



First documented records of tropical morays (Muraenidae) in Argentina and Uruguay

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Abstract: This note provides the first documented records of the reticulate moray *Muraena retifera* Goode & Bean, 1882 and ocellated moray *Gymnothorax ocellatus* Agassiz, 1831 for Uruguay and Argentina, respectively. Both records are based on recreational fishing catches and represent significant southward extensions for these moray species' geographic distributions. This report contributes for future assessments of the conservation status of tropical fishes in a global climate change context.

Key words: Southwest Atlantic, taxonomy, teleosts, tropicalization, warm coastal drift

Resumen. Primeros registros documentados de morenas tropicales (Muraenidae) en Argentina y Uruguay. Se presentan los primeros registros documentados de la morena reticulada *Muraena retifera* Goode & Bean, 1882 y la morena ocelada *Gymnothorax ocellatus* Agassiz, 1831 para Uruguay y Argentina, respectivamente. Ambos registros se basan en capturas de pesca recreacional y representan extensiones geográficas hacia el sur significativas para estas especies. Este reporte contribuye para futuras evaluaciones del estado de conservación de peces tropicales en un contexto de cambio climático global.

Palabras clave: Atlántico Sudoccidental, deriva costera cálida, taxonomía, teleósteos, tropicalización

The reticulate moray *Muraena retifera* Goode & Bean, 1882 and the ocellated moray *Gymnothorax ocellatus* Agassiz, 1831 are marine fishes belonging to Muraenidae, a cosmopolitan family of moray eels (Smith 2012). *Muraena retifera* typically occurs in tropical waters of the Western Atlantic, from New England (USA) to Venezuela (Froese & Pauly 2017), however its presence extends to Laje de Santos in the state of Sao Paulo, Brazil (Carvalho-Filho 1999). This species is oviparous and it is found in depths between 10 and 76 m (Kells & Carpenter 2011). Externally, it is characterised by a reticulated pattern of light brown blotches on a dark brown background (Smith 1997). *Gymnothorax ocellatus* is distributed

in tropical waters of the Western Atlantic from Greater Antilles to Uruguay (Froese & Pauly 2017). It is known that the species is present in the Argentine-Uruguayan Common Fishing Zone (AUCFZ), although no precise information is given about the location of the catches (Cousseau *et al.* 1998). It is a solitary species associated to gravel, sand, or mud substrates of open sedimentary bottoms, typically between 1 and 100 m deep (Carvalho-Filho 1999). Externally, it presents a white-dotted yellow pattern, and it has regularly spaced blackish spots on its dorsal fin (Uyeno *et al.* 1983). The aim of this note is to document the first

record of *M. retifera* in Uruguay and *G. ocellatus* in Argentina.

The new records of *M. retifera* and *G. ocellatus* were first noticed via Facebook™, after sport anglers publicly posted pictures of their unusual catch. From free-access photos, both species were identified to the lowest taxonomic level using a regional taxonomic guide elaborated by Carvalho-Filho (1999). Upon identification, fishermen were contacted to gather additional details regarding each fishing operation. Unfortunately, it was not possible to access the specimens for further study and preservation because both anglers disposed them before sharing the pictures on the web.

On 17 September 2015, a sport angler caught a specimen of *M. retifera* on a kayak using a fishing rod sank to the bottom 500 m from shore in front of José Ignacio lighthouse in Maldonado, Uruguay (34°51.10'S–54°38.24'W, Fig. 1). The area is characterized by rock formations which are suitable habitats for the species. This new record presented here is the most austral record to date for this tropical species, and it is the first time its presence is documented for Uruguayan waters. This record also expands the southward distribution of the species by nearly 1,100 km.

On 11 January 2016, a sport angler caught a specimen of *G. ocellatus* using a fishing rod sank to the bottom at the north mole of Mar del Plata harbour in Buenos Aires, Argentina (38°02.03'S–57°31.35'W, Fig. 2). The area ranges between 3 and 5 m deep depending on the tide and it is characterised by plain sand bottoms. The artificial rocky reef of the mole may create further suitable habitat for the species. This new record represents to date the southernmost record for the species, and it is the first confirmed and georeferenced occurrence for Argentinean and AUCFZ waters. For *G. ocellatus*, however, the new record only represents a southward expansion of ~370 km.

