Annotated checklist of the coastal ichthyofauna from Michoacán State, Mexico

Eloísa Torres-Hernández¹, Georgina Palacios-Morales¹, Salvador Romero-Gallardo¹, Paloma Salazar-Araujo², Adrián García-Meraz¹, Xavier Madrigal-Guridi¹, Luis F. Del Moral-Flores³, Omar Domínguez-Domínguez¹

¹ Laboratorio de Biología Acuática Facultad de Biología Universidad Michoacana de San Nicolás de Hidalgo Ciudad Universitaria s/n Morelia Michoacán México ² Posgrado de Ciencias del Mar y Limnología Unidad Académica Mazatlán Universidad Nacional Autónoma de México Apartado postal 811 Mazatlán 82000 Sinaloa México ³ Laboratorio de Zoología, Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México, 54090 Tláhuac, Estado de México, México.

Corresponding author: Omar Domínguez (goodeido@yahoo.com.mx)

Abstract
This study is the first to complete an intensive and comprehensive list of the ichthyofauna of nearly all ecosystems of the Michoacán coast, Mexico. The resulting systematic checklist, supplemented with information from the literature and scientific collections, comprises 440 species belonging to two classes, 31 orders, 104 families, and 264 genera. The families with the highest number of species were Sciaenidae (30 spp.), Carangidae (26), Haemulidae (24), Serranidae (21), Paralichthyidae, and Gobiidae (13). Of the total species list, 134 represent first records for the Michoacán State, and one is a first record for Mexico. The results expand the number of known fish species of the Michoacán coast by almost one third and will help to develop conservation and management plans for this coastal zone.

Keywords
Coastal fish, estuaries, marine, Mexican Central Pacific, systematic list
Introduction

Mexico has a wealth of both marine species and ecosystems. The country has the world’s twelfth longest marine territory, including both Atlantic and Pacific oceans. The geographic and geological history, as well as the ecological and biological richness of areas such as the Gulf of California, the Oceanic islands, and the Caribbean, expands the diversity of Mexican marine life (Lara-Lara et al. 2008), including the ichthyofauna. The few studies pertaining to these taxa have primarily focused on conservation priority zones such as the Gulf of California (e.g. Del Moral-Flores et al. 2013), protected marine areas (e.g. Galván-Villa et al. 2016), or on economically important species (e.g. Lara-Lara et al. 2008).

The Mexican tropical Pacific is part of the biogeographic region known as the Tropi- cal Eastern Pacific (TEP), which comprises three provinces: Cortez or Sinuscaliforniana, Mexican, and Panamic (sensu Briggs 1974). An estimated 1358 fish species occur in the TEP region, along with an additional of approximately 59 undescribed species (Zapata and Robertson, 2007). The TEP could be considered an area of low richness compared to other biogeographical regions of tropical seas, such as the Indo-Malaysian or the Great Caribbean. However, approximately 71% of identified TEP fish species are considered endemic, making it the tropical region with the highest rate of endemism per unit area in the world (Robertson and Allen 2015). According to Robertson and Allen (2015), the Cortez province possesses 9% of the 515 endemic fish species identified in the coastal ecosystems of the TEP region, whereas the Mexican and the Panamic provinces host 2% and 29% of the endemic component, respectively. Nine percent of the endemic species occur in both the Cortez and Mexican provinces, 10% in both the Mexican and the Panamic provinces, and 37% of the species are found in the three provinces. The endemic fish fauna of the five TEP oceanic islands (Revillagigedo, Galapagos, Cliperton, Coco, and Malpelo) represent, on the other hand, 10% of the total.

The Mexican province is highly productive due to the convergence of the Costa Rica Coastal Current and the California Current, favoring the presence of tropical, temperate, and transitional fish species (Kessler 2006). Based on its lower number of endemic fish species, the Mexican province has been considered a transition zone between the Cortez province in the north and the Panamic to the south (Hastings 2000, Palacios-Salgado 2005, Robertson and Cramer 2009). Attempts to characterize the ichthyofauna of this province are scarce, and most of them refer to a particular group of fishes, region or are based on unpublished reports (Madrid-Vera et al. 1998; Palacios-Salgado 2005, Madrigal-Guridi 2006, Moncayo-Estrada et al. 2006, Chávez-Comparan et al. 2008, López-Pérez et al. 2010, Márquez-Espinoza 2012, Sandoval-Huerta et al. 2012, 2012b, 2014; Palacios-Morales et al. 2014).

The coastline of the Michoacán State, in the Mexican province, is 261.5 km in length and runs from Boca de Apiza, at the mouth of the Coahuayana River, which represents the border with the Colima State to the north, to Barra de San Francisco, at the mouth of the Balsas River, which represents the border with the Guerrero State to the south (Correa and Gómez 2003). There are two contrasting physiographic zones
differing markedly in the marine ecosystems and consequently in the fish species present: (1) the municipalities of Lazaro Cardenas and Coahuayana, which are characterized by coastal plains, with a wide sandy coastline, mangroves, and estuary zones, (2) and the municipality of Aquila comprising numerous cliffs extending into the sea and forming wide zones of rocky reefs, coralline patches, and intertidal pools; estuaries in the last zone are scarce and differ in size and dynamism from those found in Lazaro Cardenas and Coahuyana (Correa and Gómez 2003).

Such heterogeneity in a transitional zone potentially produces high fish species richness. Nevertheless, information on the ichthyofauna of the Michoacán coast is limited, including two study focused on artisanal fishery species (Amezcue-Linares 2009, Sánchez-Aguilar 2007), two on estuarine fishes (Madrigal-Guridi 2006, Sandoval-Huerta et al. 2014) and one including all habitats (Medina-Nava et al. 2001). Madrid-Vera et al. (1998) published the previously most extensive list of the fish fauna of the Michoacán coast, with 257 species, 157 genera, and 76 families recorded in a wide variety of environments. This limited knowledge of the fish fauna contrasts with the importance of the fishery to the economy of the region as the main economic activity, with about 11,931 fishermen producing 6525 tons with an estimated economic value of 145,255,860 MXN (CONAPESCA 2014).

The main goal of this study was to provide an updated checklist of the ichthyofauna from the Michoacán coast including information on fish of local commercial importance and their biogeographic affinity. This knowledge will increase the understanding of regional fish diversity and could be of usefulness for conservation and management strategies of the littoral zone of the Central Mexican Pacific and particularly for the Michoacán State.

Materials and methods

The study area encompassed the coastline of Michoacán state, with 110 locations directly sampled (Fig. 1) and information on 50 additional sites obtained from published literature or scientific collections. These data were obtained through extensive review of the biological material deposited at the Colección de Peces de la Universidad Michoacana de San Nicolás de Hidalgo (CPUM), the Colección Nacional de Peces (UNAM), the Colección Ictiológica del Instituto de Ciencias del Mar y Limnología (UNAM) and the Marine Vertebrate Collection, Scripps Institute of Oceanography (SIO). In addition, records from the data base of the fish collection of the California Academy of Sciences (CAS) were reviewed. These investigation also included an extensive review of specialized publications (books, catalogues, and field guides) and reports of specimens deposited in ichthyological collections recognized by the Secretaria de Medio Ambiente y Recursos Naturales, México, or specimens of which identification was corroborated by experts.

Field sampling was conducted bimonthly from February 2010 to February 2011, with intermittent sampling in the ensuing year. Sampling was carried out in estuarine
Figure 1. Sampling locations on the coast of Michoacán State.

zones, rocky intertidal pools, rocky reefs, sandy areas, coralline communities, artificial reefs, and the demersal-pelagic area. Methods were tailored to the ecosystem. Reef species were collected via SCUBA diving using elastic band harpoons. Ecologically cryptic (sensu Viesca-Lobatón 2005) and intertidal pool species were collected using eugenol (clove oil) anesthetic at a ratio of 1:5 (eugenol:ethanol) for reef and 0.25:9.75 for intertidal pool species. When the organisms were sedated, they were captured with a slurp gun or hand net. For estuarine locations, nocturnal sampling was done using gill nets (12 × 1.8 m and 0.7 to 1.2 cm mesh) and cast nets. For sandy-bottomed sites, a small fishing net (2 × 1.8 m, 1 cm mesh and 3 m bag) was used using a dragging period of 20 min. Captures from a shrimp fishing boat were also analyzed. Aggregations of debris in the open sea were investigated to collect ocean species rarely found in coastal areas. Cooperation with local artisanal fishermen was established to review incidental and commercial catches. Fishermen used lines of 50, 100, and 200 m at 5, 20, and 40 m depth, with hooks of various sizes, fishing with fishhook at a maximum depth of 80 m and gillnets of 7 to 12 cm mesh size. Information about the commercial value and uses of the species also was recorded.

Most specimens were photographed upon collection; tissue samples were taken and deposited at the tissue collection of the CPUM. Specimens were fixed in 5% or 10% formalin neutralized with sodium borate and posteriorly preserved in 70% etha-
Annotated checklist of the coastal ichthyofauna from Michoacán State, Mexico

Fishes were identified using the keys and descriptions from Springer (1962), Allen and Robertson (1991, 1992, 1998), Fisher et al. (1995), Castro-Aguirre et al. (1999), Hastings and Robertson (1999, 1999b), Thomson et al. (2000), Carpenter and Niem (2001), Miller and Stefanni (2001), Miller et al. (2005), and Robertson and Allen (2015). For some groups, specialized literature was required: Balistidae (Latreille 1804, Shaw 1804-1805, Jordan and Evermann 1900, Froese and Pauly 2003), Rhinobatidae (Himaya and Kumada 1940), Gerreidae (Benitez 2004), Atherinopsidae (Lavenberg and Chernoff 1995), Labrisomidae (Hubbs 1953; Springer 1959, Rosenblatt and Parr 1969, Rosenblatt and Taylor 1971), Blenniidae (Springer 1962), Chaenopsidae (Hastings and Robertson 1999), Tripterygiidae (Allen and Robertson 1991, 1992, Rosenblatt et al. 2013), and for the genera *Abudefduf* Forsskål, 1775, *Tomicodon* Brisout de Barneville, 1846, *Gobiesox* Lacepède, 1800 (Briggs 1955; Briggs and Miller 1960), and *Albula* Scopoli, 1777 (Pfeiler 2008). All specimens were deposited at CPUM (MICH-PEC-227-07-09).

The systematic arrangement followed Nelson et al. (2016). The current taxonomic status of each species was corroborated in Eschmeyer et al. (2016). The arrangement of the genera and species was in alphabetical order. In the systematic list, the habitat-type from which each species was collected and the scientific collection by which the specimen was identified, or the scientific document from which information of the specimen was obtained, are indicated.

Finally, a zoogeographical affinity analysis of the species, based on the biogeographical regionalization proposed by Briggs (1974, 1995), was made. Accordingly, the Tropical Eastern Pacific was divided into three provinces. The San Diegan province was also included, since some species tended to have a northern distribution.

**Results**

Sampling was performed in 13 intertidal pool sites, 20 rocky reef sites, three coralline communities, two artificial reefs, 22 estuarine ecosystems, and 50 soft bottom and open sea sites, collecting 6963 fishes.

The compiled systematic list of ichthyofauna of the Michoacán coast comprises 436 species belonging to two classes, 31 orders, 104 families, and 260 genera (Table 1). The families representing the greatest number of species were Sciaenidae (30), Carangidae (26), Haemulidae (24), Serranidae (21), and Paralichthyidae and Gobiidae (13). The genera with the highest number of species were *Lutjanus* Bloch, 1790 (9), *Carcharhinus* Blainville, 1816 (7), *Anchoa* Jordan and Evermann, 1927 (6), *Diplectrum* Holbrook, 1855 (6), and *Caranx* Lacepède, 1801 (5).

