Check List 9(5): 987–1019, 2013

ISSN 1809-127X (available at *www.checklist.org.br*)

Check List
Journal of species lists and distribution

Lists of Species

Annotated checklist of the freshwater fishes of continental and insular Costa Rica: additions and nomenclatural revisions

Arturo Angulo [1*], Carlos A. Garita-Alvarado [1], William A. Bussing [1, 2] and Myrna I. López [1, 2]

1 Museo de Zoología, Escuela de Biología, Universidad de Costa Rica, San Pedro de Montes de Oca, San José, Costa Rica, 11501-2060.
2 Centro de Investigaciones en Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica, San Pedro de Montes de Oca, San José, Costa Rica, 11501-2060.
* Corresponding author. E-mail: *arturo.angs@gmail.com*

Abstract: Based on a combination of intensive literature review, electronic database searches, re-identification of museum specimens and fieldwork, we hereby provide an updated checklist of the freshwater fishes of continental and insular Costa Rica. This checklist, systematically arranged at the ordinal and familial level, includes nomenclatural revisions, distributional information, and when appropriate, cross-references on the basis of Bussing (1998). According to our results, the native Costa Rican freshwater fish fauna is composed by 250 species, divided into 119 genera, 49 families and 19 orders; increasing in 108 the number of species originally reported by Bussing (1998). By far, the vast majority of these species, according to their supposed tolerance to salinity, are peripheral (63.2%), followed by secondary freshwater fishes (23.6%); only 13.2% are primary freshwater fishes. 24 species in this checklist appear to be endemic to Costa Rica. In addition to the native fauna 8 exotic species are reported.

Introduction

Despite the relatively small continental size of Costa Rica, the country has a rich freshwater fish fauna, which was originally covered by Bussing (1987; 1998). Since these pioneer works, knowledge about the freshwater fishes of the country has continues to grow. The discovery of new species, the establishment of new inland and country records, and the numerous nomenclatural changes for previously known species, given major advances in understanding of the status and relationships of many groups, contribute to such development. The purpose of the following checklist is to update the known composition of the Costa Rican freshwater fish fauna, as well as provide revisions in nomenclature that reflect the well supported conclusions of recent studies on relationships.

Materials and Methods

Diversity and distributional data were obtained by several methods. First, field sampling at different localities in Costa Rica was performed between March 2009 and January 2013. Sampling gear included seines, cast nets and backpack electrofishers. Collection and research permits (No-152-2009-SINAC, No-181-2010-SINAC, No 157-2012-SINAC and No 007-2013-SINAC) were issued by the Costa Rican Ministerio de Ambiente Energía y Telecomunicaciones (MINAET) and the Sistema Nacional de Áreas de Conservación (SINAC). Parallel, a thorough review of the scientific literature and Costa Rican freshwater fish holdings at the collection of the Museo de Zoología of the Universidad de Costa Rica (UCR) was conducted. Finally, species occurrence records were also obtained by querying the inter-institutional online database FishNet2 (www.fishnet2.net) in order to supplement the data obtained by the above sources.

Specimens preserved were deposited at UCR and Louisiana State University Museum of Zoology (LSUMZ). Other institutional abbreviations used are as follows: CAS = California Academy of Sciences; LACM = Los Angeles County Museum; STRI = Smithsonian Tropical Research Institute; TU = Tulane University Museum of Natural History; UF = University of Florida; and UMMZ = University of Michigan Museum of Zoology.

The checklist is arranged by order and family following Eschmeyer and Fong (2013). Genera and species within a family are arranged in alphabetical order. After the mention of each most inclusive taxa, the number in parentheses indicates the number of species. In classification categories larger than genera the number in brackets represent the number of genera. In those higher than family the number preceding genera is the number of families.

The family tolerance to salinity is listed according to the classification of Myers (1949). Authority and year of description of each species and genera follow Eschmeyer (2013). An asterisk after the authority name indicates that the taxon is introduced. When available, after the authority name, the common English name was provided followed by the common Spanish name, both following Bussing (1998), Bussing and López (1994, 2010) and Froese and Pauly (2013) (see Angulo (2013) for a more complete list of the common and technical Spanish names of the Costa Rican freshwater fishes). The number within parenthesis following the common names indicates the page location for the appropriate account in Bussing (1998).

Distributional data are presented at the Costa Rican major River drainage basins (Figure 1), for which there are records for the species (Atlantic slope before Pacific slope drainages, all listed in north to south order). Following the distributional data, altitudinal ranges in meters above sea level are also presented. For range expansions and additions to freshwater fish fauna, on the basis of

Bussing (1998), we list the individual papers and/or museum specimens that are associated with the species of interest. Finally, comments are provided for species where annotations are necessary in the remarks section (*e.g.* nomenclatural notes, range extensions, conservation status, etc.).

Results

The native freshwater fish fauna of Costa Rica is composed by 250 species included in 119 genera, 49 families and 19 orders (Table 1). The order Perciformes, with 123 species in 17 families, is the most diverse, followed by Cyprinodontiformes (33 species in 4 families) and Characiformes (22 species in 4 families). Cichlidae (25 species), Poeciliidae (23 species), Gobiidae (22 species), Characidae (19 species) and Eleotridae (16 species) are the most speciose families. By far, the vast majority of Costa Rican freshwater fish species, according to their supposed tolerance to salinity, are peripheral (63.2%), followed by secondary (23.6%); only 13.2% are primary or obligate freshwater.

A total of 108 species in this checklist constitute additions to the Bussing (1998) list. Of these, 105 are peripheral species, two (*Ophisternon aenigmaticum* and *Poeciliopsis santaelena*) are secondary species and only *Bryconamericus gonzalezi* is a primary species. Twenty-four species appear to be endemic to the country (*Amphilophus bussingi, A. diquis, Brachyrhaphis olomina, B. rhabdophora, Bryconamericus terrabensis, Cryptoheros myrnae, C. sajica, Cynodonichthys fuscolineatus, C. glaucus, C. siegfriedi, Eleotris tubularis, Gobiesox fulvus, Hyphessobrycon savagei, Imparfinis lineatus, Lebiasina boruca, Phallichthys*

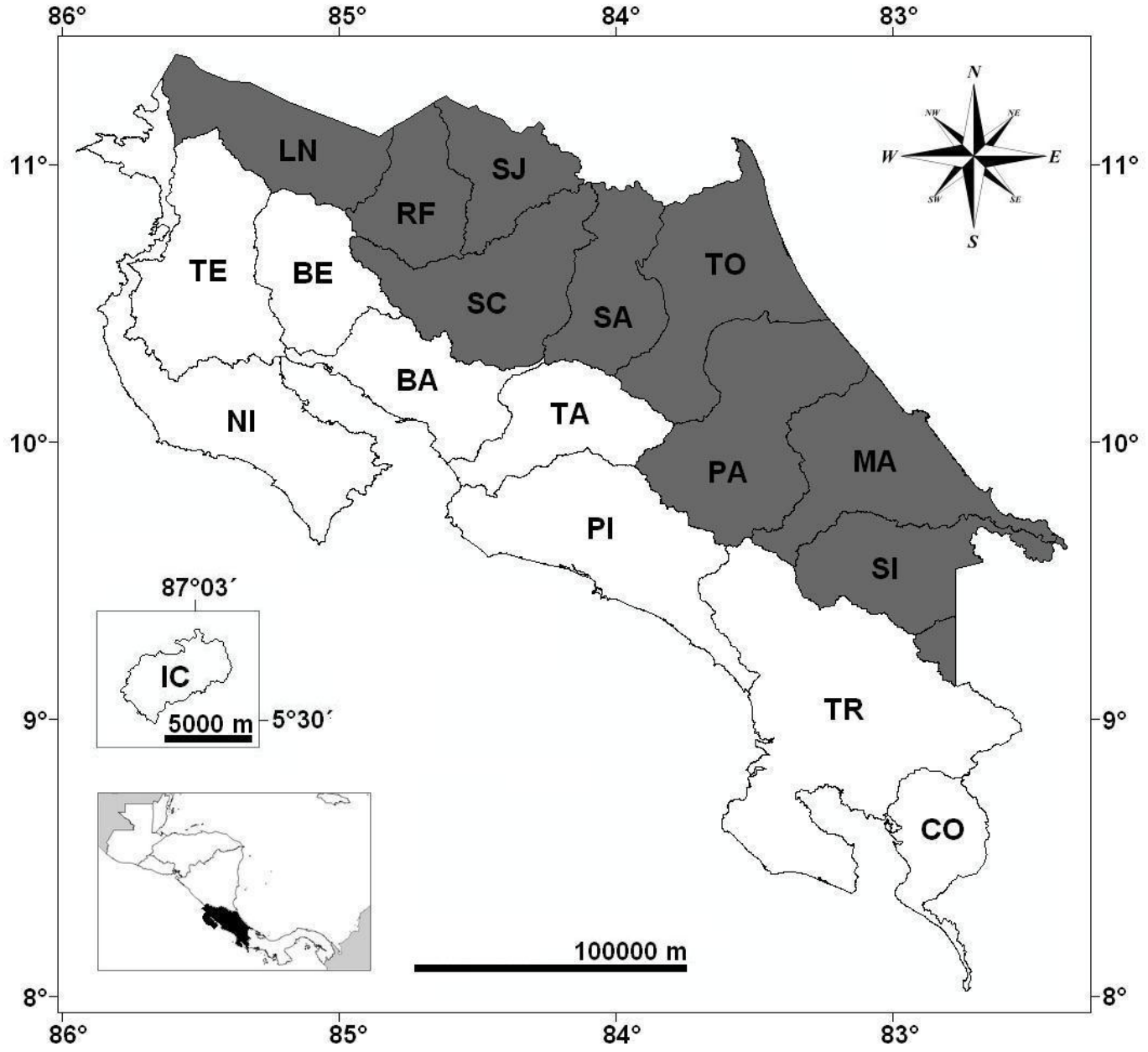

Figure 1. Map of Costa Rica showing the 18 major River drainage basins. Unshaded areas depict drainages located on the Pacific slope; shaded areas are on the Atlantic Slope. Major River drainage basins: Lago de Nicaragua (LN), Río Frío (RF), San Juan (SJ), San Carlos (SC), Sarapiquí (SA), Tortuguero (TO), Parismina (PA), Matina (MA), Sixaola (SI), Isla del Coco (IC), Nicoya (NI), Tempisque (TE), Bebedero (BE), Barranca (BA), Tárcoles (TA), Pirrís (PI), Térraba (TR) and Coto (CO).

