



New records of warm-temperate water fishes in central Patagonian coastal waters (Southwestern South Atlantic Ocean)

By N. D. Bovcon^{1,2}, P. D. Cochia¹, M. E. Góngora^{1,3} and A. E. Gosztonyi⁴

¹Facultad de Ciencias Naturales, Universidad Nacional de la Patagonia San Juan Bosco, Chubut, Argentina; ²Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina; ³Secretaría de Pesca de la Provincia del Chubut, Rawson, Chubut, Argentina; ⁴Centro Nacional Patagónico, Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Puerto Madryn, Chubut, Argentina

Summary

In the Province of Chubut (43°S–47°S), from 2001 to 2005 an on-board observers program analyzed 18 903 fishing hauls captured at depths of 19–104 m. Sport fishing tournaments near Puerto Rawson, Chubut, were also monitored from 2004 to 2006. The aim was to document the southward expansion of five cartilaginous fish species and ten bony fish species caught in Central Patagonian waters (Argentina): *Psammobatis extenta*, *Psammobatis bergi*, *Atlantoraja castelnaui*, *Sympterygia acuta*, *Torpedo puelcha*, *Selene setapinnis*, *Oncopterus darwini*, *Dules auriga*, *Mullus argentinae*, *Cynoscion guatucupa*, *Prionotus nudigula*, *Conger orbignyanus*, *Urophycis brasiliensis*, *Trachurus lathami*, and *Trichiurus lepturus*. Reproductive populations of *S. acuta*, *O. darwini* and *C. guatucupa* were detected in the Engaño Bay area close to Puerto Rawson (43°10'S–43°19'S). The newly reported fishes pertain to warm-temperate waters, where most of the species are native to the Argentinean Zoogeographic Province. One likely hypothesis explaining their occurrence in the area is the prevalence of higher water temperatures in recent times in the San Jorge Gulf and adjacent waters. Another likely hypothesis is the increase in sampling and catch efforts in Patagonian coastal areas and also improved capabilities in taxonomic recognition of the species.

Introduction

The main ecological and distributional patterns of Argentine sea fishes conform with the recognized zoogeographic provinces in the Western South Atlantic: Magellanic Province with a Patagonian District, and Argentinean Province with a South Brazilian and a Bonaerensean District (Fig. 1) (López, 1963, 1964; Balech, 1964; Menni, 1981).

Menni and Gosztonyi (1982) determined four species groups in the Southwestern Atlantic Ocean: Group I, Bonaerensean Fauna; Group II, Magellanic Fauna; Group III, called Inner Shelf Mixed Fauna; and Group IV, Widely Distributed Species. Based on the ichthyofauna, Menni and Gosztonyi (1982) established five geographic areas wherein each one of the fixed groups prevailed; these authors proved that the associations were recognizable along 10-year intervals. Menni and López (1984) recognized the same fish associations but added two more fish associations: one of Uncommon Species and one of Deep Water Species.

In Chubut Province, Argentine Patagonia, two trawling industrial fisheries catch fish with hake (*Merluccius hubbsi*

Marini 1933) and a prawn (*Pleoticus muelleri* Bate 1888) as main target species. These fisheries operate both along the Central Chubut coast and in San Jorge Gulf. A semi-industrial trawling fishery with shrimp (*Artemesia longinaris* Bate 1888) as its target species catches fish in the Engaño Bay area. Anglers with shore-lines also make intensive use of this area for recreational purposes.

From 2001 onwards, the aforementioned fisheries were monitored by the Province of Chubut On-board Observers Program. This program not only gathered data on the target species but also on all other species caught (bycatch).

The examination of bycatch affords a good opportunity to describe the ichthyofauna of a given area (Fennessy et al., 1994). Unreported species in central Patagonian waters were registered in our bycatch examinations. The objective of this paper was to document the southward extension of the geographic distribution of these species: *Psammobatis extenta* Garman, 1913; *Psammobatis bergi* Marini, 1932; *Atlantoraja castelnaui* Miranda Ribeiro, 1907; *Sympterygia acuta* Garman 1877; *Torpedo puelcha* Lahille, 1926; *Selene setapinnis* (Mitchill, 1815); *Oncopterus darwini* Steindachner, 1875; *Dules auriga* Cuvier 1829; *Mullus argentinae* Hubbs & Marini, 1933; *Cynoscion guatucupa* (Cuvier, 1829); *Prionotus nudigula* Ginsburg, 1950; *Conger orbignyanus* Valenciennes, 1847; *Urophycis brasiliensis* Kaup, 1858; *Trachurus lathami* Nichols, 1920 and *Trichiurus lepturus* Linné, 1758.

The fishes reported in this paper pertain to warm-temperate waters and are mostly native to the Argentinean Zoogeographic Province. One likely hypothesis to explain their presence in the area is the prevalence of higher water temperatures in the San Jorge Gulf and adjacent waters. Another hypothesis is the increase in the sampling and catch efforts in Patagonian coastal areas.

Materials and methods

Some 18 903 fishing hauls were analyzed from 2001 to 2005, with the Province of Chubut On-Board Observers Program as the source of the information. Hauls were performed between 43°S and 47°S at depths of 19–104 m (Fig. 1). Recreational fishing tournaments near Puerto Rawson were also monitored from 2004 to 2006.

