



Shore fishes of the Marquesas Islands, an updated checklist with new records and new percentage of endemic species

Erwan Delrieu-Trottin^{1,2*}, J. T. Williams³, Philippe Bacchet⁴, Michel Kulbicki⁵, Johann Mourier¹, René Galzin¹, Thierry Lison de Loma¹, Gérard Mou-Tham⁵, Gilles Siu¹ and Serge Planes¹

¹ Laboratoire d'Excellence "CORAIL", USR 3278 CNRS – EPHE – UPVD, Centre de Recherche Insulaire et Observatoire de l'Environnement (CRIOBE), Université de Perpignan, 58 Av. Paul Alduy – 66860 Perpignan cedex, France

² Institut de Systématique, Evolution, Biodiversité, ISYEB – UMR 7205 – MNHN, CNRS, UPMC, EPHE; École Pratique des Hautes Études, 57 rue Cuvier, CP39; F-75005, Paris, France

³ Division of Fishes, Department of Vertebrate Zoology, National Museum of Natural History, 4210 Silver Hill Road, Suitland, MD 20746, USA

⁴ BP 2720 Papeete, Tahiti, PF

⁵ IRD – UR 227 CoReUs, LABEX "CORAIL", UPVD, 66000 Perpignan, France

* Corresponding author: E-mail: erwan.delrieu.trottin@gmail.com

Abstract: Expedition Pakaihi I Te Moana was conducted in 2011 to the Marquesas Islands, lying between 07°50' S and 10°35' S latitude and 138°25' W and 140°50' W longitude. The expedition combined extensive collections and visual censuses of the shore fish fauna. A total of 74 species are added as new records for the Marquesas Islands; the coastal fish fauna of the Marquesas Islands is increased from 415 to 495 species and the number of endemic species is increased from 48 to 68 species. This increases the percentage of species-level endemism for the Marquesas Islands to 13.7%, ranking as the third highest region of endemism for coral reef fishes in the Indo-Pacific. Only two other peripheral regions, the Hawai'iian Islands and Easter Island, have higher values.

Key words: Coral reef fishes; endemism; tropical reefs; species distribution; biodiversity, hotspot.

INTRODUCTION

Tropical reefs represent a high priority for conservation action among marine ecosystems (Roberts et al. 2002). They are known to host some of the most diverse communities in the world with nearly 6,500 species of coral reef fishes (Kulbicki et al. 2013), a diversity that reaches its maximum in the Indo-Malay-Philippine archipelago (Bellwood and Hughes 2001; Roberts et al. 2002; Mora et al. 2003; Reaka et al. 2008; Bellwood and Meyer 2009; Hubert et al. 2012), while peripheral areas of the Indo-Pacific basin host high percentages of endemism. Percentages of endemism change as our knowledge of the reef fish fauna improves and may also vary according to the sizes of the regions

considered. The highest percentages of endemism for reef fish in the Indo-Pacific are: 1) Hawai'i with 25% endemism according to Randall (2007); 2) Easter Island with 21.7% (Randall and Cea 2011); 3) Red Sea third with 13.6% (Eschmeyer et al. 2010).

The census of biodiversity constitutes the primary basis for conservation efforts and the establishment of protection measures, as indicated for instance by IUCN red lists. Endemism is often perceived as an important characteristic in species conservation (e.g., Parravicini et al. 2014). Although extensive databases for coral reef fishes are being developed with more accurate taxonomy and geographical distributions (e.g., Randall 2005, 2007; Randall and Cea 2011; Kulbicki et al. 2013), our knowledge of the reef fish fauna still has major gaps due to the isolation of some remote regions or the technical difficulty of studying the reef fish fauna in certain regions of the world. The Marquesas Islands are a prime example. Located in Northeastern French Polynesia between 07°50' S and 10°35' S latitude and 138°25' W and 140°50' W longitude, they are geographically isolated. To the east, the closest islands are the Galapagos (5 300 km), to the north-west they are 2,200 km from the Line Islands and 3,500 km from Hawai'i. The closest island is in the Tuamotu archipelago some 500 km away. The South Equatorial Current, flowing between 04° N and 17° S from east to west (Wyrki and Kilonsky 1984; Bonjean and Lagerloef 2002; Gaither et al. 2010), seems to constitute a hydrographical barrier to dispersal leading to the genetic differentiation of some Marquesan populations of otherwise widespread species (Planes and Fauvelot 2002; Winters et al. 2010;

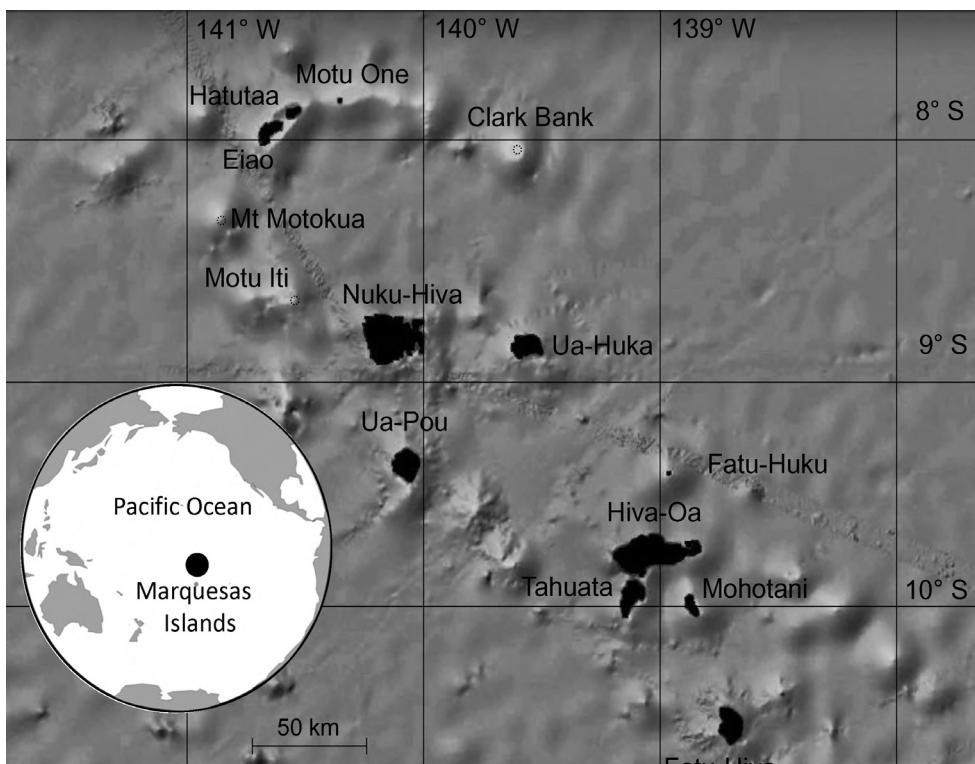


Figure 1. Map of the Marquesas Islands showing the different islands sampled.

Gaither et al. 2010). In addition to the isolation of the Marquesas, their environmental conditions are unique compared to the remainder of French Polynesia. The high islands are not surrounded by lagoons, and coral cover is minimal compared with other parts of French Polynesia. Sea temperatures are unusually variable (26–30°C) for a locality this close to the equator (Randall and Earle 2000) and upwelling of cold enriched waters leads to a general low coral cover and major production of phyto- and zooplankton (Martinez and Maamaatuaiahutapu 2004). All these features give to the archipelago its uniqueness not only within the French Polynesian landscape, but also among Pacific tropical reefs. Selection processes in such a contrasting environment have already been highlighted as a driver of speciation for a Marquesan endemic reef fish species (Gaither et al. 2015).

In 2000, Randall and Earle identified the archipelago as a major hotspot of endemism with 11.6% endemic fish species (Randall and Earle 2000) with only a relatively small portion of the islands having been explored. The present work is based on a compilation of all previous fish records in addition to a preliminary reef fish survey on one island (Mohotani) in 2008 and to the first reef fish survey, which explored all islands of the archipelago in 2011 (expedition Pakai I Te Moana – Nov. 2011).

MATERIALS AND METHODS

Sampling was carried out in 2008 in Mohotani and in 2011 for the first time at every island in the Marquesas (Clark Bank, Motu One, Hatutaa, Eiao,

Motu Iti, Nuku-Hiva, Ua-Huka, Ua-Pou, Fatu-Huku, Hiva-Oa, Tahuata, Fatu-Hiva; Figure 1) during a three-week expedition in 2011, aboard the M.V. Braveheart. A diversity of habitats was explored with shallow and deep air dives (down to 50–55 m) for a total of 54 sampled sites. Extensive collections and visual censuses were combined to establish the species composition of shore fishes of the Marquesas Islands. The complementarity of these sampling methods (Williams et al. 2006) allowed us to target different components of the ichthyofauna. Rotenone (powdered root of the Derris plant) allowed us to sample the cryptic and small fish fauna while spear guns and visual censuses allowed us to sample and record larger specimens of species not susceptible to rotenone collecting.

Fishes were identified using identification keys and taxonomic references (Randall 2005; Bacchet et al. 2006) and representative specimens of all species collected were photographed while they had their fresh coloration, sampled for tissues, labeled, and preserved as voucher specimens for the sequences made for a COI Barcode library. Voucher specimens were preserved in 10% formalin (3.7% formaldehyde solution) and later transferred into 75% ethanol. Preserved specimens were cataloged into the fish collection at the Museum Support Center, National Museum of Natural History, Smithsonian Institution, Suitland, Maryland, USA. Underwater visual censuses and underwater photographs allowed us to complete the list of new records. Nomenclature follows Randall (2005) and we followed recent taxonomic changes tracked using the

Catalog of Fishes (<http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>, accessed in August 2015). Undescribed new species are listed as sp.