Despite marine eels (Anguilliformes: Teleostei) are characterised by elongated bodies, absent pelvic fins, and elusive behaviours, their swimming capacity has proven to be remarkable. For example, European eels *Anguilla anguilla* (L., 1758) are known to swim as far as 5,000 km during their spawning migration (Aarestrup *et al.* 2009). Therefore, as potentially good swimmers, marine eels—such as muraenids—may be capable of travelling long distances as part of their migratory behaviour or driven by environmental cues. A recent study has also reported substantial geographic

expansions for the chlopsid *Chlopsis dentatus* (Seale 1917) and muraenid *G. maderensis* (Johnson 1862) by ~3,300 km and ~6,200 km southwards across the southwest Atlantic, respectively (Carvalho-Filho & Paiva 2017).

Records of tropical and subtropical fishes in the coast of Uruguay and northern Argentina are frequent toward the end of the austral summer and the beginning of the austral autumn (i.e. March–April), which coincides with the maximum values of the seasonal sea surface temperature (SST). This phenomenon is produced by the incidence of NNE prevailing winds (Guerrero *et al.* 1997) combined with a southward penetration of subtropical waters from the Brazilian continental shelf, from Cabo Frío in Brazil to Bahía Blanca in Argentina (Palma *et al.* 2004, 2008). Furthermore, because low salinity waters act as true physical barriers for marine fishes, the low freshwater discharge of the Río de la Plata during this time of the year is likely to favour the southward distribution of tropical and subtropical species. This transport of tropical and subtropical fauna to temperate latitudes couples with the hypothesis proposed by Balech (1986), named Warm Coastal Drift (WCD). During the last two decades, many teleost species have been registered in temperate waters, confirming the WCD hypothesis (e.g. Scenna *et al.* 2006, Izzo *et al.* 2008, Segura *et al.* 2008, Solari *et al.* 2010, Bogan & Di Martino 2011, Milessi *et al.* 2012, 2013, 2015, Delpiani *et al.* 2013, Bruno *et al.* 2014, Trobbiani *et al.* 2014, Spath *et al.* 2015), as well as other marine organisms (e.g. Leoni *et al.* 2016).

Social networks have become a new and effective way of communicating sport and recreational fisheries catches that in the past were only announced through bulletins from fishing clubs or associations (Bariche & Azzurro 2016). In this sense, specific information from anglers regarding their catch can be recorded with a certain degree of trust. This source of information is increasingly being used in scientific studies because it represents an innovative approach to the collection of data that might otherwise be inaccessible (Azzurro *et al.* 2013, Rizgalla *et al.* 2017). In fact, a number of recent studies have based the documentation of new records of marine rare (e.g. Trobbiani *et al.* 2014, Bettoso & Comisso 2015) and non-indigenous (e.g. Deidun & Castriota 2014, Weitzmann *et al.* 2015, Langeneck *et al.* 2015, 2017) fish species from recreational and sport anglers, or diver encounters. Social networking systems and mobile devices

