

# ANNALES

*Anali za istrske in mediteranske študije*  
*Annali di Studi istriani e mediterranee*  
*Annals for Istrian and Mediterranean Studies*  
*Series Historia Naturalis, 36, 2026, 1*





# ANNALES

**Anali za istrske in mediteranske študije**  
**Annali di Studi istriani e mediterraneei**  
**Annals for Istrian and Mediterranean Studies**

**Series Historia Naturalis, 36, 2026, 1**

**UREDNIŠKI ODBOR/  
COMITATO DI REDAZIONE/  
BOARD OF EDITORS:**

Alessandro Acquavita (IT), Nicola Bettoso (IT), Christian Capape (FR), Darko Darovec, Dušan Devetak, Jakov Dulčić (HR), Edy Fantinato (IT), Ana Fortič, Andrej Gogala, Daniel Golani (IL), Danijel Ivajnsič, Hakan Kabasakal (TR), Mitja Kaligarič, Marcelo Kovačić (HR), Petar Kružić (HR), Lovrenc Lipej, Vesna Mačić (ME), Alenka Malej, Borut Mavrič, Patricija Mozetič, Martina Orlando-Bonaca, James Pierson (USA), Michael Stachowitsch (AT), Francesco Tiralongo (IT), Tom Turk, Al Vrezec

**Glavni urednik/Redattore capo/  
Editor in chief:**

Darko Darovec

**Odgovorni urednik naravoslovja/  
Redattore responsabile per le scienze  
naturali/Natural Science Editor:**

Lovrenc Lipej

**Urednici/Redattrici/Editors:**

Martina Orlando-Bonaca, Ana Fortič

**Prevajalci/Traduttori/Translators:**

Martina Orlando-Bonaca (sl./it.)

**Oblikovalec/Progetto grafico/  
Graphic design:**

Dušan Podgornik, Lovrenc Lipej

**Tisk/Stampa/Print:**

Založništvo PADRE d.o.o.

**Izdajatelj/Editori/Published by:**Zgodovinsko društvo za južno Primorsko - Koper / Società storica del Litorale - Capodistria®  
Inštitut IRRIS za raziskave, razvoj in strategije družbe, kulture in okolja / Institute IRRIS for Research, Development and Strategies of Society, Culture and Environment / Istituto IRRIS di ricerca, sviluppo e strategie della società, cultura e ambiente®**Sedež uredništva/Sede della redazione/  
Address of Editorial Board:**Nacionalni inštitut za biologijo, Morska biološka postaja Piran / Istituto nazionale di biologia, Stazione di biologia marina di Pirano / National Institute of Biology, Marine Biology Station Piran  
SI-6330 Piran / Pirano, Fornače/Fornace 41, tel.: +386 5 671 2900, fax +386 5 671 2901;  
e-mail: annalesSHN@nib.si, internet: www.zdjp.si

Redakcija te številke je bila zaključena 20. 06. 2026.

**Sofinancirajo/Supporto finanziario/  
Financially supported by:**

Javna agencija za znanstveno-raziskovalno in inovacijsko dejavnost Republike Slovenije (ARIS)

**Annales - Series Historia Naturalis** izhaja dvakrat letno.**Naklada/Tiratura/Circulation:** 300 izvodov/copie/copies

Revija Annales, Series Historia Naturalis je vključena v naslednje podatkovne baze / La rivista Annales, series Historia Naturalis è inserita nei seguenti data base / Articles appearing in this journal are abstracted and indexed in: BIOSIS-Zoological Record (UK); Aquatic Sciences and Fisheries Abstracts (ASFA); Elsevier B.V.: SCOPUS (NL); Directory of Open Access Journals (DOAJ).

To delo je objavljeno pod licenco / Quest'opera è distribuita con Licenza / This work is licensed under a Creative Commons BY 4.0.

Navodila avtorjem in vse znanstvene revije in članki so brezplačno dostopni na spletni strani <https://zdjp.si/en/p/annalesshn/>  
The submission guidelines and all scientific journals and articles are available free of charge on the website <https://zdjp.si/en/p/annalesshn/>  
Le norme redazionali e tutti le riviste scientifiche e gli articoli sono disponibili gratuitamente sul sito <https://zdjp.si/en/p/annalesshn/>

VSEBINA / *INDICE GENERALE* / *CONTENTS*

BIOTSKA GLOBALIZACIJA  
*GLOBALIZZAZIONE BIOTICA*  
*BIOTIC GLOBALIZATION*

**Alen SOLDO, Rigers BAKIU & Sherif DURMISHAJ**  
 The First Record of Bastard Grunt *Pomadasy incisus* (Bowdich, 1825) in Albanian Waters (Adriatic Sea) ..... 1  
*Prvi zapis o pojavljanju neprave prašičevke Pomadasy incisus (Bowdich, 1825) v albanskih vodah (Jadransko morje)*