Of the total identified species, 69% were collected and deposited at the CPUM, 22% were obtained from literature records, 7.5% from the review of museum specimens, and 1% from databases of ichthyological collections (Table 1). In addition, seven species were recorded through video and photographic evidence: *Ginglymostoma unami* Del Moral Flores, Ramírez-Antonio, Angulo y Pérez-Ponce de León, 2015,
Table 1. Updated checklist of the coastal ichthyofauna from Michoacán, Mexico.

| Family | Genus and Species | References and organisms voucher | The importance in fisheries |
|--------|-------------------|----------------------------------|-----------------------------|
| CLASS ELASMOBRANCHII | | | |
| ORDER ORECTOLOBIFORMES | | | |
| FAMILY GINGLYMOSTOMATIDAE | | | |
| Ginglymostoma unami Del Moral Flores, Ramírez-Antonio, Angulo y Pérez-Ponce de León, 2015 | R | AA | 2, 4, 6, CPUM | A |
| ORDER LAMNIFORMES | | | |
| FAMILY LAMINIDAE | | | |
| Isurus oxyrinchus | | | |
| FAMILY ALOPIIDAE | | | |
| Alopias pelagicus Nakamura, 1935 | | | |
| Alopias superciliosus (Lowe, 1841) | | | |
| ORDER CARCHARHINIFORMES | | | |
| FAMILY TRIAKIDAE | | | |
| Mustelus lunulatus Jordan & Gilbert, 1882 | D | TEP | 2, 6 |
| FAMILY CARCHARHINIDAE | | | |
| Carccharhinus albimarginatus (Rüppell, 1837) | | | |
| Carccharhinus brachyurus (Günther, 1870) | | | |
| Carccharhinus ceraled Gilbert, 1898 | TEP | 1, 2 |
| Carccharhinus falciformis (Müller & Henle, 1839) | | | |
| Carccharhinus leucas (Müller & Henle, 1839) | CT | 1, 2 |
| Carccharhinus limbatas (Müller & Henle, 1839) | D | CT | 1, 2, 6, CPUM | C |
| Carccharhinus obscura (Lesueur, 1818) | CT | 1, 2 |
| Galeocerdo cuvier (Péron & Lesueur, 1822) | CT | 1, 2 |
| Nasolamia velox (Gilbert, 1898) | TEP | 2 |
| Negaprion brevirostris (Poey, 1868) | AA | 1, 2 |
| Rhizoprionodon longurio (Jordan & Gilbert, 1882) | D | SP, TEP | 1, 2, CPUM | C |
| FAMILY SPHYRNIDAE | | | |
| Sphyrna lewini (Griffith & Smith, 1834) | D | CT | 1, 2, 4, 6, 9, CPUM | C |
| Sphyrna zygaena (Linnaeus, 1758) | | | |
| ORDER TORPEDINIFORMES | | | |
| FAMILY NARCINIDAE | | | |
| Narcine entemedor Jordan & Starks, 1895 | D | TEP | 1, 9, CPUM | I |
| *Narcine vermiculatus Breder, 1928 | D | MP, PP | 6, 9, CPUM, ICMYL, CIBNOR | I |
| ORDER PRISTIFORMES | | | |
| FAMILY PRISTIDAE | | | |
| *Pristis pristis (Linnaeus, 1758) | PD | AA | CPUM-photo | C |
| ORDER RAJIFORMES | | | |
| FAMILY RHINOBATIDAE | | | |
| Rhinobatos glaucostigma Jordan & Gilbert, 1883 | R | TEP | 1, 2, 4, 6, 9, CPUM, ICMYL | C |
| Rhinobatos productus Ayres, 1856 | SP, TEP | 2 |
| *Zapteryx xyster Jordan & Evermann, 1896 | R | TEP | CPUM, SIO | I |
| Family                      | Species                                    | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|-----------------------------|--------------------------------------------|--------------------------------|---------------------------|----------------------------------|----------------------------|
| Family Rajidae              | *Raja equatorialis* (Jordan & Bollman, 1890) | MP, PP                         |                           | 1                                |                            |
| Family Myliobatiformes      | Urotrygon aff. aspidura (Jordan & Gilbert, 1882) | TEP                           |                           | 1                                |                            |
| Family Myliobatidae         | Urotrygon chilensis (Günther, 1872)         | TEP                           | 1, 2, 9                   |                                  |                            |
|                            | Urotrygon munda Gill, 1863                  | TEP                           | 2                         |                                  |                            |
|                            | Urotrygon nana Miyake & McEachran, 1988     | TEP                           | 1, 9                      |                                  |                            |
|                            | Urotrygon rogersi ( Jordan & Starks, 1895)  | PD                            | TEP 1, 4, 9, CPUM, SIO    |                                  | I                          |
| Family Gymnuridae           | Gymnura marmorata (Cooper, 1863)            | SP, TEP                       | 1, 9, CPUM                | C                                |                            |
| Family Myliobatidae         | Aetobatus laticeps (Euphrasen, 1790)        | R                             | CT 2, 4, CPUM-photo       | I                                |                            |
| Family Myliobatidae         | *Rhinoptera steindachneri* Evermann & Jenkins, 1891 | PD                            | TEP CPUM                  | I                                |                            |
| Family Mobulidae            | *Mobula munkiana* Notarbartolo di Sciara, 1987 | PD                            | TEP CPUM                  | C                                |                            |
| Family Urotrygonidae        | Urobatis concentricus Osburn & Nichols, 1916 | R                             | TEP 1, 6, CPUM            |                                  |                            |
|                            | Urobatis halleri (Cooper, 1863)             | R                             | TEP 2, CPUM               |                                  |                            |
| Family Dasyatidae           | Dasyatis dipterura (Jordan & Gilbert, 1880)  | D                             | TEP 2, 9, CIBNOR          |                                  |                            |
|                            | Dasyatis longus (Garman, 1880)              | PD                            | SP, TEP 1, CPUM           | I                                |                            |
| Class Actinopterygii        | Order Elopiformes                          |                               |                           |                                  |                            |
| Family Elopidae             | Elops affinis Regan, 1909                   | E                             | SP, TEP 2, CPUM           | C                                |                            |
| Family Albuliformes         | Order Albuliformes                         |                               |                           |                                  |                            |
| Family Albulidae            | Albula pacifica (Beebe, 1942)               | D                             | MP, PP 1, 2, 9, CPUM      | C                                |                            |
| Order Anguilliformes        | Family Muraenidae                          |                               |                           |                                  |                            |
|                            | *Echidna nocturna* (Cope, 1872)             | PM, R                         | CP, MP CPUM               |                                  |                            |
|                            | *Enchelycore octaviana* (Myers & Wade, 1941) | PM, R                         | CP, MP CPUM               |                                  |                            |
|                            | Gymnomuraena zebra (Shaw, 1797)             | R                             | AP 2, 6, CPUM             | I                                |                            |
|                            | Gymnomuraena castanea (Jordan & Gilbert, 1883) | PM, R                         | TEP 2, 6, CPUM            |                                  |                            |
|                            | *Gymnomuraena equatorialis* (Hildebrand, 1946) | R                             | TEP 9, CPUM               |                                  |                            |
|                            | *Muraena argus* (Steindachner, 1870)        | R                             | TEP ICMYL                 |                                  |                            |
|                            | Muraena lentiginosa Jenyns, 1842            | PM, R                         | TEP 2, 4, 5, 9, CPUM      |                                  |                            |
|                            | *Uropterygius macrocephalus* (Bleeker, 1864) | PM                            | TEP CPUM                  |                                  |                            |
| Family Ophichthidae         | *Apterichthys equatorialis* (Myers & Wade, 1941) | R                             | TEP CPUM                  |                                  |                            |
|                            | *Echiophis bruneus* (Castro-Aguirre & Suárez de los Cobos, 1983) | R                             | TEP CPUM                  |                                  |                            |
|                            | *Myrichthys aspetercheiros* McCosker & Rosenblatt, 1993 | R                             | CP, MP 6, CPUM            |                                  |                            |
| Taxon (authors and year) | Collected habitat | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|-------------------------|------------------|---------------------------|----------------------------------|---------------------------|
| Ophichthus trierialis (Kaup, 1856) | R | TEP | 2, CPUM, ICMYL | I |
| Ophichthus zophochir Jordan & Gilbert, 1882 | R | TEP | 1, 2, CPUM, ICMYL | I |

**FAMILY CONGRIDAE**

* Ariosa gilberti (Ogilby, 1898) | D | MP, PP | 9 |
* Heteroconger digueti (Pellegrin, 1923) | TEP | | 2 |
* Panconger californiensis Kanazawa, 1961 | TEP | | SIO |
* Rhynchoconger nitens (Jordan & Bollman, 1890) | D | TEP | 9, CPUM, ICMYL | I |

**ORDER CLupeiformes**

**FAMILY CLupeidae**

* Harengula thrixina (Jordan & Gilbert, 1882) | PM | SP, TEP | 2, 4, 6, 9, CPUM | A |
* Lile gracilis Castro-Aguiurre & Vivero, 1990 | E | MP, PP | 1, 12, CPUM |
* Lile nigrofasciata Castro-Aguiurre, Ruiz-Campos & Balart, 2002 | E | TEP | 1, 10, 12, 13, CPUM |
* Lile stolifera (Jordan & Gilbert, 1882) | E | TEP | CPUM |
* Opisthonema bulleri (Regan, 1904) | PD | TEP | CPUM |
* Opisthonema libertate (Günther, 1867) | E | SP, TEP | 2, 8, CPUM | A |
* Opisthonema medistre Berry & Barrett, 1963 | PM | TEP | CPUM | A |

**FAMILY ENGRAULIDAE**

* Anchoa argentivittata (Regan, 1904) | PM | TEP | CPUM | A |
* Anchoa ichana (Jordan & Gilbert, 1882) | TEP | | 2, 5 |
* Anchoa lucida (Jordan & Gilbert, 1882) | E | TEP | 2, 12, CPUM |
* Anchoa mundeola (Gilbert & Pierson, 1898) | TEP | | 2 |
* Anchoa nata (Kner & Steindachner, 1867) | PM | TEP | CPUM, ICMYL |
* Anchoa scofieldi (Jordan & Culver, 1895) | PD | MP, PP | 2, 4, CPUM | A |
* Anchovia macrolepidota (Kner, 1863) | PD | SP, TEP | CPUM | A |
* Ctenoglanis mysticus (Günther, 1867) | PD | TEP | 2, CPUM | A |

**FAMILY PRISITIGASTERIDAE**

* Ilisha fuerthii (Steindachner, 1875) | MP, PP | | 2, 7 |
* Opisthopterus doovi (Günther, 1868) | TEP | | 8 |
* Plioosteostoma latipinnis (Jordan & Gilbert, 1882) | E | TEP | 1, 8, 9, 10, 12, 13, CPUM | A |

**ORDER GONORYNCHIFORMES**

**FAMILY CHANIDAE**

* Chanos chanos (Forsskål, 1775) | PD | CT | 2, 7, CPUM | C |

**ORDER CYPRINIFORMES**

**FAMILY CYPRINIDAE**

* Cyprinus carpio Linnaeus, 1758 | E | Introduced | CPUM |

**ORDER SILUROFORMES**

**FAMILY ARIIDAE**

* Bagre panamensis (Gill, 1863) | TEP | | 2 |
* Bagre pinnimaculatus (Steindachner, 1876) | TEP | | 2 |
* Cathorops dasyccephalus (Günther, 1864) | MP, PP | | 2 |
* Notarius kesleri (Steindachner, 1877) | MP, PP | | 1, 2 |
* Notarius platiceps (Parr, 1931) | MP, PP | | 1, 2 |
* Occidentarius platypogon (Steindachner, 1877) | E, D | SP, TEP | 1, 8, 9, CPUM | C |
* Sciades guatemalensis (Günther, 1864) | E | MP, PP | 1, 2, CPUM | C |
* Sciades seemanni (Günther, 1864) | TEP | | 1, CNPE-IBUNAM |
| FAMILY LORICARIIDAE | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|---------------------|-------------------------------|---------------------------|---------------------------------|---------------------------|
| *Pterygoplichthys disjunctivus* (Weber, 1991) | E | Introduced | 10, CPUM |

**ORDER OSMERIFORMES**

**FAMILY BATHYLAGIDAE**

| *Bathylagoides nigrogenys* Garman, 1899 | MP, PP | SIO |

**ORDER STOMIIFORMES**

**FAMILY GONOSTOMATIDAE**

| *Cyclothone acclinidens* (Garman, 1899) | CT | SIO |

**FAMILY PHOSICHTHYIDAE**

| *Vinciguerria lucetia* (Garman, 1899) | AP | SIO |

**FAMILY STOMIIDAE**

| *Bathophilus filifer* Gilbert, 1890 | AP | SIO |
| *Idiacanthus antrostomus* (Parr, 1929) | AP | SIO |

