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Social networks allow early detection of non indigenous species: first record of the red drum *Sciaenops ocellatus* (Actinopterygii: Perciformes: Sciaenidae) in Italian waters

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*The red drum *Sciaenops ocellatus* is a large demersal fish that represents one of the top predators in estuarine environments of its native range. This species is commonly reared in aquaculture facilities, and it has already been reported as non indigenous from several countries. Here we report its first sighting in Italian waters, as well as the second documented occurrence for the Mediterranean Sea. The individual was landed in southern Sicily by artisanal fishery and this unusual observation was immediately shared on Facebook. The importance of considering social networks as tools for NIS detection is briefly discussed in light of the recognized difficulties to properly track biological introductions in the marine environment.*

Key words: red drum, aquaculture, Italy, Mediterranean Sea, social network

INTRODUCTION

The red drum, *Sciaenops ocellatus* (Linnaeus, 1766), is a large demersal fish that commonly occurs along the Atlantic coast of North America, from Massachusetts to northern Mexico (FROESE & PAULY, 2016); it is commonly found on shallow soft bottoms in coastal waters and estuaries, where it preys on crustaceans

and fishes, thus representing an important component of estuarine communities (SCHARF & SCHLICHT, 2000). The red drum is an important commercial species, but its association with estuarine environments (GOLD *et al.*, 2001) and relatively slow growth (ROSS *et al.*, 1995) make it sensitive to over-exploitation. For this reason, *S. ocellatus* has been one of the first fish to be cultured (PARKER, 1993) and it is currently grown in

fish farms in several countries outside the USA (KISSIL, 1996; SASAKI, 2000; DAO, 2003; GOFFINGS, 2010). As a consequence of mariculture escapes as well as voluntary introductions, the red drum has already become established in Taiwan waters (LIAO *et al.*, 2010), where, being a large demersal predator, it is expected to be impacting native assemblages. In Israel, red drum culture trials have begun with the importation of eggs and fry from the US in the early 1990s (DIAMANT, 1998) and a few years later the species was found in freshwater systems (GOLANI & MIRES, 2000) and subsequently along the Mediterranean coasts of the country (GOLANI *et al.*, 2015). To our best knowledge, these two observations, likely caused by occasional releases from fish farms, are the only documented occurrences of *S. ocellatus* in the Mediterranean region. In this study we report a further record of this species for another location in the Mediterranean Sea,

the Sicilian Strait. This also represents the first occurrence of *S. ocellatus* in Italian waters.

MATERIAL AND METHODS

On 17 April 2016 an unusual fish was photographed by a concerned citizen Gianluca LO BRACCO, during landing operation at the harbour of Licata - Marianello (Sicily) (Fig. 1a-b). The capture was made by a fisherman operating with trammel-nets in the shallow waters off the River Salso estuary (37° 05' 47.29" N; 13° 55' 49.03" E) and the specimen was landed with other native coastal fishes such as *Lithognathus mormyrus* (Linnaeus, 1758), *Pomatomus saltatrix* (Linnaeus, 1766) and *Diplodus vulgaris* (Geoffroy Saint-Hilaire, 1817) (Fig. 1c). The following day, the picture was shared through an Italian Facebook group called 'Pescistrani', along with a request for identification (Fig. 2).



Fig. 1. a) map of Italy with highlighted the coastline object of this study; b) close-up of Licata coast, and the low basin of the Salso River, showing the locality of capture of *Sciaenops ocellatus*; c) individual of *Sciaenops ocellatus* caught by trammel-net near Licata



Fig. 2. Screenshot of the Facebook group 'Pescistrani' showing the posted record of *Sciaenops ocellatus*, along with doubts on the identification by the original observer

The typical shape and colour pattern of *S. ocellatus*, and in particular, the presence of a dark spot with a pale edge in the upper part of the caudal peduncle, allowed a certain identification of the specimen, following ROBINS & RAY (1986) and other field guides (e.g. FROESE & PAULY, 2016). Unfortunately the individual was not preserved, but its colour pattern is unique to the red drum and it has been already used to identify the species from the sole picture, when the specimen was not kept (GOLANI *et al.*, 2015).