**Pero UGARKOVIĆ, Ilija ČETKOVIĆ, Olivera MARKOVIĆ, Aleksandar JOKSIMOVIĆ, Nikola ĐORĐEVIĆ & Jakov DULČIĆ** Additional Records of the Bastard Grunt, *Pomadasy incisus* (Bowdich, 1825), from the Eastern Adriatic Sea ..... 7  
*Dodatne najdbe neprave prašičevke, Pomadasy incisus (Bowdich, 1825), iz vzhodnega Jadranskega morja*

**Rüştü KIRMAN & Murat BİLECENOĞLU** Significant Range Expansion of *Sepioteuthis lessoniana* (Cephalopoda: Loliginidae) in the Aegean Sea Based on Scuba and Photographic Observations ..... 15  
*Znatno razširjanje areala vrste Sepioteuthis lessoniana (Cephalopoda: Loliginidae), v Egejskem morju na podlagi podvodnih opazovanj in fotografiranja*

**Adrian BRAJKOVIĆ, Iris MATULJA & Neven IVEŠA** Conquering the North: New Occurrence of the Common Lionfish, *Pterois miles* (Bennett, 1828), in the Adriatic Sea ..... 21  
*Osvajanje severa: novi zapis o pojavljanju navadne plamenke, Pterois miles (Bennett, 1828), v Jadranskem morju*

**Alan DEIDUN, Bruno ZAVA, Maria CORSINI-FOKA, Arnold SCIBERRAS & Alessio MARRONE** First Record of the Devil Firefish *Pterois miles* (Bennett, 1828) (Actinopterygii: Scorpaenidae) from Maltese Coastal Waters ..... 29  
*Prvi zapis o pojavljanju plamenke Pterois miles (Bennett, 1828) (Actinopterygii: Scorpaenidae) v malteških obalnih vodah*

**Chirine HUSSEIN, Amir IBRAHIM, Firas ALSHAWY, Mouina BADRAN & Rahaf ABO ASA** First Mediterranean Record of the Diagonal Butterflyfish, *Chaetodon fasciatus* Forsskål, 1775, Reported from Syrian Waters ..... 35  
*Prvi sredozemski zapis o pojavljanju poševnoprogame štetinozobke, Chaetodon fasciatus Forsskål, 1775, iz sirskih voda*

**Houssein ELBARAASI, Tarek SHOEIB, Mona SAID & Laith A. JAWAD** A Further Record of the Barred Knifejaw, *Oplegnathus fasciatus* (Temminck & Schlegel, 1844), a Pacific Species, from the Mediterranean: A New Record from Benghazi, Libya ..... 41  
*Novi zapis o vrsti Oplegnathus fasciatus (Temminck & Schlegel, 1844), pacifiški vrsti, v Sredozemlju: nova najdba iz Bengazija v Libiji*

**Alen SOLDO & Rigers BAKIU** Rapid Increase in Records of the Invasive Silver-cheeked Toadfish *Lagocephalus sceleratus* (Gmelin, 1789) in the Adriatic Sea ..... 49  
*Hitro naraščanje pojavov invazivne srebrnoproge napihvalke Lagocephalus sceleratus (Gmelin, 1789) v Jadranskem morju*

**Gerasimos KONDYLATOS, Konstantinos KALAENTZIS, Styliani MINOUDI & Maria CORSINI-FOKA** Further Molecular Identification Confirms the Occurrence of *Lagocephalus guentheri* Miranda Ribeiro, 1915 in the Aegean Coastal Waters of Greece ..... 55  
*Nadaljnja molekularna identifikacija potrjuje prisotnost vrste Lagocephalus guentheri Miranda Ribeiro, 1915 v egejskih obalnih vodah Grčije*

**Deniz ERGÜDEN & Cem ÇEVİK** Length–Weight and Length–Length Relationships, and Condition Factor of *Ambassis dussumieri* Cuvier, 1828, in the Northeastern Mediterranean, Türkiye ..... 65  
*Dolžinsko-masni odnos med dolžino in kondicijskim faktorjem pri vrsti Ambassis dussumieri Cuvier, 1828, v severovzhodnem Sredozemskem morju, Turčija*

**Okan AKYOL & HALİL ŞEN** Unexpected Occurrence of Prussian Carp *Carassius gibelio* (Cyprinidae) in Homa Lagoon (Izmir Bay, Aegean Sea) ..... 73  
*Nepričakovani pojav srebrnega koreslja Carassius gibelio (Cyprinidae) v laguni Homa (Izmirski zaliv, Egejsko morje)*

SREDOZEMSKÉ HRUSTANČNICE  
 SQUALI E RAZZE MEDITERRANEE  
 MEDITERRANEAN SHARKS AND RAYS

**Terry CARBON, Emily GIGNON, Justine LALLAU-VAZZOLER, Hugo MENARD, Claudio BARRIA, Ana I. COLMENERO & Nicolas ZIANI** Precopulatory Behaviour of *Pteroplatytrygon violacea* (Myliobatiformes: Dasyatidae) in the Northwestern Mediterranean ..... 81  
*Predkopulacijsko vedenje vijoličnega morskega biča (Pteroplatytrygon violacea) (Myliobatiformes: Dasyatidae) v severozahodnem Sredozemlju*