quadripunctatus, Poeciliopsis paucimaculata, P. santaelena, Priapichthys annectens, Pseudocheirodon Térrabae, Pterobrycon myrnae, Roeboides ilseae, Sicydium adelum and *S. cocoensis*). Finally, in addition to the native species, 8 exotic species (*Carassius auratus, Cyprinus carpio, Micropterus salmoides, Oncorhynchus mykiss, Oreochromis niloticus, Poecilia reticulata, Pterygoplichthys pardalis* and *Xiphophorus variatus*), included in eigth genera, three families and two orders, are also found in the country.

Annotated Checklist of the freshwater fishes of continental and insular Costa Rica 52[127](258)

Class: Elasmobranchii 2[2](3).

Order: Carcharhiniformes 1[1](1).

Family: Carcharhinidae [1](1). Peripheral.

Genus: *Carcharhinus* Blainville, 1816 (1)

1. *Carcharhinus leucas* (Müller and Henle, 1839). Bull shark, tiburón toro (51).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. Pacific slope: Térraba. 0-35 m.

Order: Pristiformes 1[1](2).

Family: Pristidae [1](2). Peripheral.

Genus: *Pristis* Linck, 1790 (2).

2. *Pristis pectinata* Latham, 1794. Smalltooth sawfish, pez sierra. Addition to fauna.

Distribution: Atlantic slope: Lago de Nicaragua, San Juan and Tortuguero. Pacific slope: Térraba. 0-35 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Thorson (1976) recorded this species in freshwaters near the outlets of the San Juan River, Nicaragua, and its major branch, the Colorado River, Costa Rica. Other freshwater records in Caribbean drainages of Central America include the Lake Izabal and the Dulce River, Guatemala (Thorson *et al*. 1966), and the Patuca River, Honduras (Matamoros *et al*. 2009). In addition, Winemiller (1983) recorded this species in freshwaters in the Claro River, Térraba drainage, Pacific slope.

3. *Pristis pristis* (Linnaeus, 1758). Common sawfish, pez sierra (53).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. Pacific slope: Tempisque. 0-35 m.

Class: Actinopterygii 50[125](255).

Order: Lepisosteiformes 1[1](1).

Family: Lepisosteidae [1](1). Secondary.

Genus: *Atractosteus* Rafinesque, 1820 (1).

4. *Atractosteus tropicus* Gill, 1863. Tropical gar, gaspar (57).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero and Parismina. 0-45 m.

Order: Elopiformes 2[2](2).

Family: Elopidae [1](1). Peripheral.

Genus: *Elops* Linnaeus, 1766 (1).

5. *Elops affinis* Regan, 1909. Pacific ladyfish, macabí. Addition to fauna.

Distribution: Pacific slope: Nicoya. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Eight specimens have been collected in freshwaters in the Calera River (UCR 0935-06), Nicoya drainage.

Family: Megalopidae [1](1). Peripheral.

Genus: *Megalops* Lacepède, 1803 (1).

6. *Megalops atlanticus* Valenciennes, 1847. Tarpon, sábalo real (61).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. 0-45 m.

Order: Albuliformes 1[1](1).

Family: Albulidae [1](1). Peripheral.

Genus: *Albula* Scopoli, 1777 (1).

7. *Albula vulpes* (Linnaeus, 1758). Bonefish, zorro. Addition to fauna.

Distribution: Atlantic slope: Matina. 0-2 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Four specimens have been collected in freshwaters in the Suarez River (UCR 0211-05), Matina drainage.

Order Anguilliformes 2[2](3).

Family Anguillidae [1](1). Peripheral.

Genus: *Anguilla* Schrank, 1798 (1).

8. *Anguilla rostrata* (Lesueur, 1817). American eel, anguila (64).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-20 m.

Family: Ophichthidae [1](2). Peripheral.

Genus: *Myrophis* Lütken, 1852 (2).

9. *Myrophis punctatus* Lütken, 1852. Speckled worm eel, tieso gusano. Addition to fauna.

Distribution: Atlantic slope: Matina. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Seven specimens have been collected in freshwaters in the Suarez River (UCR 0778-12, n=6, UCR 0779-05, n=1), Matina drainage.

10. *Myrophis vafer* Jordan and Gilbert, 1883. Pacific worm eel, anguila lombriz común. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-17 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). One specimen has been collected in freshwaters in the Quebrada Sucia River (UCR 1314-21), Térraba drainage.

Order: Clupeiformes 2[7](8).

Family: Clupeidae [3](4). Peripheral.

Genus: *Dorosoma* Rafinesque, 1820 (1).

11. *Dorosoma chavesi* Meek, 1907. Nicaragua gizzard shad, sabalete (68).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. 0-50 m.

Genus: *Lile* Jordan and Evermann, 1896 (2).

12. *Lile piquitinga* (Schreiner and Miranda Ribeiro, 1903). Atlantic piquitinga, sardina piquitinga. Addition to fauna.

Distribution: Atlantic slope: Sixaola. 0-66 m.

Remarks: One specimen has been collected in freshwaters in the Quebrada Biei River (UCR 1531-10), Sixaola drainage. This species is known only from Nueva Esparta, Venezuela, and the coasts of Brazil from Racife and Lake Papary near Natal south to Bahia and Espirito Santo (Cervigón et al. 1992); this specimen represents a north range extension of the known distribution in the western Atlantic.

13. *Lile stolifera* (Jordan and Gilbert, 1882). Striped herring, sardina rayada. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Forty-eight specimens have been collected in freshwaters in the Rincón River (UCR 0262-09, n=21, UCR 0456-06, n=26) and the Sierpe River (UCR 2863-01, n=1), Térraba drainage.

Genus: *Sardinella* Valenciennes, 1847 (1).

14. *Sardinella brasiliensis* (Steindachner, 1879). Brazilian sardinella, sardina brasileña. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Eight specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 1788-05), Tortuguero drainage.

Family: Engraulidae [4](5). Peripheral.

Genus: *Anchoa* Jordan and Evermann, 1927 (2).

15. *Anchoa curta* (Jordan and Gilbert, 1882). Short anchovy, anchoa pelada. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-12 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Alpírez (1985) recorded this species in freshwaters in the Palo Seco River and the Quebrada Vueltas River, Térraba drainage.

16. *Anchoa lucida* (Jordan and Gilbert, 1882). Bright anchovy, anchoa bocona. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). One specimen has been collected in freshwaters in the Lagarto River (UCR 1268-20), Barranca drainage.

Genus: *Anchovia* Jordan and Evermann, 1895 (1).

17. *Anchovia macrolepidota* (Kner, 1863). Bigscale anchovy, anchoa de escama grande. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-17 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). One specimen has been collected in freshwaters in the Quebrada Sucia River (UCR 1314-18), Térraba drainage.

Genus: *Anchoviella* Fowler, 1911 (1).

18. *Anchoviella elongata* (Meek and Hildebrand, 1923). Elongate anchovy, anchoveta alargada. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Parismina. 0-5 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Ten specimens have been collected in freshwaters in the Colorado River (UCR 0990-19, n=1), the Tortuguero Lagoon (UCR 1768-01, n=2), the Jalova Lagoon (UCR 2665-04, n=4), Tortuguero drainage, and the Pacuare River (UCR 2837-05, n=3), Parismina drainage. Gilbert and Kelso (1971) collected thirty-nine specimens in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

Genus: *Lycengraulis* Günther, 1868 (1).

19. *Lycengraulis grossidens* (Agassiz, 1829). Atlantic sabretooth anchovy, anchoa dientona. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Tortuguero Lagoon (UCR 1788-10), Tortuguero drainage.

Order: Cypriniformes 1[2](2).

Family: Cyprinidae [2](2). Primary.

Genus: *Carassius* Nilsson, 1832 (1).

20. *Carassius auratus* (Linnaeus, 1758)*. Goldfish, carpa dorada (23).

Distribution: Pacific slope: Tárcoles. 100-1779 m.

Remarks: Originally introduced from Asia, this species is found in Lake Fraijanes (Bussing 1998) and perhaps other ponds (Fowler 1932; Bussing 1998). We have not heard of specimens reaching other waters.

Genus: *Cyprinus* Linnaeus, 1758 (1).

21. *Cyprinus carpio* Linnaeus, 1758*. Common carp, carpa común. Addition to fauna.

Distribution: Pacific slope: Tárcoles. 112-1516 m.

Remarks: This species was introduced in 1976 from Taiwan in an attempt to strengthen aquaculture activities (Welcomme 1988). Two specimens have been collected in freshwaters in an unknown pond name in Alajuela (UCR 1104-01), Tárcoles drainage.

Order: Characiformes 4[13](22).

Family: Curimatidae [1](1). Primary.

Genus: *Cyphocharax* Fowler, 1906 (1).

