

NOTE

First confirmed records of juvenile bigeye thresher sharks *Alopias superciliosus* in Patagonia, Argentina, and southward range extension in the southwestern Atlantic

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ABSTRACT. Three juvenile specimens of *Alopias superciliosus* were recorded in Patagonia, Argentina, including one captured as bycatch in a bottom trawl fishery and two recovered following stranding events. These constitute the first confirmed records of the species in Patagonia and extend its known southern distribution in the southwestern Atlantic by approximately 1,345 km (9° 1' 40" of latitude). The presence of juvenile specimens on the Patagonian continental shelf raises the possibility that juveniles may occur in this region during part of their early life history, although the limited number of records precludes determining whether this reflects regular habitat use or only sporadic occurrence. These findings expand current knowledge of the distribution of *A. superciliosus* in the southwestern Atlantic and highlight the need for additional research on the occurrence and habitat use of pelagic sharks in Patagonia.

Key words: Elasmobranchs, range extension, habitat use, coastal waters, pelagic fauna.



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Primeros registros confirmados de juveniles de tiburón zorro (*Alopias superciliosus*) en la Patagonia argentina y extensión de su área de distribución hacia el sur en el Atlántico Sudoccidental

RESUMEN. Se registraron tres ejemplares juveniles de *Alopias superciliosus* en la Patagonia argentina, incluyendo uno capturado incidentalmente en una pesquería de arrastre de fondo y dos recuperados tras varamientos. Estos constituyen los primeros registros confirmados de la especie en la Patagonia y extienden su distribución conocida hacia el sur en el Atlántico Sudoccidental en aproximadamente 1.345 km (9° 1' 40" de latitud). La presencia de ejemplares juveniles en la plataforma continental patagónica plantea la posibilidad de que estos se encuentren en esta región durante parte de su ciclo de vida temprano, aunque el número limitado de registros impide determinar si esto refleja un uso regular del hábitat o solo una presencia esporádica. Estos hallazgos amplían el conocimiento actual sobre la distribución de *A. superciliosus* en el Atlántico Sudoccidental y resaltan la necesidad de realizar más investigaciones sobre la presencia y el uso del hábitat de los tiburones pelágicos en la Patagonia.

Palabras clave: Elasmobranquios, extensión de rango, uso del hábitat, aguas costeras, fauna pelágica.

The bigeye thresher shark *Alopias superciliosus* (Lowe, 1841), listed as Vulnerable by the International Union for Conservation of Nature (Rigby et al. 2019), is a mesopelagic species inhabiting both neritic and oceanic zones in tropical and temperate waters, and is one of three species of the family Alopiidae distributed worldwide. This species has a circumglobal distribution in tropical and temperate waters of the Atlantic, Indian, and Pacific oceans (Compagno 2002), and it occurs in the western Atlantic from New York, United States, to Brazil (Compagno 2002). However, it has also been reported from Uruguayan waters and adjacent international waters based on observations from the Uruguayan pelagic longline fleet (Berrondo et al. 2007; Mas et al. 2022), and it was more recently recorded for the first time in northern Argentine waters (Cuevas and García 2015).

The bigeye thresher shark occupies a wide portion of the water column and exhibits diel vertical movement patterns (Coelho et al. 2015; Mas et al. 2022). Satellite telemetry studies have demonstrated its high migratory capacity and eurythermal behavior. Coelho et al. (2015) reported mean daytime depths and temperatures of 653 m and 10.7 °C, respectively, compared to 72 m and 21.9 °C at night. Juveniles occupied shallower waters than adults at night, but deeper layers during the day. Similarly, Aalbers et al. (2021) recorded mean temperatures of 7.9 °C during the day and 19.3 °C at night, with a minimum of 4.6 °C during a dive to 1,013 m depth. Sepulveda et al. (2019) documented movements of 800-1,000 km, with a maximum displacement of 1,362 km within 30 days after tagging. These traits indicate high migratory capacity and broad thermal tolerance. The aim of this note was to report three records of *A. superciliosus* from northern and central Patagonia, Argentina, and to discuss the context of their occurrence. These records extend the known southern distribution of the species by 1,345 km and 9° 1' 40" of latitude.