<b>Hakan KABASAKAL</b> Distribution of <i>Odontaspis ferox</i> in the Mediterranean Sea: Insights from Spatial and Temporal Analyses ..... 87 <i>Razširjenost vrste Odontaspis ferox v Sredozemskem morju: Spoznanja na podlagi prostorskih in časovnih analiz</i>	MORSKA FAVNA FAUNA MARINA MARINE FAUNA
<b>Hristina GELEVSKA, Borut MAVRIČ, Lovrenc LIPEJ &amp; Christian CAPAPÉ</b> Is the Gulf of Trieste a potential nursery area for some elasmobranch species? ..... 99 <i>Ali je Tržaški zaliv potencialno območje odraščanja (jaslice) za določene vrste hrustančnic?</i>	<b>Francesco TIRALONGO, Paola LEOTTA &amp; Riccardo MARTELLUCCI</b> <i>Physalia physalis</i> in the central Mediterranean Sea: Recent observations associated with mass strandings of <i>Velella velella</i> and surface circulation dynamics ..... 165 <i>Portugalska ladjica (Physalia physalis) v osrednjem Sredozemskem morju: nedavna opažanja v povezavi z masovnimi nasedanji morskega jadrčka (Velella velella) in dinamiko površinskega kroženja vode</i>
IHTIOFAVNA ITTIOFAUNA ICHTHYOFAUNA	
<b>Cem DALYAN, Yunus GÖNÜL, Mahmud Samed ŞAHİNOĞULLARI &amp; Hakan KABASAKAL</b> New data on the Occurrence and Morphology of the Armless Snake Eel, <i>Dalophis imberbis</i> (Ophichthidae), from the Northeastern Mediterranean Sea ..... 119 <i>Novi podatki o pojavljanju in morfologiji kačaste jegulje, Dalophis imberbis (Ophichthidae), iz severovzhodnega Sredozemskega morja</i>	<b>Andrea LOMBARDO, Juba CHABANE &amp; Rachida GHALMI</b> First Contribution to the Study of the "Sea Slug" Fauna (Gastropoda, Heterobranchia) of the Algerian coast ..... 177 <i>Prvi prispevek k proučevanju favne „goliš morskih polžev“ (Gastropoda, Heterobranchia) alžirske obale</i>
<b>Chirine HUSSEIN, Firas ALSHAWY &amp; Amir IBRAHIM</b> First Record of the Mediterranean Dealfish, <i>Trachipterus trachipterus</i> (Gmelin, 1789) (Trachipteridae), in Syrian Marine Waters ..... 127 <i>Prvi zapis o pojavljanju kosice, Trachipterus trachipterus (Gmelin, 1789) (Trachipteridae), v sirskih morskih vodah</i>	<b>Borut MAVRIČ, Tjaša PREMRL, Martin MAVRIČ, Tina MIRT, Neža LEBAN, Tihomir MAKOVEC &amp; Lovrenc LIPEJ</b> Assessing Soft-Bottom Epibenthic Communities: Methodological Insights into Dredging and Video Surveys ..... 203 <i>Ocenjevanje epibentoških združb mehkega dna: metodološki vpogledi v dredžanje in video pregleda</i>
<b>Igor AGOSTINI &amp; Okan AKYOL</b> On the Occurrence of the Currently Largest Recorded <i>Pagellus erythrinus</i> (Sparidae) in the Tyrrhenian Sea (Italy) ..... 133 <i>O pojavljanju trenutno največjega evidentiranega primerka vrste Pagellus erythrinus (Sparidae) v Tirenskem morju (Italija)</i>	FAVNA FAUNA FAUNA
<b>Ismail Burak DABAN &amp; Yusuf ŞEN</b> Substantiated Record and Preliminary Biological Insights of <i>Microlipophrys dalmatinus</i> (Steindachner & Kolombatović, 1883) from the Sea of Marmara, Türkiye ..... 141 <i>Potrjen zapis o pojavljanju in predhodna biološka spoznanja o vrsti Microlipophrys dalmatinus (Steindachner &amp; Kolombatović, 1883) iz Marmarskega morja, Turčija</i>	<b>Kim LEBAN, Iztok ŠKORNIK, Špela ČONČ, Mateja BREG VALJAVEC, Žan KURALT, Lenart ŠTAUT, Jure TIČAR, Katarina POLAJNAR HORVAT, Primož GAŠPERIČ, Aleš SMREKAR &amp; Melita VAMBERGER</b> Habitat Insights for the European Pond Turtle ( <i>Emys orbicularis</i> ) in the Coastal Wetland Area Sečovlje Salina Nature Park, Slovenia ..... 221 <i>Habitatne značilnosti močvirske sklednice (Emys orbicularis) v krajinskem parku Sečoveljske soline, Slovenija</i>
<b>Zeliha ERDOĞAN, Gülçin ULUNEHİR AYDIN, Hatice TORCU-KOÇ &amp; Tuğba ANBAROĞLU</b> Population Study of <i>Trachurus mediterraneus</i> Focused on Reproductive Biology in Edremit Bay, Northern Aegean Sea ..... 151 <i>Razmnoževalna biologija sredozemskega šura (Trachurus mediterraneus) v sklopu populacijske raziskave v Edremitnem zalivu (severno Egejsko morje)</i>	<b>Leon CIMERMAN &amp; Matija KRIŽNAR</b> Najdbe pleistocenske avifavne v kamnolomu Črni Kal (Primorska, Slovenija) ..... 243 <i>Pleistocene Avifauna Finds in the Črni Kal Quarry (Primorska Region, Slovenia)</i>
	Kazalo k slikam na ovitku ..... 255 <b>Index to images on the cover</b> ..... 255