22. *Cyphocharax magdalenae* (Steindachner, 1879). Carp headstander, capani (126).

Distribution: Pacific slope: Coto. 12-100 m.

Family: Erythrinidae [1](1). Primary.

Genus: *Hoplias* Gill, 1903 (1).

23. *Hoplias microlepis* (Günther, 1864). Tiger fish, pez perro (123).

Distribution: Pacific slope: Coto. 20-40 m.

Family: Lebiasinidae [1](1). Primary.

Genus: *Lebiasina* Valenciennes, 1847 (1).

24. *Lebiasina boruca* (Bussing, 1967). Candela (125).

Distribution: Pacific slope: Pirrís (A. Molina, pers. comm.), Térraba and Coto. 10-1000 m.

Remarks: This species was called *Piabucina boruca* in Bussing (1998). In the present account we recognize this species in the genus *Lebiasina* following Eigenmann and Allen (1942), Weitzman (1964), Dahl (1971), Machado-Allison (1974), Géry (1977), Taphorn (1992), Ardila-Rodríguez (1994; 1999; 2000; 2001; 2002; 2004; 2008a, b; 2009; 2010) and Netto-Ferreira *et al.* (2011). This species is endemic to the Térraba and Coto drainages, Costa Rica (Bussing 1998).

Family: Characidae [10](19). Primary.

Genus: *Astyanax* Baird and Girard, 1854 (3).

25. *Astyanax aeneus* (Günther, 1860). Banded tetra, sardina (79).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-1000 m.

26. *Astyanax cocibolca* Bussing 2008. Cocibolca tetra, sardina (85).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. 5-20 m.

Remarks: Bussing (2008) described *A. cocibolca* from specimens of the Lake Nicaragua and San Juan River that he previously considered as *A. nasutus*. This species is endemic to Lake Nicaragua and San Juan drainages (Bussing 2008).

27. *Astyanax orthodus* Eigenmann, 1907. Largespot tetra, sardina blanca (86).

Distribution: Atlantic slope: Sixaola. 1-60 m.

Genus: *Bramocharax* Gill, 1877 (1).

28. *Bramocharax bransfordii* Gill, 1877. Longjaw tetra, sardina picuda (88).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero and Parismina. 5-530 m.

Remarks: Rosen (1972) considered *Bramocharax* to be monophyletic and derived from some *Astyanax* species. On the other hand, Ornelas-García *et al*. (2008) proposed that this genus is not monophyletic and considered all *Bramocharax* species as morphotypes of *Astyanax*. The close relationship between *Bramocharax* and *Astyanax* proposed by Ornelas-García *et al*. (2008) was not supported by Mirande (2010), which instead relates *Bramocharax* with *Oligosarcus* Günther 1864. In the present account we provisionally keep this species in *Bramocharax* following Rosen (1972), Bussing (1998), Lima *et al.* (2003) and Mirande (2010); however, a comprehensive taxonomic study is needed to test the monophyly and position of this clade.

Genus: *Brycon* Müller and Troschel, 1844 (2).

29. *Brycon behreae* Hildebrand, 1938. Machaca del Pacífico (90).

Distribution: Pacific slope: Pirrís, Térraba and Coto. 10-640 m.

30. *Brycon costaricensis* Angulo and Gracian-Negrete, 2013. Macabi tetra, machaca del Atlántico (93).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 0-600 m.

Remarks: Angulo and Gracian-Negrete (2013) described *B. costaricensis* from specimens of the Atlantic slope of Nicaragua and Costa Rica that Bussing (1998) considered as *B. guatemalensis*.

Genus: *Bryconamericus* Eigenmann, 1907 (3).

31. *Bryconamericus gonzalezoi* Román-Valencia 2002. Creek tetra, sardina de quebrada. Addition to fauna.
Distribution: Atlantic slope: Sixaola (STRI 0581). 69 m.

32. *Bryconamericus scleroparius* (Regan, 1908). Creek tetra, sardina de quebrada (97).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Tempisque. 12-600 m.

33. *Bryconamericus terrabensis* Meek, 1914. Creek tetra, sardina de quebrada (99).
Distribution: Pacific slope: Térraba. 60-940 m.
Remarks: This species is endemic to the Térraba drainage, Costa Rica (Bussing 1998; Román-Valencia 2002).

Genus: *Carlana* Strand, 1928 (1).

34. *Carlana eigenmanni* (Meek, 1912). Carlana tetra, sardinita (100).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero and Parismina. 35-90 m.

Genus: *Hyphessobrycon* Durbin, 1908 (3).

35. *Hyphessobrycon panamensis* Durbin, 1908. Panama tetra, sardinita (105).
Distribution: Atlantic slope: Sixaola. 40-60 m.

36. *Hyphessobrycon savagei* Bussing, 1967. Savage tetra, sardinita (108).
Distribution: Pacific slope: Pirrís and Térraba. 0-70 m.
Remarks: This species is endemic to the Pirrís and Térraba drainages, Costa Rica (Bussing 1998).

37. *Hyphessobrycon tortuguerae* Böhlke, 1958. Tortuguero tetra, sardinita de Tortuguero (110).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. 0-50 m.

Genus: *Odontostilbe* Cope, 1870 (1).

38. *Odontostilbe dialeptura* (Fink and Weitzman, 1974). Pygmy tetra, sardinita (103).
Distribution: Pacific slope: Coto. 20-90 m.
Remarks: This species was called *Compsura dialeptura* in Bussing (1998). In the present account we provisionally recognize this species in *Odontostilbe* following Malabarba and Weitzman (1999; 2000) and Malabarba (2003); however a new generic assignment is necessary for this species.

Genus: *Pseudocheirodon* Meek and Hildebrand, 1916 (1).

39. *Pseudocheirodon Térrabae* Bussing, 1967. Térraba tetra, sardinita (111).
Distribution: Pacific slope: Pirrís and Térraba. 0-680 m.
Remarks: This species is endemic to the Pirrís and Térraba drainages, Costa Rica (Bussing 1998).

Genus: *Pterobrycon* Eigenmann, 1913 (1).

40. *Pterobrycon myrnae* Bussing, 1974. Semaphore tetra, sardinita (113).
Distribution: Pacific slope: Pirrís and Térraba. 10-80 m.
Remarks: This species is endemic to the Pirrís and Térraba drainages, Costa Rica (Bussing 1998).

Genus: *Roeboides* Günther, 1864 (3).

41. *Roeboides bouchellei* Fowler, 1923. Glass headstander, sardina (116).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. Pacific slope: Nicoya, Tempisque, Bebedero and Barranca. 0-610 m.

42. *Roeboides bussingi* Matamoros, Chakrabarty, Angulo, Garita-Alvarado and McMahan, 2013. Glass headstander, sardina (117).
Distribution: Pacific slope: Coto. 11-118 m.
Remarks: Matamoros *et al.* (2013) described *R. bussingi* from specimens of the Pacific slope of Costa Rica and Panama that Bussing (1998) considered as *R.* sp.

43. *Roeboides ilseae* Bussing, 1986. Glass headstander, sardina (120).
Distribution: Pacific slope: Pirrís and Térraba. 10-660 m.
Remarks: This species is endemic to the Pirrís and Térraba drainages, Costa Rica (Bussing 1998).

Order: Siluriformes 4[10](15).

Family: Ariidae [3](6). Peripheral.

Genus: *Cathorops* Jordan and Gilbert, 1883 (2).

44. *Cathorops steindachneri* (Gilbert and Starks, 1904). Steindachner's sea catfish, congo boquita. Addition to fauna.
Distribution: Pacific slope: Tempisque and Térraba. 0-55 m.
Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994, 2009). One specimen has been collected in freshwaters in the Tempisque River (UCR 2192-01), Tempisque drainage. Rojas and Rodríguez (2008) collected one specimen in freshwaters in the Grande de Térraba River, Térraba drainage.

45. *Cathorops tuyra* (Meek and Hildebrand, 1923). Besudo sea catfish, congo de río. Addition to fauna.
Distribution: Pacific slope: Tempisque and Térraba. 0-55 m.
Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Two specimens have been collected in freshwaters in the Tempisque River (UCR 2265-01, UCR 2672-04),

Tempisque drainage. Rojas and Rodríguez (2008) collected one specimen in freshwaters in the Grande de Térraba River, Térraba drainage.

Genus: *Notarius* Gill, 1863 (1).

46. *Notarius cookei* (Acero and Betancur-R, 2002). Sea catfish, bagre. Addition to fauna.

Distribution: Pacific slope: Tempisque. 0-6 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009, both as *Arius cookei*). In the present account we recognize this species in the genus *Notarius* following Bentancur-R. and Acero (2004; 2006), Marceniuk and Menezes (2007) and Marceniuk *et al.* (2012). One specimen has been collected in freshwaters in the Tempisque River (UCR 2672-03), Tempisque drainage.

Genus: *Sciades* Müller and Troschel, 1849 (3). Costa Rican members of this genus were referred to the genus *Arius* by Bussing (1998) and Bussing and López (2009; 2010). In the present account we recognize these species in the genus *Sciades* following Marceniuk *et al.* (2012).

47. *Sciades assimilis* (Günther, 1864). Mayan sea catfish, bagre maya. Addition to fauna.

Distribution: Atlantic slope: Parismina. 0-7 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Three specimens have been collected in freshwaters in the Pacuare River (UCR 2836-07, n=2; UCR 2859-11, n=1), Parismina drainage.

48. *Sciades guatemalensis* (Günther, 1864). Blue sea catfish, bagre cuatete (138).

Distribution: Pacific slope: Tempisque. 0-11 m.

