.A. Colombo & R. Payne ³
June 1989	~42°20'S, 64°20'W	1	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
October 1989	~42°35'S, 64°19'W	50	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
1989/90	~42°20'S, 64°20'W	1	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
February 1990	~42°20'S, 64°20'W	6	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
1991	~42°27'S, 65°02'W	100	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
Winter 1991/1992/1993/1994	~42°20'S, 64°20'W	20	Four sightings of 5 <i>Grampus</i> in each year	Fernández-Ajó <i>et al.</i> 2006 ¹
1996/7	~41°35'S, 64°56'W	15	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
November 2003	~42°35'S, 64°19'W	10	Sighting from boat	Fernández-Ajó <i>et al.</i> 2006 ¹
Area II: Golfo San Jorge area				
22 January 1962	47°45'S, 65°53'W	+9	Sighting from boat	R. Bastida obs.
13 September 1991	45°52'S, 67°29'W	1	Stranding, a 13 yrs old female	Reyes 2006
November 1995	45°07'S, 65°56'W;	8	Two sightings of 4 <i>Grampus</i> in each event	Reyes 2006
	45°08'S, 66°03'W			
7 December 1995	44°08'S, 65°13'W	1	Stranding (skull)	Reyes 2006
15 November 1996	45°52'S, 67°29'W	1	Sighting from shore	R. Bastida obs.
16 November 1996	45°52'S, 67°29'W	1	Sighting from shore	R. Bastida obs.
17 November 1996	45°52'S, 67°29'W	1	Sighting from shore	R. Bastida obs.
18 November 1996	45°52'S, 67°29'W	1	Sighting from shore	R. Bastida obs.

¹Fernández-Ajó A, M Pingaro, É Zárate & LM Reyes. 2006. Delfines de Risso (*Grampus griseus*) en el norte y centro de Patagonia: visitante ocasional o habitante sigiloso? VI Jornadas Nacionales de Ciencias del Mar, Puerto Madryn, December 2006

²Harris G, personal communication to RNP Goodall. Director Programa Argentina, Asesor del Programa Cono Sur, Wildlife Conservation Society (WCS), Amenabar 1592, 2 piso oficina 19 (C1426AKC), Ciudad Autónoma de Buenos Aires, Argentina

³Arias A, GA Colombo & R Payne, personal communication to RNP Goodall. Fundación Vida Silvestre, Defensa 251, 6 piso K (C1065AAC), Ciudad Autónoma de Buenos Aires, Argentina and Whale Conservation Institute Ocean Alliance (WCI/OA), 191 Weston Road Lincoln, MA 01773-4516, United States

