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The shore fishes of the Trindade–Martin Vaz insular complex: an update

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A compilation of historical and recent collections and observations of shore fishes yielded 154 recorded species for Trindade and 67 for Martin Vaz. Twelve taxa, mostly small cryptobenthic species with limited dispersal capabilities and low ecological amplitude, are endemic to this insular complex. In several cases, the seamounts of the Vitória-Trindade Chain appear to have acted as stepping stones between the mainland and islands in periods of low sea level. © 2013 The Authors

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Key words: endemism; oceanic island; reef fishes; south-western Atlantic Ocean.

Trindade Island and the Martin Vaz Archipelago (the Trindade–Martin Vaz insular complex) are the only emerged parts of the Vitória–Trindade submarine chain. This chain was formed by the intrusion of magma through a fracture perpendicular to the Brazilian coast (Almeida, 2006); it begins 175 km off the continental shelf break and extends eastward 1000 km between 20° and 21° S. The Trindade–Martin Vaz insular complex comprise the most isolated (1160 km from mainland; Floeter *et al.*, 2008) and the newest (maximum age *c.* 3–6 million years; Cordani, 1970) oceanic islands in the south-western tropical Atlantic Ocean. This report notes the occurrence of 11 species of fishes previously unrecorded for the complex and confirms the presence of two species in Trindade that were previously known only for Martin Vaz, and the presence in Martin Vaz of 27 species previously known only for Trindade. Additionally, by cross-examination of voucher specimens, published literature and *in situ* observations it is possible to generate an updated checklist of the fish species inhabiting the shores of the Trindade–Martin Vaz insular complex.

The new occurrences for Trindade Island are based on collections made during three expeditions (October to December 2009, June and July 2011 and January to March 2012) and those for Martin Vaz are based on a single dive (January 2012) plus unpublished data (H. T. Pinheiro, unpubl. data). Fishes were collected with hand nets and spear guns or photographed during dives with open-circuit or closed-circuit rebreather scuba sets around the islands. Sampling effort comprised

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193 h in Trindade and 17 h in Martin Vaz. Maximum depth of collections or observations was 40 m. Voucher specimens were deposited in the fish collection 'Coleção Ictiológica da Universidade Federal do Espírito Santo' (CIUFES; <http://splink.cria.org.br/manager/detail?system=&setlang=en&resource=CIUFES>). The voucher numbers are provided in the Appendix.

The 11 new records include the pearlfish *Carapus bermudensis* (Jones 1874) [Fig. 1(b)], the translucent goby *Chriolepis fisheri* Herre 1942 [Fig. 1(c)], the false moray *Kaupichthys hyoprroides* (Strömman 1896) [Fig. 1(d)], an undescribed gobiid species of the genus *Lythrypnus* [*Lythrypnus* sp.; Fig. 1(f)], the redface moray *Monopenchelys acuta* (Parr 1930) [Fig. 1(g)], the reef bass *Pseudogramma gregoryi* (Breder 1927) [Fig. 1(h)], the flagfin blenny *Emblemariopsis* aff. *signifer* (Ginsburg 1942) [Fig. 2(a)], an undescribed jawfish *Opistognathus* sp. [Fig. 2(b)], the coral scorpionfish *Scorpaena albifimbria* Evermann & Marsh 1900 [Fig. 2(c)], the smooth-cheek scorpionfish *Scorpaena isthmensis* Meek & Hildebrand 1928 [Fig. 2(d)] and the dwarf wrasse *Doratonotus megalepis* Günther 1862. *Scorpaena albifimbria* represents an interesting discovery because the species was only known from the north-western Atlantic Ocean (Froese & Pauly, 2012). *Monopenchelys acuta*, on the other hand, is present in all tropical oceans (Froese & Pauly, 2012) but its only previous record in the Brazilian province is on the Vitória–Trindade Chain (Andreato & Séret, 1995). Individuals of *Emblemariopsis* aff. *signifer* from Trindade show 0.5% divergence in cytochrome c oxidase subunit I relative to individuals from the Brazilian mainland (B. C. Victor, pers. comm.); the taxonomic identity of this species is being investigated.

First time captures included: the redspotted hawkfish *Amblycirrhitus pinos* (Mowbray 1927), the chestnut moray *Enchelycore carychroa* Böhlke & Böhlke 1976, the lofty triplefin *Enneanectes altivelis* Rosenblatt 1960, the bluebar jawfish *Opistognathus* species 2 [in Smith-Vaniz (1997)], the goby *Priolepis dawsoni* Greenfield 1989, the butterflyfish *Prognathodes brasiliensis* Burgess 2001, the deepwater squirrelfish *Sargocentron bullisi* (Woods 1955), the reef scorpionfish *Scorpaenodes caribbaeus* Meek & Hildebrand 1928, the bandtail puffer *Sphoeroides spengleri* (Bloch 1785), the cardinal soldierfish *Plectrypops retrospinis* (Guichenot 1853) and the creole-fish *Paranthias furcifer* (Valenciennes 1828). These species are listed as sight records in either Gasparini & Floeter (2001) or Pinheiro *et al.* (2009) but no specimens had been deposited in scientific collections until now.