On-board observers were trained in species recognition (Bovcon and Cochia, 2007) and data collection. At the same time, a collection was begun to preserve 14 of the 15 species reported in this paper. This collection is preserved in

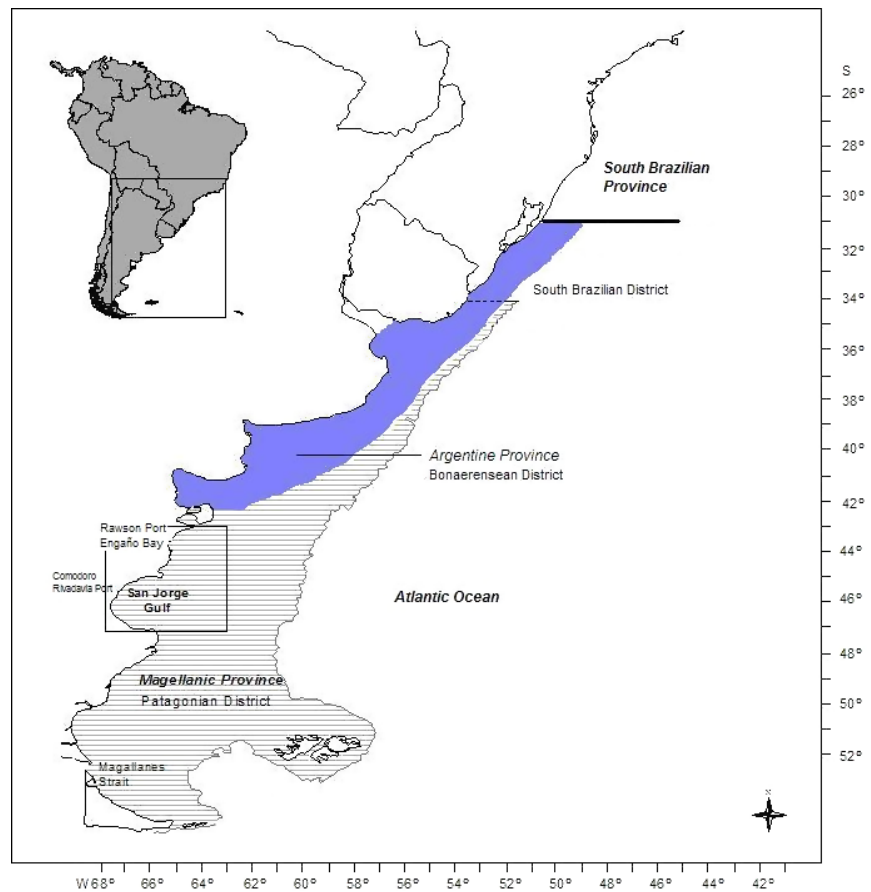


Fig. 1. Research area and zoogeographic provinces, Western South Atlantic

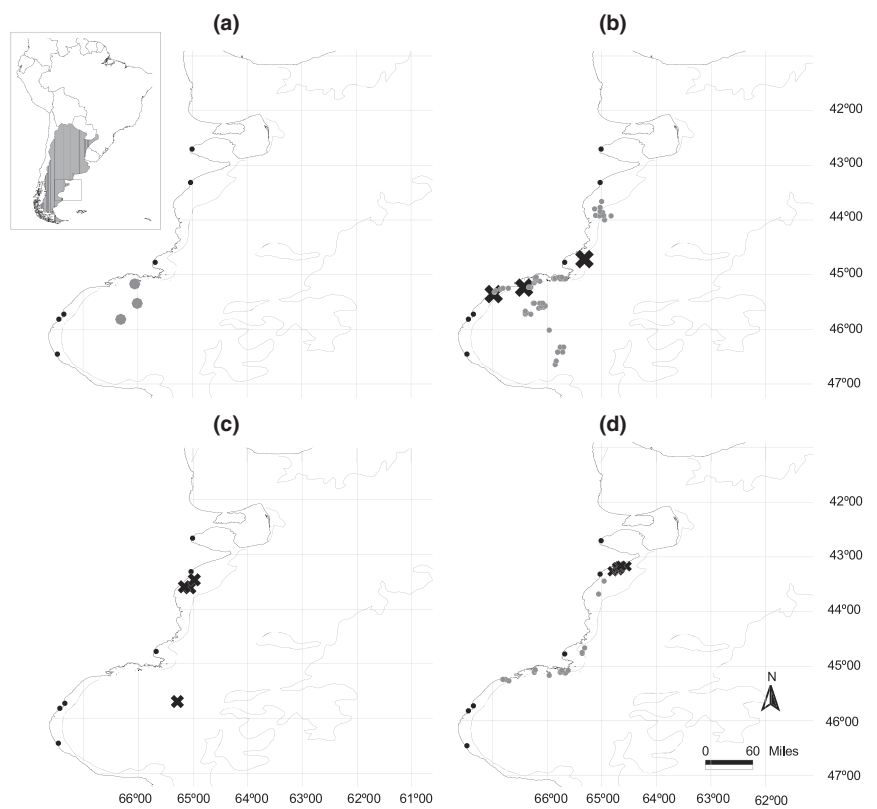


Fig. 2. Records of (a) *T. puelcha*, (b) *A. castelnaui*, (c) *P. bergi* and (d) *P. extenta* in Central Patagonia. ● catch records; X records of preserved specimens

the Facultad de Ciencias Naturales de la Universidad Nacional de la Patagonia San Juan Bosco, Trelew Campus (UNPSJB-ICT).

