

Seabird bycatch in the Brazilian pelagic longline fishery and a review of capture rates in the southwestern Atlantic Ocean

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Appendix 1. Summary of studies reporting capture rates of seabirds (birds per 1000 hooks) in demersal and pelagic longline fisheries in the southwestern Atlantic Ocean from 1991 to 2008. –: data not provided. Range of capture rates was reported in several ways, e.g. between sets, cruises, season or areas. Namorado = *Pseudopercis numida*, tilefish = *Lopholatilus villarii*, groupers = *Epinephelus* spp., toothfish = *Dissostichus eleginoides*, hake = *Merluccius hubbsii*, kingclip = *Genypterus blacodes*, tunas = *Thunnus* spp., swordfish = *Xiphias gladius*, sharks = several species, including *Prionace glauca*, *Sphyrna* spp., *Carcharhinus* spp., and *Alopias* spp.), wreckfish = *Polyprion americanus*, yellownosed skate = *Dipturus chilensis*, dolphinfish = *Coryphaena hippurus*

Longline type	Location	Mean capture rate	Range capture rate	Year(s)	No. of hooks observed	Sampling method	Comments	Sources
Demersal for toothfish and hake	Argentina	–	–	1993-1995	25 386 000	Log books and interview	Anecdotal data on bycatch	Schiavini et al. (1997)
Demersal for toothfish and kingclip	Argentina - Patagonian shelf	0.04	0–0.2	1999-2000	~14.8 million	Non dedicated onboard observers	Steep decline in capture rate during years of the study; 99% of sets with mitigation measures	Favero et al. (2003)

Demersal for kingclip	Argentina - Patagonian shelf	0.034	SD = 0.009	2000-2001	3 193 944	Seabird dedicated observers	Moon phase and water depth explained most of captures	Gandini & Frere (2006)
Demersal for kingclip, Patagonian toothfish and yellownosed skate	Argentina - Patagonian shelf and shelf break	0.03	0.001–0.18 (SD = 0.39)	1999-2003	19 067 100	Non dedicated onboard observers		Laich et al. (2006)
Demersal for kingclip, Patagonian toothfish and yellownosed skate	Argentina - Patagonian shelf and shelf break	0.014 ¹	(SD = 0.090)	1999-2003	Not explicit, but stated to be 30 millions per year, thus ~150 millions	Non dedicated onboard observers	¹ Only analyzed for white-chinned petrel. Environmental variables affecting captures were detected	Laich & Favero (2007)
Demersal for kingclip	Argentina - Patagonian shelf	0.071	0.034–1.53	2005	1 033 900	Onboard observers?	Single vessel, summer	Seco-Pon et al. (2007)
Demersal for toothfish	Malvinas/ Falkland Is. - Patagonian shelf	0.019	0–0.032	2001-2002	1 523 155	Dedicated and non-dedicated onboard observers	2 to 4 tori-lines used	Reid et al. (2004) Reid & Sullivan (2004)
Demersal for	Malvinas/	0.010	0.–8.504	2202-2204	~17.1 million	Dedicated	2 to 3 tori-lines used;	Otley et al.

toothfish	Falkland Is. - Patagonian shelf					onboard observers	injury and delayed mortality by lost hooks reported	(2007)
Pelagic for tunas	Uruguay – off Brazil & Uruguay	5.03	–	1994	55 624	–		Barea et al. (1994)
Pelagic for tunas	Uruguay	4.7	0–481.3	1994	26 364	Onboard observers	Capture rate of 481.3 birds/1000 hooks was based in a set of only 320 hooks	Stagi et al. (1997)
Demersal for rays and other spp.	Uruguay	0.41	0.075–0.575	1995	202 650	Onboard observers	Only two cruises sampled	Stagi et al. (1997)
Not provided - Probably pelagic	Uruguay	1.7	–	–	1.5 million	–	Anecdotal data (no methods, fleet or birds caught reported)	Stagi & Vaz- Ferreira (2000)
Pelagic for tuna, swordfish and sharks	Uruguay and International waters	–	0.05–5.57 ²	1993-1996	155 040	Onboard observers	² Capture rate calculated for non-fish (birds, mammals and sea turtles)	Marín et al. (1998)
Semi-pelagic (=demersal) for wreckfish	Uruguayan EEZ	3.0	–	2001	–	Onboard observers		Marín et al. (2004)