The presence in Trindade of the cobalt chromis *Chromis flavicauda* (Günther 1880), collected in Martin Vaz by Andreato & Séret (1995) but equivocally cited for Trindade by Gasparini & Floeter (2001), is here confirmed. Another species previously known only for Martin Vaz, the Atlantic cornetfish *Aulostomus strigosus* Wheeler 1955 (Pinheiro *et al.*, 2009), was also collected in Trindade. Despite being only reported as a sight record in Gasparini & Floeter (2001), the Brazilian flamefish *Apogon americanus* Castelnau 1855 was collected in 1998 by J. L. Gasparini and a vouchered lot was subsequently deposited at CIUFES (number 1469). A large number of specimens of an undescribed species of *Lythrypnus* [*Lythrypnus* species 2 in Maxfield *et al.*, 2012; Fig. 1(e)] was collected. It is here assumed that this species corresponds to the *Lythrypnus* sp. listed in Gasparini & Floeter (2001) because it is much more abundant than its also undescribed congener [*Lythrypnus* sp.; Fig. 1(f)]. The clinid *Ribeiroclinus eigenmanni* (Jordan 1888) cited by Gasparini & Floeter (2001) for Trindade was caught on the Vitória–Trindade Chain (Columbia



FIG. 1. Specimens photographed after fixation: (a) *Astrapogon puncticulatus* (CIUFES 1551; 26 mm total length, L_T), (b) *Carapus bermudensis* (CIUFES 2114; 153 mm L_T), (c) a juvenile *Chriolepis fisheri* (CIUFES 1568; 11 mm L_T), (d) *Kaupichthys hyoprорoides* (CIUFES 2205; 60 mm L_T), (e) *Lythrypnus* species 2 (CIUFES 1562; 14 mm L_T), (f) an undescribed *Lythrypnus* sp. (CIUFES 2238; 14 mm L_T), (g) *Monopenchelys acuta* (CIUFES 2204; 83 mm L_T) and (h) *Pseudogramma gregoryi* (CIUFES 2203; 37 mm L_T). Note that this specimen of *K. hyoprорoides* presents anomalous regeneration of the posterior portion of the tail.

seamount) by Andreata & Séret (1995). To date, no specimen of this species has been caught or sighted at either Trindade or Martin Vaz. The record of the conchfish *Astrapogon stellatus* (Cope 1867) cited in Pinheiro *et al.* (2009) is a misidentification of *Astrapogon puncticulatus* (Poey 1867). These specimens were re-examined and compared with another specimen collected in the present study [Fig. 1(a)]; all three individuals unambiguously belong to *A. puncticulatus*. It is likely that the visual record (R. L. Moura, pers. comm.) of *A. stellatus* in Pereira-Filho *et al.* (2011) also refers to *A. puncticulatus*. Thus, only *A. puncticulatus* is considered valid for Trindade Island.

Prior to the present work, collections and observations of shore fishes were made by Murray (1902); Nichols & Murphy (1914); Miranda-Ribeiro (1919); Carvalho (1950) and Gasparini & Floeter (2001) in Trindade; and by Andreata & Séret (1995); Pinheiro *et al.* (2009) and Pereira-Filho *et al.* (2011) in Trindade and Martin Vaz. One hundred and sixty-two species are cited for the insular complex (while all are included in the Trindade ichthyofauna, only 68 were recorded at Martin Vaz; Table I). An occurrence was considered doubtful when (1) large, common or