RESULTS AND DISCUSSION

This observation represents the first record of *S. ocellatus* for Italian waters and the second for the Mediterranean Sea. Total length estimated by comparison to the polystyrene box in the picture was of 65-70 cm TL. The occurrence of this species on sandy muddy bottoms near to brackish waters is consistent with the general habits of this fish, which is strictly associated to estuarine environments (GOLD *et al.*, 2001). Previous occurrences of this Atlantic species in the Mediterranean area has been explained as occasional aquaculture escapes (GOLANI & MIRES, 2000; GOLANI *et al.*, 2015), which may be problematic for the possibility of disease and parasite spreading (DIAMANT, 1998). Escapes of the red drum have been documented from several countries where it is grown in aquaculture

facilities (GOLANI & MIRES, 2000; SASAKI, 2000; LETOURNEUR *et al.*, 2004; WAKIDA-KUSUNOKI & SANTOS-VALENCIA, 2008) and the species is currently established in Taiwan, even if in this latter case the establishment of the species may have been fostered by subsequent voluntary introductions aimed at improving local fisheries, and by the religious practice of animal release (LIAO *et al.*, 2010). It remains challenging to identify the precise source of introduction of the present record. In the Mediterranean Sea, *S. ocellatus* is regularly farmed in Israel (KISSIL, 1996; DIAMANT, 1998). In Italy experimental rearing of the red drum has been documented in Apulia (LEMBO & SPEDICATO, 2008; LASTILLA *et al.*, 2015), but to our best knowledge, the species has not been marketed yet (MARINO *et al.*, 2015). Based on the life cycle features of *S. ocellatus* (ROSS *et al.*, 1995), the estimated age of the recorded individual is compatible with the date of the first successful culture trials in Apulia in 2013 (LASTILLA *et al.*, 2015), but there is no additional clue supporting this origin. Besides an unconfirmed sighting along the Po River delta (OCCHIPINTI-AMBROGI, 2002), there is no official report of this species in Italian waters, and *S. ocellatus* is not reported in Italian checklists (RELINI & LANTERI, 2010; OCCHIPINTI-AMBROGI *et al.*, 2011).

With regard to its size and ecological features, *S. ocellatus* can be considered as a top predator in estuarine systems, and its estab-

ishment could lead to dramatic changes in assemblage structure and composition. Even if, considering the strict protocols aimed at guaranteeing biosecurity in European waters (COPP *et al.*, 2016), this possibility seems unlikely, nevertheless a closer monitoring of possible future records of this species is strongly advisable, in order to trace and prevent possible establishment events. In this context, Facebook groups (BARICHE & AZZURRO, 2016) and other social networks (AZZURRO *et al.*, 2013; DAILIANIS *et al.*, 2016), should be seriously considered as powerful tools for the early detection of non indigenous species in the marine environment (DAILIANIS *et al.*, 2016; KLETOU *et al.*, 2016). Some researchers often hesitate to use these data due to concerns over their quality and reliability. Clearly, data provided by these sources cannot meet the rigour of traditional approaches and should be carefully checked to avoid taxonomic errors. Nevertheless, ignoring the finding of a new non-indigenous species would be a much

greater error, also considering our great underestimation of biological introductions in the marine environment (ZENETOS *et al.*, 2005). As a matter of facts, data provided by social networks can help much to increase sampling coverage, fill gaps in species distributions, and improve habitat suitability models compared to professionally generated data sets used in isolation (CRALL *et al.*, 2015). Social media are being increasingly used by Mediterranean scientists (RIZGALLA *et al.*, 2016), but they also represent a current revolution for participatory research (BONNEFOND *et al.*, 2016), which underscore the need to merge data from multiple sources to appropriately track the distribution of non indigenous species.

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Društvene mreže omogućuju rano otkrivanje nezavičajnih vrsta: prvi nalaz crvene hame *Sciaenops ocellatus* (Actinopterygii: Perciformes: Sciaenidae) u talijanskim vodama

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SAŽETAK

Crvena hama, *Sciaenops ocellatus*, je velika demersalna riba, koja je jedna od najvećih grabežljivaca u estuarijskim okruženjima njezinog prirodnog areala rasprostranjenja. Ova vrsta se obično uzgaja u akvakulturi, a već je zabilježena kao nezavičajna u nekoliko zemalja. U ovom radu utvrđeno je prvo viđenje ove vrste u talijanskim vodama, koje je ujedno druga dokumentirana pojava u Sredozemnom moru. Primjerak je ulovljen tijekom priobalnog ribolova u južnoj Siciliji. Ova neuobičajena pojava je odmah podijeljena na društvenoj mreži (Facebook). Važnost razmatranja društvenih mreža kao alata za otkrivanje nezavičajnih vrsta kratko je raspravljano u svjetlu prepoznatih poteškoća kako bi se pravilno pratili biološki unosi u morski okoliš.

Ključne riječi: Crvena hama, akvakultura, Italija, Sredozemno more, društvene mreže