49. *Sciades seemanni* (Günther, 1864). Tete sea catfish, cuminate negro (139).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero (UCR 0152-07), Barranca (UCR 1268-26, UCR 1756-06, UCR 1793-01), Tárcoles (UCR 2194-01) and Térraba (UCR 2458-01). 0-32 m.

Family: Heptapteridae [3](5). Primary. Costa Rican members of this family were referred to the family Pimelodidade by Bussing (1998). In the present account we recognize these species in the family Heptapteridae following Bockmann and Guazzelli (2003) and Nelson (2006).

Genus: *Imparfinis* Eigenmann and Norris, 1900 (1).

50. *Imparfinis lineatus* (Bussing, 1970). Pigmy catfish, barbudito (144).

Distribution: Pacific slope: Térraba. 80-980 m.

Remarks: This species was called *Nannorhamdia lineata* in Bussing (1998). In the present account we recognize this species in the genus *Imparfinis* following Mees and Cala (1989), Burgess (1989), Bockmann and Guazzelli (2003), Ferraris (2007) and Ortega-Lara *et al.* (2011). This species is endemic to the Térraba drainage, Costa Rica (Bussing 1998).

Genus: *Pimelodella* Eigenmann and Eigenmann, 1888 (1).

51. *Pimelodella chagresi* (Steindachner, 1876). Catfish, arrechito (145).

Distribution: Pacific slope: Térraba and Coto. 20-660 m.

Genus: *Rhamdia* Bleeker, 1858 (3).

52. *Rhamdia guatemalensis* (Günther, 1864). Catfish, barbudo (148).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-680 m.

Remarks: Silfvergrip's (1996) revision of the genus synonymized *R. guatemalensis* with *R. quelen*. On the other hand, Perdices *et al.* (2002) analyzed the evolutionary history of the genus in Central America and concluded that Central American R. *guatemalensis* are evolutionarily distinct from *R. quelen* from South America. In the present account we recognize this species as valid and distinct from *R. quelen* following Bussing (1998), Weber and Wilkens (1998), Perdices *et al.* (2002), Weber *et al.* (2003), Sharpf (2006) and Matamoros *et al.* (2009).

53. *Rhamdia laticauda* (Kner, 1858). Filespine chulín, barbudo (154).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 35-1350 m.

Remarks: This species was called *Rhamdia rogersi* (Regan, 1907) in Bussing (1998). In the present account we recognize this species as synonym of *R. laticauda* following Silfvergrip (1996), Bockmann and Guazzelli (2003), Ferraris (2007) and Matamoros *et al.* (2009).

54. *Rhamdia nicaraguensis* (Günther, 1864). Catfish, barbudo (152).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero and Parismina. Pacific slope: Tempisque, Bebedero, Barranca and Tárcoles. 20-1160 m.

Family: Trichomycteridae [1](1). Primary.

Genus: *Trichomycterus* Valenciennes, 1832 (1).

55. *Trichomycterus striatus* (Meek and Hidelbrand, 1913). Pencil catfish, laucha (159).

Distribution: Pacific slope: Térraba and Coto. 20-660 m.

Family: Loricariidae [3](3). Primary.

Genus: *Fonchiiichthys* Isbrücker and Michels, 2001 (1).

56. *Fonchiiichthys uracanthus* (Kner, 1863). Armored

catfish, zapatero (162).

Distribution: Pacific slope: Coto. 20-160 m.

Remarks: This species was called *Rineloricaria uracantha* (Eigenmann, 1922) in Bussing (1998). In the present account we recognize this species in the genus *Fonchiiichthys* following Isbrücker (2001; 2002), Fisch-Muller (2003) and Ferraris (2007).

Genus: *Hemiancistrus* Bleeker, 1862 (1)

57. *Hemiancistrus aspidolepis* (Günther, 1886). Panama suckermouth, arrisuaca (160).

Distribution: Atlantic slope: Río Frío (UCR 2933-01) and Parismina (Molina *et al.* 2010, as *Hypostomus panamensis*). Pacific slope: Térraba and Coto. 20-560 m.

Remarks: This species was called *Hypostomus panamensis* (Eigenmann, 1922) in Bussing (1998). In the present account we recognize this species in the genus *Hemiancistrus* as synonym of *H. aspidolepis* following Isbrücker (2001; 2002), Fisch-Muller (2003) and Ferraris (2007).

Genus: *Pterygoplichthys* Gill, 1858 (1).

58. *Pterygoplichthys pardalis* (Castelnau, 1855)*. Amazon sailfin catfish, pez diablo. Addition to fauna.

Distribution: Parismina. 20-110 m.

Remarks: One specimen has been collected in freshwaters in the Chanchera River (UCR 2911-01), Parismina drainage. Molina *et al.* (2010), as *P*. sp., and Herrera (2012) recorded this species in freshwaters in the Reventazón river, the Chanchera River and the Seis Amigos Lagoon, Parismina drainage. This species naturally occurs in Brazil and Peru, though it has been widely introduced to several countries around the world. In Costa Rica this species has been introduced most likely by aquarists (Molina *et al.* 2010; Herrera 2012).

Order: Gymnotiformes 2[2](3).

Family: Gymnotidae [1](2). Primary.

Genus: *Gymnotus* Linnaeus, 1758 (2).

59. *Gymnotus cylindricus* LaMonte, 1935. Knifefish, pez cuchillo (130).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 1-50 m.

60. *Gymnotus maculosus* Albert and Miller, 1995. Knifefish, pez cuchillo (132).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. Pacific slope: Nicoya, Tempisque and Bebedero. 20-540 m.

Family: Hypopomidae [1](1). Primary. *Brachyhypopomus occidentalis* (Regan, 1914), the unique species of this family know to be present in Costa Rica, was referred to the family Rhamphichthyidae by Bussing (1998). In the present account we recognize this species in Hypopomidae following Mago-Leccia (1994), Albert and Campos-da-Paz (1998) and Albert (2001).

Genus: *Brachyhypopomus* Mago-Leccia, 1994 (1).

61. *Brachyhypopomus occidentalis* (Regan, 1914). Knifefish, pez cuchillo (134).

Distribution: Atlantic slope: Sixaola. 1-60 m.

Remarks: This species was called *Hypopomus occidentalis* in Bussing (1998). In the present account we recognize this species in the genus *Brachyhypopomus* following Mago-Leccia (1994) and Albert (2001).

Order: Salmoniformes 1[1](1).

Family: Salmonidae [1](1). Peripheral.

Genus: *Oncorhynchus* Suckley, 1861 (1).

62. *Oncorhynchus mykiss* (Walbaum, 1792). Rainbow trout, trucha arcoiris (22).

Distribution: Atlantic slope: Parismina (A. Molina, pers. comm.). Pacific slope: Pirrís (Vargas 2003, A. Molina, pers. comm.). 654-2202 m.

Remarks: This species was introduced in Costa Rica between 1927 and 1928 for private initiative to populate the Rivers lacking of native fish and promote the sport fishing (Bussing 1998; Vargas 2003).

Order: Gobiesociformes 1[1](3).

Family: Gobiesocidae [1](3). Peripheral.

Genus: *Gobiesox* Lacepède, 1800 (3).

63. *Gobiesox fulvus* Meek, 1907. Cocos stream clingfish, chupapiedra (250).

Distribution: Pacific slope: Isla del Coco. 0-304 m.

Remarks: This species is endemic to the Isla del Coco drainage, Costa Rica (Briggs 1955; Bussing 1998; Bussing and López 2005).

64. *Gobiesox nudus* (Linnaeus, 1758). Clingfish, chupapiedra (247).

Distribution: Atlantic slope: San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 25-580 m.

65. *Gobiesox potamius* Briggs, 1955. Clingfish, chupapiedra (249).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba. 0-140 m.

Remarks: This species was thought to be endemic to the Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba drainages, Costa Rica (Bussing 1998); however, McMahan *et al.* (2013) report this in El Salvador.

Order: Atheriniformes 1[2](7).

Family: Atherinopsidae [2](7). Peripheral. Costa Rican members of this family were referred to the family Atherinidae by Bussing (1998). In the present account we recognize these species in the family Atherinopsidae following Saeed *et al.* (1994), Dyer and Chernoff (1996)

and Nelson (2006).

Genus: *Atherinella* Steindachner, 1875 (6).

66. *Atherinella argentea* Chernoff, 1986. Moon silverside, sardina (237).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-7 m.

67. *Atherinella blackburni* (Schultz, 1949). Beach silverside, tinícalo playón. Adittion to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Tortuguero Lagoon (UCR 1788-10), Tortuguero drainage.

68. *Atherinella chagresi* (Meek and Hildebrand, 1914). Chagre´s silverside, sardina (240).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 8-60 m.

69. *Atherinella hubbsi* (Bussing, 1979). Silverside, sardina (241).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina (UCR 1820-03) and Matina (UCR 1953-01). 35-540 m.

70. *Atherinella milleri* (Bussing, 1979). Miller´s silverside, sardina (243).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-40 m.

71. *Atherinella sardina* Meek, 1907. Silverside, sardina (244).

Distribution: Atlantic slope: Lago de Nicaragua. 0-40 m.

Genus: *Membras* Bonaparte, 1836 (1).

72. *Membras gilberti* (Jordan and Bollman, 1890). Landia silverside, pejerrey landia. Addition to fauna.

Distribution: Pacific slope: Barranca, Tárcoles, Pirrís and Térraba. 0-7 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Twenty-nine specimens have been collected in freshwaters in the Lagarto River (UCR 1793-09, n=1), Barranca drainage, the Drake River (UCR 0176-01, n=4) and the Rincón River (UCR 0456-05, n=24), Térraba drainage.