RESULTS

A total of 495 shore fish species in 72 families is reported from Marquesan waters (Table 1) with 74 species reported as new geographic records for the archipelago. Muraenidae (42 species), Labridae (36), Gobiidae (33), Acanthuridae (26) and Serranidae (22) constitute the 5 most speciose families. Among the 495 species, 68 are reported as endemic to the Marquesas Islands, raising the percentage of endemism for the Marquesas Islands to 13.7%. Randall and Earle (2000) recorded numerous species as undescribed species (sp.) and potentially endemic; 16 of them have since been described and are endemic: *Ariosoma multivertebratum* Karmovskaya 2004, *Scorpaenopsis pusilla* Randall & Eschmeyer, 2001, *Pseudanthias hiva* Randall & Pyle, 2001, *Apogon lativittatus* Randall, 2001, *Apogon marquesensis* Greenfield, 2001, *Ostorhinchus relativus* (Randall, 2001), *Ostorhinchus sinus* (Randall, 2001), *Pseudamiops phasma* Randall, 2001, *Chromis abrupta* Randall, 2001, *Chromis fatuhivae* Randall, 2001, *Chromis flavapicis* Randall, 2001, *Iniistius auropunctatus* Randall, Earle & Robertson 2002, *Amblyeleotris marquesas* Mohlmann & Randall, 2002, *Trimma woutsi* Winterbottom, 2002, *Engyprosopon marquisensis* Amaoka & Séret 2005, *Aseraggodes lateralis* Randall, 2005. *Stegastes lividus* (Forster 1801) was included in Randall and Earle (2002) checklist as *Stegastes* sp., but Randall (2004) determined that this endemic species was actually the *Stegastes* species described by Forster in Bloch and Schneider (1801) as *Chaetodon lividus*. *Myripristis earlei* Randall, Allen & Robertson, 2003 and *Yirrkala moorei* McCosker, 2006 have also since been described but are not restricted to the Marquesas Islands. In the same manner, six undescribed species collected during the oceanographic campaign have since been described and are endemic to the Marquesas Islands: *Eviota dorsimaculata* Tornabene, Ahmadi & Williams, 2013, *Eviota lacrimosa* Tornabene, Ahmadi & Williams, 2013, *Eviota deminuta* Tornabene, Ahmadi & Williams, 2013, *Pseudanthias oumati* Williams, Delrieu-Trottin & Planes, 2013, *Plectranthias flammeus* Williams, Delrieu-Trottin & Planes, 2013, *Apterichtus mys* McCosker & Hibino, 2015.

Nine species were reported by Randall and Earle (2000) as undescribed endemic species and still remain to be described (*Kaupichthys* sp., *Gorgasia* sp., *Gymnapogon* sp., *Pseudamia* sp., *Trachinotus* sp., *Callogobius* sp., *Priolepis* sp., *Trimma* sp., *Arnoglossus* sp.). Our collection yielded additional specimens for some of them, but also led to the discovery of eight additional undescribed new endemic species: *Moringua* sp., *Anarchias* sp.,

Gymnothorax sp., *Apterichtus* sp., *Gnathophis* sp., *Pseudogramma* sp., *Pempheris* sp., *Trimmatom* sp.

Seven species were mentioned in Randall and Earle (2000) as described species or potentially subspecies and they represent new species endemic to the Marquesas: 1 - *Trachinocephalus* sp. reported as *Trachinocephalus myops*, is currently being described by Polenco et al.; 2 - *Macropharyngodon pakoko* Delrieu-Trottin, Williams & Planes, 2014 was originally reported as an unusual looking *Macropharyngodon meleagris* (Valenciennes, 1839); 3 - *Blenniella* sp. reported as *Blenniella gibbifrons* (Quoy & Gaimard, 1824) is under study by Delrieu-Trottin, Williams and Planes; 4 - *Istiblennius* sp. reported as *Istiblennius edentulus* is under study by J.T Williams; 5 - *Pseudogramma* sp. reported as *Pseudogramma polyacantha* (Bleeker, 1856); 6 - *Cymolutes* sp. reported as *Cymolutes torquatus* with distinct color pattern for the Marquesan populations; 7 - *Cantherhines nukuhiva* Randall, 2011 reported in Randall and Earle (2000) as *Cantherhines pardalis* (Rüppell, 1837).

Due to recent taxonomic updates and revisions of several families, several species and records reported in Randall and Earle (2000) are here reported differently in this checklist: we report *Aetobatus ocellatus* (Kuhl, 1823) instead of *A. narinari* (Euphrasen, 1790) that is now restricted to the Atlantic. We report *Albula argentea* (Forster, 1801) instead of *A. forsteri* (Valenciennes, 1846), which is now a synonym. *Kyphosus oxyurus* (Jordan & Gilbert, 1882) was recorded as *Sectator oxyurus* (Jordan & Gilbert, 1882), which was transferred to *Kyphosus* (Knudsen and Clements 2013). *Centropyge fisheri* (Snyder, 1904) was reported as *C. flavicauda* Fraser-Brunner, 1933, which is a synonym. *Bodianus busellatus* Gomon, 2006 replaces *B. bilunulatus* (Lacepède, 1802) in the Marquesas (Gomon 2006). *Halichoeres claudia* Randall & Rocha, 2009 was formerly reported as *H. ornatissimus* (Garrett, 1863) which is now restricted to Hawaii (Randall and Rocha 2009). *Chlorururus spilurus* (Forsskål, 1775) was previously reported as *C. sordidus* (Forsskål 1775). The Pacific populations previously reported as *C. sordidus* belong to the distinct species *C. spilurus* (Randall 2007; Choat et al. 2012). Randall and Myers (2002) found that the Pacific goatfish populations previously reported as *Parupeneus bifasciatus* (Lacepède, 1801) were an undescribed species that they named *P. insularis* Randall & Myers, 2002. We therefore report *P. insularis* instead of *P. bifasciatus*. *Rhabdoblennius rhabdotrachelus* (Fowler & Ball, 1924) was reported as *R. ellipes* (Jordan & Starks, 1906), which is considered now as a synonym. *Fusigobius duospilus* Hoese & Reader, 1985 were previously reported as *Coryphopterus duospilus* (Hoese & Reader, 1985). *Acanthurus nigrofasciatus* Valenciennes, 1835 was reported as *Acanthurus nigrofasciatus* Valenciennes, 1835. *Acanthurus nigrofasciatus* is now restricted to Hawaii (DiBattista et al. 2011; Randall et al. 2011). *Acanthurus*

Table 1. Checklist of the Marquesan shorefish fauna. New records based on captured specimens are designated by an asterisk (*), new records based on underwater visual census are designated by a superscript (1) while records based on the Catalog of Fishes are designated by a superscript (2). Records not counted in total number of species are designated by a superscript (3). Figure numbers in bold refer to photographs in this paper.