**ORDER AULOPIFORMES**

**FAMILY SCOPELARCHIDAE**

| *Scopelarchoides nicholai* Jordan & Bollman, 1890 | SP, TEP | SIO |

**FAMILY SYNODONTIDAE**

| *Synodus evermanni* Gilbert, 1890 | R | TEP | 9, CPUM, SIO | I |
| *Synodus actinurus* Jordan & Gilbert, 1882 | R | TEP | 9, CPUM |

*S. scutuliceps* Hildebrand, 1946 | TEP | 1, 2, 9, ICMYL |

*Synodus sechurae* Parr, 1931 | PD | TEP | CPUM | I |

**ORDER MYCTOPHIFORMES**

**FAMILY MYCTOPHIDAE**

| *Diaphus pacificus* Hubbs, 1944 | AP | CAS |
| *Diogenichthys lateratus* (Jordan & Bollman, 1890) | AP | CAS |

*Lampanyctus ornostigma* (Gilbert, 1890) | AP | CAS |
| *Lampanyctus parvicauda* Parr, 1931 | AP | SIO |

*Myctophum aurolateralum* (Putnam, 1874) | AP | ANSP |

**ORDER OPHIDIIFORMES**

**FAMILY CARAPIDAE**

| *Carapus dubius* (Putnam, 1874) | AP | 1 |

**ORDER BATRACHOIDIFORMES**

**FAMILY BATRACHOIDIDAE**

| *Batrachoides watsoni* Collette & Russo, 1981 | MP, PP | ICMYL |
| *Porichthys ephippiatus* Walker y Rosenblatt, 1988 | TEP | CPUM, SIO | I |

*Porichthys margaritatus* (Richardson, 1844) | TEP | 9, CIBNOR |

**FAMILY LOPHIIDAE**

| *Lophiodon caudinotus* (Garman, 1899) | SP, TEP | 1, 9, SIO, ICMYL |
| *Lophiodon spiralis* (Garman, 1899) | TEP | 1 |
| FAMILY ANTWNNARIIDAE | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|----------------------|-------------------------------|---------------------------|---------------------------------|-----------------------------|
| *Antennatus sanguineus* (Gill, 1863) | SP, TEP                     | 6                          |                                 |                             |
| *Antennatus striatus* (Gill, 1863) | R                            | TEP                        | 6, CPUM, ICMYL                  |                             |
| *Fowlerichthys avalonis* (Bancroft, 1834) | R                            | SP, TEP                   | 6, 9, CPUM                      |                             |

| FAMILY OGCOCEPHALIDAE |
|-----------------------|
| Zalieutes elater (Jordan y Gilbert, 1882) | PD | SP, TEP | 1, 2, 9, CPUM, SIO, ICMYL | 1 |

| ORDER GOBIESOCIFORMES |
|-----------------------|
| FAMILY GOBIESOCIDAE |
| *Arcos erythrops* (Jordan & Gilbert, 1882) | PM, R | CP, MP | CPUM |
| *Gobiesox adustus* Jordan & Gilbert, 1882 | PM, R | TEP | CPUM |
| *Gobiesox mexicanus* Briggs & Miller, 1960 | E | Freshwater | CPUM |
| *Tomicocon petersii* (Garman, 1875) | R | MP, PP | CPUM |
| *Tomicocon zebri* (Jordan & Gilbert, 1882) | PM | CP, MP | 2, CPUM |

| ORDER ATERINIFORMES |
|---------------------|
| FAMILY ATERINOPSIDAE |
| *Atherinella eirena* Jordan y Gilbert, 1882 | PM | TEP | 4, CPUM, CNPE-IBUNAM |
| Atherinella guatemalensis (Günther, 1864) | E | MP, PP | 1, 8, 12, CPUM, CNPE-IBUNAM |
| Atherinella panamensis Steindacher, 1875 | E | MP, PP | 8, 10, 12, CPUM |

| ORDER CYPRINODONTIFORMES |
|--------------------------|
| FAMILY POECILIDAE |
| Poecilia butleri Jordan, 1889 | E | Freshwater | 8, 10, 12, 13, CPUM |

| ORDER BELONIFORMES |
|--------------------|
| FAMILY BELOIDAE |
| Playbelone argalis (Lesueur, 1821) | CT | 2, SIO, ANSP |
| Strongylura exilis (Girard, 1854) | SP, TEP | 2, 6 |
| Tylosurus fodiator Jordan y Gilbert, 1882 | PD | TEP | 2, CPUM |

| FAMILY HEMIRAMPHIDAE |
|----------------------|
| Hemiramphus saltator Gilbert & Starks, 1904 | PD | TEP | 1, 6, CPUM |
| Hyporhamphus naos Banford & Collette, 2001 | PD | TEP | 1, CPUM |
| *Oxporhamphus micropterus* (Valenciennes, 1847) | CT | SIO |

| FAMILY EXOCOETIDAE |
|---------------------|
| *Cheilopogon furcatus* (Mitchell, 1815) | CT | SIO |
| *Cheilopogon papilio* (Clark, 1936) | SP, CP, MP | SIO |
| Cypselurus callopterus (Günther, 1866) | SP, CP, MP | 1, 2, SIO |
| *Exocoetus monorrinus* Richardson, 1846 | AP | SIO |
| Fodiator rostratus (Günther, 1866) | TEP | 2, SIO |
| *Prognichthys tringa* Breder, 1928 | AP | SIO |

| ORDER STEPHANOBEKYRIFORMES |
|-----------------------------|
| FAMILY MELAMPHAIDAE |
| *Scopelogadus mizolepis* (Günther, 1878) | CT | CAS |