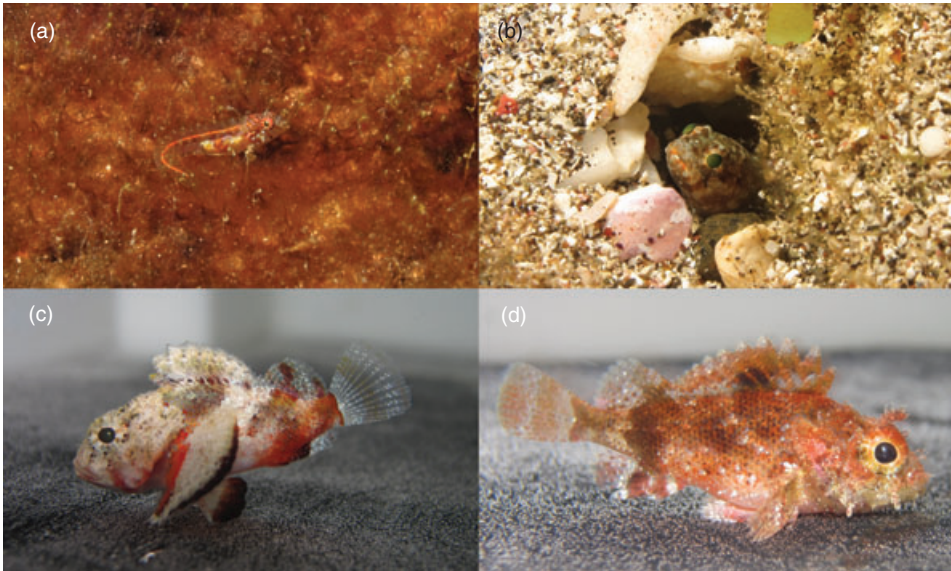


FIG. 2. Specimens of (a) *Emblemariopsis* aff. *signifer*, (b) an undescribed *Opistognathus* sp. photographed *in situ*, (c) *Scorpaena albifimbria* (CIUFES 2197; 31 mm total length, L_T) and (d) *Scorpaena isthmensis* (CIUFES 2342; 35 mm L_T) in a field aquarium.

conspicuous species were represented by a single historical record and not confirmed in recent studies (Gasparini & Floeter, 2001; Pinheiro *et al.*, 2009; Pereira-Filho *et al.*, 2011; exception was made for oceanic species because the surveys were not directed to sampling these groups) or when (2) rare, small and taxonomically challenging cryptobenthic species seem out of their ecological range. The doctorfish *Acanthurus chirurgus* (Bloch 1787), the eyed flounder *Bothus ocellatus* (Agassiz 1831), the crevalle jack *Caranx hippos* (L. 1766), the silver mojarra *Eucinostomus argenteus* Baird & Girard 1855, the yellow sea chub *Kyphosus incisor* (Cuvier 1831), the fantail mullet *Mugil trichodon* Poey 1875 and the mud eel *Pythonichthys sanguineus* Poey 1868 belong to the first case and the wasp goby *Chriolepis vespa* Hastings & Bortone 1981 to the second (this species is closely associated with muddy bottoms). Without these eight doubtful records, 154 and 67 species are known from Trindade and Martin Vaz, respectively.

Almost one half of the complex's species either have a circum-global distribution (21.6%) or are presented in the entire tropical Atlantic Ocean (27.5%); three species also occur in the Mediterranean Sea and one in the eastern Pacific Ocean. Two fifths of the species (43.1%) are shared with the western Atlantic Ocean (including 1 species also present in the eastern Pacific Ocean, 1 restricted to the south-western Atlantic Ocean and 14 that are endemic to the Brazilian Province). Twelve species (7.8%) appear endemic to the insular complex. Considering only the reef fishes (Floeter *et al.*, 2008; $n = 125$), the present level of endemism is 9.6%, significantly higher than the 5.7% that had been previously estimated (Floeter *et al.*, 2008) (note that many endemic species were discovered and described after the work of Floeter *et al.*, 2008). Except for two labrids, endemics are small cryptobenthic species (three gobiids, three blenniids, two gobiessocids, one opistognathid and one labrisomid).

TABLE 1. Shore fish species of the Trindade–Martin Vaz insular complex. The reference for the first mention of each species is given, including those that are personal communications in the present study. For bibliographical records, the nomenclature was corrected for synonymy where necessary. Family order follows Nelson (2006). Epinephelidae follow Craig & Hastings (2007) and Craig *et al.* (2011), and Labridae follow Westneat & Alfaro (2005)

Family/species	Trindade	Martin Vaz
Ginglymostomatidae		
<i>Ginglymostoma cirratum</i> (Bonaterre 1788)	Nichols & Murphy (1914)	H. T. Pinheiro, pers. comm.
Rhincodontidae		
<i>Rhincodon typus</i> Smith 1828	Pinheiro <i>et al.</i> (2009)	
Lamnidae		
<i>Carcharodon carcharias</i> (L. 1758)	Miranda-Ribeiro (1919)	
Carcharhinidae		
<i>Carcharhinus limbatus</i> (Müller & Henle 1839)	Carvalho (1950)	
<i>Carcharhinus obscurus</i> (Lesueur 1818)	Carvalho (1950)	
<i>Carcharhinus perezii</i> (Poey 1876)	Nichols & Murphy (1914)	
<i>Galeocerdo cuvier</i> (Perón & LeSueur 1822)	Carvalho (1950)	
<i>Prionace glauca</i> (L. 1758)	Pinheiro <i>et al.</i> (2010)	Pereira-Filho <i>et al.</i> (2011)
Myliobatidae		
<i>Aetobatus narinari</i> (Euphrasen 1790)	Pinheiro <i>et al.</i> (2009)	
Heterenchelyidae		
<i>Pythonichthys sanguineus</i> Poey 1868†	Miranda-Ribeiro (1919)	
Moringuidae		
<i>Moringua edwardsi</i> (Jordan & Bollman 1889)*	Gasparini & Floeter (2001)	
Chlopsidae		
<i>Chlopsis bicolor</i> Rafinesque 1810*	Andreatta & Séret (1995)	
<i>Kaupichthys hyoproroides</i> (Strömman 1896)*	Present study	
Muraenidae		
<i>Echidna catenata</i> (Bloch 1795)*	Murray (1902)	
<i>Enchelycore carychroa</i> Böhlke & Böhlke 1976*	Pinheiro <i>et al.</i> (2009)	
<i>Enchelycore nigricans</i> (Bonaterre 1788)*	Miranda-Ribeiro (1919)	