Family or Species	Distribution	Family or Species	Distribution
Carcharhinidae		Gymnothorax	
<i>Carcharhinus albimarginatus</i> (Rüppell, 1837)	Non-Endemic	<i>javanicus</i> (Bleeker, 1859)	Non-Endemic
<i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856)	Non-Endemic	<i>margaritophorus</i> Bleeker, 1864	Non-Endemic
¹ <i>Carcharhinus falciformis</i> (Müller & Henle, 1839)	Non-Endemic	<i>melatremus</i> Schultz, 1953	Non-Endemic
<i>Carcharhinus limbatus</i> (Müller & Henle, 1839)	Non-Endemic	<i>meleagris</i> (Shaw, 1795)	Non-Endemic
<i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 1824)	Non-Endemic	<i>monostigma</i> (Regan, 1909)	Non-Endemic
<i>Galeocerdo cuvier</i> (Péron & Lesueur, 1822)	Non-Endemic	<i>pictus</i> (Ahl, 1789)	Non-Endemic
¹ <i>Negaprion acutidens</i> (Rüppell, 1837)	Non-Endemic	<i>prismodon</i> Böhlke & Randall, 2000	Non-Endemic
<i>Triaenodon obesus</i> (Rüppell, 1837)	Non-Endemic	<i>reevesii</i> (Richardson, 1845)	Non-Endemic
Ginglymostomatidae		<i>rueppelliae</i> (McClelland, 1844)	Non-Endemic
<i>Nebris ferrugineus</i> (Lesson, 1831)	Non-Endemic	* <i>Gymnothorax shaoi</i> Chen & Loh, 2007 [USNM 409357, USNM 409689]	Non-Endemic
Sphyriidae		* <i>Gymnothorax</i> sp. [USNM 409505]	Endemic
<i>Sphyra lewini</i> (Griffith & Smith, 1834)	Non-Endemic	<i>thyroideus</i> (Richardson, 1845)	Non-Endemic
¹ <i>Sphyra mokarran</i> (Rüppell, 1837)	Non-Endemic	<i>zonipectis</i> Seale, 1906	Non-Endemic
Dasyatidae		<i>Scuticaria tigrina</i> (Lesson, 1829)	Non-Endemic
<i>Himantura fai</i> Jordan & Seale, 1906	Non-Endemic	<i>Uropterygius alboguttatus</i> Smith, 1962	Non-Endemic
<i>Taenirops meyeni</i> (Müller & Henle, 1841)	Non-Endemic	<i>Uropterygius concolor</i> (Rüppell, 1837)	Non-Endemic
Myliobatidae		<i>Uropterygius fuscoguttatus</i> Schultz, 1953	Non-Endemic
<i>Aetobatus ocellatus</i> (Kuhl 1823)	Non-Endemic	<i>Uropterygius macrocephalus</i> (Bleeker, 1865)	Non-Endemic
Mobulidae		<i>Uropterygius marmoratus</i> (Lacepède, 1803)	Non-Endemic
¹ <i>Manta alfredi</i> (Krefft, 1868)	Non-Endemic	Congridae	
<i>Manta birostris</i> (Walbaum 1792)	Non-Endemic	<i>Ariosoma multivertebratum</i> Karmovskaya, 2004	Endemic
Megalopidae		<i>Conger cinereus</i> cinereus Rüppell, 1828	Non-Endemic
<i>Megalops cyprinoides</i> (Broussonet, 1752)	Non-Endemic	* <i>Gnathophis</i> sp. [USNM 409314, USNM 409315, USNM 409316]	Endemic
Albulidae		* <i>Gorgasia galzini</i> Castle & Randall, 1999 [USNM 409324, USNM 409325, USNM 397394, USNM 405348, USNM 397096, USNM 397393, USNM 409711]	Non-Endemic
<i>Albula argentea</i> (Forster, 1801)	Non-Endemic	<i>Gorgasia</i> sp.	Endemic
<i>Albula glossodonta</i> (Forsskål, 1775)	Non-Endemic	<i>Heteroconger lentiginosus</i> Böhlke & Randall, 1981	Non-Endemic
Chanidae		Ophichthidae	
<i>Chanos chanos</i> (Forsskål, 1775)	Non-Endemic	<i>Apterichtus moseri</i> (Jordan & Snyder, 1901)	Non-Endemic
Moringidae		<i>Apterichtus mys</i> McCosker & Hibino, 2015	Endemic
<i>Moringua ferruginea</i> Bliss, 1883	Non-Endemic	* <i>Apterichtus</i> sp. [USNM 409323]	Endemic
<i>Moringua javanica</i> (Kaup, 1856)	Non-Endemic	<i>Brachysomophis crocodilinus</i> (Bennett, 1831)	Non-Endemic
* <i>Moringua</i> sp. [USNM 397080, USNM 408504, USNM 408709, USNM 408722, USNM 409523, USNM 409677]	Endemic	* <i>Callechelys marmorata</i> (Bleeker, 1854) [USNM 409326, USNM 409713]	Non-Endemic
Chlopsidae		<i>Callechelys randalli</i> McCosker, 1998	Endemic
<i>Kaupichthys</i> sp.	Endemic	<i>Cirrhimuraena playfairii</i> (Günther, 1870)	Non-Endemic
<i>Kaupichthys diodontus</i> Schultz, 1943	Non-Endemic	<i>Ichthyapus vulturis</i> (Weber & de Beaufort, 1916)	Non-Endemic
Muraenidae		<i>Lamnostoma orientalis</i> (McClelland, 1844)	Non-Endemic
<i>Anarchias leucurus</i> (Snyder, 1904)	Non-Endemic	<i>Leiuranus semicinctus</i> (Lay & Bennett, 1839)	Non-Endemic
<i>Anarchias seychellensis</i> Smith, 1962	Non-Endemic	¹ <i>Myrichthys colubrinus</i> (Boddaert 1781)	Non-Endemic
* <i>Anarchias</i> sp. [USNM 408488]	Endemic	<i>Myrichthys maculosus</i> (Cuvier, 1816)	Non-Endemic
<i>Echidna leucotaenia</i> (Schultz, 1943)	Non-Endemic	<i>Phaenomonas cooperae</i> Palmer, 1970	Non-Endemic
<i>Echidna nebulosa</i> (Ahl, 1789)	Non-Endemic	<i>Phyllolichthys xenodontus</i> Gosline, 1951	Non-Endemic
<i>Echidna polyzona</i> (Richardson, 1844)	Non-Endemic	<i>Schultzia johnstonensis</i> (Schultz & Woods, 1949)	Non-Endemic
<i>Echidna unicolor</i> Schultz, 1953	Non-Endemic	* <i>Myrophis microchir</i> (Bleeker 1864) [USNM 409322, USNM 409715]	Non-Endemic
<i>Enchelycore bayeri</i> (Schultz, 1953)	Non-Endemic	<i>Xestochilus nebulosus</i> (Smith, 1962)	Non-Endemic
<i>Enchelycore bikiniensis</i> (Schultz, 1953)	Non-Endemic	<i>Yirrkala moorei</i> McCosker, 2006	Non-Endemic
<i>Enchelycore pardalis</i> (Temminck & Schlegel, 1846)	Non-Endemic	Clupeidae	
<i>Enchelycore schismatorhynchus</i> (Bleeker, 1853)	Non-Endemic	<i>Sardinella marquesensis</i> Berry & Whitehead, 1968	Endemic
<i>Enchelycore canina</i> (Quoy & Gaimard, 1824)	Non-Endemic	Synodontidae	
<i>Gymnomuraena zebra</i> (Shaw, 1797)	Non-Endemic	<i>Saurida gracilis</i> (Quoy & Gaimard, 1824)	Non-Endemic
<i>Gymnothorax breedeni</i> McCosker & Randall, 1977	Non-Endemic	* <i>Saurida nebulosa</i> Valenciennes, 1850 [USNM 409129, USNM 411412]	Non-Endemic
<i>Gymnothorax buroensis</i> (Bleeker, 1857)	Non-Endemic	* <i>Synodus binotatus</i> Schultz, 1953 [USNM 409126, USNM 409321, USNM 411375, USNM 412475, USNM 411376]	Non-Endemic
* <i>Gymnothorax eurostus</i> (Abbott, 1860)	Non-Endemic	<i>Synodus jaculum</i> Russell & Cressey, 1978	Non-Endemic
<i>Gymnothorax fimbriatus</i> (Bennett, 1832)	Non-Endemic		
<i>Gymnothorax flavimarginatus</i> (Rüppell, 1830)	Non-Endemic		
* <i>Gymnothorax formosus</i> Bleeker, 1864 [USNM 409651]	Non-Endemic		
* <i>Gymnothorax fuscomaculatus</i> (Schultz, 1953) [USNM 408496]	Non-Endemic		
<i>Gymnothorax gracilicauda</i> Jenkins, 1903	Non-Endemic		

Continued

Table 1. Continued.

Family or Species	Distribution	Family or Species	Distribution
<i>Synodus variegatus</i> (Lacepède, 1803)	Non-Endemic	' <i>Scorpaenodes hirsutus</i> (Smith, 1957)	Non-Endemic
<i>Trachinocephalus</i> sp.	Endemic	<i>Scorpaenodes kelloggi</i> (Jenkins, 1903)	Non-Endemic
Antennariidae		<i>Scorpaenodes littoralis</i> (Tanaka, 1917)	Non-Endemic
<i>Antennarius coccineus</i> (Lesson, 1831)	Non-Endemic	<i>Scorpaenodes parvipinnis</i> (Garrett, 1863)	Non-Endemic
* <i>Antennarius nummifer</i> (Cuvier 1817) [USNM 409022, USNM 409252, USNM 409498, USNM 412034]	Non-Endemic	*' <i>Scorpaenodes quadrispinosus</i> Greenfield & Matsuura, 2002 [USNM 409127, 409335, USNM 412001, USNM 411005, USNM 412003, USNM 412004, USNM 411006, USNM 411008, USNM 412007, USNM 411011, USNM 411012, USNM 412450, USNM 412454]	Non-Endemic
* <i>Antennarius striatus</i> (Shaw 1794) [USNM 399893, USNM 409507]	Non-Endemic	<i>Scorpaenopsis diabolus</i> (Cuvier, 1829)	Non-Endemic
* <i>Antennatus tuberosus</i> (Cuvier, 1817) [USNM 420988]	Non-Endemic	<i>Scorpaenopsis macrochir</i> Ogilby, 1910	Non-Endemic
Ophidiidae		*' <i>Scorpaenopsis possi</i> Randall & Eschmeyer, 2001 [USNM 409048, USNM 409333, USNM 409334, USNM 404814, USNM 411018, USNM 411022, USNM 411023, USNM 411024, USNM 411025, USNM 411026, USNM 411036, USNM 411037, USNM 411038, USNM 412060, USNM 411432, USNM 411433, USNM 411434]	Non-Endemic
<i>Brotula multibarbata</i> Temminck & Schlegel, 1846	Non-Endemic	<i>Scorpaenopsis pusilla</i> Randall & Eschmeyer, 2001	Endemic
* <i>Ophidiidae</i> sp. [USNM 409219, USNM 409220, USNM 409285, USNM 409320]	Endemic	*' <i>Scorpaenopsis vittapinna</i> Randall & Eschmeyer, 2001 [USNM 409124]	Non-Endemic
<i>Ophidion exul</i> Robins, 1991	Non-Endemic	<i>Sebastapistes galactacma</i> Jenkins, 1903	Non-Endemic
Carapidae		<i>Sebastapistes mauritiana</i> (Cuvier, 1829)	Non-Endemic
<i>Carapus mourlani</i> (Petit, 1934)	Non-Endemic	*' <i>Sebastapistes strongia</i> (Cuvier 1829) [USNM 409328, USNM 411044, USNM 412458, USNM 412459]	Non-Endemic
<i>Onuxodon fowleri</i> (Smith, 1955)	Non-Endemic	<i>Sebastapistes tinkhami</i> (Fowler, 1946)	Non-Endemic
Belonidae		<i>Taenianotus triacanthus</i> Lacepède, 1802	Non-Endemic
<i>Platybelone argalus platyura</i> (Bennett, 1832)	Non-Endemic	Platycephalidae	
<i>Tylosurus acus melanotus</i> (Bleeker, 1850)	Non-Endemic	<i>Eurycephalus otaitensis</i> (Cuvier, 1829)	Non-Endemic
<i>Tylosurus crocodilus crocodilus</i> (Peron & Lesueur, 1821)	Non-Endemic	<i>Thysanophrys chiltonae</i> (Schultz, 1953)	Non-Endemic
Hemiramphidae		Caracanthidae	
<i>Hemiramphus depauperatus</i> Lay & Bennett, 1839	Non-Endemic	<i>Caracanthus maculatus</i> (Gray, 1831)	Non-Endemic
<i>Hyporhamphus acutus acutus</i> (Günther, 1872)	Non-Endemic	Dactylopteridae	
Holocentridae		<i>Dactyloptena orientalis</i> (Cuvier, 1829)	Non-Endemic
³ <i>Myripristis cf. botche</i> Figure 2	Non-Endemic	Pegasidae	
¹ <i>Myripristis chryseres</i> Jordan & Evermann, 1903	Non-Endemic	<i>Eurypegasus draconis</i> (Linnaeus, 1766)	Non-Endemic
<i>Myripristis berndti</i> Jordan & Evermann, 1903	Non-Endemic	Serranidae	
<i>Myripristis earlei</i> Randall, Allen & Robertson, 2003	Non-Endemic	<i>Aporops bilinearis</i> Schultz, 1943	Non-Endemic
<i>Myripristis kuntee</i> Valenciennes, 1831	Non-Endemic	<i>Cephalopholis argus</i> Bloch & Schneider, 1801	Non-Endemic
<i>Myripristis pralinia</i> Cuvier, 1829	Non-Endemic	<i>Cephalopholis sexmaculata</i> (Rüppell, 1830)	Non-Endemic
¹ <i>Myripristis violacea</i> Bleeker, 1851	Non-Endemic	*' <i>Cephalopholis piloparaea</i> (Valenciennes, 1828) [USNM 409360]	Non-Endemic
<i>Myripristis vittata</i> Valenciennes, 1831	Non-Endemic	<i>Cephalopholis urodetata</i> (Bloch & Schneider, 1801)	Non-Endemic
<i>Myripristis woodsi</i> Greenfield, 1974	Non-Endemic	<i>Epinephelus fasciatus</i> (Forsskål, 1775)	Non-Endemic
<i>Neoniphon argenteus</i> (Valenciennes, 1831)	Non-Endemic	<i>Epinephelus hexagonatus</i> (Bloch & Schneider, 1801)	Non-Endemic
<i>Neoniphon aurolineatus</i> (Liénard, 1839)	Non-Endemic	<i>Epinephelus irroratus</i> (Forster, 1801) Figure 3	Endemic
<i>Neoniphon sammara</i> (Forsskål, 1775)	Non-Endemic	<i>Epinephelus lanceolatus</i> (Bloch, 1790)	Non-Endemic
<i>Plectrypops lima</i> (Valenciennes, 1831)	Non-Endemic	<i>Epinephelus macrostomus</i> (Bleeker, 1855)	Non-Endemic
<i>Sargocentron caudimaculatum</i> (Rüppell, 1838)	Non-Endemic	<i>Epinephelus octofasciatus</i> Griffin, 1926	Non-Endemic
<i>Sargocentron diadema</i> (Lacepède, 1802)	Non-Endemic	<i>Epinephelus polyphekadion</i> (Bleeker, 1849)	Non-Endemic
<i>Sargocentron ittodai</i> (Jordan & Fowler, 1903)	Non-Endemic	<i>Epinephelus tauvina</i> (Forsskål, 1775)	Non-Endemic
<i>Sargocentron punctatissimum</i> (Cuvier, 1829)	Non-Endemic	<i>Grammistes sexlineatus</i> (Thunberg, 1792)	Non-Endemic
<i>Sargocentron spiniferum</i> (Forsskål, 1775)	Non-Endemic	<i>Plectranthias flammeus</i> Williams, Delrieu-Trottin & Planes, 2013	Endemic
<i>Sargocentron tiere</i> (Cuvier, 1829)	Non-Endemic	<i>Plectranthias nanus</i> Randall, 1980	Non-Endemic
Aulostomidae		<i>Pogonoperca punctata</i> (Valenciennes, 1830)	Non-Endemic
<i>Aulostomus chinensis</i> (Linnaeus, 1766)	Non-Endemic	<i>Pseudanthias hiva</i> Randall & Pyle, 2001	Endemic
Fistulariidae		<i>Pseudanthias oumati</i> Williams, Delrieu-Trottin & Planes, 2013	Endemic
<i>Fistularia commersonii</i> Rüppell, 1838	Non-Endemic	<i>Pseudanthias regalis</i> (Randall & Lubbock, 1981)	Endemic
Syngnathidae		<i>Pseudogramma</i> sp.	Endemic
<i>Doryrhamphus excisus</i> Kaup, 1856	Non-Endemic	<i>Variola louti</i> (Forsskål, 1775)	Non-Endemic
<i>Halicampus marquesensis</i> Dawson, 1984	Non-Endemic	Kuhliidae	
<i>Coelonotus argulus</i> (Peters, 1855)	Non-Endemic	<i>Kuhlia petitii</i> Schultz, 1943	Non-Endemic
Scorpaenidae		Priacanthidae	
<i>Iracundus signifer</i> Jordan & Evermann, 1903	Non-Endemic	<i>Heteropriacanthus cruentatus</i> (Lacepède, 1801)	Non-Endemic
* <i>Parascorpaena macadamsi</i> (Fowler, 1938) [USNM 409431, USNM 407976, USNM 404811, USNM 411000, USNM 412061, USNM 412492, USNM 412493, USNM 411525]	Non-Endemic		
* <i>Parascorpaena mossambica</i> (Peters, 1855) [USNM 409123, USNM 412000, USNM 411010, USNM 411013, USNM 412494]	Non-Endemic		
<i>Pterois antennata</i> (Bloch, 1787)	Non-Endemic		
<i>Pterois volitans</i> (Linnaeus, 1758)	Non-Endemic		
<i>Scorpaenodes guamensis</i> (Quoy & Gaimard, 1824)	Non-Endemic		