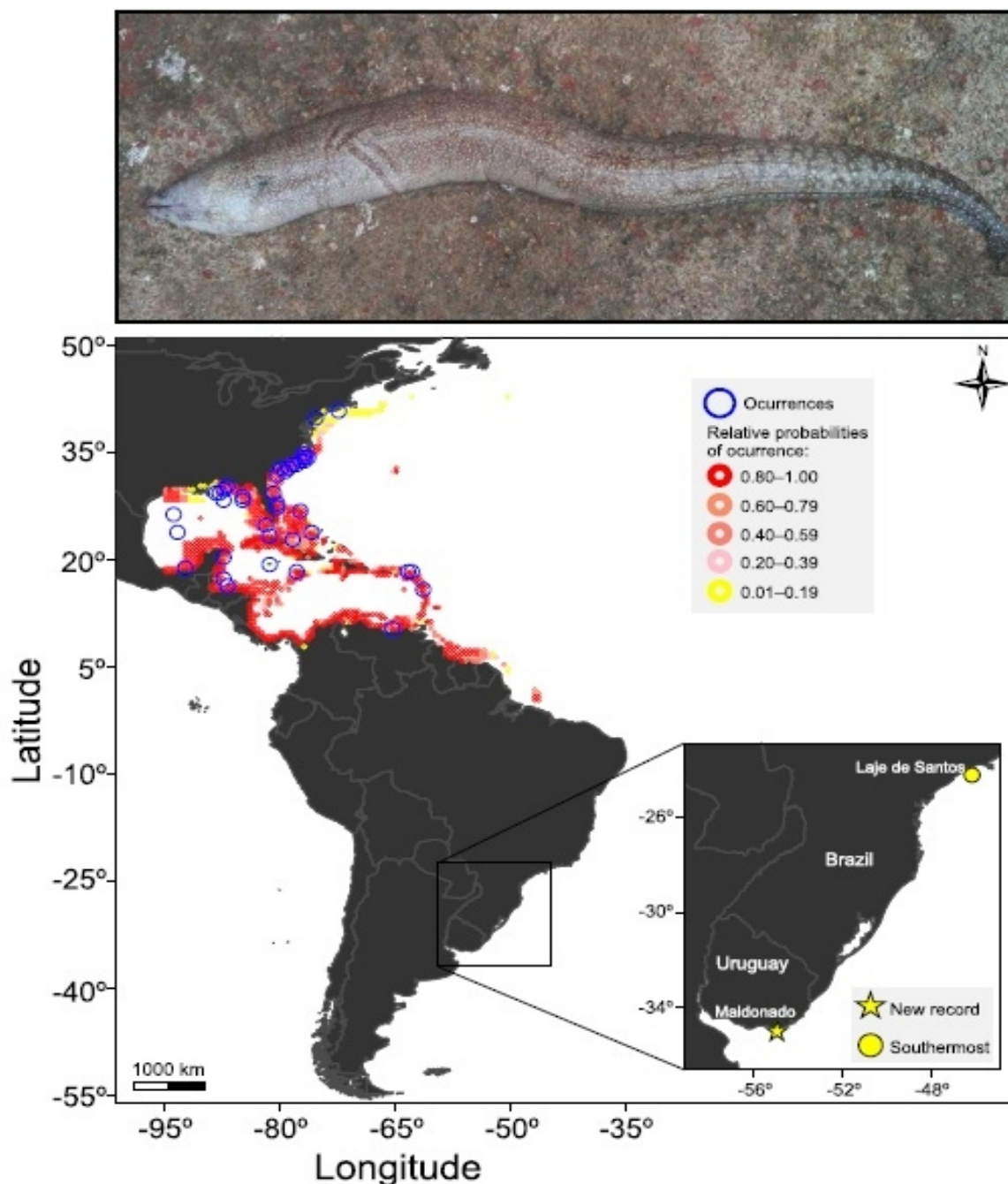


Figure 1. New record of reticulate moray *Muraena retifera* from Maldonado (Uruguay) along with historical occurrences of the species from FishBase (Froese & Pauly 2017), and its southernmost occurrence in Laje de Santos (25°19.30'S–46°10.22'W, Brazil) from Carvalho-Filho (1999). Distribution range colours indicate degree of suitability of habitat which can be interpreted as probabilities of occurrence (Froese & Pauly 2017). The picture used for identification is included.

technologies are on the rise (Robson 2012), which might be considered as a starting point for the monitoring of rare and invasive species in marine environments. In recent years, public interest in marine citizen science has also shown great potential for growth [e.g. Martin *et al.* 2016, eOceans

(<https://www.eoceans.co/>)]. More ideally, engagement among citizens may also be driven to foster the preservation of specimens to be comprehensively analysed by experts. Unfortunately, specimens reported in this note were lost to be further analysed and kept in an