Three individuals of *A. superciliosus* were recorded in Patagonia, Argentina. The first specimen was captured by the hake fishery in Golfo San

Matías (40° 57' 59" S, 64° 51' 42" W) in September 2017 using a bottom trawl. The second record corresponded to a specimen found by bathers after stranding at Playa Unión (43° 19' 37" S, 65° 02' 56" W) on 10 February 2017. The third specimen was reported by fishermen on 20 February 2021 after it stranded at Rada Tilly (45° 55' 39" S, 67° 32' 49" W) in Golfo San Jorge (Figure 1). Specimens were identified as *A. superciliosus* based on the diagnostic characters proposed by Figueroa (2019), namely a flat interorbital region and the presence of a deep groove on each side of the nape, which distinguishes this species from *A. vulpinus*. Morphometric measurements were taken from the first two stranded specimens following Compagno (2002). Sex and maturity were determined based on the presence and degree of clasper calcification in males and ovarian development in females, following the maturity stages proposed by Colonello et al. (2011). The two stranded specimens were preserved and deposited in the Ichthyological Collection of the Universidad Nacional de la Patagonia San Juan Bosco (UNPSJB), Trelew, Argentina (catalogue numbers UNPSJB ICT-2017/13 and UNPSJB ICT-2021/2, respectively). The specimen captured as bycatch in the San Antonio Oeste hake fishery was not preserved; its identification was based on photographic records examined by the first author (Figure 2).

The first specimen measured 1,830 mm total length (TL), but its sex could not be determined because it had been eviscerated at a processing facility. The second specimen was a female measuring 1,650 mm TL, whereas the third specimen was a male measuring 1,479 mm TL and weighing 6,590 g (Table 1). All three individuals were juveniles, and their body sizes were consistent with an age of approximately one year, according to published growth estimates for the species (Fernandez-Carvalho et al. 2011, 2015). These new records from northern and central Patagonia extend the known distribution of *A. superciliosus* southward by approximately 1,345 km along the Argentine continental shelf in the southwestern Atlantic,

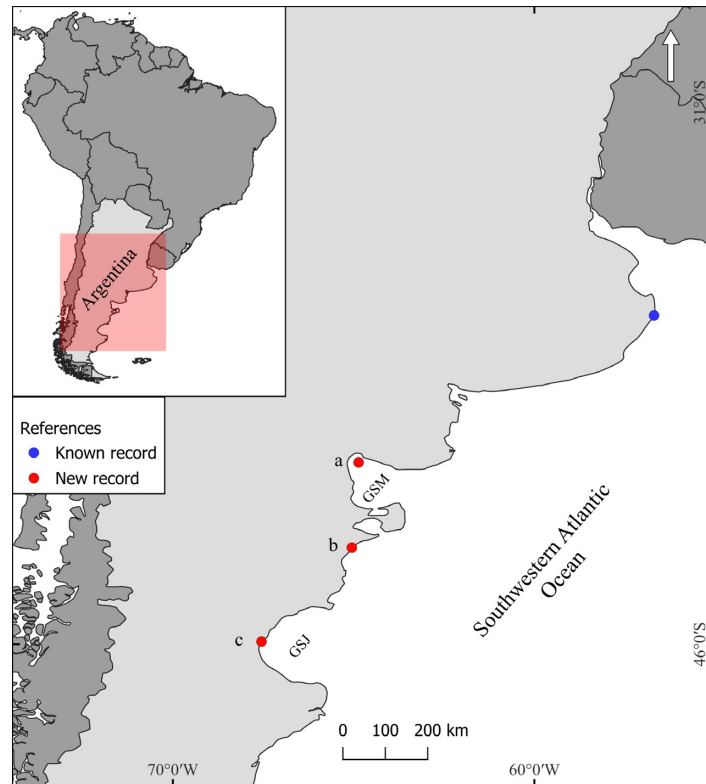


Figure 1. Location of *Alopias superciliosus* records in Argentina. Red dots: (a) specimen caught in the hake fishery in Golfo San Matías (GSM); (b) Playa Unión; and (c) Rada Tilly, Golfo San Jorge (GSJ). Blue dot: Pinamar, Buenos Aires (Cuevas and García 2015).

based on the linear distance between the previously southernmost record and the new southernmost record, calculated in QGIS (3.44.12 ‘Solothurn’). Consequently, these occurrences in Patagonian coastal waters expand current knowledge of the species’ distribution at higher latitudes.

While Cuevas and García (2015) linked the occurrence of the species to occasional intrusions of warm-water masses, the broad thermal tolerance and highly migratory behavior of *A. superciliosus* indicate that the occurrence of juveniles on the Patagonian shelf is also biologically plausible. *Alopias superciliosus* is a highly migratory shark capable of inhabiting waters ranging from approximately 4–26 °C, encompassing the environmental conditions of the Patagonian shelf. Several non-mutually exclusive explanations may account

for these records. Juveniles may occur more regularly on the Patagonian shelf than currently recognized but remain underdetected because of the species’ rarity and limited sampling. Alternatively, their occurrence could be associated with episodic southward displacement linked to warm-water intrusions, as suggested by Cuevas and García (2015). A third possibility is that these records represent occasional vagrants or stranded individuals that do not reflect persistent use of the continental shelf. At the Atlantic Ocean scale, Fernandez-Carvalho et al. (2015) reported an apparent size-based spatial segregation in *A. superciliosus*, with larger individuals occurring mainly at higher latitudes in the southwestern and northwestern Atlantic, whereas smaller individuals were more frequently recorded in tropical and northeastern Atlantic waters. In this