Pelagic for swordfish, tunas and sharks	Uruguay and International waters	0.42	0.04–1.65	1998-2004	647 722	Dedicated and non-dedicated onboard observers		Jiménez (2005) & Jiménez et al. (2005)
Pelagic for swordfish, tunas and sharks	Uruguay and International waters	0.26		1998-2006	2 242 026	Dedicated and non-dedicated onboard observers	Monthly capture rates provided. Higher in southern area and winter	Jiménez & Domingo (2007)
Pelagic for tunas	Southern Brazil	1.35	0–97.9	1987-1990	52 593	Onboard observers	Winter months; high capture rates during stormy weather; higher capture rate (97.9) calculated from a set of only 1 205 hooks; several authors erroneously derived capture rates from Vaske's paper based only on sets with bird captures	Vaske-Jr (1991), and pers. comm. on total number of hooks.
Pelagic for tunas, swordfish and	Brazil and adjacent	0.12	–	1994-1995	c. 983 333	Log books	Capture rate considered underestimate and highly	Neves & Olmos (1997)

sharks	international waters						variable	
Demersal for tilefish, namorado and groupers	Brazil	0.3	–	1994-1995	280 197	Log books	Research vessel; Capture rate included 49 unidentified birds	Neves & Olmos (1997)
Demersal	Brazil	–	0.1–0.32	–	–	Onboard observers	Review of two other studies	Olmos et al. (2000)
Pelagic for swordfish	Brazil	–	0.09–1.35	–	–	Onboard observers	Data are from three previous studies	Olmos et al. (2000)
Demersal for tilefish, namorado and groupers	Brazil	0.32	–	1994-1995	340 777	Log books and onboard observers	Research vessel; data partially reported in Neves & Olmos (1997)	Olmos et al. (2001)
Demersal for tilefish, namorado and groupers	Brazil	0.1	–	1996-1997	187 908	Log books	Research vessel	Olmos et al. (2001)
Pelagic for tunas, sharks and swordfish	Brazil	–	0.095–0.73	1994-1999	1 529 312	Interview and onboard observers	Include data from research vessel	Olmos et al. (2001)
Demersal for	Brazil	0.26	0.1–0.32	1994-1997	528 685	Fishermen		Neves et al.

tilefish, namorado, groupers, etc.						interview		(2001)
Pelagic for tunas, swordfish and sharks		Brazil	0.095	–	1994-1999	1 529 312	Fishermen interview	Neves et al. (2001)
Demersal for tilefish, namorado, groupers, etc.		Brazil	0.298	–	1994-1995	338 812	Onboard observers	Research cruises Tutui et al. (2000)
Pelagic for tunas, swordfish and sharks		Brazil	0.27	0–6	2002-2003	64 150	–	Only five cruises; use of mitigation measures; cite other three previous cruises with higher capture rates without details, and no cruise with ‘zero’ capture rate reported Soto et al. (2003)
Demersal		Brazil	0.101	–	1996-1997	188 000	Onboard observers	Research cruises Vooren & Coelho (2004)
Pelagic for swordfish, tunas, sharks		Brazil	0.102	–	2000-2005	499 978	Onboard observers	Capture rates for demersal longline based in previous studies Neves et al. (2007)

Pelagic for swordfish and dolphinfish	Brazil	0.114	0–0.15	2001-2006	52 691	Onboard observers	Small vessels from Itaipava fleet; focused on the description of other fisheries	Bugoni et al. (2008)
Pelagic for tunas, swordfish and sharks	Brazil and international waters	0.229	0–0.542	2001-2007	778 446	Onboard observers	No mitigation measure	This study

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This list includes only the references cited in this Appendix and not those from the main article.

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