Continued

Table 1. Continued.

Family or Species	Distribution	Family or Species	Distribution
<i>Priacanthus hamrur</i> (Forsskål, 1775)	Non-Endemic	<i>Lutjanus fulvus</i> (Forster in Bloch & Schneider, 1801)	Non-Endemic
Cirrhitidae		<i>Lutjanus gibbus</i> (Forsskål, 1775)	Non-Endemic
<i>Cirrhitoichthys oxycephalus</i> (Bleeker, 1855)	Non-Endemic	<i>Lutjanus kasmira</i> (Forsskål, 1775)	Non-Endemic
<i>Cirrhitus pinnulatus</i> (Forster in Bloch & Schneider, 1801)	Non-Endemic	<i>Lutjanus monostigma</i> (Cuvier, 1828)	Non-Endemic
<i>Cyprinocirrhites polyactis</i> (Bleeker, 1875)	Non-Endemic	<i>Paracaesio sordida</i> Abe & Shinohara, 1962	Non-Endemic
¹ <i>Oxycirrhites typus</i> Bleeker, 1857	Non-Endemic	<i>Pristipomoides zonatus</i> (Valenciennes, 1830)	Non-Endemic
<i>Paracirrhites forsteri</i> (Bloch & Schneider, 1801)	Non-Endemic	Cæsionidae	
<i>Paracirrhites hemistictus</i> (Günther, 1874)	Non-Endemic	<i>Pterocaesio marri</i> Schultz, 1953	Non-Endemic
<i>Paracirrhites xanthus</i> Randall, 1963	Non-Endemic	<i>Pterocaesio tile</i> (Cuvier, 1830)	Non-Endemic
Apogonidae		Lethrinidae	
<i>Apogon caudicinctus</i> Randall & Smith, 1988	Non-Endemic	<i>Gnathodentex aureolineatus</i> (Lacepède, 1802)	Non-Endemic
<i>Apogon lativittatus</i> Randall, 2001	Non-Endemic	<i>Gymnocranius grandoculis</i> (Valenciennes, 1830)	Non-Endemic
<i>Apogon marquesensis</i> Greenfield, 2001	Endemic	<i>Lethrinus rubrioperculatus</i> Sato, 1978	Non-Endemic
<i>Apogonichthys ocellatus</i> (Weber, 1913)	Non-Endemic	<i>Lethrinus xanthochilus</i> Klunzinger, 1870	Non-Endemic
* <i>Apogonichthys perdix</i> Bleeker, 1854 [USNM 409402, USNM 409496]	Non-Endemic	<i>Monotaxis grandoculis</i> (Forsskål, 1775)	Non-Endemic
<i>Cheilodipterus quinquelineatus</i> Cuvier, 1828	Non-Endemic	Mugilidae	
<i>Fowleria marmorata</i> (Alleyne & Macleay, 1876)	Non-Endemic	<i>Planiliza macrolepis</i> (Smith, 1846)	Non-Endemic
<i>Gymnapogon</i> sp.	Endemic	<i>Planiliza melinopterus</i> (Valenciennes, 1836)	Non-Endemic
* <i>Gymnapogon urospilotus</i> Lachner, 1953 [USNM 409278, USNM 409380, USNM 409381, USNM 405632]	Non-Endemic	² <i>Crenimugil crenilabis</i> (Forsskål, 1775)	Non-Endemic
* <i>Gymnapogon vanderbilti</i> (Fowler 1938) [USNM 404821, USNM 407188]	Non-Endemic	² <i>Planiliza alata</i> (Steindachner, 1892)	Non-Endemic
¹ <i>Lachneratus phasmaticus</i> Fraser & Struhaker, 1991	Non-Endemic	<i>Osteomugil engeli</i> (Bleeker, 1858)	Non-Endemic
<i>Ostorrhinchus apogonoides</i> (Bleeker, 1856)	Non-Endemic	<i>Crenimugil seheli</i> (Forsskål, 1775)	Non-Endemic
<i>Ostorrhinchus relativus</i> (Randall, 2001) Figure 4	Endemic	<i>Neomyxus leuciscus</i> (Günther, 1871)	Non-Endemic
<i>Ostorrhinchus sinus</i> (Randall, 2001) Figure 5	Endemic	Mullidae	
<i>Pristiopogon kallopterus</i> (Bleeker, 1856)	Non-Endemic	<i>Mulloidichthys flavolineatus</i> (Lacepède, 1801)	Non-Endemic
<i>Pristiopogon taeniopterus</i> (Bennett, 1836)	Non-Endemic	<i>Mulloidichthys mimicus</i> Randall & Guézé, 1980	Non-Endemic
<i>Pseudamia</i> sp.	Endemic	<i>Mulloidichthys pfluegeri</i> (Steindachner, 1900)	Non-Endemic
* <i>Pseudamiops gracilicauda</i> (Lachner, 1953) [USNM 409275, USNM 411071]	Non-Endemic	<i>Mulloidichthys vanicolensis</i> (Valenciennes, 1831)	Non-Endemic
<i>Pseudamiops phasma</i> Randall, 2001	Endemic	<i>Parupeneus barberinus</i> (Lacepède, 1801)	Non-Endemic
<i>Zapogon evermanni</i> (Jordan & Snyder, 1904)	Non-Endemic	<i>Parupeneus ciliatus</i> (Lacepède, 1801)	Non-Endemic
Malacanthidae		<i>Parupeneus cyclostomus</i> (Lacepède, 1801)	Non-Endemic
<i>Malacanthus brevirostris</i> Guichenot, 1858	Non-Endemic	<i>Parupeneus insularis</i> Randall & Myers, 2002	Non-Endemic
Echeneidae		<i>Parupeneus multifasciatus</i> (Quoy & Gaimard, 1825)	Non-Endemic
¹ <i>Echeneis naucrates</i> Linnaeus, 1758	Non-Endemic	<i>Parupeneus pleurostigma</i> (Bennett, 1831)	Non-Endemic
<i>Remora remora</i> (Linnaeus, 1758)	Non-Endemic	<i>Upeneus vittatus</i> (Forsskål, 1775)	Non-Endemic
<i>Remorina albescens</i> (Temminck & Schlegel, 1850)	Non-Endemic	Pempheridae	
Carangidae		* <i>Pempheris</i> sp. [USNM 409165, USNM 409166, USNM 409167, USNM 409276, USNM 409382, USNM 402187, USNM 402188, USNM 412388, USNM 412389, USNM 412390]	Endemic
<i>Alectis ciliaris</i> (Bloch, 1787)	Non-Endemic	<i>Pempheris oualensis</i> Cuvier, 1831	Non-Endemic
<i>Carangoides orthogrammus</i> (Jordan & Gilbert, 1881)	Non-Endemic	Kyphosidae	
<i>Caranx ignobilis</i> (Forsskål, 1775)	Non-Endemic	<i>Kyphosus bigibbus</i> Lacepède, 1801	Non-Endemic
<i>Caranx lugubris</i> Poey, 1860	Non-Endemic	<i>Kyphosus cinerascens</i> (Forsskål, 1775)	Non-Endemic
<i>Caranx melampygus</i> (Cuvier, 1833)	Non-Endemic	<i>Kyphosus vaigiensis</i> (Quoy & Gaimard, 1825)	Non-Endemic
<i>Caranx papuensis</i> Alleyne & Macleay, 1876	Non-Endemic	<i>Kyphosus ocyurus</i> (Jordan & Gilbert, 1882)	Non-Endemic
<i>Caranx sexfasciatus</i> Quoy & Gaimard, 1825	Non-Endemic	Chaetodontidae	
<i>Decapterus macarellus</i> (Valenciennes, 1833)	Non-Endemic	<i>Chaetodon auriga</i> Forsskål, 1775	Non-Endemic
<i>Elagatis bipinnulata</i> (Quoy & Gaimard, 1825)	Non-Endemic	<i>Chaetodon citrinellus</i> Cuvier, 1831	Non-Endemic
<i>Gnathanodon speciosus</i> (Forsskål, 1775)	Non-Endemic	<i>Chaetodon declivis</i> Randall, 1975	Non-Endemic
<i>Scomberoides lysan</i> (Forsskål, 1775)	Non-Endemic	<i>Chaetodon ephippium</i> Cuvier, 1831	Non-Endemic
* <i>Scomberoides tol</i> (Cuvier, 1832) [USNM 409332]	Non-Endemic	<i>Chaetodon lineolatus</i> Cuvier, 1831	Non-Endemic
<i>Selar crumenophthalmus</i> (Bloch, 1793)	Non-Endemic	<i>Chaetodon lunula</i> (Lacepède, 1802)	Non-Endemic
¹ <i>Seriola lalandi</i> Valenciennes, 1833	Non-Endemic	* <i>Chaetodon mertensi</i> Cuvier, 1831 [USNM 409160]	Non-Endemic
¹ <i>Seriola rivoliana</i> Valenciennes, 1833	Non-Endemic	<i>Chaetodon ornatissimus</i> Cuvier, 1831	Non-Endemic
<i>Trachinotus</i> sp.	Endemic	<i>Chaetodon pelewensis</i> Kner, 1868	Non-Endemic
<i>Uraspis secunda</i> (Poey, 1860)	Non-Endemic	<i>Chaetodon quadrimaculatus</i> Gray, 1831	Non-Endemic
Lutjanidae		<i>Chaetodon reticulatus</i> Cuvier, 1831	Non-Endemic
<i>Aphareus furca</i> (Lacepède, 1801)	Non-Endemic	<i>Chaetodon semeion</i> Bleeker, 1855	Non-Endemic
<i>Aprion virescens</i> Valenciennes, 1830	Non-Endemic	<i>Chaetodon trichrous</i> Günther, 1874	Non-Endemic
<i>Lutjanus bohar</i> (Forsskål, 1775)	Non-Endemic	<i>Chaetodon unimaculatus</i> Bloch, 1787	Non-Endemic