| ORDER BERYCIFORMES |
|--------------------|
| FAMILY HOLOCENTRIDAE |
| Sargocentron suborbitale (Gill, 1863) | PM, R | TEP | 2, 4, 5, 6, CPUM, SIO, ICMYL |
|                | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|----------------|--------------------------------|---------------------------|----------------------------------|----------------------------|
| Myripristis leiognathus Valenciennes, 1846 | R                               | SP, TEP                   | 2, 5, 6, 9, CPUM                  |                            |
| **ORDER SYNGNATHIFORMES**                  |                                 |                           |                                  |                            |
| **FAMILY FISTULARIIDAE**                    |                                 |                           |                                  |                            |
| Fistularia commersonii Rüppell, 1838        | R                               | AP                        | 1, 2, 6, CPUM                     |                            |
| *Fistularia corneta Gilbert & Starks, 1904  | R                               | SP, TEP                   | CPUM                             |                            |
| **FAMILY SYNGNATHIDAE**                     |                                 |                           |                                  |                            |
| *Doryrhamphus excisus Kaup, 1856            | R                               | AP                        | CPUM                             |                            |
| Hippocampus ingens Girard, 1858             | R                               | SP, TEP                   | 1, 2, 6, 9, CPUM, ICMYL           |                            |
| Pseudophallus starkii (Jordan & Culver, 1895) | E                               | TEP                       | 1, 12, CPUM, CNPE-IBUNAM         |                            |
| **ORDER SCORPAENIFORMES**                  |                                 |                           |                                  |                            |
| **FAMILY SCORPAENIDAE**                     |                                 |                           |                                  |                            |
| Scorpaena histrio Jenyns, 1840              |                                 | TEP                       | 2                                |                            |
| Scorpaena mystes (Jordan & Starks, 1895)    | R                               | AA                        | 1, 6, 9, CPUM, ICMYL              | I                          |
| Scorpaena rurutula Jordan & Bollman, 1890   |                                 | TEP                       | 1, 9                             |                            |
| *Scorpaena sonone Jenkins & Evermann, 1889 | PD                              | CP, PP                    | CPUM                             | I                          |
| *Scorpaenodes xyris (Jordan & Gilbert, 1882)| R                               | SP, TEP                   | CPUM                             |                            |
| **FAMILY TRIGLIDAE**                        |                                 |                           |                                  |                            |
| *Bellator gymnostethus (Gilbert, 1892)      |                                 | TEP                       | 9                                |                            |
| Bellator loxias (Jordan, 1897)              |                                 | TEP                       | 2                                |                            |
| Bellator xenisma (Jordan & Bollman, 1890)   |                                 | TEP                       | 1, 2, 9                          |                            |
| Prionotus albirostris Jordan & Bollman, 1890|                                 | TEP                       | 1, 9                             |                            |
| Prionotus borreni Richardson, 1844          |                                 | TEP                       | 1                                |                            |
| Prionotus ruscarius Gilbert & Starks, 1904  | R                               | SP, TEP                   | 1, 2, 9, CPUM, SIO               | A                          |
| Prionotus stephanophrys Lockington, 1881    | R                               | SP, TEP                   | 1, 2, 9, CPUM, ICMYL             | A                          |
| **ORDER PERCIFORMES**                       |                                 |                           |                                  |                            |
| **FAMILY CENTROPOMIDAE**                    |                                 |                           |                                  |                            |
| Centropomus armatus Gill, 1863              | PD                              | MP, PP                    | 2, 7, 8, CPUM                    | C                          |
| Centropomus medius Günther, 1864            | PD                              | SP, TEP                   | 1, 2, CPUM                       | C                          |
| Centropomus nigrescens Günther, 1864        |                                 | E                         | 2, 4, 10, 12, 13, CPUM           | C                          |
| Centropomus rosalito Jordan & Gilbert, 1882 |                                 | E                         | 2, 3, CPUM                       |                            |
| Centropomus viridis Lockington, 1877        |                                 | E                         | 1, 2, 3, 7, 8, CPUM              |                            |
| **FAMILY SERRANIDAE**                       |                                 |                           |                                  |                            |
| Alphespes inmaculatus Breder, 1936          | R                               | TEP                       | 2, 6, CPUM                       | I                          |
| Alphespes multiguttatus (Günther, 1867)     | R                               | TEP                       | 2, 4, 5, 6, CPUM                 | I                          |
| Cephalopholis panamensis (Steindachner, 1877)| R                               | TEP                       | 2, 4, 6, CPUM                    |                            |
| Dermatoptis dermatolepis (Boulenger, 1895)  | R                               | TEP                       | 2, 6, CPUM-photo                 |                            |
| Diplectrum eumelum Rosenblatt & Johnson, 1974| R                               | TEP                       | 1, 9, CPUM, SIO                  |                            |
| *Diplectrum euryplectrum Jordan & Bollman, 1890)| R                               | TEP                       | CPUM, ICMYL                      |                            |
| Diplectrum laborum Rosenblatt & Johnson, 1974| R                               | TEP                       | 1, 9, CPUM, SIO                  |                            |
| Species                                           | Collector | Ichthyogeographic affinity | Reference and Organisms Voucher | Importance in Fisheries |
|---------------------------------------------------|-----------|----------------------------|---------------------------------|-------------------------|
| Diplectrum macroptoma (Günther, 1864)             | R         | TEP                        | 1, CPUM, SIO                    |                         |
| Diplectrum pacificum Meek & Hildebrand, 1925      | R         | TEP                        | 2, 4, 6, 9, CPUM                |                         |
| *Diplectrum rostrum* Bortone, 1974                | PD        | TEP                        | CPUM                            | A                       |
| Epinephelus analogus Gill, 1863                   | R         | TEP                        | 1, 2, 4, 6, 9, CPUM, ICMYL, CNPE-IBUNAM | C                       |
| Epinephelus labriformis (Jenyns, 1840)            | PM, R     | TEP                        | 1, 2, 4, 6, 9, CPUM             | C                       |
| Hyporthodus acanthistius (Gilbert, 1892)          | R         | TEP                        | 1, 2, 4, 9, CPUM, ICMYL          | C                       |
| *Hyporthodus exsul* (Fowler, 1944)                |           | TEP                        | SIO                             |                         |
| Hyporthodus niphobles Gilbert & Starks, 1897      | R         | SP, TEP                    | 1, CPUM                         | C                       |
| *Paralabrax loriculus* Walford, 1936              | R         | TEP                        | 9, CPUM                         | C                       |
| Paranthias colonus (Valenciennes, 1846)           | R         | TEP                        | 2, 6, CPUM, ICMYL                | C                       |
| *Pseudogramma thaumasia* (Gilbert, 1900)          | R         | TEP                        | CPUM                            |                         |
| Rypticus bicolor Valenciennes, 1846               | PM, R     | TEP                        | 1, CPUM                         | A                       |
| *Rypticus nigripinnus* Gill, 1861                 | TEP       |                            | 9, ICMYL                        |                         |
| Serranus pittacinus Valenciennes, 1846             | TEP       |                            | 2                                |                         |
| **FAMILY PRIACANTHIDAE**                          |           |                            |                                  |                         |
| Heteropriacanthus cruentatus (Lacepède, 1801)     |           | CT                         | 2, 6                            |                         |
| Pristigenys serrula (Gilbert, 1891)               | D         | TEP                        | 1, 2, 6, 9, CPUM                |                         |
| **FAMILY APOGONIDAE**                             |           |                            |                                  |                         |
| Apogon pacificus (Herre, 1935)                    | R         | TEP                        | 1, 6, CPUM, photo, ICMYL         |                         |
| Apogon retrovella (Gilbert, 1862)                 | PM, R     | TEP                        | 2, 6, CPUM                      |                         |
| **FAMILY ECHENEIDAE**                             |           |                            |                                  |                         |
| *Phtheirichthys lineatus* (Menzies, 1791)         |           | CT                         | ANSP                            |                         |
| *Remora osteochir* (Cuvier, 1829)                 |           | CT                         | SIO                             |                         |
| Remora remora (Linnaeus, 1758)                    | D         | CT                         | 2, CPUM, CNPE-IBUNAM            |                         |
| **FAMILY CARANGIDAE**                             |           |                            |                                  |                         |
| Alectis ciliaris (Bloch, 1787)                    | PD        | CT                         | 1, 2, 9, CPUM                   | C                       |
| Canangoides otrynter (Jordan & Gilbert, 1883)     | R         | SP, TEP                    | 1, 2, 4, CPUM, ICMYL            | C                       |
| Canangoides vinctus Jordan & Gilbert, 1882        | D         | SP, TEP                    | 1, 2, 9, CPUM, ICMYL, CNPE-IBUNAM | C                       |
| Canax caballus Günther, 1868                      | PM, R     | SP, TEP                    | 1, 2, 4, 6, CPUM, ICMYL          | C                       |
| Canax caninus Günther, 1867                       | R, E      | SP, TEP                    | 1, 2, 9, 12, CPUM, SIO, CIBNOR  | C                       |
| Canax lugubris Poey, 1860                        | PD        | TEP                        | 2, CPUM                         | C                       |
| Canax melampogus Cuvier, 1833                    |           | CT                         | 2, 6                            |                         |
| Canax sexfasciatus Quoy & Gaimard, 1825           | R, E      | AP                         | 2, 7, 8, CPUM                   | C                       |
| Chlorocharinus orcuttii Jordan & Gilbert, 1883    | PM        | SP, TEP                    | 1, 2, 9, CPUM, CNPE-IBUNAM      | A                       |
| *Decapterus macrozona* Bleeker, 1851              | PD        | AP                         | CPUM                            | C                       |
| Decapterus muroads (Temminck & Schlegel, 1844)    |           | CT                         | 1, 2                            |                         |
| Species                                                                 | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|------------------------------------------------------------------------|-------------------------------|---------------------------|-----------------------------------|----------------------------|
| Annotated checklist of the coastal ichthyofauna from Michoacán State, Mexico
| Elagatis bipinnulata (Quoy & Gaimard, 1825)                            | PD                            | CT                         | 1, 2, CPUM                        | C                          |
| Gnathanodon speciosus (Forsskål, 1775)                                 | AP                            |                           | 2                                 |                            |
| Hemicaranx leucurus (Günther, 1864)                                    | TEP                           |                           | 2                                 |                            |
| Hemicaranx zelotes Gilbert, 1898                                       | TEP                           |                           | 2, 7                              |                            |
| Oligoplites alutus (Günther, 1868)                                     | PD                            | TEP                       | 2, CPUM                           | C                          |
| Oligoplites refugens Gilbert & Starks, 1904                            | PD                            | TEP                       | 2, CPUM                           | C                          |
| Oligoplites saurus (Bloch & Schneider, 1801)                           | E                             | TEP                       | 2, CPUM                           |                            |
| Selar crumenophthalmus (Bloch, 1793)                                   | R, E                          | CT                        | 1, 2, 8, CPUM, SIO                | C                          |
| Selene brevoortii (Gill, 1863)                                         | R, E                          | SP, TEP                   | 1, 2, CPUM                        | A                          |
| Selene peruviata (Guichenot, 1866)                                     | R                             | TEP                       | 1, 2, 9, CPUM                      | A                          |
| Seriola peruana Steindachner, 1881                                    | R                             | TEP                       | 2, CPUM                           | C                          |
| Seriola rivoliana Valenciennes, 1833                                   | PD                            | CT                        | 2, CPUM                           |                            |
| *Trachinotus kennedyi Steindachner, 1876                               | E                             | TEP                       | 2, CPUM, CNPE-IBUNAM              |                            |
| Trachinotus patiensis Cuvier, 1832                                     | TEP                           |                           | 1, 2                              |                            |
| Trachinotus rhodopus Gill, 1863                                        | PM, R, E                      | SP, MP, PP                | 1, 2, 4, 6, 7, 12, CPUM, ICMYL    |                            |
| **FAMILY NEMATISTIIDAE**                                               |                               |                           |                                   |                            |
| Nematistius pectoralis Gill, 1862                                      | PD                            | TEP                       | 2, 4, CPUM                        | C                          |
| **FAMILY CORYPHAENIDAE**                                               |                               |                           |                                   |                            |
| *Coryphaena equiselis Linnaeus, 1758                                   | CT                            |                           | SIO                               |                            |
| Coryphaena hippurus Linnaeus, 1758                                     | PD                            | CT                        | 2, 4, CPUM-photo                  | C                          |
| **FAMILY LUTJANIDAE**                                                  |                               |                           |                                   |                            |
| Hoplopagrus guentheri Gill, 1862                                       | R                             | SP, TEP                   | 1, 2, 6, CPUM                      | C                          |
| Lutjanus aratus (Günther, 1864)                                        | TEP                           |                           | 1                                  |                            |
| Lutjanus argentiventris (Peters, 1869)                                 | PM, R, E                      | SP, TEP                   | 1, 2, 6, 12, CPUM, CNPE-IBUNAM    | C                          |
| Lutjanus colorado Jordan & Gilbert, 1882                               | R, E                          | SP, TEP                   | 1, 2, 4, 6, 8, CPUM               | C                          |
| Lutjanus guttatus (Steindachner, 1869)                                 | R                             | TEP                       | 1, 2, 4, 6, CPUM, SIO, ICMYL       | C                          |
| Lutjanus inermis (Peters, 1869)                                        | R                             | TEP                       | 1, 2, CPUM, ICMYL                  | C                          |
| *Lutjanus jordani (Gilbert, 1898)                                      | TEP                           |                           | 6                                 |                            |
| Lutjanus novemfasciatus Gill, 1862                                     | PM, R, E                      | SP, TEP                   | 1, 2, 4, 6, 7, 8, 10, 12, 13, CPUM | C                          |
| Lutjanus peru (Nichols & Murphy, 1922)                                 | R                             | SP, TEP                   | 1, 2, 4, 9, CPUM, ICMYL            | C                          |
| *Lutjanus viridis (Valenciennes, 1846)                                 | PD                            | TEP                       | 6, CPUM                           |                            |
| **FAMILY LOBOTIDAE**                                                   |                               |                           |                                   |                            |
| Lobotes pacificus Gilbert, 1898                                        | PD                            | CT                        | 1, CPUM                           | C                          |
| **FAMILY GERREIDAE**                                                   |                               |                           |                                   |                            |
| Deckerichthys aureolus (Jordan & Gilbert, 1882)                         | D                             | TEP                       | 1, 2, 9, CPUM, ICMYL               | C                          |
| Diapterus brevirostris (Sauvage, 1879)                                 | E                             | TEP                       | 1, 2, CPUM                        | C                          |
| Eucinostomus curranii Zahuranec, 1980                                  | PM, E                         | SP, TEP                   | 1, 2, 7, 8, 9, 10, 12, 13, CPUM, CNPE-IBUNAM | C                          |
| Eucinostomus dowii (Gill, 1863)                                        | SP, TEP                       |                           | 1                                  |                            |
| Species                             | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|------------------------------------|-------------------------------|---------------------------|----------------------------------|----------------------------|
| *Eucinostomus entomelas* Zahuranec, 1980 | SP, TEP                      | CNPE-IBUNAM               |                                  |
| Eucinostomus gnecilis (Gill, 1862)   | TEP                          | 1, 2, 9                   |                                  |
| *Eugerres axillaris* (Günther, 1864) | R, E                         | TEP                       | CPUM                            |
| Eugerres brevimanus (Günther, 1864)  | MP, PP                       | 1                         |                                  |
| *Eugerres lineatus* (Humboldt, 1821) | E                            | TEP                       | CPUM                            |
| Gerres simillimus Reagan, 1907      | R, E                         | TEP                       | 1, 2, 4, 7, CPUM, C              |

**FAMILY HAEMULIDAE**

| Species                             | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|------------------------------------|-------------------------------|---------------------------|----------------------------------|----------------------------|
| *Anisotremus caesius* (Jordan & Gilbert, 1882) | R                             | MP, PP                    | CPUM, CNPE-IBUNAM               | C                          |
| Anisotremus interruptus (Gill, 1862)   | R                             | SP, TEP                   | 1, 2, 6, CPUM, ICMYL, CNPE-IBUNAM | C                          |
| Anisotremus tenuitennis Gill, 1861     | R                             | SP, TEP                   | 1, 2, 6, CPUM                    | C                          |
| Conodon serrifer Jordan & Gilbert, 1882 | SP, TEP                     | 1, ICMYL                  |                                  |
| Genyatremus dovii (Günther, 1864)      | R                             | TEP                       | 2, CPUM, ICMYL, CNPE-IBUNAM     | C                          |
| Genyatremus pacifici (Günther, 1864)   | SP, TEP                      | 2, CPUM, ICMYL, CNPE-IBUNAM |                                  | C                          |
| Haemulon californiaeis (Steindacher, 1876) | TEP                         | 2                         |                                  |
| Haemulon flaviguttatum Gill, 1862      | R                             | SP, TEP                   | 1, 2, 4, 6, CPUM, ICMYL          | C                          |
| Haemulon maculicauda (Gill, 1862)      | R                             | SP, TEP                   | 2, 6, CPUM, ICMYL                | C                          |
| Haemulon scudderii Gill, 1862          | R                             | SP, TEP                   | 1, 2, 6, CPUM                    | C                          |
| Haemulon seafaciatum Gill, 1862        | R                             | TEP                       | 1, 2, 6, CPUM                    | C                          |
| Haemulon steindachneri (Jordan & Gilbert, 1882) | R                             | AA                        | 2, CPUM, ICMYL, CNPE-IBUNAM     | C                          |
| Haemulopis axillaris (Steindachner, 1869) | R                             | MP, PP                    | 2, CPUM                          | C                          |
| Haemulopis elongatus (Steindachner, 1879) | R                             | MP, PP                    | 1, CPUM                         | C                          |
| Haemulopis leuciscus (Günther, 1864)    | E                             | TEP                       | 1, 2, 6, 9, CPUM, CNPE-IBUNAM   | C                          |
| Haemulopis nitidus (Steindachner, 1869) | R                             | TEP                       | 1, CPUM                          | C                          |
| *Microlepidotus brevipinnis* (Steindachner, 1869) | R                             | TEP                       | CPUM                            | C                          |
| Orthopristis chalceus (Günther, 1864)   | R                             | TEP                       | 2, 4, CPUM                       | C                          |
| Orthopristis reddingi Jordan & Richardson, 1895 | R                             | TEP                       | 1, 2, CPUM                       | C                          |
| Pomadasys bayanus Jordan & Evermann, 1898 | E                             | TEP                       | 1, 2, CPUM                       | C                          |
| Pomadasys branickii (Steindachner, 1879) | E                             | TEP                       | 1, 7, 10, CPUM, ICMYL            | C                          |
| Pomadasys macracanthus (Günther, 1864)   | E                             | TEP                       | 2, CPUM                          |                            |
| Pomadasys panamensis (Steindachner, 1876) | TEP                         | 1, 2, 9, CNPE-IBUNAM      |                                  | C                          |
| Xenichthys xanti Gill, 1863             | R                             | SP, TEP                   | 2, CPUM, CNPE-IBUNAM             | C                          |