Ichthyological collections at the Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Museo de Ciencias Naturales de la Universidad Nacional de La Plata,

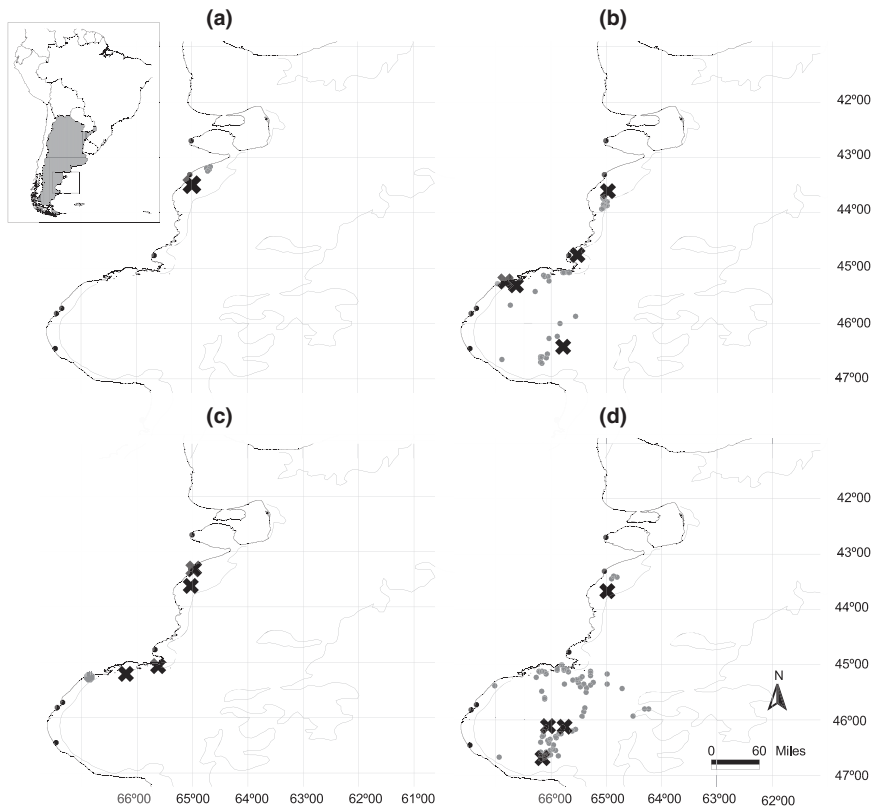


Fig. 3. Records of (a) *S. acuta*, (b) *C. orbignyanus*, (c) *U. brasiliensis* and (d) *P. nudigula* in Central Patagonia. ● catch records; X records of preserved specimens

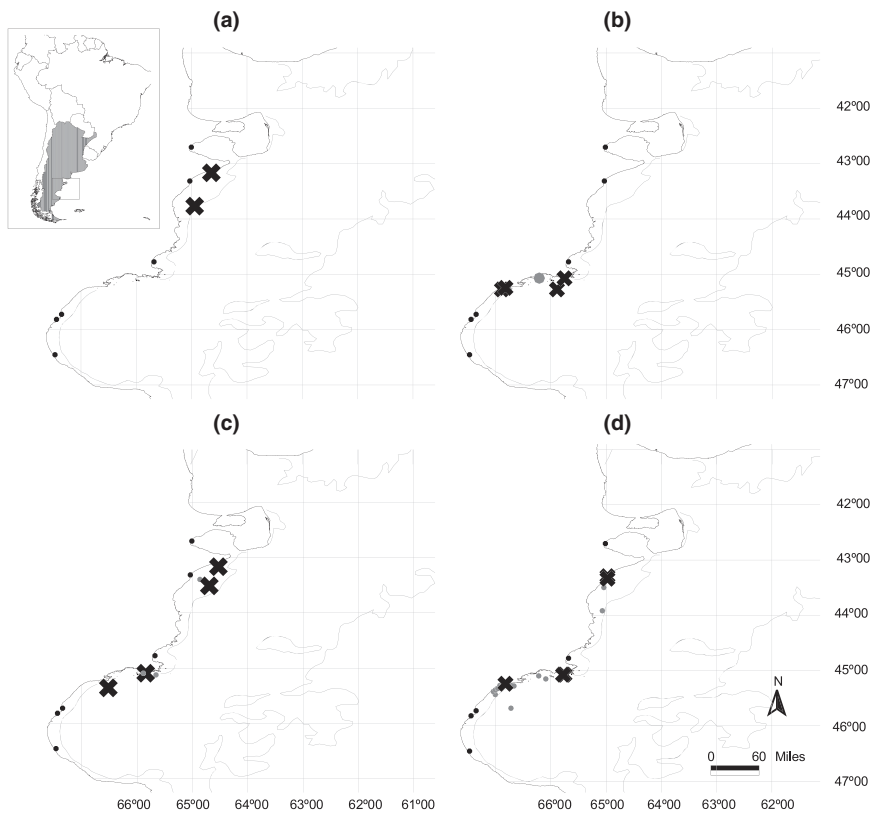


Fig. 4. Records of (a) *D. auriga*, (b) *T. lathami*, (c) *M. argentinae* and (d) *C. guatucupa* in Central Patagonia. ● catch records; X records of preserved specimens

Universidad Nacional de Mar del Plata and Centro Nacional Patagónico (CONICET) were checked in order to confirm or corroborate the existence of earlier records of the species reported in this paper from the Patagonian region.