Continued

Table 1. Continued.

Family or Species	Distribution	Family or Species	Distribution
* <i>Hemitaurichthys thompsoni</i> Fowler, 1923 [USNM 409368]	Non-Endemic	<i>Stethojulis marquesensis</i> Randall, 2000 Figure 12	Endemic
* <i>Heniochus acuminatus</i> (Linnaeus, 1758) [USNM 409272]	Non-Endemic	<i>Thalassoma amblycephalum</i> (Bleeker, 1856)	Non-Endemic
Pomacanthidae		<i>Thalassoma lutescens</i> (Lay & Bennett, 1839)	Non-Endemic
<i>Centropyge fisheri</i> (Snyder, 1904)	Non-Endemic	<i>Thalassoma purpureum</i> (Forsskål, 1775)	Non-Endemic
<i>Centropyge flavissima</i> (Cuvier, 1831)	Non-Endemic	<i>Thalassoma quinquevittatum</i> (Lay & Bennett, 1839)	Non-Endemic
<i>Centropyge loricula</i> (Günther, 1874)	Non-Endemic	<i>Thalassoma trilobatum</i> (Lacepède, 1801)	Non-Endemic
* <i>Centropyge nigriocella</i> Woods & Schultz, 1953 [USNM 409156, USNM 409157, USNM 409158] Figure 6	Non-Endemic	<i>Wetmorella nigropinnata</i> (Seale, 1900)	Non-Endemic
* <i>Paracentropyge multifasciata</i> (Smith & Radcliffe, 1911) [USNM 409443] Figure 6	Non-Endemic	Scaridae	
Pomacentridae		<i>Calotomus carolinus</i> (Valenciennes, 1839)	Non-Endemic
<i>Abudefduf conformis</i> Randall & Earle, 2000 Figure 7	Endemic	<i>Chlorurus microrhinos</i> (Bleeker, 1854)	Non-Endemic
<i>Abudefduf sordidus</i> (Forsskål, 1775)	Non-Endemic	<i>Chlorurus spilurus</i> (Valenciennes, 1840)	Non-Endemic
<i>Chromis abrupta</i> Randall, 2001	Endemic	' <i>Scarus forsteni</i> (Bleeker, 1861)	Non-Endemic
<i>Chromis fatuhivae</i> Randall, 2001	Endemic	<i>Scarus koputea</i> Randall & Choat, 1980	Endemic
<i>Chromis flavapicis</i> Randall, 2001 Figure 7	Endemic	<i>Scarus psittacus</i> Forsskål, 1775	Non-Endemic
<i>Chromis leucura</i> Gilbert, 1905	Non-Endemic	<i>Scarus rubroviolaceus</i> Bleeker, 1849	Non-Endemic
<i>Chromis viridis</i> (Cuvier, 1830)	Non-Endemic	Pinguipedidae	
<i>Chromis xanthuria</i> (Bleeker, 1854)	Non-Endemic	' <i>Parapercis millepunctata</i> (Günther, 1860)	Non-Endemic
<i>Chrysiptera brownriggii</i> (Bennett, 1828)	Non-Endemic	<i>Parapercis schauinslandii</i> (Steindachner, 1900)	Non-Endemic
<i>Dascyllus aruanus</i> (Linnaeus, 1758)	Non-Endemic	Creediidae	
<i>Dascyllus strasburgi</i> Klausewitz, 1960 Figure 8	Endemic	* <i>Chalixodutes tauensis</i> Schultz, 1943 [USNM 405635, USNM 404800, USNM 411405]	Non-Endemic
<i>Lepidozygus tapeinosoma</i> (Bleeker, 1856)	Non-Endemic	* <i>Crystallodutes enderburyensis</i> Schultz, 1943 [USNM 409397, USNM 409467, USNM 409468, USNM 409469, USNM 412179, USNM 411404, USNM 412502]	Non-Endemic
<i>Plectroglyphidodon dickii</i> (Liénard, 1839)	Non-Endemic	* <i>Limnichthys nitidus</i> Smith, 1958 [USNM 409352, USNM 409353, USNM 412342, USNM 412343]	Non-Endemic
<i>Plectroglyphidodon johnstonianus</i> Fowler & Ball, 1924	Non-Endemic	Tripterygiidae	
<i>Plectroglyphidodon lacrymatus</i> (Quoy & Gaimard, 1825)	Non-Endemic	<i>Enneapterygius rhabdotus</i> Fricke, 1994	Non-Endemic
<i>Plectroglyphidodon leucozonus</i> (Bleeker, 1859)	Non-Endemic	Blenniidae	
<i>Plectroglyphidodon phoenixensis</i> (Schultz, 1943)	Non-Endemic	<i>Alticus simplicirrus</i> Smith-Vaniz & Springer, 1971 Figure 13	Endemic
<i>Plectroglyphidodon sagmarius</i> Randall & Earle, 2000 Figure 9	Endemic	<i>Aspidontus taeniatus</i> Quoy & Gaimard, 1834	Non-Endemic
<i>Pomacentrus coelestis</i> Jordan & Starks, 1901	Non-Endemic	<i>Blenniella caudolineata</i> (Günther, 1877)	Non-Endemic
<i>Stegastes aureus</i> (Fowler, 1927)	Non-Endemic	<i>Blenniella paula</i> (Bryan & Herre, 1903)	Non-Endemic
<i>Stegastes lividus</i> (Forster, 1801)	Endemic	<i>Blenniella</i> sp.	Endemic
Labridae		<i>Cirripectes quagga</i> (Fowler & Ball, 1924)	Non-Endemic
<i>Anampsese caeruleopunctatus</i> Rüppell, 1828	Non-Endemic	* <i>Cirripectes</i> sp. [USNM 409139, USNM 409140]	Non-Endemic
<i>Anampsese melanurus</i> Bleeker, 1857	Non-Endemic	<i>Cirripectes variolosus</i> (Valenciennes, 1836)	Non-Endemic
<i>Bodianus busellatus</i> Gomon, 2006	Non-Endemic	<i>Ecsenius midas</i> Starck, 1969	Non-Endemic
<i>Bodianus axillaris</i> (Bennett, 1831)	Non-Endemic	<i>Enchelyurus ater</i> (Günther, 1877)	Non-Endemic
' <i>Cheilio inermis</i> (Forsskål, 1775)	Non-Endemic	<i>Entomacrodus corneliae</i> (Fowler, 1932) Figure 14	Endemic
<i>Cheilinus chlorourus</i> (Bloch, 1791)	Non-Endemic	<i>Entomacrodus macrospilus</i> Springer, 1967 Figure 14	Endemic
<i>Cheilinus oxycephalus</i> Bleeker, 1853	Non-Endemic	<i>Entomacrodus randalli</i> Springer, 1967 Figure 14	Endemic
* <i>Cheilinus trilobatus</i> Lacepède, 1801 [USNM 409210]	Non-Endemic	<i>Exallias brevis</i> (Kner, 1868)	Non-Endemic
<i>Coris hewitti</i> Randall, 1999	Endemic	<i>Istiblennius bellus</i> (Günther, 1861)	Non-Endemic
<i>Coris marquesensis</i> Randall, 1999	Endemic	<i>Istiblennius</i> sp.	Endemic
<i>Cymolutes</i> sp.	Endemic	<i>Plagiotremus rhinorhynchos</i> (Bleeker, 1852)	Non-Endemic
<i>Gomphosus varius</i> Lacepède, 1801	Non-Endemic	<i>Plagiotremus tapeinosoma</i> (Bleeker, 1857)	Non-Endemic
<i>Halichoeres claudia</i> Randall & Rocha, 2009	Non-Endemic	<i>Rhabdoblennius rhabdotrachelus</i> (Fowler & Ball, 1924)	Non-Endemic
' <i>Halichoeres margaritaceus</i> (Valenciennes, 1839)	Non-Endemic	Callionymidae	
<i>Halichoeres melasma</i> Randall, 1980	Non-Endemic	<i>Callionymus marquesensis</i> Fricke, 1989	Endemic
<i>Hemigymnus fasciatus</i> (Bloch, 1792)	Non-Endemic	<i>Callionymus simplicicornis</i> Valenciennes, 1837	Non-Endemic
<i>Iniistius europunctatus</i> Randall, Earle & Robertson, 2002	Endemic	<i>Synchiropus ocellatus</i> (Pallas, 1770)	Non-Endemic
<i>Iniistius pavo</i> (Valenciennes, 1840)	Non-Endemic	Gobiidae	
<i>Labroides bicolor</i> Fowler & Bean, 1928	Non-Endemic	<i>Amblyeleotris marquesas</i> Mohlmann & Randall, 2002 Figure 15	Endemic
<i>Labroides dimidiatus</i> (Valenciennes, 1839)	Non-Endemic	<i>Amblygobius nocturnus</i> (Herre, 1945)	Non-Endemic
<i>Labroides rubrolabiatus</i> Randall, 1958	Non-Endemic	<i>Bathygobius coalitus</i> (Bennett, 1832)	Non-Endemic
<i>Macropharyngodon pakoko</i> Delrieu-Trottin, Williams & Planes, 2014 Figure 10	Endemic	<i>Bathygobius cocosensis</i> (Bleeker, 1854)	Non-Endemic
<i>Novaculichthys taeniourus</i> (Lacepède, 1801)	Non-Endemic	<i>Bathygobius cotticeps</i> (Steindachner, 1880)	Non-Endemic
<i>Oxycheilinus bimaculatus</i> (Valenciennes, 1840)	Non-Endemic	<i>Bryaninops yongei</i> (Davis & Cohen, 1969)	Non-Endemic
<i>Oxycheilinus unifasciatus</i> Streets, 1877	Non-Endemic	<i>Callogobius</i> sp.	Endemic
<i>Pseudocheilinus octotaenia</i> Jenkins, 1901	Non-Endemic	<i>Discordipinna griessingeri</i> Hoes & Fourmanoir, 1978	Non-Endemic
<i>Pseudodax moluccanus</i> (Valenciennes, 1839)	Non-Endemic	<i>Eviota deminuta</i> Tornabene, Ahmadia & Williams, 2013	Endemic
<i>Pseudojuloides pyrius</i> Randall & Randall, 1981 Figure 11	Endemic		