## ADDITIONAL RECORDS OF THE BASTARD GRUNT, *POMADASYS INCISUS* (BOWDICH, 1825), FROM THE EASTERN ADRIATIC SEA

Pero UGARKOVIĆ  
Velebitska 24, 21000 Split, Croatia  
e-mail: lignja@gmail.com

Ilija ĆETKOVIĆ, Olivera MARKOVIĆ, Aleksandar JOKSIMOVIĆ & Nikola ĐORĐEVIĆ  
Institute of Marine Biology, University of Montenegro, Kotor, Montenegro

Jakov DULČIĆ  
Institute of Oceanography and Fisheries, Split, Croatia

### ABSTRACT

The bastard grunt, *Pomadasys incisus* (Bowdich, 1825), is a thermophilic coastal species that has historically been rare and only sporadically recorded in the northernmost Mediterranean sub-basins. Following the first confirmed Adriatic record in 2016, further observations have remained limited. The present study documents 11 individuals recorded between October 2023 and November 2025 from five localities in the eastern Adriatic. Records were obtained through validated citizen science contributions and were supported by photographic evidence. Most occurrences were concentrated between summer and autumn. This seasonal pattern, together with ongoing sea warming trends in the Adriatic, is consistent with the broader process of northward spreading of Mediterranean species.

**Key words:** Haemulidae, northward spreading, citizen science, range expansion

## ULTERIORI SEGNALAZIONI DEL GRUGNITORE BASTARDO *POMADASYS INCISUS* (BOWDICH, 1825) NELL'ADRIATICO ORIENTALE

### SINTESI

Il grugnitore bastardo, *Pomadasys incisus* (Bowdich, 1825), è una specie costiera termofila che storicamente è stata rara e segnalata solo sporadicamente nei sottobacini più settentrionali del Mediterraneo. Dopo la prima segnalazione confermata nell'Adriatico nel 2016, le successive osservazioni sono rimaste limitate. Il presente studio documenta 11 individui registrati tra ottobre 2023 e novembre 2025 in cinque località dell'Adriatico orientale. Le segnalazioni sono state ottenute tramite contributi validati di scienza partecipativa e supportate da prove fotografiche. La maggior parte delle osservazioni si è concentrata tra l'estate e l'autunno. Questo andamento stagionale, insieme ai continui trend di riscaldamento del mare Adriatico, è coerente con il più ampio processo di espansione verso nord delle specie mediterranee.

**Parole chiave:** Haemulidae, espansione verso nord, scienza partecipativa, espansione dell'areale

## INTRODUCTION

The bastard grunt, *Pomadasys incisus* (Bowdich, 1825), is a coastal thermophilic demersal species inhabiting marine and occasionally brackish environments, and typically occurring at depths between 10 and 100 m. It is most frequently associated with sandy or mixed substrates, but has also been recorded on rocky bottoms and in seagrass meadows (Kapiris et al., 2008; Bodilis et al., 2013). The genus *Pomadasys* Lacepède, 1802 (Haemulidae) is currently represented in the Mediterranean Sea by two species: *P. incisus* and *P. stridens* (Forsskål, 1775) (Froese & Pauly, 2025).

*P. incisus* is known to form relatively dense coastal aggregations and constitutes a characteristic component of shallow demersal fish assemblages (Pajuelo et al., 2003a). It is gonochoric and exhibits a relatively rapid growth rate and a moderately short

life span, with a maximum reported age generally reaching 7–8 years, depending on the study area (Pajuelo et al., 2003b; Chater et al., 2015).

The species was first documented in the Mediterranean Sea between 1840 and 1842, during surveys conducted along the Algerian coast (Guichenot, 1850, as reported in Bodilis et al., 2013). This record, interpreted as evidence of natural migration from the eastern Atlantic through the Strait of Gibraltar, was followed by subsequent observations along the southern Mediterranean coastline and later in northern sectors of the basin, suggesting a progressive expansion within the Mediterranean (Bodilis et al., 2013). In contrast, Doumpas et al. (2020) proposed that the species may have been historically present in certain areas of the Mediterranean but was overlooked or misidentified, implying that its apparent expansion could partly reflect increased sampling effort and improved taxonomic resolution rather than a recent biogeographical shift.



**Fig. 1:** Distribution of the bastard grunt (*P. incisus*) in the Adriatic Sea, including previous records (blue dots) and records from this study (red dots).