Results

Five species of cartilaginous fishes and ten bony fish species (Figs 2–5) previously not reported in central Patagonian

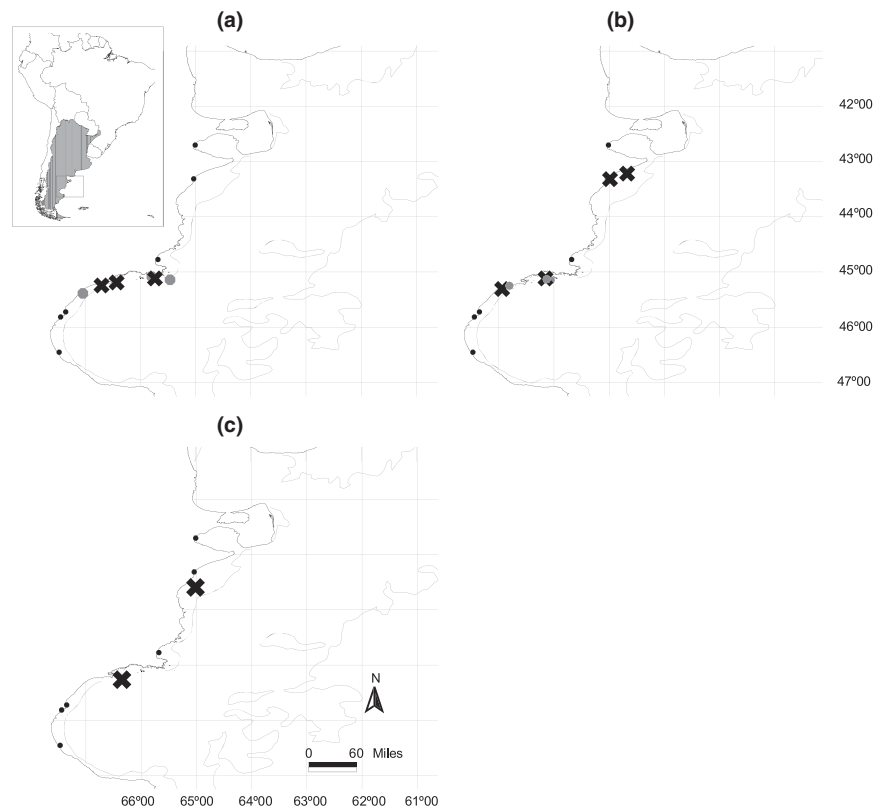


Fig. 5. Records of (a) *T. lepturus*, (b) *O. darwini* and (c) *S. setapinnis* in Central Patagonia. ● catch records; X records of preserved specimens

waters were recorded: *P. extenta*, *P. bergi*, *A. castelanui*, *S. acuta*, *T. puelcha*, *S. setapinnis*, *O. darwini*, *D. auriga*, *M. argentinae*, *C. guatucupa*, *P. nudigula*, *C. Orbignyanus*, *U. brasiliensis*, *T. lathami*, and *T. lepturus*.

Geographic positions of the hauls at which the species were observed, their southward distribution extension, biogeographic data, indication of reproductive populations, collection number and total length range of the stored specimens are presented in Table 1.

Reproductive populations of *O. darwini*, *C. guatucupa* and *S. acuta* were also detected in the Engaño Bay area near Puerto Rawson (43°10'S–43°19'S), as the young and adult specimens were caught by shore-lines throughout the year by recreational anglers and by artisanal and coastal vessels.

Discussion

The distribution of most of marine organisms is mainly determined by water temperature (Briggs, 1995). When water temperature variations take place, variations in the biotas of the areas involved will also occur (Vinuesa, 2005). In Central Patagonian waters, recently published papers reported the occurrence of fishes from warm-temperate waters south of their known distribution: *Diplodus argenteus* and *Pagrus pagrus* (Galván et al., 2005), *Epinephelus marginatus* and *Seriola lalandi* (Irigoyen et al., 2005) and *Pseudoperca numida* (Venerus et al., 2007).

Vinuesa (2005) reported the presence of Brazilian warm-temperate water crustaceans in the northern San Jorge Gulf: *Artemesia longinaris*, *Peisos petrunkevitchi*, *Alpheus puapeba*, *Pontocaris boschii*, *Pachycheles chubutensis*, *Platyxanthus patagonicus* and *Cyrtograpsus altimanus*. According to Vinuesa (2005), these previously unknown appearances might be due to higher water temperatures in the gulf.

Oceanographic information from the area is scarce. Louge et al. (2004) [based on the database of Reynolds et al. (2002)] indicated the January existence of thermal anomalies in surface waters in the San Jorge Gulf and adjacent waters over two decades (1982–2002); 1983 and 2000 were regarded as relatively warm years, and 1988, 1993, and 1998 as cold ones. Using data from research cruises, these same authors stated that the year 2000 showed the highest surface and bottom temperatures and considered it as warmest year between 1995 and 2000.

Another likely hypothesis explaining the occurrence of warm-temperate water species in the area is the lack of samplings within this Patagonian area. Available historical data come from fish assessment campaigns that were conducted through agreements between Argentina and the governments of Japan and Germany between 1970 and 1979. Those cruises covered the Argentine continental shelf and did not intensely explore the coastal areas or inner waters of the gulfs.

As of 2001 all fisheries in the Province of Chubut are monitored by an on-board observers program, whereby information on both target species and bycatch is gathered. Thus far, 90 species including those referred to in this paper, have been recognized (Bovcon and Cochia, 2007). The program has enabled researchers to explore coastal waters and San Jorge Gulf inner waters, and enhance the sampling effort in the area, thus allowing a much better knowledge of the presence and distribution of fish species in central Patagonian waters.