**FAMILY SPARIDAE**

| Species                             | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|------------------------------------|-------------------------------|---------------------------|----------------------------------|----------------------------|
| Calamus brachyomus (Lockington, 1880) | R                             | SP, TEP                   | 1, 2, CPUM                       | C                          |

**FAMILY SCIAENIDAE**

| Species                             | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|------------------------------------|-------------------------------|---------------------------|----------------------------------|----------------------------|
| Bairdiella armata Gill, 1863        | TEP                          | 1, 2                      |                                  |
| Bairdiella eniferae (Jordan & Gilbert, 1882) | MP, PP                     | 1, 2                      |                                  |
| Bairdiella icistia (Jordan & Gilbert, 1882) | CP, MP                     | 2                         |                                  |
Annotated checklist of the coastal ichthyofauna from Michoacán State, Mexico

| Species                        | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|--------------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------|
| *Corvula macrops* (Steindachner, 1876) | R                              | TEP                         | CPUM                             |                           |
| Cynoscion nannus *Castro-Aguirre & Arvizu-Martínez, 1976* | PD                             | CP, MP                      | 1, CPUM                           | C                         |
| Cynoscion phoxocephalus *Jordan & Gilbert, 1882* | MP, PP                         | TEP                         | 1, 9, CPUM, CIBNOR                | C                         |
| Cynoscion reticulatus (Günther, 1864) | TEP                            |                             | ICMYL                            |                           |
| *Cynoscion stolzmani* (Steindachner, 1879) | TEP                            |                             | ICMYL                            |                           |
| Elatarchus archidium (Jordan & Gilbert, 1882) | PD                             | TEP                         | 2, CPUM                           | C                         |
| Isopisthus remifer *Jordan & Gilbert, 1882* | TEP                            |                             | 2                                 |                           |
| Larimus acclivii *Jordan & Bristol, 1898* | PD                             | TEP                         | 2, CPUM                           | C                         |
| Larimus argenteus (Gill, 1863) | PD                             | TEP                         | 1, 2, CPUM, ICMYL                 | C                         |
| Larimus effulgens *Gilbert, 1898* | PD                             | TEP                         | 1, 2, 9, CPUM                     | C                         |
| Menticirrhus elongatus (Günther, 1864) | E                              | SP, TEP                     | 2, CPUM                           | C                         |
| Menticirrhus natus (Günther, 1868) | TEP                            |                             | 2, CPUM, CNPE-IBUNAM             | C                         |
| Menticirrhus panamensis (Steindachner, 1875) | TEP                            |                             | 1, 2                              |                           |
| Menticirrhus undulatus (Girard, 1854) | PD                             | SP, TEP                     | 1, CPUM                           | C                         |
| Micropogonias altipinnis (Günther, 1864) | TEP                            |                             | 2                                 |                           |
| *Micropogonias ectenes* (Jordan & Gilbert, 1882) | PD                             | SP, TEP                     | CPUM                             | C                         |
| Micropogonias megalops (Jordan & Gilbert, 1884) | CP, MP                         |                             | 1                                 |                           |
| Odontoscion santhos *Gilbert, 1898* | R                              | TEP                         | 2, CPUM                           |                           |
| Ophioscion limicola (Jordan & Gilbert, 1882) | MP, PP                         |                             | 2, ICMYL, CNPE-IBUNAM            |                           |
| Ophioscion scierus (Jordan & Gilbert, 1884) | MP, PP                         |                             | 2, ICMYL                          |                           |
| *Ophioscion strabo* *Gilbert, 1897* | TEP                            |                             | ICMYL                            |                           |
| *Ophioscion typicus* *Gill, 1863* | TEP                            |                             | CNPE-IBUNAM                       |                           |
| *Ophioscion vermicularis* (Günther, 1867) | PD                             | MP, PP                      | CPUM                             | C                         |
| *Pareques fuscovertatus* (Kendall & Radcliffe, 1912) | R                              | MP                          | 6, CPUM                           |                           |
| Umbrina busingi *López S., 1980* | PD                             | MP, PP                      | 1, 9, CPUM, ICMYL                 | C                         |
| Umbrina dorsalis *Gill, 1862* | R, E                           | TEP                         | 2, 12, CPUM                       | C                         |
| Umbrina sancta *Gill, 1862* | R, E                           | SP, TEP                     | 1, 2, CPUM                        | C                         |

FAMILY POLYNEMIDAE

| Species                        | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|--------------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------|
| Polydactylus approximans (Lay & Bennett, 1839) | E                              | TEP                         | 1, 2, 9, CPUM, SIO, CNPE-IBUNAM   | C                         |
| Polydactylus opercularis (Gill, 1863) | E                              | SP, TEP                     | 1, 2, 8, CPUM                     | C                         |

FAMILY MULLIDAE

| Species                        | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|--------------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------|
| Mallophichthys dentatus (Gill, 1862) | R                              | TEP                         | 2, 6, CPUM, ICMYL                 | C                         |
| Pseudupeneus grandissquamis (Gill, 1863) | R                              | TEP                         | 1, 2, 9, CPUM, CNPE-IBUNAM       | C                         |

FAMILY KYPHOSIDAE

| Species                        | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|--------------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------|
| Kyphosus analogus (Gill, 1862) | R                              | TEP                         | 2, 4, CPUM                        | C                         |
| Kyphosus elegans (Peters, 1869) | R                              | TEP                         | 2, 4, 5, CPUM                     | C                         |
| Kyphosus oculatus (Jordan & Gilbert, 1882) | R                              | CT                          | 1, 2, CPUM, SIO, ICMYL            | C                         |
| FAMILY CHAETODONTIDAE | Collected habitat (2010–2011) | Ichthyographic affinity | References and organisms voucher | The importance in fisheries |
|-----------------------|-------------------------------|------------------------|---------------------------------|-----------------------------|
| Chaetodon humeralis Günther, 1860 | PM, R | TEP | 1, 2, 4, 5, 6, 9, CPUM | |
| Johnrandallia nigrostris (Gill, 1862) | PM, R | SP, TEP | 2, 6, CPUM | |

**FAMILY POMACANTHIDAE**

| Holacanthus passer Valenciennes, 1846 | R | TEP | 2, 6, CPUM | |
| Pomacanthus zonipectus (Gill, 1862) | R | SP, TEP | 1, 2, 6, 9, CPUM, ICMYL | |

**FAMILY CIRRHITIDAE**

| Cirrhitichthys oxycephalus (Bleeker, 1855) | R | TEP | 2, 6, CPUM | |
| Cirrhitus rivulatus Valenciennes, 1846 | PM, R | TEP | 2, 4, 5, 6, CPUM | |

**FAMILY MUGILIDAE**

| Agonostomus monticola (Bancroft, 1882) | E | AA | 1, 3, 10, 12, 13, CPUM, ICMYL | |
| *Chaenomugil proboscideus* (Günther, 1861) | PM | TEP | CPUM, ICMYL | |
| Mugil cephalus Linneaus, 1758 | | | 1, 2 | |

| Mugil curema Valenciennes, 1836 | PM, E | AA | 2, 3, 4, 5, 7, 8, 10, 12, 13, CPUM | C |

**FAMILY POMACENTRIDAE**

| *Abudeifius declivifrons* (Gill, 1862) | PM, R | TEP | 4, 5, CPUM | |
| Abudeifius trochelii (Gill, 1862) | PM, R | SP, TEP | 2, 5, 6, CPUM | |
| Chromis atrilobata Gill, 1862 | R | TEP | 2, 6, CPUM | |
| Microspathodon bairdii (Gill, 1862) | PM, R | TEP | 2, 5, CPUM | |
| Microspathodon dorsalis (Gill, 1862) | PM, R | SP, TEP | 2, 4, 5, 6, CPUM | I |
| Stegastes acapulcoensis (Fowler, 1944) | PM, R | MP, PP | 2, 5, 6, CPUM | |
| Stegastes flavilatus (Gill, 1862) | PM, R | MP, PP | 2, 5, 6, CPUM, ICMYL | |
| Stegastes rectifraenum (Gill, 1862) | PM, R | SP, CP, MP | 2, 5, CPUM, ICMYL | |

**FAMILY LABRIDAE**

| Bodianus diplotaenia (Gill, 1862) | R | SP, TEP | 2, 6, CPUM, ICMYL | |
| Halichoeres chiriachi Valencian, 1947 | R | TEP | 2, 6, CPUM | |
| Halichoeres disipils (Günther, 1864) | PM, R | TEP | 2, 4, 5, 6, CPUM | |
| Halichoeres nicholsi (Jordan & Gilbert, 1882) | R | TEP | 2, 6, CPUM | |
| Halichoeres notospilis (Günther, 1864) | PM, R | TEP | 2, 6, CPUM | |
| Iniistius pavo (Valenciennes, 1840) | R | AP | CPUM | |
| *Novaculichthys taeniourus* (Lacepède, 1801) | R | AP | 6 | |
| *Thalassoma grammaticum* Gilbert, 1890 | R | TEP | 6, CPUM | |
| Thalassoma lucasanum (Gill, 1862) | PM, R | TEP | 2, 5, 6, CPUM | |

**FAMILY SCARIDAE**

| *Calotomus carolinus* (Valenciennes, 1840) | PD | CT | 6, CPUM | |
| *Nicholsina denticulata* (Evermann & Radcliffe, 1917) | R | SP, TEP | CPUM | |
| *Scarus compressus* (Osburn & Nichols, 1916) | R | TEP | 6, CPUM | |
| Scarus perrico Jordan & Gilbert, 1882 | R | TEP | 2, 6, CPUM | C |

**FAMILY URANOSCOPIDAE**

| Astrosopus zephyrus Gilbert & Starks, 1897 | PD | SP, TEP | 2, CPUM | A |
| FAMILY TRIPTERGYIIDAE | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|----------------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| Axoclinus storeyae (Brock, 1940) | PM, R | CP, MP | 2, CPUM | |
| Enneanectes carinalis Jordan & Gilbert, 1882 | | | | |
| *Enneanectes glendae Roseblatt, Miller & Hastings, 2013 | R | CP, MP | CPUM | |
| *Enneanectes macrosp Roseblatt, Miller & Hastings, 2013 | R | MP | CPUM | |

| FAMILY LABRISOMIDAE | | | |
|-------------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| Brockius striatus (Hubbs, 1953) | PM, R | CP, MP | 2, CPUM | |
| *Labrisomus multiporus Hubbs, 1953 | PM, R | TEP | CPUM | |
| *Labrisomus santi Gill, 1860 | | | ICMYL | |
| Malacoctenus ebisui Springer, 1959 | R | TEP | 2, CPUM | |
| Malacoctenus hubisi Springer, 1959 | R | TEP | 2, 5, CPUM | |
| *Malacoctenus mexicanus Springer, 1959 | R | TEP | CPUM | |
| *Malacoctenus tetranemus (Cope, 1877) | PM, R | TEP | CPUM | |
| *Malacoctenus zonifer (Jordan & Gilbert, 1882) | PM | TEP | CPUM | |
| *Panachelus mexicanus (Gilbert, 1904) | PM | TEP | CPUM | |
| *Starksia posthon Roseblatt & Taylor, 1971 | R | MP, PP | CPUM | |
| *Starksia spinipenis (Al-Uthman, 1960) | R | CP, MP | CPUM | |

| FAMILY CHAENOPSIDAE | | | |
|-------------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| Acanthemblemaria balanorum Brock, 1940 | | | 2 | |
| *Acanthemblemaria macrospilus Brock, 1940 | R | CP, MP | CPUM | |
| *Coralliozetus boehlkei Stephens, 1963 | R | TEP | CPUM | |
| *Ekemblemaria myersi Stephens, 1963 | R | TEP | CPUM | |
| *Protemblemaria bicirrus (Hildebrand, 1946) | R | TEP | CPUM | |

| FAMILY DACTYLOSCOPIDAE | | | |
|----------------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| Dactyloscopus amnis Miller & Briggs, 1962 | E | MP, PP | 1, 12, CPUM | |

| FAMILY BLENNIDAE | | | |
|-----------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| *Entomacrodus chiostictus (Jordan & Gilbert, 1882) | PM | TEP | CPUM | |
| *Hypoblennius brevipinnis (Günther, 1861) | R | TEP | CPUM, SIO, ICMYL | |
| Ophioblennius steindachneri Jordan & Evermann, 1898 | PM, R | TEP | 2, 5, 6, CPUM, ICMYL | |
| Plagiotremus azaleu (Jordan & Bollman, 1890) | R | TEP | 2, 6, CPUM | |

| FAMILY ELEOTRIDAE | | | |
|-----------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| Dormitator latifrons (Richardson, 1844) | E | SP, TEP | 1, 7, 8, 10, 12, 13, CPUM, CNPE-IBUNAM | |
| Eleotris picta Kner, 1863 | E | TEP | 1, 7, 8, 10, 12, 13, CPUM, CNPE-IBUNAM | |
| Gobiomorus maculatus (Günther, 1859) | E | TEP | 1, 2, 7, 8, 10, 12, 13, CPUM, CNPE-IBUNAM | |
| *Gobiomorus polyplepis Ginsburg, 1953 | E | | | |

| FAMILY GOBIIDAE | | | |
|----------------|--------------------------------|---------------------------|---------------------------------|---------------------------|
| Awaous banana (Valenciennes, 1837) | E | SP, TEP | 3, 8, 12, CPUM | |