**Sl. 1.** Razširjenost neprave prašičevke (*P. incisus*) v Jadranskem morju, vključno s prejšnjimi zapisi o pojavljanju (modre pike) in najdbami iz te študije (rdeče pike).

*P. incisus* has low commercial value and is rarely targeted by fisheries. In the Canary Islands, it constitutes one of the most abundant coastal demersal species within artisanal multispecies fisheries, although it is largely discarded due to limited market demand (Pajuelo, 1997; Pajuelo *et al.*, 2003a). In Mediterranean waters, the species is regularly recorded in landings and fish markets; however, given its marginal economic importance, total catches remain poorly quantified (Chater *et al.*, 2015) and the attention the species has received from a fisheries management perspective is comparatively limited (Kapiris *et al.*, 2008).

Although *P. incisus* has been present in the Mediterranean Sea for over a century, its occurrence in the northernmost sectors of the basin is relatively recent and remains sporadic. The first confirmed record in the Adriatic Sea originated from the shallow coastal waters of the Pelješac Peninsula in southern Croatia (Karachle *et al.*, 2016), and was followed nearly a decade later by one from the Italian side of the Adriatic (Toma *et al.*, 2025).

The primary objective of the present study was to provide additional verified records of *P. incisus* from the Adriatic Sea and thereby contribute to a more precise understanding of its current distribution and occurrence dynamics within the basin.

## MATERIAL AND METHODS

Records of *P. incisus* from the Adriatic Sea were collected opportunistically between 2023 and 2025 through collaboration with professional and recreational fishers. Contributors contacted the authors directly by phone or via social media platforms, and follow-up communication was conducted to verify and supplement the information provided.

In 2025, following the first confirmed findings, a public announcement was published in the widely followed Facebook group “Živi svijet Jadranskog mora” (“The Living World of the Adriatic Sea”, active in Croatia and Montenegro and managed by some of the authors of this paper. The announcement, which was subsequently disseminated by national and regional media news portals, included a call for information regarding further observations or captures of *P. incisus* to stimulate additional data collection. Records including both visual observations and captures reported through citizen science channels but lacking verifiable photographic evidence, were excluded from the present study. For each confirmed record, the following data were compiled: date of capture or observation, locality, number of individuals, and fishing gear used.

Species identification was based primarily on photographic material provided by contributors. Diagnostic morphological characters were assessed against published taxonomic descriptions for Mediterranean individuals of *P. incisus*. Identification followed the

morphological criteria for the species provided by Bodilis *et al.* (2013): dorsum brownish, ventral side silvery, distinct dark blotch on upper corner of operculum; head relatively large; mouth small, slightly oblique; two distinct pores on tip of the chin. These features are consistent with earlier regional identification works for the Mediterranean ichthyofauna (e.g., Ben-Tuvia & McKay, 1986).

## RESULTS

During the study period, six confirmed occurrences of *P. incisus* were documented in the Adriatic Sea between October 2023 and November 2025, comprising a total of 11 individuals (Tab. 1). The recorded occurrences originated from five distinct localities, four in Montenegro (Bigova, Obala Đuraševića, Bijela, and Budva) and one in Croatia (Mljet Island). An overview of the distribution of all known records of *P. incisus* in the Adriatic Sea is presented in Fig. 1. Temporally, the records were concentrated in autumn (October–December), with a single exception in early summer (June 2024). No records were documented during winter or spring. Total length was not independently estimated from photographic material, as the study focused primarily on temporal frequency and spatial occurrence. In Fig. 2, the final panel shows a single individual, whereas Table 1 indicates two individuals for that record; the second specimen was not adequately photographed and was therefore not included in the figure. Notably, these records also represent the first confirmed occurrences of *P. incisus* in Montenegrin waters.

**Tab. 1: Additional confirmed records of the bastard grunt (*Pomadasys incisus*) from the eastern Adriatic Sea.**

**Tab. 1: Dodatne potvrjene najdbe neprave prašičevke (*Pomadasys incisus*) iz vzhodnega Jadranskega morja.**

Record number	Date	Number of individuals	Location	Coordinates
1	06.10.2023	1	Bigova (Montenegro)	42.359561° N, 18.691744° E
2	15.06.2024	1	Obala Đuraševića (Montenegro)	42.402984° N, 18.692258° E
3	04.12.2024	5	Bijela (Montenegro)	42.448171° N, 18.657222° E
4	28.09.2025	1	Mljet (Croatia)	42.756347° N, 17.402503° E
5	05.10.2025	1	Budva (Montenegro)	42.276986° N, 18.844875° E
6	13.11.2025	2	Bijela (Montenegro)	42.448171° N, 18.657222° E

## DISCUSSION

The new records of *P. incisus* presented in this study are consistent with the ongoing northward spreading of Mediterranean species affecting the Mediterranean Sea, including the Adriatic sub-basin, as has been widely documented over recent decades (Bianchi & Morri, 2003; Azzurro *et al.*, 2011; Bianchi *et al.*, 2019).