López (1964) stated that warm-water species come to the area seasonally. Balech (1986) noticed a tongue-shaped warm water mass west of the Malvinas Current that is subject to periodic forward and backward movements with attenuated effects reaching as far as the southern San Jorge Gulf. The environmental conditions mentioned by López (1964) and

Table 1
Records, known distribution, southward distributional extension, biogeographical data, evidence for reproductive populations, collection data and total length of preserved specimens

Species (family)	Sample size	Distribution	Southernmost limit in this study	Extension southwards	Biogeographic Data	Indication of reproductive populations	Ichthyological Collection	TL range in the collection
Torpedinidae <i>Torpedo puelicha</i> Lahille, 1926	Caught in three hauls, 45°00'S–46°00'S, at 72–92 m depths (Fig. 2a)	From Santa Catarina to Rio Grande do Sul, Brazil. Two specimens were registered in the Mar del Plata area, Argentina ²	45°49'S, 66°20'W	Known distribution extends 7° southwards, as far as San Jorge Gulf	Some authors regard this species as native or endemic to the Argentinean Zoogeographic Province ^{3,4}	Young and adult specimens (490–1050 mm TL) caught in summer by recreational tournament fishing on beaches close to Engaño Bay (43°10'S 43°19'S)	Photographic records stored for safekeeping	580–655 mm TL
Rajidae <i>Atlantoraja castelnaui</i> (Miranda Ribeiro, 1907)	Caught in 87 hauls, 43°30'S–47°00'S, at 20–104 m depths (Fig. 2b)	From Rio de Janeiro, Brazil to Argentina at 42°S, from the coast to 50 m depth ^{5,6}	46°39'S, 65°52'W	Known distribution extends 5° southwards, as far as San Jorge Gulf	A strictly Bonaerensean species ^{7,8} . To other authors, native to Bonaerensean and South Brazilian Districts ^{3,9}		Three specimens: UNPSJB-ICT 2005/28, 2005/29 and 2005/30	
Rajidae <i>Psammobatis bergi</i> Marini 1932	Caught in four hauls, 43°00'S–46°00'S, at 30–37 m depths (Fig. 2c)	Between Uruguay (23°43'S) and Argentina (38°25'S) and at 31–81 m depths ¹⁰ . Other authors fix 42°S as southern distribution limit	45°42'S, 65°20'W	Known distribution extends 4°42' southwards, as far as San Jorge Gulf	Some authors regard this species as strictly Bonaerensean ⁸ , other authors as pertaining to the Bonaerensean and South Brazilian Districts ³		Four specimens: UNPSJB-ICT 2001/2, 2003/21, 2004/7 and 2005/16	260–475 mm TL
Rajidae <i>Psammobatis eximia</i> Garman, 1913	Caught in 36 hauls, 43°00'S–45°20'S, at 26–76 m depths (Fig. 2d)	Southwestern Atlantic, from 29°52'S–40°S, at 29–160 m depths ^{3,5,10}	45°16'S, 66°43'W	Known distribution extended 5° southwards, as far as San Jorge Gulf	Native to Bonaerensean and South Brazilian Districts ³		Eight specimens: UNPSJB-ICT 2002/5, 2003/11, 2003/12 and 2003/13	
Rajidae <i>Sympterygia acuta</i> Garman 1877	Caught in six hauls, 43°00'S–43°20'S, at 9–49 m depths (Fig. 3a)	Authors report this species up to 39°04'S ¹¹ . Other authors register its southern distribution limit at 40°S ^{5,11}	Observed by recreational anglers, Solano Bay (45°43'S, 67°21'W) near Comodoro Rivadavia, Chubut Province, Argentina	Known distribution extended 5°40' southwards, as far as San Jorge Gulf	Endemic species to the Argentinean Province; authors fix Buenos Aires as type locality ³	Young and adult specimens (210–400 mm TL) caught year round by anglers and by coastal and artisanal vessels operating close to Engaño Bay (43°10'S, 43°19'S)	Five specimens: UNPSJB-ICT 2002/3 and 2002/6. Ten specimens also caught in recreational tournament fishing	220–400 mm TL
Congridae <i>Conger orbignyanus</i> Valenciennes, 1847	Caught in 37 hauls, 43°30'S–46°45'S, at 46–98 m depths (Fig. 3b)	From Rio de Janeiro, Brazil to Argentina at 42°S in coastal waters to depths of 40 m	46°43'S, 66°11'W	Known distribution extended 4°43' southwards, to San Jorge Gulf	A strictly Bonaerensean species ⁸		Five specimens: UNPSJB-ICT 2003/18, 2003/19, 2003/20, 2004/9 and 2007/3	555–960 mm TL
Phycidae <i>Urophycis brasiliensis</i> Kaup, 1858	Caught in 12 hauls, 43°00'S–45°20'S, at 8–72 m depths (Fig. 3c)	Species typical of South American coasts. Registered from 23°S–35°S, distribution not further south than 40°S (Argentina) ^{6,12,15,16,17}	45°17'S, 66°54'W	Known distribution extended 5°17' southwards, to San Jorge Gulf			Ten specimens: UNPSJB-ICT 2002/2, 2002/4, 2003/17, 2003/8, 2005/9 and 2005/21	116–520 mm TL
Triglidae <i>Prionotus madrigala</i> Ginsburg, 1950	Caught in 93 hauls, 42°00'S–47°00'S, at 30–99 m depths (Fig. 3d)	From Rio de Janeiro, Brazil to north of Patagonian in Argentina (43°S) in coastal waters ⁶	46°42'S, 66°12'W	Known distribution extended 3°42' southwards, to San Jorge Gulf	A strictly Bonaerensean species ⁸		Four specimens: UNPSJB-ICT 2004/4, 2004/5, 2004/6 and 2005/15	165–256 mm TL
Serranidae <i>Dules auriga</i> Cuvier, 1839	Caught in two hauls, 43°00'S–44°00'S, at 25–47 m depths (Fig. 4a)	From Rio de Janeiro, Brazil to north of Argentina ¹²	43°47'S, 65°00'W	Known distribution extended 3° southwards			Five specimens: UNPSJB-ICT 2003/2 and 2004/1	123–148 mm TL