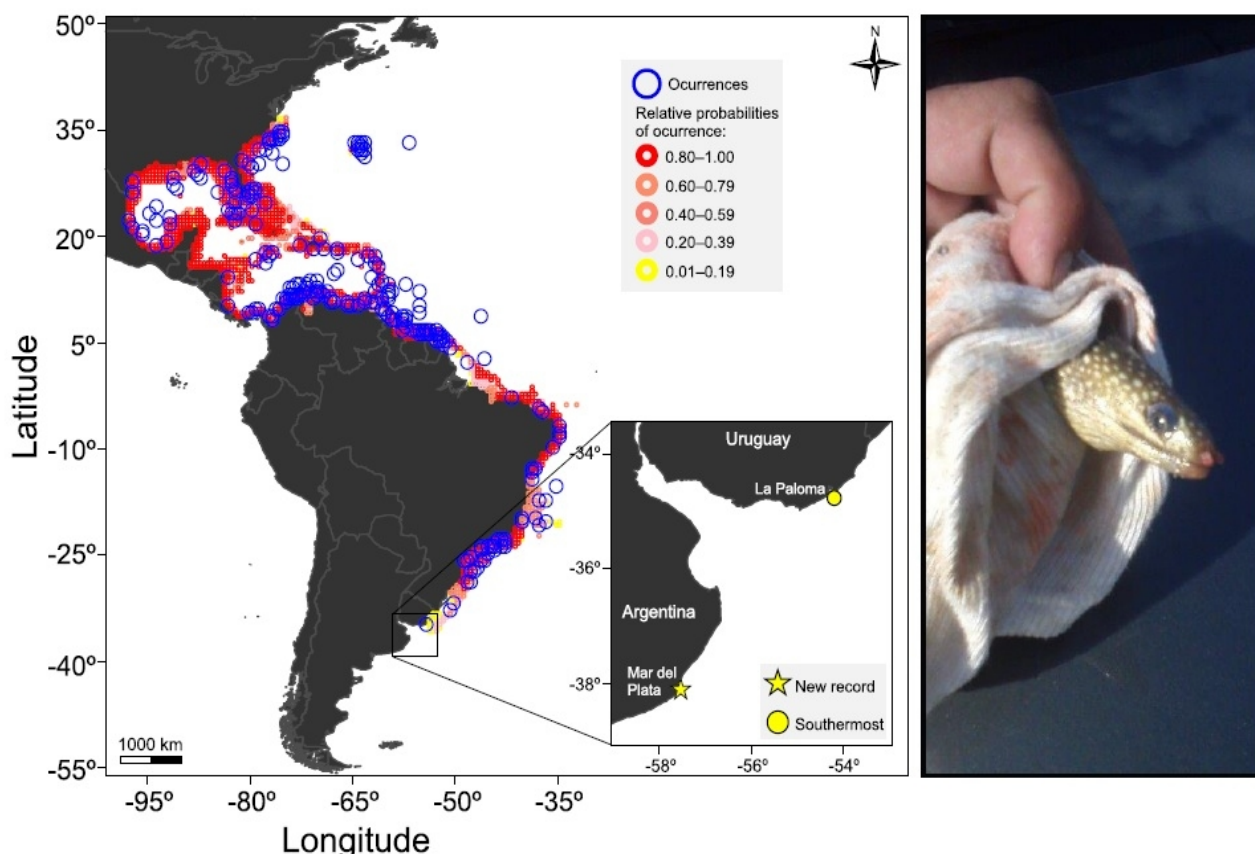


Figure 2. New record of ocellated moray *Gymnothorax ocellatus* from Mar del Plata (Argentina) along with historical occurrences of the species from FishBase (Froese & Pauly 2017), accounting for its southernmost occurrence in La Paloma (34°45.00'S-54°15.00'W, Uruguay). Distribution range colours indicate degree of suitability of habitat which can be interpreted as probabilities of occurrence (Froese & Pauly 2017). The picture used for identification is included.

ichthyological collection. Therefore, is necessary to develop a protocol in order to collect unusual samples, as well as a community program to educate toward the recognition of foreign marine species and the importance of their sighting.

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