19 November 1996	45°52'S, 67°29'W	1	Sighting from shore	R. Bastida obs.
12 December 1999	45°52'S, 67°29'W	7	Sighting from shore	R. Bastida obs.
November, December 2002	44°21'S, 65°15'W; 45°00'S, 65°29'W	5	Two sightings of 2 and 3 <i>Grampus</i> , respectively	Reyes 2006
October 2003	45°03'S, 66°17'W	1	Stranding (skull)	Reyes 2006
December 2003	45°00'S, 65°37'W	90	Two sightings of 50-60 and 30-40 <i>Grampus</i> , respectively	Reyes 2006
14 December 2004	45°00'S, 65°37'W	20	Sighting from boat	L. Reyes obs.
Area III: southern Santa Cruz-Strait of Magellan-Tierra del Fuego				
1980	51°26'S, 69°01'W	4	Stranding	Goodall and Schiavini 1992 ^{4,5}
16 May 1978	52°33'S, 68°46'W	1	Stranding, skeleton (IPPA CE-8)	Venegas and Stiefeld 1980; Stiefeld 1983
13 June 1978	52°28'S, 69°32'W	1	Stranding, skull (IPPA CE-19)	Venegas and Stiefeld 1980; Stiefeld 1983
23 April 1980	52°15'S, 69°20'W	1	Stranding, skull (IPPA CE-29)	Stiefeld 1980, 1983
No date	Strait of Magellan			
1980	~53°17'S, 68°22'W	4	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
1981	~53°58'S, 67°26'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1982	~53°59'S, 67°23'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1984	~54°16'S, 66°43'W	3	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
1985	~52°52'S, 68°27'W	3	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
1985	~53°56'S, 67°29'W	2	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1986	~54°43'S, 64°10'W	1	Stranding (Skull)	Goodall 1986
1986	~51°34'S, 68°57'W	3	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
1986	~53°17'S, 68°22'W	2	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1987	~53°09'S, 68°12'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1987	~53°17'S, 68°22'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1988	~53°17'S, 68°22'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1988	~53°17'S, 68°22'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1989	~52°54'S, 68°31'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1990	~53°17'S, 68°22'W	15	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
1991	~52°52'S, 68°27'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1992	~53°17'S, 68°22'W	5	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
1992	~52°21'S, 68°13'W	2	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1992	~53°17'S, 68°22'W	15	Stranding (RNP Goodall)	Goodall and Schiavini 1992 ^{4,5}
20 May 1993	~53°18'S, 68°16'W	2	Sighting from shore	L.G. Benegas and A. Golán obs. ⁶
20 March 1993	~54°53'S, 67°24'W	2	Sighting from boat, probably <i>Grampus</i>	Anonymous
31 March 1993	~54°60'S, 68°16'W	1	Sighting from boat, probably <i>Grampus</i>	A.C.M. Schiavini obs. ⁷
1993	~53°17'S, 68°22'W	7	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1993	~53°17'S, 68°22'W	3	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1994	~54°09'S, 66°43'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1997	~53°17'S, 68°22'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
1999	~53°17'S, 68°22'W	1	Stranding (RNP Goodall)	R.N.P. Goodall unpublished data ⁵
11 November 2006	50°15'S, 68°38'W	2	Sighting from shore	R. Bastida obs.
14 November 2006	50°15'S, 68°40'W	3	Sighting from shore	R. Bastida obs.
15 November 2006	50°20'S, 68°55'W	3	Sighting from shore	R. Bastida obs.
19 November 2006	50°20'S, 68°55'W	3	Sighting from shore	R. Bastida obs.

⁴Goodall RNP & ACM Schiavini. 1992. Varamientos de delfín gris, *Grampus griseus*, en las costas del extremo sur sudamericano, p. 31. 5ta Reunión de Especialistas en Mamíferos Acuáticos de América del Sur, SOLAMAC, Buenos Aires

⁵Specimens from these surveys are held in the RNP Goodall collection at the Museo Acatushún de Aves y Mamíferos Marinos Australes, Ea. Harberton, Tierra del Fuego, Argentina

⁶Benegas LG & A Golán, personal communication to RNP Goodall. Museo de la Ciudad "Virginia Choinquiel", Alberdi 555, Rio Grande, Tierra del Fuego, Argentina

⁷Adrián AC Schiavini, personal communication to RNP Goodall. Centro Austral de Investigaciones Científicas (CADIC), Bernardo Houssay 200, Ushuaia (9410), Tierra del Fuego, Argentina

animals were on an opportunistic basis. The isolation of this area, due to long distances from nearby locations, few roads that are in poor condition, and extreme climatic conditions, have resulted in a lack of an organized observation program; nevertheless, there are a large number of stranding records.

The high number of sightings in austral summer months and the low number in winter along the Patagonian coast probably indicates a lack of research effort during winter or that during winter months, Risso's dolphins are in offshore areas or migrate to warmer ocean waters. Also, bad weather conditions and fewer observers may be largely responsible for the lack of sightings in austral fall and winter months. For Area I, sighting records in winter months could indicate the presence of late summer groups (records at the beginning of winter), early summer groups (records at the end of winter months) or the presence of resident groups living in northern Patagonian waters (sightings in mid-winter). The absence of records north of Peninsula Valdés suggests that this species could come in from offshore areas, probably at the southern part of the Province of Buenos Aires. The presence of this species so far south (~52°-55°S), based primarily on stranding records from Area III, could be evidence of short term and seasonal movements of its principal prey. It is also possible that there are long-term fluctuations in the boundaries of its range in response to long-term environmental changes, as suggested by Leatherwood *et al.* (1980) for Risso's dolphins in the NE Pacific.

Future studies in other potential areas of the Risso's dolphin's distribution, such as the outer continental shelf and slope break, are important to increase the scarce information available on this species in this southern part of the world.

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