Table 1
(Continued)

Species (family)	Sample size	Distribution	Southernmost limit in this study	Extension southwards	Biogeographic Data	Indication of reproductive populations	Ichthyological Collection	TL range in the collection
Carangidae <i>Trachurus lathami</i> Nichols 1920	Caught in eight hauls, 45°00'S–45°20'S, at 20–72 m depths (Fig. 4b)	From Gulf of Maine, USA (43°N) to northern Argentina, to 30 m depths ¹² . Other authors cite it as far as north of San Matías Gulf (41°30'S) in Argentina ⁶	45°17'S, 66°56'W	Distribution extended 4° southwards, to San Jorge Gulf	A strictly Bonaerense species ⁸		Five specimens: UNPSJB-JCT 2003/9, 2005/10, 2005/34, 2005/35 and 2005/36	175–190 mm TL
Mullidae <i>Mullus argentinus</i> Hubbs & Marini, 1933	Caught in eight hauls, 42°00'S–45°30'S, at 37–85 m depths (Fig. 4c)	From Rio de Janeiro, Brazil to Bonaerense coasts in Argentina. Reaches 40°S in autumn and not exceeding 37°S in spring ⁶	45°22'S, 66°34'W	Known distribution extended 5°27' southwards to San Jorge Gulf. Records made in spring–summer and autumn			Four specimens: UNPSJB-JCT 2001/1, 2003/3, 2005/1 and 2005/2	170–230 mm TL
Sciaenidae <i>Cynoscion guatucupa</i> (Cuvier, 1829)	Caught in 48 hauls, 43°S–45°45'S, at 4–87 m depths (Fig. 4d)	From Rio de Janeiro, Brazil (22°35'S) to approximately 43°S in Argentina ⁶ .	45°41'S, 66°44'W	Known distribution extended 2°41' southwards, to San Jorge Gulf	A strictly Bonaerense species, although was registered south of Brazil ^{8,18}	Between 2001 and 2006, young specimens (65–110 mm TL) seen year round as prawn fishery bycatch in Engaño Bay. Also 143–335 mm size range caught in recreational fishing tournaments between November and January in beaches near Puerto Rawson.	Fifty three specimens: UNPSJB-JCT 2002/1, 2003/7, 2004/10, 2005/6, 2005/7, 2006/6 and 2006/9	65–306 mm TL
Trichiuridae <i>Trichiurus lepturus</i> Linne, 1758	Caught in six hauls, 45°00'S–45°20'S, at 25–74 m depths (Fig. 5a)	From Virginia (37°N) USA to 40°S in Argentina ^{6,12}	45°24'S, 67°05'W	Known distribution extended 5° southwards, to San Jorge Gulf	Cosmopolitan species, inhabiting temperate and tropical waters at depths below 100 m.		Three specimens: UNPSJB-JCT 2003/15, 2005/18 and 2005/19	900–1030 mm TL
Pleuronectidae <i>Oncopeltus darwini</i> Steindachner, 1875	Caught in nine hauls, 43°00'S–45°20'S, at 19–65 m depths (Fig. 5b)	From Rio Grande do Sul, Brazil to San Matías Gulf, Argentina, 20–80 m depths ¹²	45°19'S, 66°59'W	Known distribution extended 4° southwards, to San Jorge Gulf	A strictly Bonaerense species ⁸	At Engaño Bay, species caught year round by artisanal and coastal vessels as bycatch in prawn and shrimp fisheries. Young specimens were also caught in Nuevo Gulf and Engaño Bay, suggesting reproductive populations in the area	Thirty six specimens: UNPSJB-JCT 2005/32, 2005/33, 2006/12, 2006/13, 2006/14, and 2006/15	30–225 mm TL
Caragidae <i>Selene setapinnis</i> (Mitchill, 1815)	Caught in two hauls, 43°30'S–45°20'S, at 43–81 m depths (Fig. 5c)	Western Atlantic from 45°N in Nova Scotia, Canada to 38°S in Mar del Plata, Argentina ^{19,20}	45°16'S, 66°24'W	Known distribution extended 7° southwards, to San Jorge Gulf			Two specimens: UNPSJB-JCT 2005/3 and 2007/1	195–300 mm TL

¹Figureado, 1977; ²Cousseau and Bastida, 1982; ³Menni and Stiehmman, 2000; ⁴García et al., 2000; ⁵Cousseau et al., 2000; ⁶Cousseau and Perrota, 2004; ⁷Menni and Gosztonyi, 1982; ⁸Menni and López, 1984; ⁹López, 1963; ¹⁰McEachran, 1983; ¹¹Gosztonyi, 1981; ¹²Nakamura et al., 1986; ¹³Figuerola, 1992; ¹⁴Figuerola, 1992; ¹⁵Goldstein, 1986; ¹⁶Goldstein, 1988; ¹⁷Acuña Plavan and Verocai, 2001; ¹⁸Menni, 1981; ¹⁹Cordeiro and Luque, 2004; ²⁰Cousseau and Bastida, 1976.

Balech (1986) would be appropriate for new species to reach their present distribution.

The occurrence of *D. auriga*, *M. argentinae*, *U. brasiliensis*, *S. setapinnis*, *T. lepturus* and *T. lepidopodea*, well-known warm-temperate water species, and that of *A. castelnaui*, *S. acuta*, *T. puelcha*, *P. bergi*, *P. exenta*, *C. guatucupa*, *C. orbignyanus*, *P. nudigula*, *T. lathami* and *O. darwini* in the Magellanic Zoogeographic Province waters, all regarded as strictly pertaining to the Bonaerensean district of the Argentinean Zoogeographic Province or endemic to that province, necessitates a revision of the fish distribution in the Argentine Sea and consequently its ichthyogeography. This need is enhanced by the fact that reproductive populations of at least three of the above-mentioned species (*O. darwini*, *C. guatucupa* and *S. acuta*) were discovered in Engaño Bay area near the Puerto Rawson area (43°10'S–43°19'S), precluding the possibility that these fishes make only occasional appearances in the area.