Continued

Table 1. Continued.

Family or Species	Distribution	Family or Species	Distribution
<i>Eviota dorsimaculata</i> Tornabene, Ahmadia & Williams, 2013	Endemic	<i>Acanthurus pyroferus</i> Kittlitz, 1834	Non-Endemic
<i>Eviota infulata</i> (Smith, 1957)	Non-Endemic	<i>Acanthurus reversus</i> Randall & Earle, 1999	Endemic
<i>Eviota lacrimosa</i> Tornabene, Ahmadia & Williams, 2013	Endemic	<i>Acanthurus thompsoni</i> (Fowler, 1923)	Non-Endemic
<i>Fusigobius duospilus</i> Hoese & Reader, 1985	Non-Endemic	<i>Acanthurus triostegus</i> (Linnaeus, 1758)	Non-Endemic
* <i>Fusigobius inframaculatus</i> (Randall, 1994) [USNM 409011, USNM 409012]	Non-Endemic	<i>Acanthurus xanthopterus</i> Valenciennes, 1835	Non-Endemic
* <i>Gnatholepis anjerensis</i> (Bleeker, 1851) [USNM 412070, USNM 412083, USNM 412256, USNM 412257]	Non-Endemic	<i>Ctenochaetus flavicauda</i> Fowler, 1938	Non-Endemic
<i>Gnatholepis cauerensis</i> (Bleeker, 1853)	Non-Endemic	<i>Ctenochaetus hawaiiensis</i> Randall, 1955	Non-Endemic
<i>Kelloggella tricuspidata</i> (Herre, 1935)	Endemic	<i>Ctenochaetus marginatus</i> (Valenciennes, 1835)	Non-Endemic
<i>Paragobiodon echocephalus</i> (Rüppell, 1828)	Non-Endemic	<i>Naso annulatus</i> (Quoy & Gaimard, 1825)	Non-Endemic
<i>Pleuroscyia mossambica</i> Smith, 1959	Non-Endemic	<i>Naso brachycentron</i> (Quoy & Gaimard, 1825)	Non-Endemic
* <i>Priolepis ailina</i> Winterbottom & Burridge, 1993 [USNM 409428, USNM 411293, USNM 411294]	Non-Endemic	<i>Naso brevirostris</i> (Valenciennes, 1835)	Non-Endemic
<i>Priolepis compita</i> Winterbottom, 1985	Non-Endemic	<i>Naso hexacanthus</i> (Bleeker, 1855)	Non-Endemic
<i>Priolepis nocturna</i> Smith, 1957	Non-Endemic	<i>Naso lituratus</i> (Bloch & Schneider, 1801)	Non-Endemic
<i>Priolepis semidoliata</i> (Valenciennes, 1837)	Non-Endemic	<i>Naso unicornis</i> (Forsskål, 1775)	Non-Endemic
<i>Priolepis</i> sp. [USNM 409437]	Endemic	¹ <i>Naso vlamingii</i> (Valenciennes, 1835)	Non-Endemic
<i>Priolepis squamogena</i> Winterbottom & Burridge, 1989	Non-Endemic	¹ <i>Zebrasoma velifer</i> (Bloch, 1795)	Non-Endemic
* <i>Priolepis triops</i> Winterbottom & Burridge, 1993 [USNM 409362, USNM 409447, USNM 409448, USNM 411087, USNM 411059, USNM 411279, USNM 411280, USNM 411281]	Non-Endemic	<i>Zebrasoma rostratum</i> (Günther, 1873)	Non-Endemic
<i>Stonogobiops medon</i> Hoese & Randall, 1982 Figure 16	Endemic		
* <i>Trimma</i> sp. [USNM 409435, USNM 409436, USNM 409438, USNM 409439, USNM 409440]	Endemic		
<i>Trimma woutsi</i> Winterbottom, 2002	Endemic		
* <i>Trimmatom</i> sp. [USNM 409434]	Endemic		
<i>Valenciennea helsdingenii</i> (Bleeker, 1858)	Non-Endemic		
<i>Valenciennea strigata</i> (Broussonet, 1782)	Non-Endemic		
<i>Vanderhorstia ornatissima</i> Smith, 1959	Non-Endemic		
Xenisthmiidae			
* <i>Xenisthus polyzonatus</i> (Klunzinger, 1871) [USNM 409131, USNM 409132, USNM 411054, USNM 412524, USNM 412525, USNM 412526]	Non-Endemic		
Microdesmidae			
<i>Gunnellichthys monostigma</i> Smith, 1958	Non-Endemic		
<i>Nemateleotris magnifica</i> Fowler, 1938	Non-Endemic		
<i>Ptereleotris heteroptera</i> (Bleeker, 1855)	Non-Endemic		
<i>Ptereleotris melanopogon</i> Randall & Hoese, 1985 Figure 17	Endemic		
<i>Ptereleotris zebra</i> (Fowler, 1938)	Non-Endemic		
Sphyraenidae			
<i>Sphyraena barracuda</i> (Edwards, 1771)	Non-Endemic		
<i>Sphyraena forsteri</i> Cuvier, 1829	Non-Endemic		
<i>Sphyraena helleri</i> Jenkins, 1901	Non-Endemic		
<i>Sphyraena qenie</i> Klunzinger, 1870	Non-Endemic		
Gempylidae			
<i>Promethichthys prometheus</i> (Cuvier, 1832)	Non-Endemic		
Scombridae			
<i>Acanthocybium solandri</i> (Cuvier, 1831)	Non-Endemic		
<i>Euthynnus affinis</i> (Cantor, 1849)	Non-Endemic		
<i>Gymnosarda unicolor</i> (Rüppell, 1838)	Non-Endemic		
Zanclidae			
<i>Zanclus cornutus</i> (Linnaeus, 1758)	Non-Endemic		
Acanthuridae			
<i>Acanthurus achilles</i> (Shaw, 1803)	Non-Endemic		
* <i>Acanthurus blochii</i> Valenciennes 1835 [USNM 409483]	Non-Endemic		
<i>Acanthurus guttatus</i> Forster, 1801	Non-Endemic		
¹ <i>Acanthurus leucopareius</i> (Jenkins, 1903)	Non-Endemic		
<i>Acanthurus lineatus</i> (Linnaeus, 1758)	Non-Endemic		
<i>Acanthurus mata</i> (Cuvier, 1829)	Non-Endemic		
<i>Acanthurus nigricans</i> (Linnaeus, 1758)	Non-Endemic		
<i>Acanthurus nigros</i> Günther, 1861	Non-Endemic		
* <i>Acanthurus nubilus</i> (Fowler & Bean, 1929) [USNM 409451]	Non-Endemic		



Figure 2. *Myripristis cf. botche*. Photographed by Yves Lefèvre at -65 m, this *Myripristis* is closest to *Myripristis blotche*.