Order: Cyprinodontiformes 3[12](33).

Family: Rivulidae [1](7). Secondary.

Genus: *Cynodonichthys* Poey, 1860 (7). Costa Rican members of this genus were referred to the genus *Rivulus* by Bussing (1998). Costa (2011), based on molecular and morphological data of 33 rivuline taxa, restricted *Rivulus* to two endemic species to Cuba and considered as valid genera *Anablepsoides, Atlantirivulus*, *Laimosemion*, *Melanorivulus* and *Cynodonichthys,* previously classified as subgenera of *Rivulus*. In the present account we placed in *Cynodonichthys* all Costa Rican rivulids species following this author.

73. *Cynodonichthys fuscolineatus* (Bussing, 1980). Arenal rivulus, olomina (171).

Distribution: Atlantic slope: San Carlos. Pacific slope: Bebedero. 525-695 m.

Remarks: This species is endemic to the San Carlos and Bebedero drainages, Costa Rica (Bussing 1980; 1998).

74. *Cynodonichthys glaucus* (Bussing, 1980). Blue rivulus, olomina (173).

Distribution: Pacific slope: Térraba and Coto. 540-680 m.

Remarks: This species is endemic to the Térraba and Coto drainages, Costa Rica (Bussing 1980; 1998).

75. *Cynodonichthys hildebrandi* (Myers, 1927). Speckled rivulus, olomina (175).

Distribution: Pacific slope: Térraba and Coto. 10-90 m.

76. *Cynodonichthys isthmensis* (Garman, 1985). Isthmian rivulus, olomina (176).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Bebedero and Tárcoles. 0-1500 m.

77. *Cynodonichthys rubripunctatus* (Bussing, 1980). Rivulus, olomina (177).

Distribution: Atlantic slope: Sixaola. 2-40 m.

Remarks: This species was recognized as a subspecies of *C. isthmensis* in Bussing (1980; 1998). In the present account we recognize this species as valid following Berkenkamp and Etzel (1999) and Costa (2003; 2006; 2011).

78. *Cynodonichthys siegfriedi* (Bussing, 1980). Rivulus, olomina (179).

Distribution: Pacific slope: Térraba. 20-80 m.

Remarks: This species was recognized as a subspecies of *C. uroflammeus* in Bussing (1980; 1998). In the present account we recognize this species as valid following Costa (2003; 2006; 2011). This species is endemic to the Térraba drainage, Costa Rica (Bussing 1980).

79. *Cynodonichthys uroflammeus* (Bussing, 1980). Flame rivulus, olomina (179).

Distribution: Pacific slope: Térraba and Coto. 750-1100 m.

Family: Anablepidae [1](1). Secondary.

Genus: *Oxyzygonectes* Fowler, 1916 (1).

80. *Oxyzygonectes dovii* (Günther, 1866). White-eye, ojos blancos (166).

Distribution: Pacific slope: Nicoya, Tempisque,

Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-15 m.

Family: Poeciliidae [10](25). Secondary.

Genus: *Alfaro* Meek, 1912 (1).

81. *Alfaro cultratus* (Regan, 1908). Alfaro, olomina (192).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Tempisque. 0-300 m.

Genus: *Belonesox* Kner, 1860 (1).

82. *Belonesox belizanus* Kner, 1860. Pike killifish, gasparcillo (194).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 0-45 m.

Genus: *Brachyrhaphis* Regan, 1913 (6).

83. *Brachyrhaphis cascajalensis* (Meek and Hildebrand, 1913). Olomina. Addition to fauna.

Distribution: Atlantic slope: Sixaola. 5-125 m.

Remarks: Bussing (1998) do not listed this species from Costa Rica, although he mentions that all specimens from the Sixaola drainage lack of a caudal black spot (apparently the unique feature present in *B. cascajalensis* that separate this of *B. parismina*). In the present account, following Meek and Hildebrand (1913), Rosen and Bailey (1963), Mojica *et al*. (1997), Parenti *et al*. (1999), Lucinda (2003) and Lucinda and Reis (2005) and on the basis of this feature, we recognize this species to be present in the Sixaola drainage; however, further studies are needed to clarify this situation as noted by Bussing (1998) and Meyer and Etzel (2001).

84. *Brachyrhaphis holdridgei* Bussing, 1967. Olomina (195).

Distribution: Atlantic slope: Lago Nicaragua, Rio Frío, San Juan, San Carlos, Sarapiquí, Tortuguero and Parismina. 35-620 m.

85. *Brachyrhaphis olomina* (Meek, 1914). Olomina (198).

Distribution: Atlantic slope: Lago de Nicaragua and Parismina. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca and Tárcoles. 10-900 m.

Remarks: Rosen and Bailey (1963), Parenti *et al*. (1999) and Lucinda (2003) recognized *B. olomina* as synonym of *B. rhabdophora* (Regan 1908). Following Meek (1914), Bussing (1998) and Meyer and Etzel (1998) we recognize *B. olomina* as valid and different from *B. rhabdophora*, since the two species can be completely separated based on the number of gonopodial subterminal spines in ray 4p and the coloration pattern. This species is endemic to the Lago de Nicaragua, Parismina, Nicoya, Tempisque, Bebedero, Barranca and Tárcoles drainages, Costa Rica (Bussing 1998).

86. *Brachyrhaphis parismina* (Meek, 1912). Olomina (200).

Distribution: Atlantic slope: Lago de Nicaragua, Rio Frio, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 5-50 m.

87. *Brachyrhaphis rhabdophora* (Regan, 1908). Olomina (203)

Distribution: Pacific slope: Pirrís and Térraba. 3-1450 m (UCR 2432-02).

Remarks: This species is endemic to the Pirrís and Térraba drainages, Costa Rica (Bussing 1998).

88. *Brachyrhaphis roseni* Bussing, 1988. Olomina (205)

Distribution: Pacific slope: Coto. 20-100 m.

89. *Brachyrhaphis terrabensis* (Regan, 1907). Olomina (207).

Distribution: Pacific slope: Pirrís (UCR 2934-01), Térraba and Coto. 40-1450 m (UCR 2934-01).

Genus: *Gambusia* Poey, 1854 (1).

90. *Gambusia nicaraguensis* Günther, 1866. Nicaraguan mosquitofish, olomina (209).

Distribution: Atlantic slope: Matina. 0-15 m.

Genus: *Phallichthys* Hubbs, 1924 (3).

91. *Phallichthys amates* (Miller, 1907). Merry widow, olomina (213).

Distribution: Atlantic slope: Lago de Nicaragua, Rio Frio, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Tempisque, Bebedero and Tárcoles. 0-1120 m (UCR 0234-04).

92. *Phallichthys quadripunctatus* Bussing, 1979. Olomina (216).

Distribution: Atlantic slope: Sixaola. 0-40 m.

Remarks: This species is endemic to the Sixaola drainage, Costa Rica (Bussing 1998).

93. *Phallichthys tico* Bussing, 1963. Olomina (217).

Distribution: Atlantic slope: Lago de Nicaragua, San Juan, San Carlos and Sarapiquí. 35-600 m.

Genus: *Poecilia* Bloch and Schneider, 1801 (4).

94. *Poecilia gillii* (Kner and Steindachner, 1863). Molly, olomina/alumina panzona (219).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba. 0-1220 m.

95. *Poecilia mexicana* Steindachner, 1863. Shortfin molly, olomina (222).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 2-45 m.

96. *Poecilia reticulata* Peters, 1859*. Guppy, olomina (23).

Distribution: Atlantic slope: Parismina (UCR 2541-02). Pacific slope: Tárcoles (UCR 0034-03, UCR 0084-01, UCR 0234-03). 30-1250 m.

Remarks: This species naturally occurs in Barbados, Trinidad, Venezuela, northern Brazil and the Guyanas, though it has been widely introduced to several countries around the world. In Costa Rica this species has been introduced most likely by aquarists (Bussing 1998; Devezé *et al.* 2004) and for hematophagous pests and disease-carrying insect control (Lody 1978; Bussing 1998; Urriola *et al.* 2004).

Genus: *Poeciliopsis* Regan, 1913 (5).

97. *Poeciliopsis elongata* (Günther, 1866). Elongate toothcarp, olomina (223).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-40 m.

98. *Poeciliopsis paucimaculata* Bussing, 1967. Olomina (225).

Distribution: Pacific slope: Térraba and Coto. 20-940 m.

Remarks: This species is endemic to the Térraba and Coto drainages, Costa Rica (Bussing 1998).

99. *Poeciliopsis retropinna* (Regan, 1908). Olomina (227).

Distribution: Pacific slope: Térraba and Coto. 0-940 m.

100. *Poeciliopsis santaelena* Bussing, 2008. Olomina. Addition to fauna.

Distribution: Pacific slope: Nicoya (LACM 56479-001, n=10; LACM 56480-001, n=1; UCR 2507-02, n=3; UCR 2508-01, n=6; UCR 2618-1, n=64; UCR 2696-01, n=41). 90-115 m.

Remarks: This species is endemic to the Potrero Grande River, Peninsula de Santa Elena, Nicoya drainage, Costa Rica (Bussing 2008).

101. *Poeciliopsis turrubarensis* (Meek, 1912). Olomina (229).

Distribution: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-120 m.

Genus: *Priapichthys* Regan, 1913 (2).

102. *Priapichthys annectens* (Regan, 1907). Olomina (230).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca and Tárcoles. 25-1270 m.

Remarks: This species is endemic to the Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina, Sixaola, Nicoya, Tempisque, Bebedero, Barranca and Tárcoles drainages, Costa Rica (Bussing 1998).