TABLE I. Continued

Family/species	Trindade	Martin Vaz
<i>Gymnothorax miliaris</i> (Kaup 1856)*	Miranda-Ribeiro (1919)	H. T. Pinheiro, pers. comm.
<i>Gymnothorax moringa</i> (Cuvier 1829)*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Gymnothorax polygonus</i> Poey 1876*	Gasparini & Floeter (2001)	
<i>Monopenchelys acuta</i> (Parr 1930)*	Present study	
Ophichthidae		
<i>Myrichthys breviceps</i> (Richardson 1848)*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Myrophis</i> sp.*	Gasparini & Floeter (2001)	
<i>Ophichthus ophis</i> (L. 1758)*	Gasparini & Floeter (2001)	
Clupeidae		
<i>Harengula jaguana</i> Poey 1865	Carvalho (1950)	
Synodontidae		
<i>Synodus synodus</i> (L. 1758)*	Gasparini & Floeter (2001)	
<i>Trachinocephalus myops</i> (Forster 1801)*	Gasparini & Floeter (2001)	
Carapidae		
<i>Carapus bermudensis</i> (Jones 1874)*	Present study	
Mugilidae		
<i>Mugil curvidens</i> (Valenciennes 1836)	Gasparini & Floeter (2001)	
<i>Mugil trichodon</i> Poey 1875†	Miranda-Ribeiro (1919)	
Exocoetidae		
<i>Cheilopogon furcatus</i> (Mitchill 1815)	Carvalho (1950)	
<i>Cheilopogon heterurus</i> (Rafinesque 1810)	Miranda-Ribeiro (1919)	
<i>Exocoetus volitans</i> L. 1758	Miranda-Ribeiro (1919)	
<i>Hirundichthys affinis</i> (Günther 1866)	Carvalho (1950)	
Hemirhamphidae		
<i>Hemiramphus brasiliensis</i> (L. 1758)	Nichols & Murphy (1914)	
Belontiidae		
<i>Platybelone argalus</i> (Lesueur 1821)	Gasparini & Floeter (2001)	

TABLE I. Continued

Family/species	Trindade	Martin Vaz
Holocentridae		
<i>Holocentrus adscensionis</i> (Osbeck 1771)*	Nichols & Murphy (1914)	Pereira-Filho <i>et al.</i> (2011)
<i>Myripristis jacobus</i> Cuvier 1829*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Plectrypops retrospinis</i> (Guichenot 1853)*	Pinheiro <i>et al.</i> (2009)	Present study
<i>Sargocentron bullisi</i> (Woods 1955)*	Pinheiro <i>et al.</i> (2009)	Present study
Aulostomidae		
<i>Aulostomus strigosus</i> Wheeler 1955*	Present study	Pinheiro <i>et al.</i> (2009)
Dactylopteridae		
<i>Dactylopterus volitans</i> L. 1758*	Pinheiro <i>et al.</i> (2009)	
Scorpaenidae		
<i>Scorpaena albifimbria</i> Evermann & Marsh 1900*	Present study	
<i>Scorpaena isthmensis</i> Meek & Hildebrand 1928*	Present study	
<i>Scorpaena plumieri</i> Bloch 1789*	Gasparini & Floeter (2001)	
<i>Scorpaenodes caribbaeus</i> Meek & Hildebrand 1928*	Pinheiro <i>et al.</i> (2009)	
Serranidae		
<i>Pseudogramma gregoryi</i> (Breder 1927)*	Present study	
<i>Serranus phoebe</i> Poey 1851*	Gasparini & Floeter (2001)	Andreata & Séret (1995)
Epinephelidae		
<i>Cephalopholis fulva</i> (L. 1758)*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Dermatolepis inermis</i> (Valenciennes 1833)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Epinephelus adscensionis</i> (Osbeck 1765)*	Murray (1902)	Pereira-Filho <i>et al.</i> (2011)
<i>Gonioplectrus hispanus</i> (Cuvier 1828)*	Gasparini & Floeter (2001)	
<i>Hyporhamphus mystacinus</i> (Poey 1852)*	Pinheiro <i>et al.</i> (2010)	
<i>Mycteroperca bonaci</i> (Poey 1861)*	Carvalho (1950)	H. T. Pinheiro, pers. comm.
<i>Mycteroperca interstitialis</i> (Poey 1861)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Mycteroperca venenosa</i> (L. 1758)*	Carvalho (1950)	H. T. Pinheiro, pers. comm.
<i>Paranthias furcifer</i> (Valenciennes 1828)*	Pinheiro <i>et al.</i> (2009)	
<i>Rypticus saponaceus</i> (Bloch & Schneider 1801)*	Miranda-Ribeiro (1919)	