Although *P. incisus* has been present in the Mediterranean since at least the mid-19th century, its expansion towards northern sectors has historically been slow and spatially discontinuous. Despite its broad distribution, its presence in the northernmost sub-basins has remained patchy (Bodilis *et al.*, 2013).

The Ionian Sea represents the principal transitional corridor between the central Mediterranean and the Adriatic Sea and may facilitate northward dispersal. Historical records from the Greek Ionian are limited to a single specimen reported from Lefkada (Kaspiris, 1970). In contrast, more recent confirmed records from the Italian Ionian indicate a continued presence and gradual consolidation of *P. incisus* within that basin (Bilecenoğlu *et al.*, 2013; Tiralongo *et al.*, 2019; Tiralongo *et al.*, 2020).

The first confirmed record of *P. incisus* in the Adriatic Sea dates to 2016, when a single specimen was captured off the Pelješac Peninsula (southern Croatia) (Karachle *et al.*, 2016). No additional confirmed records were reported for several years thereafter. This apparent absence may have reflected either a true absence of the species from the area during that period or its occurrence at such low densities as to result in a limited detection probability.

The findings presented herein indicate a more recurrent presence in the southern Adriatic, suggesting an altered regional occurrence pattern. The recent record off Ancona, Italy (Toma *et al.*, 2025), further supports the interpretation of a northward extension within the Adriatic basin.

The northward expansion of this species in the Aegean Sea has already been documented. Fishermen in Gökova Bay (SE Aegean Sea) report that the populations have increased in recent years (Çoker & Akyol, 2021). In Cyprus, where *P. incisus* was formally documented only in 2020, it has been suggested that the species was likely present earlier but remained undetected due to local rarity (Doupas *et al.*, 2020). This interpretation was supported by previous studies indicating that high abundances of *P. incisus* are typically reached only in subtropical habitats and warmer environmental conditions (Pajuelo *et al.*, 2003a; Pajuelo *et al.*, 2003b; Fehri-Bedoui & Gharbi, 2008), which are not uniformly encountered across the eastern Mediterranean.

Available Ionian and Adriatic records predominantly correspond to summer and autumn months (e.g., Tiralongo *et al.*, 2020; Toma *et al.*, 2025). This seasonal pattern aligns with the broader framework described by Ben-Tuvia & McKay (1986) and discussed by Bodilis *et al.* (2013), whereby *P. incisus* occurs year-round in the warmest Mediterranean regions but appears in colder sectors mainly during thermally favourable periods. The concentration of Adriatic records between June and December therefore supports the interpretation of seasonal incursions into the northern basin.

Given the pronounced seasonal cooling and thus comparatively lower winter sea surface temperatures in the Adriatic, the hypothesis of a long-standing but overlooked resident population appears less plausible. Moreover, documented sea warming trends in the Adriatic (Grbec *et al.*, 2018; Terzić *et al.*, 2025) temporally coincide with the increasing number of records reported herein. This concordance is consistent with the broader process of northward spreading of thermophilic Mediterranean species into temperate sectors under ongoing climate warming.

Although the growing number of records suggests a wider regional presence, the available data remain insufficient to infer population size, structure, or long-term stability. The scarcity of verified *in situ* underwater observations further limits the assessment of establishment status and true abundance in the Adriatic. At present, the evidence supports recurrent seasonal presence rather than confirmed year-round persistence. However, the dataset remains limited in spatial and temporal resolution. Clarifying population dynamics will require systematic and temporally standardised monitoring.

The continued integration of structured, rigorously validated citizen science contributions, alongside improved communication among professional and recreational stakeholders, may enhance detection reliability while minimising misidentification. Such coordinated efforts will be essential for accurately assessing the temporal and spatial dynamics of *P. incisus* in the Adriatic Sea, where current evidence suggests that observed records may represent either episodic incursions or the early stages of regional persistence.

## CONCLUSIONS

The newly documented records confirm the repeated occurrence of *P. incisus* in the eastern Adriatic Sea. The temporal pattern of observations, concentrated mainly between summer and late autumn,



**Fig. 2:** Specimens of *P. incisus* recorded in the Adriatic Sea during the study period, arranged in chronological order from left to right and top to bottom. (Photos from top left to bottom right: S. Lazarević, M. Malović, S. Andričić, M. Orlandini, B. Vujović, A. Vodovar).  
**Sl. 2:** Primerki vrste *P. incisus*, zabeleženi v Jadranskem morju v obdobju študije, razvrščeni v kronološkem vrstnem redu od leve proti desni in od zgoraj navzdol. (Fotografije od zgoraj levo do spodaj desno: S. Lazarević, M. Malović, S. Andričić, M. Orlandini, B. Vujović, A. Vodovar).

suggests seasonal incursions rather than confirmed year-round persistence. These findings are consistent with the broader northward spreading of Mediterranean thermophilic species associated with ongoing sea warming. Continued monitoring and integration of validated citizen science observations will be essential in determining whether the species has established a stable population in the Adriatic Sea.