103. *Priapichthys panamensis* Meek and Hildebrand, 1916. Olomina (232).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-95 m (Rojas and Rodríguez 2008).

Genus: *Xenophallus* Hubbs, 1924 (1).

104. *Xenophallus umbratilis* (Meek, 1912). Olomina (210)

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero and Parismina. Pacific slope: Bebedero. 35-590 m.

Remarks: This species was called *Neoheterandria umbratilis* in Bussing (1998). In the present account we recognize this species in the genus *Xenophallus* following Radda and Meyer (1981) and Lucinda and Reis (2005).

Genus: *Xiphophorus* Heckel, 1848 (1).

105. *Xiphophorus variatus* (Meek 1904)*. Variable platyfish, platí (23).

Distribution: Atlantic slope: Parismina. 45 m.

Remarks: This species naturally occurs in Mexico, though it has been widely introduced to several countries around the world. In Costa Rica this species has been introduced most likely by aquarists (Bussing 1998).

Order: Beloniformes 2[3](4).

Family: Belonidae [1](2). Peripheral.

Genus: *Strongylura* van Hasselt, 1824 (2).

106. *Strongylura marina* (Walbaum, 1792). Atlantic needlefish, aguja verde. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Seven specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 1778-02, n=3; UCR 2495-21, n=4), Tortuguero drainage.

107. *Strongylura timucu* (Walbaum, 1792). Timucu, aguja timucú. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Matina. 0-13 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Five specimens have been collected in freshwaters in the Negro River (UCR 1296-02, n=4) and the Quebrada Westfalia River (UCR 0376-14, n=1), Matina drainage. Winemiller and Leslie (1992) recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

Family: Hemiramphidae [2](2). Peripheral.

Genus: *Hemiramphus* Cuvier, 1816 (1).

108. *Hemiramphus brasiliensis* (Linnaeus, 1758). Ballyhoo halfbeak, agujeta brasileña. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-2 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Colorado River (UCR 0990-08), Tortuguero drainage.

Genus: *Hyporhamphus* Gill, 1859 (1).

109. *Hyporhamphus roberti* (Valenciennes, 1847). Slender halfbeak, agujeta larga. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-2 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Colorado River (UCR 1067-11), Tortuguero drainage.

Order: Syngnathiformes 1[3](5).

Family: Syngnathidae [3](5). Peripheral.

Genus: *Microphis* Kaup, 1853 (1).

110. *Microphis lineatus* (Kaup, 1856). Opossum pipefish, pez pipa (256).

Distribution: Atlantic slope: Tortuguero (Gilbert and Kelso 1971; Winemiller and Leslie (1992), as *Oostethus lineatus*; UCR 1067-25, UCR 1072-01, UCR 1073-04, UCR 1882-02), Matina (LSUMZ 14776, LSUMZ 14787, UCR 0210-10, UCR 1127-03, UCR 1297-01, UCR 1352-09) and Sixaola (UCR 0281-13, UCR 1824-10, UCR 1838-02, UCR 1847-05). 0-12 m.

Remarks: This species was recognized as a subspecies of *Oostethus brachyurus* in Bussing (1998). In the present account we recognize this species as valid and place this in the genus *Microphis* following Ferraris (2003) and Kuiter (2009).

Genus: *Pseudophallus* Herald, 1940 (3).

111. *Pseudophallus elcapitanensis* (Meek and Hidelbrand, 1914). Pipefish, pez pipa (253).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-20 m.

112. *Pseudophallus mindi* (Meek and Hidelbrand, 1923). Pipefish, pez pipa (255).

Distribution: Atlantic slope: Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-35 m.

113. *Pseudophallus starksi* (Jordan and Culver, 1895). Pipefish, pez pipa (257).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-155 m.

Genus: *Syngnathus* Linnaeus, 1758 (1).

114. *Syngnathus scovelli* (Evermann and Kendall, 1896). Gulf pipefish, pez pipa del golfo. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Tortuguero Lagoon (UCR 1757-13), Tortuguero drainage.

Order: Synbranchiformes 1[2](2).

Family: Synbranchidae [2](2). Secondary.

Genus: *Synbranchus* Bloch, 1795 (1).

115. *Synbranchus marmoratus* Bloch, 1795. Marbled swamp eel, anguila de pantano (260).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-640 m.

Genus: *Ophisternon* McClelland, 1844 (1).

116. *Ophisternon aenigmaticum* Rosen and Greenwood, 1976. Obscure swamp eel, anguila de pantano (259). Addition to fauna.

Distribution: Atlantic slope: Río Frío. 43 m.

Remarks: Rosen and Greenwood (1976) and Bussing (1998) suggested that *O. aenigmaticum* may occur in Costa Rica. Sáenz *et al.* (2006) collected six specimens in freshwaters in the Caño Negro National Wildlife Refuge, Río Frío drainage, confirming their occurrence in Costa Rica.

Order: Perciformes 18[56](125).

Family: Centropomidae [1](11). Peripheral.

Genus: *Centropomus* Lacepède, 1802 (11).

117. *Centropomus armatus* Gill, 1863. Armed snook, róbalo. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-6 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Six specimens have been collected in freshwaters in the Coyolito River (UCR 0962-05), Barranca drainage.

118. *Centropomus ensiferus* Poey, 1860. Swordspine snook, róbalo espolón. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-11 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Four specimens have been collected in freshwaters in the Colorado River (UCR 0989-04, n=1), Caño Agua Fría Viejo River (UCR 1785-10, n=1), Tortuguero drainage, and Cocles River (UCR 2752-01, n=2), Matina drainage.

119. *Centropomus medius* Günther, 1864. Blackfin snook, gualaje aleta manchada (265).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-250 m.

120. *Centropomus mexicanus* Bocourt, 1868. Largescale fat snook, róbalo constantino. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-4 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Four specimens have been collected in freshwaters in the Colorado River (UCR 1067-28, n=1; UCR 1073-05, n=3), Tortuguero drainage.

121. *Centropomus nigrescens* Günther, 1864. Black snook, róbalo negro. Addition to fauna.

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-145 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994, 2009). Sixty specimens have been collected in freshwaters in the Zelaya River (UCR 1487-02, n=2), Nicoya drainage, the Lagarto River (UCR 1268-23, n=1), the Pánica River (UCR 1488-11, n=9), Barranca drainage, the Quebrada Doña Maria River (UCR 1150-03, n=3), Tárcoles drainage, the Jicote River (UCR 3040-14, n=1), the Quebrada Aserradero River (UCR 3080-18, n=2), the Barú River (UCR 3130-08, n=20), Pirrís drainage, the Rincón River (UCR 0165-01, n=1), the Riyito River (UCR 0690-10, n=3), the Claro River (UCR 1941-01, n=15), the Pejeperro River (UCR 2534-03, n=1), the Pejeperrito Lagoon (UCR 2535-05, n=1), Térraba drainage, and the Coto River (UCR 2181-01, n=1), Coto drainage. Constantz *et al.* (1981), Winemiller (1983), Winemiller and Morales (1989) and Lyons and Schneider (1990) recorded this species in freshwaters in the Claro River, Térraba drainage. Rojas and Rodríguez (2008) collected sixty-four specimens in freshwaters in the Grande de Térraba River, Térraba drainage.

122. *Centropomus parallelus* Poey, 1860. Fat snook, calva (267).

Distribution: Atlantic slope: Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-43 m.

123. *Centropomus pectinatus* Poey, 1860. Tarpon snook, róbalo sábalo (269).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-12 m.

124. *Centropomus robalito* Jordan and Gilbert, 1882. Little snok, robalito (270).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-50 m.

125. *Centropomus undecimalis* (Bloch, 1792). Common snok, robalo blanco (272).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-50 m.

126. *Centropomus viridis* Lockington, 1877. White snok, robalo blanco. Addition to fauna.

Distribution: Pacific slope: Tempisque and Térraba. 0-145 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). One specimen has been collected in freshwaters in the Tempisque River (UCR 2188-01), Tempisque drainage. Rojas and Rodríguez (2008) collected sixty-four specimens in freshwaters in the Grande de Térraba River, Térraba drainage.

127. *Centropomus unionensis* Bocourt, 1868. Union snook, mano de piedra. Addition to fauna.

Distribution: Pacific slope: Tempisque and Pirrís (A. Molina, pers. comm.). 0-80 m (A. Molina, pers. comm.).

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994, 2009). Nine specimens have been collected in freshwaters in the Tempisque River (UCR 0970-01), Tempisque drainage.

Family: Serranidae [1](1). Peripheral.

Genus: *Epinephelus* Bloch, 1793 (1).

128. *Epinephelus guttatus* (Linnaeus, 1758). Red hind, cabrilla colorada. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Tortuguero Lagoon (UCR 0261-10), Tortuguero drainage.

Family: Centrarchidae [1](1). Primary.

Genus: *Micropterus* Lacepède, 1802 (1).

129. *Micropterus salmoides* (Lacepède, 1802). Largemouth black bass, black-bass (23).

Distribution: Pacific slope: Tárcoles (UCR 0074-07). 854 m.

Remarks: This species was introduced in Costa Rica for private initiative to populate some artificial ponds to promote the sport fishing (Bussing 1998). We have not heard of specimens reaching other waters.

Family: Carangidae [4](9). Peripheral.

Genus: *Carangoides* Bleeker, 1851 (1).

134. *Carangoides vinctus* (Jordan and Gilbert, 1882). Cocinero, platanillo. Addition to fauna.

Distribution: Pacific slope: Tárcoles. 0-7 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994, 2009, 2011 as *Caranx vinctus*). Alpírez (1985), as *Caranx vinctus*, recorded this species in freshwaters in the Quebrada Doña María River, Tárcoles drainage. In the present account, we recognize this species in the genus *Carangoides* following Castro-Aguirre *et al.* (1999) and Springer and Smith-Vaniz (2008).