TABLE I. Continued

Family/species	Trindade	Martin Vaz
Opistognathidae		
<i>Opistognathus</i> species 2 in Smith-Vaniz, 1997*	Gasparini & Floeter (2001)	
Undescribed <i>Opistognathus</i> sp.*; ‡	Present study	
Priacanthidae		
<i>Heteropriacanthus cruentatus</i> (Lacepède 1801)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
Apogonidae		
<i>Apogon americanus</i> (Castelnau 1855)*	Gasparini & Floeter (2001)	
<i>Astrapogon puncticulatus</i> (Cope 1867)*	Pinheiro <i>et al.</i> (2009)	
<i>Phaeoptyx pigmentaria</i> (Poey 1860)*	Pinheiro <i>et al.</i> (2009)	
Malacanthidae		
<i>Malacanthus plumieri</i> (Bloch 1786)*	Miranda-Ribeiro (1919)	H. T. Pinheiro, pers. comm.
Coryphaenidae		
<i>Coryphaena hippurus</i> L. 1758	Nichols & Murphy (1914)	
Echeneidae		
<i>Echeneis naucrates</i> L. 1758	Miranda-Ribeiro (1919)	
<i>Remora remora</i> (L. 1758)	Pinheiro <i>et al.</i> (2009)	
Carangidae		
<i>Alectis ciliaris</i> (Bloch 1787)*	Pinheiro <i>et al.</i> (2009)	
<i>Carangoides bartholomaei</i> (Cuvier 1833)*	Carvalho (1950)	
<i>Carangoides ruber</i> (Bloch 1793)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Caranx crysos</i> (Mitchill 1815)*	Pinheiro <i>et al.</i> (2009)	Pinheiro <i>et al.</i> , 2009
<i>Caranx hippos</i> (L. 1766)*; †	Carvalho (1950)	
<i>Caranx latus</i> Agassiz 1831*	Gasparini & Floeter (2001)	
<i>Caranx lugubris</i> Poey 1860*	Nichols & Murphy (1914)	
<i>Decapterus macarellus</i> (Cuvier 1833)	Carvalho (1950)	Pereira-Filho <i>et al.</i> (2011)
<i>Elagatis bipinnulata</i> (Quoy & Gaimard 1825)	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Selar crumenophthalmus</i> (Bloch 1793)	Carvalho (1950)	H. T. Pinheiro, pers. comm.
<i>Seriola rivoliana</i> Valenciennes 1833*	Gasparini & Floeter (2001)	

TABLE I. Continued

Family/species	Trindade	Martin Vaz
<i>Uraspis secunda</i> (Poey 1860)	Gasparini & Floeter (2001)	
Lutjanidae		
<i>Lutjanus</i> cf. <i>vivamus</i> (Cuvier 1828)*	Gasparini & Floeter (2001)	
Gerreidae		
<i>Eucinostomus argenteus</i> Baird & Girard 1855†	Carvalho (1950)	
Haemulidae		
<i>Anisotremus surinamensis</i> (Bloch 1791)*	Nichols & Murphy (1914)	
Sparidae		
<i>Diplodus argenteus</i> (Valenciennes 1830)*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
Mullidae		
<i>Mulloidichthys martinicus</i> (Cuvier 1829)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Pseudupeneus maculatus</i> (Bloch 1793)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
Pempheridae		
<i>Pempheris poeyi</i> Bean 1885*	Miranda-Ribeiro (1919)	
<i>Pempheris schomburgki</i> Müller & Troschel 1848*	Pinheiro <i>et al.</i> (2009)	
Kyphosidae		
<i>Kyphosus incisor</i> (Cuvier 1831)*,†	Carvalho (1950)	Pereira-Filho <i>et al.</i> (2011)
<i>Kyphosus sectatrix</i> (L. 1758)*	Miranda-Ribeiro (1919)	
Chaetodontidae		
<i>Chaetodon striatus</i> L. 1758*	Miranda-Ribeiro (1919)	H. T. Pinheiro, pers. comm.
<i>Prognathodes brasiliensis</i> (Burgess 2001)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
Pomacanthidae		
<i>Centropyge aurantanotus</i> Burgess 1974*	Gasparini & Floeter (2001)	
<i>Holacanthus tricolor</i> (Bloch 1795)*	Gasparini & Floeter (2001)	
Cirrhitidae		
<i>Amblycirrhites pinos</i> (Mowbray 1927)*	Pinheiro <i>et al.</i> (2009)	H. T. Pinheiro, pers. comm.
Pomacentridae		
<i>Abudefduf saxatilis</i> (L. 1758)*	Murray (1902)	Pereira-Filho <i>et al.</i> (2011)