#### ACKNOWLEDGEMENTS

The authors thank all contributors who provided information and photographic documentation of *Pomadasys incisus* records. Special thanks are extended to S. Lazarević, M. Malović, S. Andričić, M. Orlandini, B. Vujović, and A. Vodovar for sharing verified observations that contributed to this study.

DODATNE NAJDBE NEPRAVE PRAŠIČEVKE, *POMADASYS INCISUS* (BOWDICH, 1825),  
IZ VZHODNEGA JADRANSKEGA MORJA

Pero UGARKOVIĆ  
Velebitska 24, 21000 Split, Croatia  
e-mail: lignja@gmail.com

Ilija ČETKOVIĆ, Olivera MARKOVIĆ, Aleksandar JOKSIMOVIĆ & Nikola ĐORĐEVIĆ  
Institute of Marine Biology, University of Montenegro, Kotor, Montenegro

Jakov DULČIĆ  
Institute of Oceanography and Fisheries, Split, Croatia

POVZETEK

Neprava prašičevka, *Pomadasys incisus* (Bowdich, 1825), je termofilna obalna vrsta, ki je bila zgodovinsko gledano redka in le sporadično zabeležena v najsevernejših podbazenih Sredozemskega morja. Po prvem zapisu o pojavljanju v Jadranskem morju leta 2016 so kasnejši podatki o najdbi te vrste še vedno redki. Pričujoča raziskava dokumentira 11 osebkov, zabeleženih med oktobrom 2023 in novembrom 2025 na petih lokalitetah v vzhodnem Jadranu. Podatki o najdbah so bili pridobljeni s prispevkom občanske znanosti in podprti s fotografskim gradivom. Večina podatkov o pojavljanju je bila zbrana med poletjem in jesenjo. Ta sezonski vzorec je skupaj s trendi ogrevanja Jadranskega morja skladen s širšim procesom tropikalizacije Sredozemskega morja.