Genus: *Caranx* Lacepède, 1801 (4).

130. *Caranx caballus* Günther, 1868. Green Jack, jurel.

Addition to fauna.

Distribution: Pacific slope: Térraba. 0-55 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2005; 2009). Rojas and Rodríguez (2008) collected three specimens in freshwaters in the Grande de Térraba River, Térraba drainage.

131. *Caranx caninus* Günther, 1867. Pacific crevalle jack, jurel. Addition to fauna.

Distribution: Pacific slope: Tárcoles, Pirrís and Térraba. 0-55 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994, 2005, 2009). Alpírez (1985) recorded this species in freshwaters in the Quebrada Doña María River, Tárcoles drainage, and the Paquita River, Pirrís drainage. Rojas and Rodríguez (2008) collected one specimen in freshwaters in the Grande de Térraba River, Térraba drainage.

132. *Caranx hippos* (Linnaeus, 1766). Crevalle jack, jurel. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Matina. 0-5 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Twenty-one specimens have been collected in freshwaters in the Colorado River (UCR 0989-07, n=1; UCR 0992-12, n=2; UCR 1073-08, n=2; UCR 1078-05, n=1), the Tortuguero Lagoon (UCR 0260-11, n=2; UCR 1790-10, n=1), Tortuguero drainage, and the Quebrada Westfalia (UCR 0376-14, n=12), Matina drainage.

133. *Caranx latus* Agassiz, 1831. Horse-eye jack, jurel (274).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-20 m.

Genus: *Hemicaranx* Bleeker, 1862 (1).

135. *Hemicaranx amblyrhynchus* (Cuvier, 1833). Bluntnose jack, jurelito chato. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Colorado River (UCR 1067-23), Tortuguero drainage.

Genus: *Oligoplites* Gill, 1863 (3).

136. *Oligoplites altus* (Günther, 1868). Longjaw leatherjacket, cuero. Addition to fauna.

Distribution: Pacific slope: Térraba and Coto. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Six specimens have been collected in freshwaters in the Sierpe River (UCR 2863-04, n=5), Térraba drainage, and the Coto River (UCR 2181-03, n=1), Coto drainage.

137. *Oligoplites palometa* (Cuvier, 1831). Maracaibo letherjacket, pez cuero (276).

Distribution: Atlantic slope: Sarapiquí and Tortuguero. 0-10 m.

138. *Oligoplites saurus* (Bloch and Schneider, 1801). Leatherjacket, piña sietecueros. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-4 m.

Remarks: This species has been reported in the Pacific and Caribbean coasts of Costa Rica by Bussing and López (1994; 2009; 2010). Three specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 2495-14), Tortuguero drainage.

Family: Lutjanidae [1](7). Peripheral.

Genus: *Lutjanus* Bloch, 1790 (7).

139. *Lutjanus analis* (Cuvier, 1828). Mutton snapper, pargo criollo. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Matina. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Four specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 0261-03, n=3), Tortuguero drainage, and the Suarez River (UCR 0779-07, n=1), Matina drainage.

140. *Lutjanus argentiventris* (Peters, 1869). Yellow snapper, pargo amarillo (278).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-20 m.

141. *Lutjanus colorado* Jordan and Gilbert, 1882. Colorado snapper, pargo colorado. Addition to fauna.

Distribution: Pacific slope: Isla del Coco, Pirrís and Térraba. 0-17 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2005; 2009). Seven specimens have been collected in freshwaters in an unknown river name in the Cocos Island (LACM 35473-004, n=2), Isla del Coco drainage, the Quebrada Sucia River (UCR 1314-10, n=4), and the Pavo River (UCR 1868-02, n=1), Térraba drainage. Winemiller (1983), Winemiller and Morales (1989) and Lyons and Schneider (1990) recorded this species in freshwater in the Quebrada Camaronal River, the Pavo River and the Claro River, Térraba drainage. Alpírez (1985) recorded this species in freshwaters in the Paquita River, Pirrís drainage.

142. *Lutjanus griseus* (Linnaeus, 1758). Gray snapper, pargo mulato. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 2495-24), Tortuguero drainage.

143. *Lutjanus jocu* (Bloch and Schneider, 1801). Dog snapper, pargo caballera. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-9 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Ten specimens have been collected in freshwaters in the Caño Agua Fría River (UCR 1765-06, n=3; UCR 1785-07, n=2), the Caño California River (UCR 1808-09, n=1), Tortuguero drainage, the Pacuare River (UCR 2837-08, n=1; UCR 2840-02, n=2), Parismina drainage, and the Urén River (UCR 1374-06, n=1), Sixaola drainage. Winemiller and Leslie (1992) recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

144. *Lutjanus jordani* (Gilbert, 1898). Jordan's snapper, pargo ñanguero. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-145 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2005; 2009). Rojas and Rodríguez (2008) collected three specimens in freshwaters in the Grande de Térraba River, Térraba drainage.

145. *Lutjanus novemfasciatus* Gill, 1862. Pacific dog snapper, pargo negro. Addition to fauna.

Distribution: Pacific slope: Tárcoles, Pirrís and Térraba. 0-95 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2005; 2009). Thirty-seven specimens have been collected in freshwaters in the Tárcoles River (UCR 0080-02, n=1), Tárcoles drainage, the Quebrada Aserradero River (UCR 0308-14, n=24), the Barú River (UCR 0313-09, n=2), Pirrís drainage, the Quebrada Sucia River (UCR 1314-06, n=5) and the Claro River (UCR 1869-03, n=1, UCR 1941-03, n=4), Térraba drainage. Winemiller and Morales (1989) and Lyons and Schneider (1990) recorded this species in freshwaters in the Claro River, Térraba drainage. Rojas and Rodríguez (2008) collected one specimen in freshwaters in Grande de Térraba River, Térraba drainage.

Family: Gerreidae [4](11). Peripheral.

Genus: *Diapterus* Ranzani, 1842 (3).

146. *Diapterus auratus* Ranzani, 1842. Irish mojarra, mojarra gaucha. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Seven specimens have been collected in freshwaters in the Colorado River (UCR 0990-09, n=1), the Caño California River (UCR 1808-04, n=5) and the Tortuguero Lagoon (UCR 2495-19, n=1), Tortuguero drainage.

147. *Diapterus peruvianus* (Cuvier, 1830). Peruvian mojarra, pargo blanco. Addition to fauna.

Distribution: Pacific slope: Barranca, Pirrís and Térraba. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Sixty-two specimens have been collected in freshwaters in the Lagarto River (UCR 0168-24, n=2), Barranca drainage, the Rincón River (UCR 0456-07, n=19), the Sirena River (UCR 1287-07, n=36) and the Sierpe River (UCR 2863-03, n=5), Térraba drainage. Alpírez (1985) recorded this species in freshwaters in the Hatillo Nuevo River, Pirrís drainage.

148. *Diapterus rhombeus* (Cuvier, 1829). Caitipa mojarra, mojarra de estero. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Parismina. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Five specimens have been collected in freshwaters in the Colorado River (UCR 0990-10; n=1, UCR 1070-06; n=1), the Gandoca River (UCR 1882-05; n=2), Tortuguero drainage, and the Pacuare River (UCR 2859-10; n=1), Parismina drainage.

Genus: *Eucinostomus* Baird and Girard, 1855 (4).

149. *Eucinostomus argenteus* Baird and Girard, 1855. Silver mojarra, mojarra plateada. Addition to fauna.

Distribution: Atlantic slope: Matina. 0-6 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Suarez River (UCR 0209-15, n=1) and the Matina River (UCR 0804-10, n=1), Matina drainage.

150. *Eucinostomus currani* Zahuranec, 1980. Pacific flagfin mojarra, palmito bandera (286).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-145 m (Rojas and Rodríguez 2008).

151. *Eucinostomus dowii* (Gill, 1863). Dow's mojarra, palmito plateado. Addition to fauna.

Distribution: Pacific slope: Pirrís. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009, both as *E. argenteus*). One specimen has been collected in freshwaters in the Barú River (UCR 0313-17), Pirrís drainage. In the present account we recognize this species as valid and distinct from *E. argenteus* following Allen and Robertson (1994), De la Cruz Agüero *et al*. (1997), Grove and Lavenberg (1997) and Castro-Aguirre *et al*. (1999).

152. *Eucinostomus melanopterus* (Bleeker, 1863). Flagfin mojarra, mojarra de ley. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina and Matina. 0-10 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One hundred-eight specimens have been collected in freshwaters in the Colorado River (UCR 0990-11, n=1; UCR 1067-22, n=32; UCR 1070-09, n=5), the Caño California River (UCR 1808-07, n=1), the Tortuguero Lagoon (UCR 0260-07, n=1; UCR 1854-07, n=2; UCR 2495-18, n=2), Tortuguero drainage, the Suarez River (UCR 0209-09, n=32), the Quebrada Westfalia River (UCR 0376-11, n=20), the Negro River (UCR 1296-03, n=1), and the Hone Creek River (UCR 1352-11, n=11), Matina drainage.

Genus: *Eugerres* Jordan and Evermann, 1927 (2).

153. *Eugerres brevimanus* (Günther, 1864). Short fin mojarra, pargo aleta corta (282).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-145 m (Rojas and Rodríguez 2008).

154. *Eugerres plumieri* (Cuvier, 1830). Striped mojarra, mojarra prieta (285).

Distribution: Atlantic slope: San Juan, San Carlos, Sarapiquí and Tortuguero. 0-31 m.