TABLE I. Continued

Family/species	Trindade	Martin Vaz
<i>Chromis flavicauda</i> (Günther 1880)*	Present study	Andreatta & Séret (1995)
<i>Chromis jubauna</i> Moura 1995*	Pereira-Filho <i>et al.</i> (2011)	Pereira-Filho <i>et al.</i> (2011)
<i>Chromis multilineata</i> (Guichenot 1853)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Microspathodon chrysurus</i> (Cuvier 1830)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Stegastes fuscus</i> (Cuvier 1830)*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Stegastes pictus</i> (Castelnau 1855)*	Pinheiro <i>et al.</i> (2009)	Pereira-Filho <i>et al.</i> (2011)
Labridae		
<i>Bodianus pulchellus</i> (Poey 1860)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Bodianus rufus</i> (L. 1758)*	Carvalho (1950)	H. T. Pinheiro, pers. comm.
<i>Clepticus brasiliensis</i> (Heiser, Moura & Robertson 2001)*	Pinheiro <i>et al.</i> (2009)	
<i>Cryptotomus roseus</i> Cope 1871*	Pinheiro <i>et al.</i> (2009)	
<i>Doratonotus megalepis</i> Günther 1862*	Present study	
<i>Halichoeres brasiliensis</i> (Bloch 1791)*	Murray (1902)	Pereira-Filho <i>et al.</i> (2011)
<i>Halichoeres penrosei</i> (Starks 1913)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Halichoeres poeyi</i> (Steindachner 1867)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Halichoeres rubrovirens</i> Rocha, Pinheiro & Gasparini 2010*, ‡	Pinheiro <i>et al.</i> (2009)	Pinheiro <i>et al.</i> (2009)
<i>Sparisoma amplum</i> (Ranzani 1842)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Sparisoma axillare</i> (Steindachner 1878)*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Sparisoma rocha</i> Pinheiro, Gasparini & Sazima 2010*, ‡	Carvalho (1950)	
<i>Sparisoma tuiupiranga</i> Gasparini, Joyeux & Floeter 2003*	Gasparini & Floeter (2001)	
<i>Thalassoma noronhanum</i> (Boulenger 1890)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Xyrichtys splendens</i> (Castelnau 1855)*	Pinheiro <i>et al.</i> (2009)	
<i>Xyrichtys novacula</i> (L. 1758)*	Carvalho (1950)	Andreatta & Séret (1995)
Tripterygiidae		
<i>Enneanectes altivelis</i> Rosenblatt 1960*	Gasparini & Floeter (2001)	
Blenniidae		
Undescribed <i>Entomacrodus</i> sp.*; ‡	Miranda-Ribeiro (1919)	H. T. Pinheiro, pers. comm.
Undescribed <i>Hypleurochilus</i> sp.*; ‡	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)

TABLE I. Continued

Family/species	Trindade	Martin Vaz
<i>Ophioblennius trinitatis</i> Miranda-Ribeiro, 1919*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Scartella potii</i> Rangel, Gasparini & Guimarães 2004*, ‡	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
Labrisomidae		
<i>Labrisomus nuchipinnis</i> (Quoy & Gaimard 1824)*	Murray (1902)	Pereira-Filho <i>et al.</i> (2011)
<i>Malacoctenus brunoi</i> Guimarães, Nunan & Gasparini 2010*, ‡	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
Chaenopsidae		
<i>Emblemarionopsis</i> aff. <i>signifer</i> (Ginsburg 1942)*	Present study	
Gobiesocidae		
Undescribed <i>Arcos</i> sp.*, ‡	Gasparini & Floeter (2001)	
Undescribed <i>Tomicodon</i> sp.*, ‡	Pinheiro <i>et al.</i> (2009)	
Callionymidae		
<i>Callionymus bairdi</i> Jordan 1888*	Pinheiro <i>et al.</i> (2009)	
Gobiidae		
<i>Chriolepis fisheri</i> Herre 1942*	Present study	
<i>Chriolepis vespa</i> Hastings & Bortone 1981*, †	Andreatta & Séret (1995)	
<i>Coryphopterus thrix</i> Bohlke & Robins 1960*	Pinheiro <i>et al.</i> (2009)	Present study
<i>Elacatinus pridisi</i> Guimarães, Gasparini & Rocha 2004*, ‡	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Gnatholepis thompsoni</i> Jordan 1902*	Gasparini & Floeter (2001)	
<i>Lythrypnus</i> species 2 in Maxfield <i>et al.</i> 2012*, ‡	Gasparini & Floeter (2001)	
Undescribed <i>Lythrypnus</i> sp.*, ‡	Present study	
<i>Priolepis dawsoni</i> Greenfield 1989*	Gasparini & Floeter (2001)	
Acanthuridae		
<i>Acanthurus bahianus</i> Castelnau 1855*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Acanthurus chirurgus</i> (Bloch 1787)*, †	Murray, 1902	
<i>Acanthurus coeruleus</i> Bloch & Schneider 1801*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
Sphyaenidae		
<i>Sphyaena barracuda</i> (Walbaum 1792)	Carvalho (1950)	Pereira-Filho <i>et al.</i> (2011)