**Ključne besede:** Haemulidae, tropikalizacija, občanska znanost, širjenje areala

## REFERENCES

- Azzurro, E., P. Moschella & F. Maynou (2011):** Tracking signals of change in Mediterranean fish diversity based on local ecological knowledge. *PLoS ONE*, 6(9), e24885.
- Ben-Tuvia, A. & R. McKay (1986):** Haemulidae. In: Whitehead P.J.P., Bauchot M.-L., Hureau J.-C., Nielsen J., Tortonese E. (eds.) *Fishes of the North-eastern Atlantic and the Mediterranean*. Vol. 2. UNESCO, Paris, pp. 858–864.
- Bianchi, C.N. & C. Morri (2003):** Global sea warming and “tropicalization” of the Mediterranean Sea: Biogeographic and ecological aspects. *Biogeographia*, 24, 319–327.
- Bianchi, C.N., A. Azzola, M. Bertolino, F. Betti, M. Bo, R. Cattaneo-Vietti & G. Bavestrello (2019):** Consequences of the marine climate and ecosystem shift of the 1980–90s on the Ligurian Sea biodiversity (NW Mediterranean). *The European Zoological Journal*, 86(1), 458–487.
- Bilecenoglu, M., J. Alfaya, E. Azzurro, R. Bal-dacconi, Y. Boyaci, V. Circosta, L. Compagno, F. Coppola, A. Deidun, H. Durgham, F. Durucan, D. Ergüden, F. Fernández-Álvarez, P. Gianguzza, G. Giglio, M. Gökoğlu, M. Gürlek, S. Ikhtiyar, H. Kabasakal, P. Karachle, S. Katsanevakis, D. Koutsogiannopoulos, E. Lanfranco, P. Micarelli, Y. Özvarol, L. Pena-Rivas, D. Poursanidis, J. Saliba, E. Sperone, D. Tibullo, F. Tiralongo, S. Tripepi, C. Turan, P. Vella, M. Yokeş & B. Zava (2013):** New Mediterranean marine biodiversity records (December 2013). *Mediterranean Marine Science*, 14(2), 463–480.
- Bodilis, P., F. Crocetta, J. Langeneck & P. Francour (2013)** The spread of an Atlantic fish species, *Pomadasys incisus* (Bowdich, 1825): (Osteichthyes: Haemulidae), within the Mediterranean Sea with new additional records from the French Mediterranean coast. *Italian Journal of Zoology* 80(2): 273–278.
- Chater, I., A. Romdhani, J.L. Dufour, K. Mahé, P. Francour & N. Chakroun-Marzouk (2015):** Otolith growth and age estimation of bastard grunt, *Pomadasys incisus* (Actinopterygii: Perciformes: Haemulidae), in the Gulf of Tunis (Central Mediterranean). *Acta Ichthyologica et Piscatoria*, 45(1), 57–64.
- Çoker, Y. & O. Akyol (2021):** On the Occurrence of *Pomadasys incisus* (Haemulidae) in the Turkish Aegean Sea (Eastern Mediterranean Sea). *Annales, Ser. Hist. Nat.*, 31 (1), 123–128.
- Doumpas, N., V. Tanduo, F. Crocetta, I. Giovos, J. Langeneck, F. Tiralongo & P. Kleitou (2020):** The bastard grunt *Pomadasys incisus* (Bowdich, 1825) (Teleostei: Haemulidae) in Cyprus (eastern Mediterranean Sea) – a late arrival or just a neglected species? *Biodiversity Data Journal*, 8: e58646.
- Fehri-Bedoui, R. & H. Gharbi (2008):** Sex-ratio, reproduction and feeding habits of *Pomadasys incisus* (Haemulidae) in the Gulf of Tunis (Tunisia). *Acta Adriatica*, 49(1), 5–19.
- Froese, R. & D. Pauly. eds (2025):** FishBase. World Wide Web electronic publication. www.fishbase.org, version (11/2025).
- Grbec, B., F. Matic, G. Beg Paklar, M. Morović, R. Popović & I. Vilibić (2018):** Long-term trends, variability and extremes of in situ sea surface temperature measured along the eastern Adriatic coast and its relationship to hemispheric processes. *Pure and Applied Geophysics*, 175(11), 4031–4046.
- Kapiris, K., E. Kallias & A. Conides (2008):** Preliminary biological data on *Pomadasys incisus* (Osteichthyes: Haemulidae) in the Aegean Sea, Greece. *Mediterranean Marine Science*, 9(2), 53–62.
- Karachle, P. K., A. Angelidis, G. Apostolopoulos, D. Ayas, M. Ballesteros, C. Bonnici, M. M. Brodersen, L. Castriota, N. Chalari, J. M. Cottalorda, F. Crocetta, A. Deidun, Ž. Đodo, A. Dogrammatzi, J. Dulčić, F. Fiorentino, O. Gönülal, J. G. Harmelin, G. Insacco, D. Izquierdo-Gómez, A. Izquierdo-Muñoz, A. Joksimović, S. Kavadas, M. E. Malaquias, E. Madrenas, D. Massi, P. Micarelli, D. Minchin, U. Önal, P. Ovalis, D. Poursanidis, A. Siapatis, E. Sperone, A. Spinelli, C. Stamouli, F. Tiralongo, S. Tunçer, D. Yaglioglu, B. Zava & A. Zenetos (2016):** New Mediterranean biodiversity records (March 2016). *Mediterranean Marine Science*, 17(1), 230–252.
- Kaspiris, P. (1970):** Presenza di *Pomadasys incisus* (Bowd.) nelle acque della Grecia (Pisces Perciformes). *Doriana*, 4(192), 1–3.
- Pajuelo, J.G. (1997):** La pesquería artesanal canaria de especies demersales: análisis y ensayo de dos modelos de evaluación. PhD Thesis, University of Las Palmas de Gran Canaria.
- Pajuelo, J.G., J.M. Lorenzo & M. Gregoire (2003a):** Age and growth of the bastard grunt (*Pomadasys incisus*: Haemulidae) inhabiting the Canarian archipelago, northwest Africa. *Fishery Bulletin*, 101(4), 851–859.
- Pajuelo, J.G., J.M. Lorenzo, M. Gregoire & R. Domínguez Seoane (2003b):** Life history of *Pomadasys incisus* (Osteichthyes, Haemulidae) in the Canarian archipelago. *Scientia Marina*, 67(2), 241–248.
- Terzić, E., V. Cardin, J. Le Meur, N. Dunić, M. Vodopivec, I. Vilibić (2025):** Unprecedented warming and salinization observed in the deep Adriatic. *Limnology and Oceanography Letters*, 10(6), 888–898.

**Tiralongo, F., A. O. Lillo, D. Tibullo, E. Tondo, C. Lo Martire, R. D'Agnesse, A. Macali, E. Mancini, I. Giovos, S. Coco & E. Azzurro (2019):** Monitoring uncommon and non-indigenous fishes in Italian waters: one year of results for the AlienFish project. *Regional Studies in Marine Science*, 28, 100606.

**Tiralongo, F., F. Crocetta, E. Riginella, A. O. Lillo, E. Tondo, A. Macali, E. Mancini, F. Russo, S. Coco, G. Paolillo, E. Azzurro (2020):** Snapshot of rare, exotic and overlooked fish species in the Italian seas: a citizen science survey. *Journal of Sea Research*, 164, 101930.

**Toma, M., D. Agius, E. Azzurro, M. Bo, F. Crocetta, İ. Dal, T. Delli Carri, M. C. Deval, L. Galli, A. Gkoulia, F. Grati, D. Kolokotronis, L. Lipej, C. Matthews, B. Mavrič, R. Mejri, J. Murcia, E. S. Okudan, V. Orenes-Salazar, J. P. Renoult, L. Pisani, J. Rizgalla, F. Russo, A. Salman, A. Soldo, V. Tanduo, F. Tiralongo, I. Tuney & A. Ünlüoğlu (2025):** New records of rarely reported species in the Mediterranean Sea (December 2025). *Mediterranean Marine Science*, 26(4), 972–994.