Acknowledgements

This paper was made possible thanks to the Observers Program coordinated by the Province of Chubut Fisheries Secretariat. We acknowledge the invaluable work of on-board observers, particularly of Néstor Santibañez, Leonardo Jerez, Juan José Romero, Rubén Cambursano, Cristian Marinao, Diego Jara, Mario Robert, Gonzalo Quiroga, Gabriel Alonso, Fabián García, Rodrigo Cárdenas, Marcelo Schmith, Osvaldo Muñoz and Jerónimo Sarsa. We wish to thank Prof. Ricardo Ferriz, Dra. Amalia Miquelarena and Dra. María Berta Cousseau for allowing access to information from ichthyological collections in their care. We also wish to thank Luis Mendia, Matías Soutir, Mauricio Gallardo Gallardo, Graciela Sarsa and Katy Olsen, for their assistance in the work and also to the two anonymous referees who gave valuable advice to improve the quality of our publication.

References

- Acuña Plavan, A.; Verocal, J. E., 2001: Importancia de la pequería artesanal y biología de la brótola, *Urophycis brasiliensis* (Kaup 1858) (Phycidae, Gadiformes) en la costa uruguaya. (The importance of artisanal fisheries and biology of the Brazilian codling, *Urophycis brasiliensis* (Kaup, 1858) (Phycidae, Gadiformes) in the Uruguayan coast). *Investig. Mar.* **1**, 47–58.
- Balech, E., 1964: Caracteres Biogeográficos de la Argentina y Uruguay. (Biogeographic characteristics of Argentina and Uruguay). *Bol. Inst. Biol. Mar.* **7**, 107–112.
- Balech, E., 1986: De nuevo sobre la Oceanografía frente a la Argentina. Armada Argentina, Servicio de Hidrología Naval, Buenos Aires, Argentina **645** (publicación H), 1–23. (Once again dealing with oceanography off Argentina).
- Bovcon, N. D.; Cochia, P. D., 2007: Guía para el reconocimiento de los peces capturados por buques pesqueros monitoreados con observadores a bordo. Gobierno de la Provincia del Chubut. Secretaría de Pesca. Publicación especial de la Secretaría de Pesca de la Provincia del Chubut, Rawson, 44 pp. (Guide to the identification of fishes caught by on-board observers monitored fishing vessels).
- Briggs, J. C., 1995: Global biogeography elsevier science. B. V., Amsterdam, 453 pp.
- Cordeiro, A. S.; Luque, J. L., 2004: Community ecology of the metazoan parasites of Atlantic moonfishes, *Selene setapinnis* (Osteichthyes: Carangidae) from the coastal zone of the State of Rio de Janeiro, Brazil. *Braz. J. Biol.* **64**, 399–406.
- Cousseau, M. B.; Bastida, R., 1976: Nuevas citas para la ictiofauna argentina y comentarios sobre especies poco conocidas. (New records in the Argentine ichthyofauna and commentaries on little-known species. *Physis* **35** (Section A), 235–252.
- Cousseau, M. B.; Bastida, R., 1982: Capturas ocasionales de *Torpedo Puelcha* Lahille, 1928 en aguas argentinas (Chondrichthyes, Torpedinidae). (Occasional catches of *Torpedo puelcha* Lahille, 1928 in Argentine waters (Chondrichthyes, Torpedinidae)). *Neotropica* **28**, 139–145.
- Cousseau, M. B.; Perrota, R. G., 2004: Peces Marinos de Argentina. iología, distribución, pesca. (Sea fishes of Argentina, biology, distribution and fisheries). Publicaciones Especiales INIDEP, Mar del Plata, 167 pp.
- Cousseau, M. B.; Figueroa, D. E.; Díaz de Astarloa, J. M., 2000: Clave de Identificación de las Rayas del Litoral Marítimo de Argentina y Uruguay (Chondrichthyes, Familia Rajidae). (Identification key of the littoral skates of Argentina and Uruguay (Chondrichthyes, Family Rajidae)). Publicaciones Especiales INIDEP, Mar del Plata, 35 pp.
- Fennessy, S. T.; Villacastin, C.; Field, J. G., 1994: Distribution and seasonality of ichthyofauna associated with commercial prawn trawl catches on the Tugela Bank of Natal, South Africa. *Fish. Res.* **20**, 263–282.
- Figueiredo, J. L., 1977. Manual de peixes marinhos do sudeste do Brasil. I. Introducao. Cacoés, raias e quimeras. (Handbook of the marine fishes of Southwestern Brasil. I. Introduction, sharks, skates and chimaeras). Museu de Zoologia, Universidade de Sao Paulo, Brazil, 104 pp.
- Figueroa, D. E., 1992: Distribución geográfica y estadísticas pesqueras de los congrios *Conger orbignyanus* y *Pseudoxenomystax albescens*. (Geographic distribution and fishery statistics of *Conger orbignyanus* and *Pseudoxenomystax albescens*). *Publ. Com. Téc. Mix. Fr. Marit.* **11**, 33–36.
- Figueroa, D. E., 2006: Systematics and distribution of leptocephali in Western South Atlantic. *Bull. Mar. Sci.* **78**, 227–242.
- Galván, D. E.; Venerus, L. A.; Irigoyen, A. J.; Parma, A. M.; Gosztonyi, A. E., 2005: Extension of the distributional range of the silver porgy *Diplodus argenteus* (Valenciennes 1830) and the red porgy *Pagrus pagrus* (Linnaeus 1758) (Sparidae) in northern Patagonia, southwestern Atlantic. *J. Appl. Ichthyol.* **21**, 444–447.
- García, M. L.; Menni, R. C.; Jaureguizar, A. J., 2000: *Torpedo puelcha* (Chondrichthyes, Torpedinoidea), an endemic species from the Argentinean zoogeographic province. *Biogeographica* **76**, 173–178.
- Goldstein, H. E., 1986: Características morfológicas y hábitos alimentarios de la brótola (*Urophycis brasiliensis*) (Pisces, Gadidae). (Digestive system morphologic characteristics and feeding patterns in the Brazilian codling (*Urophycis brasiliensis*) (Pisces, Gadidae)). *Publ. Com. Téc. Mix. Fr. Marit.* **1**, 351–368.
- Goldstein, H. E., 1988: Estudio comparativo de los hábitos alimentarios y de los nichos tróficos en 2 peces costeros: la brótola (*Urophycis brasiliensis*) y el mero (*Acanthistius brasiliensis*). (Comparative examination of the feeding patterns and trophic niches in 2 seacoast fishes: the Brazilian codling (*Urophycis brasiliensis*) and the grouper (*Acanthistius brasiliensis*)). *Publ. Com. Téc. Mixta Frente Marítimo* **4**, 7–24.
- Gosztonyi, A. E., 1981: Resultados de las investigaciones ictológicas de la Campaña I del B/I Shinkai Maru en el mar argentino (10.04–08.05 1978). (Results of the ichthyological research in the first trip of the R/V Shinkai Maru's research trip in the Argentine Sea (10.04–08.05 1978)). *Contribuciones INIDEP* **383**, 254–266.
- Irigoyen, A. J.; Galván, D. E.; Venerus, L. A., 2005: Occurrence of dusky grouper *Epinephelus marginatus* (Lowe, 1834) in gulfs of northern Patagonia, Argentina. *J. Fish Biol.* **67**, 1741–1745.
- López, R. B., 1963: Problemas sobre la distribución geográfica de los peces marinos sudamericanos. (Questions regarding the geographic distribution of South American sea fishes). *Rev. Mus. Argentino Cs. Nat. Bernardino Rivadavia* **1**, 109–135.
- López, R. B., 1964: Problemas de la distribución geográfica de los peces suramericanos. (Questions regarding the geographic distribution of South American sea fishes). *Bol. Inst. Biol. Mar.* **7**, 57–63.
- Louge, E. B.; Reta, R.; Santos, B. A.; Hernández, D. R., 2004: Variaciones interanuales (1995–2000) de la temperatura y salinidad registradas en los meses de enero en el Golfo San Jorge y aguas adyacentes (43°S–47°S). (Interannual variations (1995–2000) in temperature and salinity in the month of January at San Jorge Gulf and adjacent waters (43°S–47°S)). *Rev. Inv. Des. Pesq. INIDEP* **16**, 27–42.
- McEachran, J. D., 1983: Results of the FRV "Walther Herwig" research cruises to South America. LXI. Revision of South