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*Note: TEP refers to temporary epibenthic pavements, SP refers to spiny pavements, MP refers to muddy pavements, CPUM refers to coastal upwelling habitats, E refers to estuarine habitats, P refers to brackish habitats, and CNPE-IBUNAM refers to coastal Nearshore Perilous Ecosystems and IBUNAM (a marine protected area). The references and organisms voucher columns list the specific references and voucher information for each species. The importance in fisheries column indicates the significance of each species in fisheries.
| Species                                      | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|----------------------------------------------|--------------------------------|----------------------------|----------------------------------|-----------------------------|
| *Barbulifer mexicanus* Hoese & Larson, 1985 | CP, MP                         |                            |                                  | 1                           |
| *Bathygobius andrei* (Sauvage, 1880)         | E                              | MP, PP                     | CPUM                             |                             |
| *Bathygobius namosus* Ginsburg, 1947         | PM                             | SP, TEP                    | 1, 2, 5, CPUM, ICMYL              |                             |
| *Bollmannia marginalis* Ginsburg, 1939       |                                 | TEP                        |                                  | 9                           |
| *Bollmannia stigmatura* Gilbert, 1892        |                                 | TEP                        | ICMYL                            |                             |
| *Coryphopterus arusilos* Ginsburg, 1938      | R                              | TEP                        | CPUM                             |                             |
| Ctenogobius sagittula (Günther, 1861)        | E                              | TEP                        | 12, CPUM                         |                             |
| *Elacatinus puncticulatus* (Ginsburg, 1938)  | R                              | TEP                        | CPUM                             |                             |
| Gobionellus microdon (Gilbert, 1892)         | E                              | TEP                        | 1, 3, 7, 10, 12, 13, CPUM         |                             |
| *Gymnolepis seminuda* (Günther, 1864)        |                                 | TEP                        |                                  |                             |
| Microgobius miniflorensis Gilbert & Starks, 1904 |                              |                            |                                  | CPUM                        |
| *Sicydium multipunctatum* Regan, 1905        | E                              | TEP                        | Freshwater                       | CPUM                        |
| **FAMILY MICRODESMIDAE**                     |                                |                            |                                  |                             |
| Clarkichthys bilineatus (Clark, 1936)        | PM                             | TEP                        | CPUM                             |                             |
| Microdesmus doripunctatus Dawson, 1968       | E                              | TEP                        | 12, CPUM                         |                             |
| **FAMILY EPHIPPIDAE**                        |                                |                            |                                  |                             |
| Chetodoipterus zonatus (Girard, 1858)        | R                              | SP, TEP                    | 1, 3, 8, 9, CPUM                 | C                           |
| Parapetitus panamensis Steindachner, 1876    | R                              | TEP                        |                                  | 1, 3                        |
| **FAMILY ZANCLIDAE**                         |                                |                            |                                  |                             |
| *Zanclus cornutus* (Linnaeus, 1758)          | R                              | SP, TEP                    | 6, CPUM                          |                             |
| **FAMILY ACANTHURIDAE**                      |                                |                            |                                  |                             |
| Acanthurus triostegus (Linnaeus, 1758)       | PM, R                          | AP                         | 2, 5, 6, CPUM                    | A                           |
| Acanthurus xanthopterus Valenciennes, 1835   | R                              | AP                         | 2, 6, CPUM                       | A                           |
| Prionurus punctatus Gill, 1862               | PM, R                          | TEP                        | 2, 5, 6, CPUM                    | A                           |
| **FAMILY SPHYRAENIDAE**                      |                                |                            |                                  |                             |
| Sphyraena ensis Jordan & Gilbert, 1882       | R                              | TEP                        | 1, 2, CPUM                       | C                           |
| **FAMILY TRICHIURIDAE**                      |                                |                            |                                  |                             |
| *Trichiurus nitens* Garman, 1899             | PD                             | CT                         | CPUM                             | I                           |
| **FAMILY SCOMBRIDAE**                        |                                |                            |                                  |                             |
| Auxis brachydonix Collette & Aadland 1996    |                                 | SP, TEP                    | 2                                |                             |
| Euthynus lineatus Kishinouye, 1920           | PD                             | SP, TEP                    | 1, 2, CPUM, SIO                  | C                           |
| Katsuwonus pelamis (Linnaeus, 1758)          |                                 | CT                         | 2                                |                             |
| *Sarda orientalis* (Temminck & Schlegel, 1844) | PD                          | AP                         | CPUM                             | C                           |
| Scomberomorus sierra Jordan & Starks, 1895   | PD                             | SP, TEP                    | 1, 2, CPUM                       | C                           |
| *Scomber japonicus* Houttuyn, 1782           | PD                             | CT                         | CPUM                             | C                           |
| Thunnus alalunga (Bonnaterre, 1788)          |                                 | CT                         | 1                                |                             |
| **FAMILY ISTIOPHORIDAE**                     |                                |                            |                                  |                             |
| Istiophorus platypterus (Shaw, 1792)         |                                 | AP                         | 2                                |                             |
| **FAMILY STROMATEIDAE**                      |                                |                            |                                  |                             |
| *Peprilus medius* Peters, 1869               |                                 | TEP                        | 2, CPUM                          | C                           |
| *Peprilus snyderi* Gilbert & Starks, 1904    | PD                             | SP, TEP                    | CPUM                             | C                           |
| **ORDER PLEURONECTIFORMES**                 |                                |                            |                                  |                             |
| **FAMILY PARALICHTHYIDAE**                   |                                |                            |                                  |                             |
| Ancylorhynchus dendriticus Gilbert, 1890     |                                 | SP, TEP                    | 1, 2, 9, CPUM                    | C                           |
| *Citharichthys gilberti* Jenkins & Evermann, 1889 | PD                          | SP, TEP                    | 1, 8, 12, CPUM                   |                             |
| *Citharichthys platophrys* Gilbert, 1891     |                                 | TEP                        | CPUM                             | SIO                         |
| Common Name | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|-------------|-------------------------------|---------------------------|---------------------------------|---------------------------|
| *Cycloptera panamensis* (Steindachner, 1876) | TEP | 1 | C |
| *Cycloptera querna* (Jordan & Bollman, 1890) | PD | TEP | 1, 2, 9, CPUM, SIO | C |
| *Etropus croesus* Jordan & Gilbert, 1882 | PD | SP, TEP | 1, 2, 9, CPUM, SIO | C |
| *Etropus extenuis* Jordan, 1889 | PD | SP, TEP | CPUM, SIO | |
| *Etropus peruvianus* Hildebrand, 1946 | TEP | 1 | |
| *Hippoglossina tetrophalma* (Gilbert, 1890) | TEP | 2 | |
| *Paralichthys woolmani* Jordan & Williams, 1897 | D | TEP | 1, 2, 9, CPUM, ICMYL | C |
| *Syacium latifrons* (Jordan & Gilbert, 1882) | PD | SP, TEP | 1, 9, CPUM | C |
| *Syacium longidorsale* Murakami & Amaoka, 1992 | PP | CIBNOR | |
| *Syacium ovale* (Günther, 1864) | PD | TEP | 1, 2, 9, CPUM, ICMYL | C |
| **FAMILY BOTHIDAE** | | | | |
| *Bothus constellatus* (Jordan, 1889) | PD | TEP | 1, 2, 9, CPUM | A |
| *Bothus leopardinus* (Günther, 1862) | TEP | 9 | |
| *Engyrophrys sanctilaurentii* Jordan & Bollman, 1890 | TEP | 1, SIO | |
| **FAMILY ACHIRIDAE** | | | | |
| *Achirus klunzingeri* (Steindachner, 1879) | E | MP, PP | 12, CPUM | |
| *Achirus mazatlanus* (Steindachner, 1869) | E | TEP | 1, 7, 12, CPUM | |
| *Achirus scutum* (Günther, 1862) | E | TEP | 1, CPUM | |
| *Trinectes fonsecensis* (Günther, 1862) | E | TEP | 1, 9, 10, 12, 13, CPUM | I |
| **FAMILY CYNOGLOSSIDAE** | | | | |
| *Symphurus atricaudus* (Jordan & Gilbert, 1880) | CP, MP | | 1 | |
| *Symphurus callopterus* Munroe & Mahadeva, 1989 | TEP | CAS | |
| *Symphurus elongatus* (Günther, 1868) | PD | SP, TEP | 1, CPUM | I |
| *Symphurus leei* Jordan & Bollman, 1890 | MP, PP | 9, SIO, ICMYL | |
| **ORDER TETRADONTIFORMES** | | | | |
| **FAMILY BALISTIDAE** | | | | |
| *Balistes polylepis* Steindachner, 1876 | R | | 1, 2, 4, 6, 9, CPUM | |
| *Canthidermis maculata* (Bloch, 1786) | R | CT | CPUM | |
| *Pseudobalistes naufragium* (Jordan & Starks, 1895) | R | SP, TEP | 2, 8, CPUM | |
| *Sufflamen graenatium* (Latreille, 1804) | PD | AP | 11, CPUM | |
| *Sufflamen verres* (Gilbert & Starks, 1904) | R | SP, TEP | 2, 4, 6, CPUM | C |
| **FAMILY MONACANTHIDAE** | | | | |
| *Aluterus monoceros* (Linnaeus, 1758) | R | CT | 9, CPUM | C |
| *Aluterus scriptus* (Osbeck, 1765) | R | CT | 1, 6, CPUM-photo | |
| **FAMILY OSTRACIIDAE** | | | | |
| *Ostracion meleagris* Shaw, 1796 | R | AP | 2, 6, CPUM | |
| **FAMILY TETRAODONTIDAE** | | | | |
| *Arothron hispidus* (Linnaeus, 1758) | R | CT | CPUM, ICMYL | |
| *Arothron meleagris* (Lacèpede, 1798) | R | CT | 2, 6, CPUM | I |
**Canthigaster janthinoptera** (Bleeker, 1855)

Canthigaster punctatissima (Gunther, 1870)

*Lagocephalus lagocephalus* (Linnaeus, 1758)

*Sphoeroides schwenkii* Hildebrand, 1946

*Sphoeroides annulatus* (Jenyns, 1842)

*Sphoeroides lobatus* (Steindachner, 1870)

**FAMILY DIODONTIDAE**

*Diodon holocanthus* Linnaeus, 1758

*Diodon hystrix* Linnaeus, 1758

*Pristis pristis* (Linnaeus, 1758), *Aetobatus laticeps* (Euphrasen, 1790), *Apogon pacificus* (Herre, 1935), *Coryphaena hippurus* Linnaeus, 1758, *Kyphosus ocyurus* (Jordan & Gilbert, 1882), and *Novaculichthys taeniourus* (Lacepède, 1801). Of the 436 species, 131 were new records for the Michoacán State, and *Canthigaster janthinoptera* (Bleeker, 1855) was a new record for Mexico (Table 1).