Figure 3. *Epinephelus irroratus*. Photo: Philippe Bacchet.



Figure 4. *Ostorhinchus relativus*. Photo: Yann Hubert.



Figure 5. *Ostorhinchus sinus* (89mm SL). Photo: Jeffrey T. Williams.

triostegus (Linnaeus, 1758) was reported as *Acanthurus triostegus marquesensis* Schultz & Woods, 1948, which is now a synonym. *Coelonotus argulus* (Peters, 1855) was reported as *Microphis argulus* (Peters, 1855), which is now a synonym. The reports of *Apterichtus flavicaudus* (Snyder, 1904) and *A. moseri* (Jordan & Snyder, 1901) were based on misidentifications of *A. mys* McCosker & Hibino, 2015 and *A. klazingai* (Weber, 1913) (J.E. McCosker, personal communication). *Apterichtus moseri* is now restricted to Japan while *A. flavicaudus* is restricted to Hawaii, Midway Island, and possibly Australia and Seychelles (McCosker and Hibino 2015). For Mugilidae, we followed Durand et al. (2012) and report *Planiliza macrolepis* (Smith, 1846) instead of *Chelon macrolepis* (Smith, 1846); *Planiliza melinopterus* (Valenciennes, 1836) instead of *Chelon melinopterus* (Valenciennes, 1836); *Planiliza alata* (Steindachner, 1892) instead of *Liza alata* (Steindachner, 1892); *Osteomugil engeli* (Bleeker, 1858) instead of *Moolgarda engeli* (Bleeker, 1858); *Crenimugil seheli* (Forsskål, 1775) instead of *Moolgarda seheli* (Forsskål, 1775).

Gobiidae (11 endemic species), Labridae (7), Pomacentridae (7), Serranidae (6), Apogonidae (6) and Blenniidae (6) are the families that possess the highest number of endemic species and among the highest percentage of endemism with respectively 33.3%, 20.0%, 33.3%, 27.3%, 30.0% and 31.6%. They are only surpassed by Clupeidae and Soleidae that have a single



Figure 6. *Paracentropyge multifasciata* (58 mm SL, top), *Centropyge nigrocella* (36 mm SL, bottom). Photos: Jeffrey T. Williams.



Figure 7. Two endemic species to the Marquesas Islands: *Chromis flavapicis* (black) and *Abudefduf conformis* (striped). *Chaetodon trichrous* (half black, half white and yellow tail) is endemic to French Polynesia. Photo: Yann Hubert



Figure 8. *Dascyllus strasburgi* finding shelter in a *Pocillopora* sp. colony. Photo: Yann Hubert.



Figure 9. *Plectroglyphidodon sagmarius*. Photo: Yann Hubert.



Figure 10. *Macropharyngodon pakoko* (male, 72 mm SL). Photo: Jeffrey T. Williams.



Figure 11. *Pseudojuloides pyrius* (32 mm SL). Photo: Jeffrey T. Williams.

represented species endemic from the Marquesas (100% of endemism), and Congridae, Bothidae, Chlopsidae, Pempheridae (50%), all of them represented by no more than six species in total in the Marquesas. Among the five most speciose families; the percentage of endemism observed is uneven with 5.0% for Muraenidae, 20.0% for Labridae, 33.3% for Gobiidae, 3.9% for Acanthuridae and 27.3% for Serranidae.



Figure 12. *Stethojulis marquesensis* (84 mm SL). Photo: Jeffrey T. Williams.



Figure 13. *Alticus simplicirrus*. Photo: Philippe Bacchet.



Figure 14. From top to bottom: *Entomacrodus corneliae* (40 mm SL), *E. macrospilus* (19 mm SL), *E. randalli* (109 mm SL). Photos: Jeffrey T. Williams.



Figure 15. *Amblyeleotris marquesas* (69 mm SL). Photo: Jeffrey T. Williams.

DISCUSSION

Percentage of endemism is dependant on our level of knowledge of the locality in question but also of the surrounding islands and archipelagos. While remote places like Hawaii tend to lose percentage of endemism due to new records of widespread fishes in their waters, the Marquesas constitutes one of the rare places where both the number of widespread and endemic fishes have grown despite continuous explorations of islands around it; with 10% of endemism in 1976, 1978 (Randall 1976, 1998); 11.6% in 2000 (Randall and Earle 2000), 12.3% (8.3% identified endemics + 4% unidentified) in 2007 (Kulbicki 2007), while Williams et al. (2013) evoked 12.9% of endemism based on a preliminary analysis of the collection presented in this study.

Fifteen years ago, the Marquesas were reported to be one of the few hotspots of endemism in the Indo-Pacific for shore reef fishes (Randall and Earle 2000). This percentage is presently at its highest level ever with 13.7%. This census of the Marquesan fish biodiversity constitutes a baseline that is essential to ensure the future protection of these islands. A plan to set up a



Figure 16. *Stenogobiops medon* adult (19 mm SL, top) and juvenile (bottom, 15 mm SL). Photos: Jeffrey T. Williams.



Figure 17. *Ptereleotris melanopogon* (76 mm SL). Photo: Jeffrey T. Williams.



Figure 18. *Cantherhines nukuhiva* (160 mm SL). Photo: Jeffrey T. Williams.

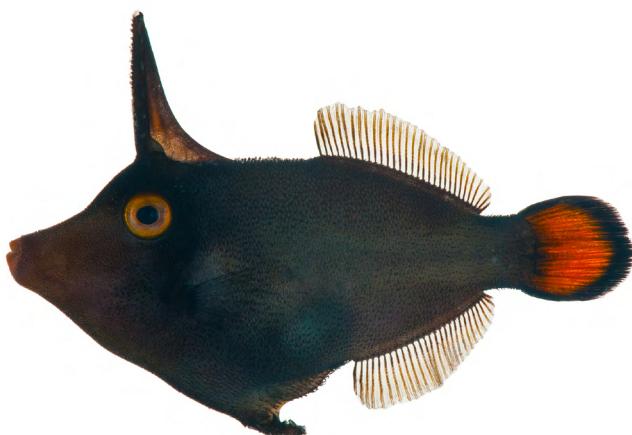


Figure 19. *Pervagor marginalis* (46 mm SL). Photo: Jeffrey T. Williams.



Figure 20. *Canthigaster crible* (44 mm SL). Photo: Jeffrey T. Williams.

Marine Protected Area is in progress for the Marquesas Islands. Our study highlights the uniqueness of the Marquesan reef fish fauna and emphasizes the necessity to preserve the reef fish fauna of the archipelago, possessing the third highest percentage of endemism in the Indo-Pacific.

ACKNOWLEDGEMENTS

This study was part of the Pakaihi I Te Moana expedition organized and funded by the Agence des Aires Marines Protégées in France. We thank the Centre Plongée Marquises (Xavier (Pipapo) and Marie Curvat), l'Agence des Aires Marines Marine Protégées, the Fondation TOTAL, the Ministère de l'Environnement de Polynésie, the Délégation à la Recherche Polynésie, the Mairie of Nuku-Hiva, and the people of the Marquesas Islands for their kind and generous support of the project as we traveled throughout the islands. Particular thanks go to the Captain and crew of the M/V “Braveheart” for their invaluable assistance during the Marquesas Expedition. We thank Jerry Finan, Diane Pitassy, Erika Wilbur, Shirleen Smith, Kris Murphy, David Smith and Sandra Raredon of the Division of Fishes (National Museum of Natural History) for assistance in preparations for the trip and processing specimens. We are also grateful to Tom Cribb, and Pierre Sasal for their field assistance collecting fishes in



Figure 21. *Canthigaster marquesensis*. Photo: Yann Hubert.

the Marquesas. We thank the staff of the CRIODE for logistical support, particularly Yannick Chancerelle for his assistance with arrangements for shipments into and out of French Polynesia. The second author's travel to Moorea to participate in the expedition was funded by grants from the Leonard P. Schultz Fund (Division of Fishes, National Museum of Natural History). We thank Bruce Mundy and an anonymous reviewer for providing constructive reviews of an earlier version of the manuscript.