TABLE I. Continued

Family/species	Trindade	Martin Vaz
Scombridae		
<i>Scomberomorus cavalla</i> (Cuvier 1829)	Gasparini & Floeter (2001)	
<i>Thunnus alalunga</i> (Bonmatte 1788)	Carvalho (1950)	
<i>Thunnus obesus</i> (Lowe 1839)	Pinheiro <i>et al.</i> (2009)	
Xiphiidae		
<i>Xiphias gladius</i> L. 1758	Pinheiro <i>et al.</i> (2010)	
Bothidae		
<i>Bothus lunatus</i> (L. 1758)*	Gasparini & Floeter (2001)	Andreata & Séret (1995)
<i>Bothus ocellatus</i> (Agassiz 1831)*,†	Miranda-Ribeiro (1919)	Andreata & Séret (1995)
Balistidae		
<i>Balistes capricus</i> Gmelin 1788*	Miranda-Ribeiro (1919)	Pereira-Filho <i>et al.</i> (2011)
<i>Balistes vetula</i> L. 1758*	Nichols & Murphy (1914)	
<i>Canthidermis maculata</i> (Bloch 1786)*	Murray (1902)	Pereira-Filho <i>et al.</i> (2011)
<i>Canthidermis sufflamen</i> (Mitchill 1815)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Melichthys niger</i> (Bloch 1786)*	Murray (1902)	
Monacanthidae		
<i>Aluterus scriptus</i> (Osbeck 1765)*	Carvalho (1950)	H. T. Pinheiro, pers. comm.
<i>Cantherhines macrocerus</i> (Hollard 1854)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
<i>Cantherhines pullus</i> (Ranzani 1842)*	Gasparini & Floeter (2001)	Pereira-Filho <i>et al.</i> (2011)
Ostraciidae		
<i>Acanthostracion polygonius</i> Poey 1876*	Pereira-Filho <i>et al.</i> (2011)	Present study
<i>Acanthostracion quadricornis</i> (L. 1758)*	Gasparini & Floeter (2001)	
Tetraodontidae		
<i>Canthigaster figuiredoi</i> Moura & Castro 2002*	Pinheiro <i>et al.</i> (2009)	Pereira-Filho <i>et al.</i> (2011)
<i>Sphoeroides spengleri</i> (Bloch 1785)*	Pinheiro <i>et al.</i> (2009)	
Diodontidae		
<i>Chilomycterus reticulatus</i> (L. 1758)*	Pinheiro <i>et al.</i> (2009)	
<i>Chilomycterus spinosus</i> (L. 1758)*	Pinheiro <i>et al.</i> (2009)	
<i>Diodon holocanthus</i> L. 1758*	Gasparini & Floeter (2001)	H. T. Pinheiro, pers. comm.
<i>Diodon hystrix</i> L. 1758*	Carvalho (1950)	

*Reef fish species (Floeter *et al.*, 2008).

†Doubtful records.

‡Trindade—Martin Vaz endemics.

With respect to reef fishes, Trindade, together with São Tomé and Príncipe and Fernando de Noronha Ridge (Fernando de Noronha Archipelago plus Rocas Atoll), was thought to have an intermediate level of endemism compared to the other oceanic islands of the Atlantic (Floeter *et al.*, 2008). Such moderate endemism is normally attributed to proximity to the continental margin (<1000 km) or to connections to mainland areas *via* seamounts. Because distances of 250 km or less separate each seamount of the Vitória–Trindade Chain from its closest neighbours, the seamounts could function as stepping stones permitting a rich fauna of great affinity with the western Atlantic Ocean to reach the chain extremity (Floeter & Gasparini, 2000). Trindade's endemism (9.6%), however, is comparable to that of St Paul's Rocks (9.3%), which are islets similarly isolated from the mainland (1010 km) but farther from the nearest reef habitats (630 km from Fernando de Noronha). Thus, the seamounts of the Vitória–Trindade Chain do not appear to function as stepping stones as expected, at least for cryptobenthic fishes of limited dispersal capabilities. Alternatively, the seamounts may have facilitated the colonization of Trindade by such species during glacial epochs. At the time, the sea level was up to 130 m below present (Lambeck *et al.*, 2002) and all seamounts were emerged, providing an extensive variety of habitats to be colonized between the island and the mainland. For species restricted to shallow depths and intertidal habitats, such as combtooth blenniids of the genus *Scartella* and *Entomacrodus*, the inundation of shallow habitats by sea level rise would have interrupted gene flow, allowing allopatric speciation (Rocha & Bowen, 2008). In contrast, for species of higher ecological amplitude or greater dispersal capabilities the seamounts may never have been important; obviously, a number of intermediate situations are possible between these two extremes. The evolution of the stepping stones function of seamounts is currently being investigated using a genetic survey of the entire chain. A portion of the chain is in international waters between unconnected parts of the Brazilian Exclusive Economic Zones (370 km off the continental coast and 370 km around Trindade). Thus, the maintenance of seamount-aided genetic flow for a number of species is probably essential to ensure the continuity of ecosystems services (*e.g.* biodiversity and genetic resources; Moberg & Ronnback, 2003) and will necessitate the establishment of international marine protected areas.