For the specimens collected during field trips, some were collected from a single habitat type: 123 (40%) were collected in reefs, 57 (19%) in the pelagic-demersal zone, 46 (15%) in estuarine zones, 17 (6%) in the demersal zones, and 14 (5%) in rocky intertidal zones. Forty-seven species were collected in more than one habitat type (Table 1 and Fig. 2).

The artisanal fishery captures yielded 154 species. The families with the highest number of species were Carangidae (17), Haemulidae (15), Sciaenidae (13), Serranidae (10), and Lutjanidae (7). Of these, 104 (68%) were commercially valuable, 23 (15%) were used for direct consumption or as bait. Twenty-seven (18%) were bycatch, that are normally rejected and thrown back (Fig. 3).

Forty-six (11%) of the species were circumtropical, 27 (6%) transpacific, and seven (2%) amphi-American; whereas 350 (81%) belonged to the TEP. Of these 77

| Species | Collected habitat (2010–2011) | Ichthyogeographic affinity | References and organisms voucher | The importance in fisheries |
|---------|--------------------------------|---------------------------|---------------------------------|-----------------------------|
| **Canthigaster janthinoptera** (Bleeker, 1855) | R | AP | CPUM |  |
| Canthigaster punctatissima (Gunther, 1870) | R | TEP | 2, 6, CPUM |  |
| *Lagocephalus lagocephalus* (Linnaeus, 1758) | CT | | 9 |  |
| *Sphoeroides schwenkii* Hildebrand, 1946 | R | TEP | 9, CPUM | A |
| *Sphoeroides annulatus* (Jenyns, 1842) | R, E | SP, TEP | 1, 2, 4, 6, 8, 12, CPUM, SIO |  |
| *Sphoeroides lobatus* (Steindachner, 1870) | R | TEP | 2, 6, CPUM | I |
| **FAMILY DIODONTIDAE** | | | | |
| *Diodon holocanthus* Linnaeus, 1758 | R | CT | 2, 6, 8, 9, CPUM |  |
| *Diodon hystrix* Linnaeus, 1758 | R | CT | 1, 2, 4, 6, 9, CPUM | I |

* New record for the state of Michoacan. **New record for the Mexico. Collection habitat: Reef (R), rocky intertidal or tidal pool (PM), estuary (E), demersal (D) pelagic-demersal (PD). Zoogeographical affinity: Circumtropical (CT), Amphiamerican (AA), Transpacific (AP) San Diegan province (SP), Cortés province (CP), Mexican province (MP), Panamic province (PP). Record from literature: Castro-Aguirre et al. 2006 (1), Madrid-Vera et al. 1998 (2), Medina-Nava et al. 2005 (3), Galván-Torres, 1989 (4), Aguirre-Villaseñor, 1991 (5), Domínguez-Domínguez, 1998 (6), González-Luna, 2000 (7), Madrigal-Guridi, 2006 (8), Sánchez-Aguilar, 2007 (9), Sandoval-Huerta et al. 2012 (10), Palacios-Mora et al. 2014 (11), Sandoval-Huerta et al. 2014 (12), Sandoval-Huerta et al. 2015 (13). Records from Fish Collection of Universidad Michoacana de San Nicolás de Hidalgo (CPUM), Fish Collection of the Institute of Biology of the National Autonomous University of Mexico (CNPE-IBUNA), fish collection of Instituto de Ciencias del Mar y Limnología (ICMYL), fish collection of California Academy of Sciences, San Francisco California, E.U.A. (CAS), the Marine Vertebrate Collection of Scripps Institution of Oceanography, San Diego, California (SIO) and fish collection of Biological Research Center Northwest S.C. (CIBNOR). Fishery importance: personal consumption (A), commercial use (C) and discarded (I).
Figure 2. Percent of species collected in each habitat.

Figure 3. Classification of commercial importance of the species captured in the Michoacán coastal fisheries.

(18%) were widely distributed from the San Diegan province to the Panamic province, and 3 (1%) from the San Diegan province to the Mexican province. The largest number of species, 216 (49.2%), were found in the three provinces of the TEP; 15
(3%) were restricted to the Cortez and the Mexican provinces; 35 (8%) were limited to the Mexican and Panamic provinces; and 2 (0.5%) were endemic to the Mexican province (Fig. 4). Six species collected in the estuarine ecosystems occurred in fresh or brackish water habitats and were not included in the marine biogeographical affinity categories: *Gobiomorus polylepis* Ginsburg, 1953 (brackish), *Sicydium multipunctatum* Regan, 1905, *Gobiesox mexicanus* Briggs & Miller, 1960, and *Poecilia butleri* Jordan, 1889 (fresh water). The introduced species *Pterygoplichthys disjunctivus* (Weber, 1991) and *Cyprinus carpio* Linnaeus, 1758 were also omitted.

**Discussion**

The present checklist represents the most updated and comprehensive systematic list of fishes recorded from the coast of the Mexican State of Michoacán. Of the species cataloged, 30% were first records for this State. The highest proportion of cataloged species was collected in reefs (40%). The pelagic zone accounted for 24% of the species collected, indicated a requirement for future studies of the demersal and pelagic
zones with increased sampling effort (Fig. 2). The highest number of new records for Michoacán was found in reefs, chiefly species exhibiting cryptic behavior (Table 1). This could be related to the sampling methods employed, which had not been previously used; the few previously reported species with cryptic behavior were primarily bycatch (Madrid-Vera 1998, Castro-Aguirre et al. 2006, Moncayo-Estrada et al. 2006, Chávez-Comparan 2008, Márquez-Espinoza 2012). Another source of new species records from Michoacán was the intertidal zone (Table 1), for which no published records are available. In general, the number of species in the area may be increased if sampling effort is expanded and records from shrimp and tuna bycatches are included. A new record was obtained for Mexico, two specimens of *C. janthinoptera* (Bleeker, 1855) were collected from Barco Hundido del Faro de Bucerías (CPUM 4532, N 18°21'8.82"W -103°31'18.71"), which identification was corroborated by BLAST (http://www.ncbi.nlm.nih.gov/genbank) and by boldsystems (http://www.boldsystems.org), searches showing 99% similarity in the cytochrome oxidase subunit 1 gene (COX-1) to specimens identified as *C. janthinoptera* from the south Tropical Eastern Pacific and the Indo-Pacific Ocean (GenBank accession numbers: KX505745 and KX505746). One specimen of *Bathygobius andrei* (Sauvage, 1880) (Gobiidae) was also reported in the Chuta estuary (CPUM 3296, 18°2'1"N and 102°33'33"W), representing an extension of its previously known northern distribution limit of the coast of Chiapas (Gómez-González et al. 2012). One specimen of *Calotomus carolinus* (Valecniennes, 1840) was collected from rocky reef in Faro de Bucerías location (18°20'50"N and 103°30'37"W), extending its extension range in the TEP.

In artisanal fishing (Fig. 3), the species considered to have the highest economic value belong chiefly to Carangidae (e.g. *Alectis ciliaris*, (Bloch, 1787)), Lutjanidae (e.g. *Lutjanus guttatus*, (Steindachner, 1869)), Paralichthiidae (e.g. *Cyclopsetta guerna*, (Jordan & Bollman, 1890)), Centropomidae (e.g. *Centropomus armatus*, Gill, 1863), and Serranidae (e.g. *Epinephelus labriformis*, (Jenyns, 1840)) (Table 1). Most of the elasmobranch capture, with the exception of the fins, is considered of low economic value. A high number of neonatal and juvenile hammerhead sharks (*Sphyrna* sp.), were captured, as well as pregnant *Rhinobatos glaucostigma* Jordan & Gilbert, 1883, *Gymnura marmorata* (Cooper, 1863), and *Urotrygon* spp. In general, the elasmobranchs, due to their unique biological and ecological characteristics, present low population growth and are considered highly vulnerable (Frisk et al. 2005, Hutchings et al. 2012). We accordingly recommend review and enforcement of the relevant legislation.

Bycatch in commercial fishing is frequently used for personal consumption, bait (~50%), or discarded (Fig. 3). Species with no current market value may have high nutrient value; hence the number of species with potential to be commercialized is underestimated. In offshore fisheries, these species often have commercial value. For instance, *Scorpaena mystes* (Jordan & Starks, 1895) reaches 35.6 cm and is marketed in regions such as Baja California. *Trichiurus nitens* Garman, 1899 supports a small fishery in the central portion of the littoral zone of Ecuador (pers. obs. Romero-Gallardo), whereas, in Michoacán, this species is not used for human consumption.
It was observed that 49% of the listed species are reported as also occurring throughout the three TEP provinces, with 8% of the species reported only in the Panamic and Mexican provinces, being mostly of tropical affinity, agreeing with previous fish fauna surveys in the area (Castro-Aguirre et al. 2006, Moncayo-Estrada 2006). The presence of 81 species (19%) with affinity to the San Diegan province (Fig. 4), a temperate-warm zone, reflects the dynamics of the current flow system of the Michoacán coast, reaffirming this region as a transition zone.

Although visual censuses and photo identification of fish species is widely used for the study of richness, diversity, and ecology of marine habitats (Aguilar-Palomino 2002, Palacios-Salgado 2005, Galván-Villa 2016), it is necessary to rely on reference organisms for taxonomic corroboration. A high proportion of small, nocturnal, or ecologically cryptic species may not be counted in a visual census, especially when the fish fauna of the area under study is not well known, as is the case for the Michoacán State.

The collections obtained in the present study enriched the records of the CPUM collection by 19%, since the majority of marine species previously collected remain in collections outside of Michoacán. Many species reported in this study as new records (Table 1) were included by Robertson and Allen (2015), although these authors listed them in the littoral zone of Michoacán coastline only as potential distribution based on habitat suitability. We have confirmed the distribution of such fish, as exemplified by the first formal record of 24 ecologically cryptic species. Our work expanded on the most complete fish fauna checklist previously available for the area by 32.5% (Madrid et al. 1998) and will undoubtedly represent important input for decisions about conservation and management of the coastal area of Michoacán State.

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References

Aguilar-Palomino C, Pérez R, Galván-Magaña F, Abitia-Cárdenas A (2001) Ictiofauna de la Bahía de Navidad, Jalisco, México. Revista de Biología Tropical 49: 173–190.

Allen GR, Robertson DR (1991) Descriptions of two new genera and four new species of Triplefins (Pisces: Tripterygiidae) from the tropical eastern Pacific. Revue française Aquariologie 18: 79–82.

Allen GR, Robertson DR (1992) Three new species of Triplefins (Pisces: Tripterygiidae) from Malpelo and Socorro Islands, in the tropical eastern Pacific. Revue française Aquariologie 19: 53–56.

Allen GR, Robertson DR (1998) Peces del Pacífico Oriental Tropical. CONABIO-Agrupación Sierra Madre, México, 328 pp.

Amezcua-Linares F (2009) Peces Demersales del Pacífico Mexicano. UNAM-ICMyL, México, 281 pp.

Benitez CO (2004) Contribución al estudio de la filogenia molecular de los peces de la familia Gerreidae en México. Master Thesis, Instituto Politécnico Nacional, La Paz, México.

Bleeker P (1855) Zesde bijdrage tot de kennis der ichthyologische fauna van Amboina. Natuurkundig Tijdschrift voor Nederlandsch Indië 8: 391–434.

Briggs JC (1955) A monograph of the clingfishes (Order Xenopterygii). Stanford Ichthyological Bulletin 6: 1–224.

Briggs JC, Miller RR (1960) Two new freshwater fishes of the genus Gobiesox from southern México. Occasional Papers of the Museum of Zoology. University of Michigan 616: 1–15.

Briggs JC (1974) Marine zoogeography. McGraw-Hill, New York, 473 pp.

Briggs JC (1995) Global biogeography. Developments in Palaeontology and Stratigraphy 14. Elsevier, Amsterdam, 452 pp.

Carpenter KE, Niem V (2001) FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 6. Bony fishes part 4 (Labridae to Latimeriidae), estuarine crocodiles, sea turtles, sea snakes and marine mammals. Rome 4(6): 3381–4218.

Castro-Aguirre JL, Espinoza-Pérez HS, Schmitter-Soto JJ (1999) Ictiofauna estuarino-lagunar y vicaria de México. Colección de textos politécnicos. Serie biotecnologías. Ed. Limusa. Primera edición. México, 711 pp.