LITERATURE CITED

- Bacchet, P., Y. Lefèvre, and T. Zysman. 2006. Guide des poissons de Tahiti et ses îles. Au Vent des Iles, Tahiti, 608 pp.
- Bonjean, F. and G.S.E. Lagerloef. 2002. Diagnostic model and analysis of the surface currents in the Tropical Pacific Ocean. *Journal of Physical Oceanography* 32: 2938–2954. doi: [10.1175/1520-0485\(2002\)032<2938:DMAAOT>2.0.CO;2](https://doi.org/10.1175/1520-0485(2002)032<2938:DMAAOT>2.0.CO;2)
- Bellwood, D.R. and T.P. Hughes. 2001. Regional-scale assembly rules and biodiversity of coral reefs. *Science* 292: 1532–1535. doi: [10.1126/science.1058635](https://doi.org/10.1126/science.1058635)
- Bellwood, D.R. and C.P. Meyer. 2009. Searching for heat in a marine biodiversity hotspot. *Journal of Biogeography*, 36: 569–576. doi: [10.1111/j.1365-2699.2008.02029.x](https://doi.org/10.1111/j.1365-2699.2008.02029.x)
- Choat, J.H., O.S. Klanten, L.Van Herwerden, D.R. Robertson and K.D. Clements. 2012. Patterns and processes in the evolutionary history of parrotfishes (Family Labridae). *Biological Journal of the Linnean Society* 107: 529–557. doi: [10.1111/j.1095-8312.2012.01959.x](https://doi.org/10.1111/j.1095-8312.2012.01959.x)
- DiBattista J.D., C. Wilcox, M.T. Craig, L.A. Rocha and B. Bowen. 2011. Phylogeography of the Pacific blueline surgeonfish, *Acanthurus nigrofasciatus*, reveals high genetic connectivity and a cryptic endemic species in the Hawaiian archipelago. *Journal of Marine Biology* 2011: 1–17. doi: [10.1155/2011/839134](https://doi.org/10.1155/2011/839134)
- Durand, J.D., W.-J. Chen, K.-N. Shen, C. Fu and P. Borsa. 2012. Genus-level taxonomic changes implied by the mitochondrial phylogeny of grey mullets (Teleostei: Mugilidae). *Comptes Rendus Biologies* 335: 687–697. doi: [10.1016/j.crvi.2012.09.005](https://doi.org/10.1016/j.crvi.2012.09.005)
- Eschmeyer, W.N. (ed). Catalog of fishes: genera, species, references. Accessed at: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>, 27 August 2015.

- Eschmeyer, W.N., R. Fricke, J.D. Fong, and D.A. Polack. 2010. Marine fish diversity: history of knowledge and discovery (Pisces). *Zootaxa* 2525: 19–50.
- Gaither, M.R., R.J. Toonen, D.R. Robertson, S. Planes, and B.W. Bowen. 2010. Genetic evaluation of marine biogeographical barriers: perspectives from two widespread Indo-Pacific snappers (*Lutjanus kasmira* and *Lutjanus fulvus*). *Journal of Biogeography* 37: 133–147. doi: [10.1111/j.1365-2699.2009.02188.x](https://doi.org/10.1111/j.1365-2699.2009.02188.x)
- Gaither, M.R., M.A. Bernal, R.R. Coleman, B.W. Bowen, S.A. Jones, W.B. Simison, and L.A. Rocha. 2015. Genomic signatures of geographic isolation and natural selection in coral reef fishes, *Molecular Ecology* 24: 1543–1557. doi: [10.1111/mec.13129](https://doi.org/10.1111/mec.13129)
- Gomon, M.F. 2006. A revision of the labrid fish genus *Bodianus* with descriptions of eight new species. *Records of the Australian Museum Supplement* 30: 1–133. doi: [10.3853/j.0812-7387.30.2006.1460](https://doi.org/10.3853/j.0812-7387.30.2006.1460)
- Hubert, N., C.P. Meyer, H.J. Bruggemann, F. Guérin, R.J.L. Komeno, B. Espiau, R. Causse, J.T. Williams and S. Planes. 2012. Cryptic diversity in Indo-Pacific coral-reef fishes revealed by DNA-barcoding provides new support to the centre-of-overlap hypothesis. *PLoS ONE* 7: e28987. doi: [10.1371/journal.pone.0028987](https://doi.org/10.1371/journal.pone.0028987)
- Knudsen, S.W. and K.D. Clements. 2013. Revision of the fish family Kyphosidae (Teleostei: Perciformes). *Zootaxa* 3751: 001–101. doi: [10.11646/zootaxa.3751.1.1](https://doi.org/10.11646/zootaxa.3751.1.1)
- Kulbicki, M. 2007. Biogeography of reef fishes of the French Territories in the South Pacific. *Cybium* 31: 275–288.
- Kulbicki, M., V. Parravicini, D.R. Bellwood, E. Arias-González, P. Chabanet, S.R. Floeter, A. Friedlander, J. McPherson, R.E. Myers, L. Vigliola and D. Mouillot. 2013. Global biogeography of reef fishes: A hierarchical quantitative delineation of regions, *PLOS One* 8: e81847. doi: [10.1371/journal.pone.0081847](https://doi.org/10.1371/journal.pone.0081847)
- Martinez, E., and K. Maamaatuahutapu. 2004. Island mass effect in the Marquesas Islands: time variation. *Geophysical Research Letters* 31: L18307. doi: [10.1029/2004gl020682](https://doi.org/10.1029/2004gl020682)
- Mora, C., P.M. Chittaro, P.F. Sale, J.P. Kritzer, and S.A. Ludsin. 2003. Patterns and processes in reef fish diversity. *Nature* 421: 933–936. doi: [10.1038/nature01393](https://doi.org/10.1038/nature01393)
- Parravicini, V., S. Villeger, T.R. McClanahan, J.E. Arias-González, D.R. Bellwood, J. Belmaker, P. Chabanet, S.R. Floeter, A.M. Friedlander, F. Guilhaumon, L. Vigliola, M. Kulbicki, and D. Mouillot. 2014. Global mismatch between species richness and vulnerability of reef fish assemblages. *Ecology Letters* 17: 1101–1110. doi: [10.1111/ele.12316](https://doi.org/10.1111/ele.12316)
- Planes, S. and C. Faugeron. 2002. Isolation by distance and vicariance drive genetic structure of a coral reef fish in the Pacific Ocean. *Evolution* 56: 378–399. doi: [10.1554/0014-3820\(2002\)056\[0378:ibd\]2.0.co;2](https://doi.org/10.1554/0014-3820(2002)056[0378:ibd]2.0.co;2)
- Randall, J.E. 1976. The endemic shore fishes of the Hawaiian Islands, Lord Howe Island and Easter Island. *Travaux et Documents de l'ORSTOM* 47: 49–73.
- Randall, J.E. 1998. Zoogeography of shore fishes of the Indo-Pacific region. *Zoological Studies* 37: 227–268. <http://zoolstud.sinica.edu.tw/Journals/37.4/227.pdf>
- Randall, J.E. 2004. On the status of the pomacentrid fish *Stegastes lividus* (Forster). *Ichthyological Research* 51: 389–391. doi: [10.1007/s10228-004-0236-4](https://doi.org/10.1007/s10228-004-0236-4)
- Randall, J.E. 2005. Reef and Shore fishes of the South Pacific. Honolulu, HI: UH Sea Grant. 720 pp.
- Randall, J.E. 2007. Reef and shore fishes of the Hawaiian Islands. Honolulu, HI: UH Sea Grant. 560 pp.
- Randall, J.E., and A. Cea. 2011. Shore fishes of Easter Island. Sea Grant College Program, University of Hawai'i Press, Honolulu, Hawaii. 546 pp.
- Randall, J.E., and J.L. Earle. 2000. Annotated checklist of the shore fishes of the Marquesas Islands. *Bishop Museum Occasional Papers* 66: 1–42. <http://hbs.bishopmuseum.org/pubs-online/pdf/op66.pdf>
- Randall, J.E., and L.A. Rocha. 2000. *Halichoeres claudia* sp. nov., a new Indo-Pacific wrasse (Perciformes: Labridae), the fourth species of the *H. ornatissimus* complex. *Zoological Studies* 48: 709–718. <http://zoolstud.sinica.edu.tw/Journals/48.5/709.pdf>
- Randall, J.E., Rocha L.A. and C. Wilcox. 2011. *Acanthurus nigros* Günther, a valid species of surgeonfish, distinct from the Hawaiian *A. nigrolineatus* Valenciennes. *Pacific Science* 65: 265–275. doi: [10.2984/65.2.265](https://doi.org/10.2984/65.2.265)
- Reaka, M., P. Rodgers and A. Kudla. 2008. Patterns of biodiversity and endemism on Indo-West Pacific coral reefs. *Proceedings of the National Academy of Sciences of the United States of America* 105: 11474–11481. doi: [10.1073/pnas.0802594105](https://doi.org/10.1073/pnas.0802594105)
- Roberts, C.M., C.J. McClean, J.E.N. Veron, J.P. Hawkins, G.R. Allen, D.E. McAllister, C.G. Mittermeier, F.W. Schueler, M. Spalding, F. Wells, C. Vynne and T.B. Werner. 2002. Marine biodiversity hotspots and conservation priorities for tropical reefs. *Science* 295: 1280–1284. doi: [10.1126/science.1067728](https://doi.org/10.1126/science.1067728)
- Williams, J.T., L. Wantiez, C. Chauvet, R. Galzin, M. Harmelin-Vivien, E. Jobet, M. Juncker, G. Mou-Tham, S. Planes and P. Sasal. 2006. Checklist of the shorefishes of Wallis Islands (Wallis and Futuna French Territories, South-Central Pacific). *Cybium* 30: 247–260.
- Williams, J.T., E. Delrieu-Trottin, S. Planes. 2013. Two new fish species of the subfamily Anthiinae (Perciformes, Serranidae) from the Marquesas. *Zootaxa* 3647: 167–180. doi: [10.11646/zootaxa.3647.1.8](https://doi.org/10.11646/zootaxa.3647.1.8)
- Winters, K.L., L. van Herwerden, J.H. Choat and D.R. Robertson. 2010. Phylogeography of the Indo-Pacific parrotfish *Scarus psittacus*: isolation generates distinctive peripheral populations in two oceans. *Marine Biology* 157: 1679–1691. doi: [10.1007/s00227-010-1442-4](https://doi.org/10.1007/s00227-010-1442-4)
- Wyrtski, K., and B. Kilonsky. 1984. Mean water and current structure during the Hawaii-to-Tahiti Shuttle Experiment. *Journal of Physical Oceanography* 14, 242–254. doi: [10.1175/1520-0485\(1984\)014<0242:mwacs>2.0.co;2](https://doi.org/10.1175/1520-0485(1984)014<0242:mwacs>2.0.co;2)

Authors' contribution statement: ED-T, JTW, PB, MK, JM, RG, TLL, GM-T, GS, SP collected the data, ED-T, JTW, MK, JM, RG, GS, SP analyzed the data, ED-T, JTW, MK, JM, RG, GS, SP wrote and commented on the text.

Received: 29 May 2015

Accepted: 11 September 2015

Academic editor: Osmar J. Luiz