Figure 2. Photographs of juvenile specimens of *Alopias superciliosus* recorded in Patagonia, Argentina. A) Male specimen stranded at Rada Tilly (UNPSJB ICT-2021/2). B) Female specimen stranded at Playa Unión (UNPSJB ICT-2017/13). Scale bars = 100 mm.

context, the occurrence of juvenile individuals in Patagonia may represent part of a broader pattern of habitat use across ontogenetic stages. However, the analysis of Fernandez-Carvalho et al. (2015) was based on heterogeneous datasets derived from multiple fleets employing different fishing gears and targeting different species, which may introduce biases associated with gear selectivity. Furthermore, information available for the coastal southwestern Atlantic remains fragmented and has not yet been evaluated comprehensively. For example, Hazin et al. (1998) reported historical records of this species only from northern Brazil, which have not yet been adequately assessed within the broader context of the species' Atlantic distribution.

Although these represent the first confirmed re-

ords of *A. superciliosus* in Patagonia, the species may previously have gone unnoticed in the region because of the historically limited development of pelagic fisheries in central Patagonia. Several oceanic pelagic species, including *Mola mola*, *Xiphias gladius*, *Regalecus glesne*, *Gasterochisma melampus*, and *Lamna nasus* (Alonso de Arámburu 1957; López 1963; Ruiz and Gosztanyi 2010; Irusta et al. 2021; Chiaramonte et al. 2024), are known from Patagonia mainly through occasional records, strandings, or incidental catches. This pattern likely reflects substantial knowledge gaps regarding the oceanic pelagic fauna of the southwestern Atlantic, driven by both the limited development of pelagic fisheries in the region and historically low sampling effort.

Table 1. Total length (TL) and morphometric measurements and proportions (%TL) of the two stranded *Alopias superciliosus* juveniles from Patagonia, Argentina.

Measurement (mm)	Female (UNPSJB ICT-2017/13)	%TL	Male (UNPSJB ICT-2021/2)	%TL
Total length (TL)	1,650	-	1,479	-
Fork length (FOR)	950	57.6	886	59.9
Precaudal fin length (PCL)	850	51.5	790	53.4
Prepectoral fin length (PP1)	270	16.4	235	15.9
Preorbital length (POB)	84	5.1	73	4.9
Eye length (EYL)	35	2.1	35	2.4
Pectoral fin anterior margin (P1A)	320	19.4	287	19.4
Pelvic fin anterior base (P2A)	150	9.1	120	8.1
Mouth width (MOW)	83	5.0	75	5.1
Mouth length (MOL)	55	3.3	45	3.0
Internarial width (INW)	28	1.7	27	1.8
Interdorsal space (IDS)	157	9.5	142	9.6
Prenarial length (PRN)	70	4.2	62	4.2
Preoral length (POR)	98	5.9	86	5.8
Clasper inner length (CLI)	-	-	64/65	4.3/4.4
Trunk length (TR)	495	30.0	395	26.7
D2DC	110	6.7	73	4.9

Measurements follow Compagno (2002), except for D2DC and TR, which were defined in this study. CLI corresponds to left and right claspers. D2DC: distance between the origin of the second dorsal fin and the origin of the caudal fin.

These records constitute the first confirmed occurrences of *A. superciliosus* in Patagonia and considerably extend the known southern distribution of the species in the southwestern Atlantic. Although the presence of juvenile individuals raises the possibility that the Patagonian continental shelf may be used by juveniles during part of their early life history, the limited number of available records, including two strandings, precludes distinguishing between regular habitat use and sporadic occurrence. Resolving this question will require additional evidence from fisheries observer programs, repeated captures, telemetry, trophic and stable isotope analyses, and environmental data. If future studies confirm regular juvenile occurrence on the Patagonian shelf, this pattern could be consistent with regional variation in the ontogenetic habitat use of *A. superciliosus*,

as proposed for Atlantic populations by Fernandez-Carvalho et al. (2015). Overall, these findings highlight the limited current knowledge of the pelagic fish fauna of Patagonia and underscore the importance of continued monitoring and sampling efforts to improve our understanding of the distribution and habitat use of pelagic species in the southwestern Atlantic.

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Author contributions

Nelson D. Bovcon: conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, supervision, visualization, writing-original draft preparation, writing-review and editing. Pablo D. Cochia: conceptualization, data curation, formal analysis, investigation, methodology, visualization, writing-original draft preparation, writing-review and editing. Kevin J. Jacobi: conceptualization, data curation, formal analysis, investigation, methodology, visualization, writing-review and editing. Ana E. Ruiz: resources, validation, writing-review and editing. Gustavo E. Chiaramonte: conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, visualization, writing-original draft preparation, writing-review and editing.

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