Castro-Aguirre JL, González-Acosta AF, Agüero JC, Moncayo-Estrada R (2006) Ictiofauna marina-costera del Pacífico central mexicano: análisis preliminar de su riqueza y relaciones biogeográficas. In: Jiménez-Quiroz MC, Espino-Barr E (Eds) Los recursos pesqueros y acuícolas de Jalisco, Colima y Michoacán. INP, SAGARPA, México, 149–165.

Chávez-Comparan JC, Galeana LGG, Manzo VI, Salinas SJA (2008) Catálogo de peces de arrecifes rocosos-coralinos de Punta Carrizales, Colima, México. Facultad de ciencias Marinas. Universidad de Colima, México, 118 pp.

Correa PG, Gómez RM (2003) Litoral. Atlas Geográfico del Estado de Michoacán. EDDISA, en Colaboración SEEM, UMSNH y Colegio de Michoacán, México.

CONAPESCA (2014) Base de datos de producción, anuario estadístico de Acuacultura y Pesca. Comisión Nacional de Acuacultura y Pesca, México. http://www.conapesca.sagarpa.gob.mx/wb/cona/anuario_2014_zip
Del Moral-Flores LF, González-Acosta AF, Espinosa-Pérez H, Riuz-Campos G, Castro-Aguirre JL (2013) Lista anotada de la ictiofauna de las islas del golfo de California, con comentarios sobre sus afinidades zoogeográficas. Revista Mexicana de Biodiversidad 84: 184–214. doi: 10.7550/rmb.27335

Eschmeyer WN, Fricke R, van der Laan R (2016) Catalog of Fishes: Genera, Species, References. http://research.calacademy.org/ichthyology/catalog/fishcatmain.asp [accessed 20 March 2016]

Fisher W, Krupp F, Schneider W, Sommer C, Carpenter KE, Niem VH (1995) Vertebrados 1-2. Guía FAO para la identificación de especies para los fines de la pesca – Pacífico Centro-Oriental. FAO, Roma, 647–1813.

Frisk MG, Miller TJ (2005) Life Histories and Vulnerability to Exploitation of Elasmobranchs: Inferences from Elasticity, Perturbation and Phylogenetic Analyses. Journal of Northwest Atlantic Fisheries Science 35: 27–45. doi: 10.2960/J.v35.m514

Froese R, Pauly D (2013) FishBase. World Wide Web electronic publication http://www.fishbase.org [accessed February 2016]

Galván-Villa CM, Ríos-Jara E, Bastida-Izaguirre D, Hastings PA, Balart EF (2016) Annotated checklist of marine fishes from the Sanctuary of Bahía Chamela, Mexico with occurrence and biogeographic data. ZooKeys 554: 139–157. doi: 10.3897/zookeys.554.6106

Gómez-González AE, Velázquez-Velázquez E, Rodiles-Hernández R, González-Díaz AA, González-Acosta AF, Castro-Aguirre JL (2012) Lista sistemática de la ictiofauna de la Reserva de la Biosfera La Encrucijada, Chiapas, México. Revista Mexicana de Biodiversidad 83: 674–686. doi: 10.7550/rmb.24468

Hastings PA (2000) Biogeography of the Tropical Eastern Pacific: distribution and phylogeny of Chaenopsid fishes. Zoological Journal of the Linnean Society 128: 319–335. doi: 10.1111/j.1096-3642.2000.tb00166.x

Hastings PA, Robertson DR (1999) Notes on a collection of Chaenopsid blennies from Bahía Azul, Bocas del Toro, Caribbean Panama. Revue française Aquariologie 26: 33–38.

Hastings PA, Robertson DR (1999b) Acanthemblemaria atrata and Acanthemblemaria mangognatha, new species of eastern Pacific barnacle blennies (Chaenopsidae) from Isla del Coco, Costa Rica and Islas Revillagigedo, México, and their relationships with other barnacle blennies. Revue Française de Aquariologie 25: 107–118.

Himaya Y, Kumada T (1940) Peces marinos de la Costa Mexicana del Pacífico. Talls. De la Nac., México, 78.

Hubbs CL (1953) Revision of the Eastern Pacific fishes of the Clinid genus Labrisomus. Zoologica 38: 113–136.

Hutchings JA, Myers RA, García VB, Lucifora LO, Kuparinen A (2012) Life-history correlates of extinction risk and recovery potential. Ecological Applications 22: 1061–1067. doi: 10.1890/11-1313.1

Jordan DS, Evermann BW (1900) The fishes of north and Middle America. Bulletin United States National Museum 47: 1–3313.

Kessler WS (2006) The circulation of the eastern tropical Pacific: A review. Progress in Oceanography 69: 181–217. doi: 10.1016/j.pocean.2006.03.009

Lara-Lara JR, Fuentes VA, Guzmán CB, Castañeda VD, Briones EE, Abad MCG, Castro GG (2008) Los ecosistemas marinos. In: Sarukhan J (Ed.) Capital de México I. Conocimiento de la Biodiversidad, CONABIO, México, 133–159.
Latreille PA (1804) Tableaux Methodiques des Poissons. In: Nouveau Dictionnaire d’Histoire Naturelle (1st edn), Vol. 24. Paris, 71–105.
Lavenberg RJ, Chernoff M (1995) Atherinidae. Pejerreyes. In: Fischer W, Krupp F, Schneider W, Sommer C, Carpenter KE, Niem V (Eds) Guía FAO para Identificación de especies para los fines de la Pesca. Vol. 2. Pacífico Centro-Oriental. FAO, Rome, 889–901.
Lessios HA, Allen GR, Wellington GM, Bermingham E (1995) Genetic and morphological evidence that the Eastern Pacific damselfish *Abudelfuf declivifrons* is distinct from *A. concolor* (Pomacentridae). Copeia 2: 277–288. doi: 10.2307/1446891
López-Pérez RA, Pérez-Maldonado IL, López-Ortiz AM, Barranco-Servín LM, Barrientos-Villalobos J, Leyte-Morales GE (2010) Reef fishes or the Mazunte-Bahías de Huatulco reef track, Oaxaca, Mexican Pacific. Zootaxa 2422: 53–62.
Madrid-Vera J, Ruiz-Luna A, Rosado-Bravo I (1998) Peces de la plataforma continental de Michoacán y sus relaciones regionales en el Pacífico Mexicano. Revista de Biología Tropical 46: 267–276.
Madrigal-Guridi X (2006) Distribución espacial y temporal de la ictiofauna del estero de Santa Ana, Michoacán, México. Marter Thesis, Universidad Nacional Autónoma de México, México.
Márquez-Espinoza A (2012) Listado sistemático de los peces marinos de la costa Norte del estado de Guerrero, México. In: Del Moral-Flores LF, Martínez-Pérez JA, Franco-López J, Ramírez-Villalobos AJ, Tello-Musi JL (Eds) Investigación Ictiológica en México: Temas selectos en honor al Dr. José Luis Castro Aguirre. Universidad Nacional Autónoma de México, Facultad de Estudios Superiores Iztacala y Sociedad Ictiológica Mexicana A.C. México, 159–167.
Medina-Nava M, Osorio R, Domínguez-Domínguez O. (2001) La Biodiversidad en Michoacán: Los Peces. Gobierno del Estado de Michoacán y Universidad Michoacana de San Nicolás de Hidalgo. México, 95–99.
Miller PJ, Stefanni S (2001) The Eastern Pacific species of *Bathygobius* (Perciformes: Gobiidae). International Journal of Tropical 49: 141–156.
Miller RR, Minckley WL, Norris SM (2005) Freshwater fishes of Mexico. University of Chicago Press, Chicago, 652 pp.
Moncayo-Estrada R, Castro-Aguirre J, De la Cruz-Agüero J (2006) Lista sistemática de la ictiofauna de Bahía Banderas, México. Revista Mexicana de Biodiversidad 77: 67–80.
Nelson JS, Grande TC, Wilson MVH (2016) Fishes of the World (5th edition). John Wiley and Sons, Hoboken, New Jersey, 752 pp. doi: 10.1002/9781119174844
Palacios-Salgado DS (2005) Asociaciones de peces en los arrecifes rocosos de la Bahía de Acapulco, Guerrero, México. Master thesis, Baja California Sur, Instituto Politécnico Nacional, México.
Palacios-Morales G, Torres-Hernández E, Campos-Mendoza A, Domínguez-Domínguez O (2014) Corroboración taxonómica y genética de la presencia del ballesta enmascarado *Sufflamen fraenatum* (Balistidae) para la costa de México. Revista Mexicana de Biodiversidad 85: 641–644. doi: 10.7550/rmb.36883
Pfeiler E (2008) Resurrection of the name *Albula pacifica* (Beebe, 1942) for the shafted bonefish (Albuliformes: Albulidae) from the eastern Pacific. Revista de Biología Tropical 56: 839–844.
Robertson DR, Allen GR (2015) Peces Costeros del Pacífico Oriental Tropical: sistema de Información en línea. Versión 2.0 Instituto Smithsonian de Investigaciones Tropicales, Balboa, República de Panamá. http://biogeodb.stri.si.edu/sftep/es/pages [last accessed in March 2016]

Robertson DR, Cramer KL (2009) Marine shore fishes and biogeographic subdivisions of the tropical Eastern Pacific. Marine Ecology Progress Series 380: 1–16. doi: 10.3354/meps07925

Rosenblatt RH, Parr TD (1969) The Pacific species of the clinid fish genus Paraclinus. Copeia 1969: 1–20. doi: 10.2307/1441691

Rosenblatt RH, Taylor LR (1971) The Pacific species of the clinid fish tribe starksiini. Pacific Science 25: 436–463.

Rosenblatt RH, Miller EC, Hastings PA (2013) Three new species of triplefin blennies of the genus Enneanectes (Teleostei, Tripterygiidae) from the tropical eastern Pacific with a key to Pacific species of Enneanectes. Zootaxa 3636: 361–373. doi: 10.11646/zootaxa.3636.2.7

Sánchez-Aguilar D (2007) Ecología de la Ictiofauna demersal en la costa de Michoacán. Master Thesis, Universidad a de San Nicolás de Hidalgo, Michoacán.

Sandoval-Huerta ER, Madrigal-Guridi X, García-Meraz A, Dimas-Mora NI, Domínguez-Domínguez O, González-Acosta AF (2012) First records of Atherinella panamensis in the Pacific Central Mexican coasts. Cybium 36: 587–588.

Sandoval-Huerta ER, Madrigal-Guridi X, García-Meraz A, Dimas-Mora NI, Domínguez-Domínguez O (2012b) Nuevo registro de Pterygoplichthys disjunctivus (Actinopterygii: Loricariidae) en la desembocadura del río Coahuayana, Coahuayana, Michoacán, México Revista Mexicana de Biodiversidad 83: 294–297.

Sandoval-Huerta ER, Madrigal-Guridi X, Escalera-Vázquez LH, Medina-Nava M, Domínguez-Domínguez O (2014) Estructura de la comunidad de peces en cuatro estuarios del Pacífico mexicano central. Revista Mexicana de Biodiversidad 85: 1184–1196. doi: 10.7550/rmb.42105

Shaw G (1804) Pisces. General Zoology or Systematic Natural History (Vol. 5). London.

Springer VG (1959) Systematics and Zoogeography of the Clinid Fishes of the Subtibe Labrissomini Hubbs. Department of Zoology and Institute of Marine Science. University of Texas 5: 417–492.

Springer VG (1962) A Review of the Blenniid Fishes of the Genus Ophioblennius Gill. Copeia 2: 426–433. doi: 10.2307/1440912

Thomson DA, Findley LT, Kerstitch AN (2000) Reef fishes of the Sea of Cortez. University of Texas Press, 353 pp.

Viesca-Lobatón C (2005) Evaluación preliminar del proceso de rehabilitación del arrecife coralino de San Lorenzo en la Bahía de la Paz, B.C.S., México. Master thesis, Baja California Sur, México: Centro de Investigaciones Biológicas del Noroeste, S.C. CIBNOR.

Zapata FA, Robertson DR (2007) How many species of shore fishes are there in the Tropical Eastern Pacific? Journal of Biogeography 34: 38–51. doi: 10.1111/j.1365-2699.2006.01586.x