Another point to consider is the geological history of the seamounts and islands of the Vitória–Trindade Chain. Formation occurred in a west-to-east direction while the South-American Plate was drifting above a hotspot (Almeida, 2006). While the closest seamount to Trindade (Columbia, at 250 km) is *c.* 10 million years old (Fodor & Hanan, 2000), the insular complex is only 3–6 million years old (Cordani, 1970). The two islands also belong to two distinct seamounts despite their geographical closeness (*c.* 50 km) and, as such, could harbour rather distinct faunas. In fact, while 154 species are found on Trindade, only 67 are known from Martin Vaz (excluding doubtful records), and none occurs only on Martin Vaz. Martin Vaz' apparent indistinctness relative to Trindade appears sufficient to justify the concatenation of the two locales as a single zoogeographical unit [as in Pinheiro *et al.* (2009); Pereira-Filho *et al.* (2011) and the present study]. The paucity of ichthyological censuses at Martin Vaz, despite its proximity to Trindade, however, precludes in-depth comparisons. Martin Vaz remains the ultimate shallow Brazilian marine frontier to be explored before fishing of top predators (Pinheiro *et al.*, 2010) completely spoils the

fish assemblage structure, as has occurred at other Brazilian oceanic islands (Luiz & Edwards, 2011).

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APPENDIX

Museum vouchers of specimens from the Trindade–Martin Vaz insular complex, deposited in the ichthyological collection of the Universidade Federal do Espírito Santo (CIUFES). Species arranged in alphabetical order. *Amblycirrhitus pinos*: CIUFES 2210; *Astrapogon puncticulatus*: CIUFES 0845, 1551; *Aulostomus strigosus*: CIUFES 2339; *Carapus bermudensis*: CIUFES 2107, 2108, 2109, 2114, 2298; *Chriolepis fisheri*: CIUFES 1568, 1586, 2324; *Chromis flavicauda*: CIUFES 2206, 2212; *Doratonotus megalepis*: CIUFES 1541; *Emblemariopsis* aff. *signifer*: CIUFES 1565, 1593, 2129, 2221, 2294, 2301, 2311, 2316, 2319, 2331, 2353; *Enchelycore carychroa*: CIUFES 2241, 2243; *Enneanectes altivelis*: CIUFES 1561, 1592, 2214, 2236, 2295, 2303, 2315; *Kaupichthys hyoproroides*: CIUFES 2205, 2320, 2335; *Lythrypnus* species 2: CIUFES 1562, 1563, 1599, 2198, 2231, 2213, 2219, 2224, 2226, 2239, 2201, 2297, 2304, 2313, 2314, 2322, 2325, 2326, 2329; an undescribed *Lythrypnus* sp.: CIUFES 2232, 2238, 2296, 2327, 2330; *Monopenchelys acuta*: CIUFES 2204, 2336; *Opistognathus* species 2: CIUFES 1548, 1549, 1584, 2306, 2334; an undescribed *Opistognathus* sp.: CIUFES 2332, 2341, 2344, 2345, 2346, 2347, 2348, 2351; *Paranthias furcifer*: CIUFES 2379; *Plectrypops retrospinis*: CIUFES 2380; *Priolepis dawsoni*: CIUFES 1557, 1573; *Prognathodes brasiliensis*: CIUFES 1550; *Pseudogramma gregoryi*: CIUFES 2113, 2203, 2209, 2312; *Sargocentron bullisi*: CIUFES 1600, 2381; *Scorpaena albifimbria*: CIUFES 2197, 2222, 2337; *Scorpaena isthmensis*: CIUFES 2342, 2349; *Scorpaenodes caribbaeus*: CIUFES 2200, 2223; *Sphoeroides spengleri*: CIUFES 1545.