- American skate genus *Psammobatis* Günther, 1870 (Elasmobranchii: Rajiformes, Rajidae). Arch. Fischereiwis. **34**, 23–80.
- Menni, R. C., 1981: Sobre la distribución de los peces marinos en la Argentina. (On the distribution of Argentine marine fishes). Symposia, VI Jornadas Argentinas de Zool., Serie Biogeografía, pp. 57–73.
- Menni, R. C.; Gosztonyi, A. E., 1982: Benthic and semidemersal fish association in the Argentine Sea. Stud. Neotrop. Fauna Environ. **17**, 1–29.
- Menni, R. C.; López, H. L., 1984: Distributional patterns of Argentine marine Fishes. Physis **42**(A), 71–85.
- Menni, R. C.; Stehmann, M. F. W., 2000: Distribution, environment and biology of batoid fishes off Argentina, Uruguay and Brazil; a review. Rev. Mus. Argentino de Cs. Nat. Bernardino Rivadavia **2**, 69–109.
- Nakamura, I.; Inada, T.; Takeda, M.; Hatanaka, H., 1986: Important Fishes Trawled off Patagonia, Japan Marine Fisheries Research Center Fishes Patagonia. 1–369, 148 color plates.
- Reynolds, R. W.; Rayner, N. A.; Smith, T. M.; Stokes, D. C.; Wang, W., 2002: An improved *in situ* and satellite SST analysis for climate. J. Climate **15**, 1609–1625.
- Venerus, L. A.; Galván, D. E.; Irigoyen, A. J.; Gosztonyi, A. E., 2007: First record of the namorado sandperch, *Pseudoperca numida* Miranda-Ribeiro, 1903 (Pinguipedidae; Osteichthyes) in Argentine waters. J. Appl. Ichthyol. **23**, 110–112.
- Vinuesa, J. H., 2005: Distribución de los crustáceos decápodos y estomatópodos del Golfo San Jorge, Argentina. (Distribution of decapod and stomatopod crustaceans in San Jorge Gulf, Argentina). Rev. Biol. Mar. Oceanogr. **40**, 7–21.
- Author's address:** N. D. Bovcon, Facultad de Ciencias Naturales, Universidad Nacional de la Patagonia San Juan Bosco, Julio A. Roca 115 1º piso, (9100) Trelew, Chubut, Argentina.
E-mail: nelsonbovcon@hotmail.com