Genus: *Gerres* Quoy and Gaimard, 1824 (2).

155. *Gerres cinereus* (Walbaum, 1792). Yellow fin mojarra, mojarra trompetera. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Colorado River (UCR 1070-10, n=1) and the Gandoca River (UCR 1882-08, n=1), Tortuguero drainage.

156. *Gerres simillimus* Regan, 1907. Pacific yellow fin mojarra, palmito blanco. Addition to fauna.

Distribution: Pacific slope: Nicoya, Pirrís and Térraba. 0-640 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009, both as *G. cinereus*). Seventeen specimens have been collected in freshwaters in the Quebrada Aserradero River (UCR 0308-21, n=1), Pirrís drainage, and an unknown river name in Isla del Caño (UCR 1849-06; n=16), Térraba drainage. Alpírez (1985), as *G. cinereus*, recorded this species in freshwaters in the Nosara River, Nicoya drainage, and the Pacuar River, Térraba drainage. In the present account we recognize this species as valid and distinct from *G. cinereus* following Regan (1907).

Family: Haemulidae [3](8). Peripheral.

Genus: *Conodon* Cuvier, 1830 (1).

157. *Conodon nobilis* (Linnaeus, 1758). Barred grunt, ronco canario. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-51 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Seven specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 1788-09, n=6), Tortuguero drainage, and the Urén River (UCR 1374-05, n=1), Sixaola drainage.

Genus: *Haemulopsis* Steindachner, 1869 (2).

158. *Haemulopsis corvinaeformis* (Steindachner, 1868). Roughneck grunt, corocoro gris. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-5 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 1788-08), Tortuguero drainage.

159. *Haemulopsis leuciscus* (Günther, 1864). Raucous grunt, vieja chinilla. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-145 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Rojas and Rodríguez (2008) collected three specimens in freshwaters in the Grande de Térraba River, Térraba drainage.

Genus: *Pomadasys* Lacepède, 1802 (5).

160. *Pomadasys bayanus* Jordan and Evermann, 1898. Purplemouth grunt, roncador (289).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba. 0-640 m.

161. *Pomadasys branickii* (Steindachner, 1879). Sand grunt, burro. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-17 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Twenty specimens have been collected in freshwaters in the Rincón River (UCR 0456-04, n=15) and the Quebrada Sucia River (UCR 1314-09, n=5), Térraba drainage.

162. *Pomadasys crocro* (Cuvier, 1830). Burro grunt, roncador (291).

Distribution: Atlantic slope: Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-40 m.

163. *Pomadasys empherus* Bussing, 1993. Bigspine grunt, roncador. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). One specimen has been collected in freshwaters in the Lagarto River (UCR 1690-12), Barranca drainage.

164. *Pomadasys macracanthus* (Günther, 1864). Longspine grunt, vieja espinalarga. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Three specimens have been collected in freshwaters in the Lagarto River (UCR 1268-25), Barranca drainage.

Family: Sciaenidae [5](5). Peripheral.

Genus: *Bairdiella* Gill, 1861 (1).

165. *Bairdiella ronchus* (Cuvier, 1830). Ground croaker, ronco rayado. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-5 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Three specimens have been collected in freshwaters in the Colorado River (UCR 1073-09, n=2) and the Tortuguero Lagoon (UCR 1854-08, n=1), Tortuguero drainage. Gilbert and Kelso (1971) collected

three specimens in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

Genus: *Cynoscion* Gill, 1861 (1).

166. *Cynoscion albus* (Günther, 1864). Whitefin weakfish, corvina reina. Addition to fauna.

Distribution: Pacific slope: Bebedero. 0-6 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Four specimens have been collected in freshwaters in the Bebedero River (UCR 1382-03), Bebedero drainage.

Genus: *Larimus* Cuvier, 1830 (1).

167. *Larimus breviceps* Cuvier, 1830. Shorthead drum, bombache cabezón. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Caño Agua Fría Viejo River (UCR 1785-08), Tortuguero drainage.

Genus: *Micropogonias* Bonaparte, 1831 (1).

168. *Micropogonias furnieri* (Desmarest, 1823). Whitemouth croaker, corvinón rayado. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Parismina. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Six specimens have been collected in freshwaters in the Colorado River (UCR 0990-15, n=2; UCR 1067-12, n=2), Tortuguero Lagoon (UCR 1854-08, n=1), Tortuguero drainage, and Pacuare River (UCR 2858-08, n=1), Parismina drainage.

Genus: *Ophioscion* Gill, 1863 (1).

169. *Ophioscion typicus* Gill, 1863. Point-nosed croaker, china corredora. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-43 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Two specimens have been collected in freshwaters in the Sierpe River (UCR 2310-02), Térraba drainage.

Family: Polynemidae [1](1). Peripheral.

Genus: *Polydactylus* Lacepède, 1803 (1).

170. *Polydactylus virginicus* (Linnaeus, 1758). Barbu, barbudo barbú. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina and Matina. 0-6 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Twenty-five specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 1788-06, n=4; UCR 2495-20, n=11; UCR 2804-06, n=1), Tortuguero drainage, the Pacuare River (UCR 2859-08, n=8), Parismina drainage, and the Suarez River (UCR 0209-06, n=1), Matina drainage.

Family: Kyphosidae [1](1). Peripheral.

Genus: *Kyphosus* Lacepède, 1801 (1).

171. *Kyphosus sectatrix* (Linnaeus, 1758). Bermuda sea chub, chopa blanca. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Tortuguero Lagoon (UCR 2495-20), Tortuguero drainage.

Family: Mugilidae [3](4). Peripheral.

Genus: *Agonostomus* Bennett, 1832 (1).

172. *Agonostomus monticola* (Bancroft, 1834). Mountain mullet, tepemechín (385).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Isla del Coco, Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-650 m.

Genus: *Joturus* Poey, 1860 (1).

173. *Joturus pichardi* Poey, 1860. Bobo mullet, bobo (390).

Distribution: Atlantic slope: Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-600 m.

Genus: *Mugil* Linnaeus, 1758 (2).

174. *Mugil cephalus* Linnaeus, 1758. Flathead grey mullet, liza rayada. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Pacific and Caribbean coasts of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Colorado River (UCR 0990-12), Tortuguero drainage.

175. *Mugil curema* Valenciennes, 1836. White mullet, lisa blanca. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-145 m.

Remarks: This species has been reported in the Pacific and Caribbean coasts of Costa Rica by Bussing and López (1994; 2009; 2010). Three hundred eighty-seven specimens have been collected in freshwaters in the Colorado River (UCR 1067-09, n=10), Tortuguero drainage, the Quebrada Westfalia River (UCR 0376-04, n=12), Matina drainage, an unknown river name in Gandoca (UCR 2011-02, n=38), Sixaola drainage, the Calera River (UCR 0935-07, n=205), Nicoya drainage, the Lagarto River (UCR 1268-05, n=2, UCR 1803-03, n=1), Barranca drainage,

the Quebrada Aserradero River (UCR 0308-19, n=3), the Tusubres River (UCR 1368-08, n=3), Pirrís drainage, the Quebrada sucia River (UCR 1314-08, n=6), an unknown river name in Isla del Caño (UCR 1791-02, n=5; UCR 1849-02, n=34), the Bravo River (UCR 1867-01, n=1), the Sirena River (UCR 1872-04, n=6), the Sierpe River (UCR 2863-02, n=4), Térraba drainage, and the Quebrada Pavita River (UCR 1316-04, n=57), Coto drainage. Winemiller (1983), Winemiller and Morales (1989) and Lyons and Schneider (1990) recorded this species in freshwaters in the Quebrada Camaronal River, the Pavo River and the Claro River, Térraba drainage. Alpírez (1985) recorded this species in freshwaters in the Guacimal River, Barranca drainage and the Punta Mala River, Térraba drainage. Rojas and Rodríguez (2008) collected two specimens in freshwaters in the Grande de Térraba River, Térraba drainage.

Family: Cichlidae [10](26). Secondary.

Genus: *Amatitlania* Schmitter-Soto, 2007 (2). Schmitter-Soto (2007a) described *A. kanna*, from Atlantic slope of Costa Rica and Panama, and *A. siquia*, from Honduras, Nicaragua and Costa Rica, from specimens that Bussing (1998) considered as *Archocentrus nigrofasciatus* (Günther, 1867).

176. *Amatitlania kanna* Schmitter-Soto 2007. Convict cichlid, mojarra (342, in part).
Distribution: Atlantic slope: Sixaola. 0-65 m.

177. *Amatitlania siquia* Schmitter-Soto 2007. Convict cichlid, mojarra (342, in part).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina; Pacific slope: Nicoya, Tempisque, Bebedero, Barranca and Tárcoles. 0-540 m.

Genus: *Amphilophus* Agassiz, 1859 (9). Costa Rican members of this genus, with exception of *A. citrinellus* and *A. lyonsi*, were referred to the genus *Astatheros* by Bussing (1998). In the present account we provisionally recognize in the genus *Amphilophus* all Costa Rican *Astatheros* species (*sensu* Bussing 1998) following Loiselle (1997), Kullander and Hartel (1997), Burgess (2000) and Kullander (2003); however a comprensive taxomonic work is needed to test the monophyly and position of this group.

178. *Amphilophus alfari* (Meek, 1907). Pastel cichlid, mojarra (318).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina; Pacific slope: Nicoya, Tempisque, Bebedero and Tárcoles. 2-1150 m.

179. *Amphilophus altifrons* (Kner, 1863). Mojarra (322).
Distribution: Pacific slope: Coto. 20-400 m.

180. *Amphilophus bussingi* Loiselle, 1997. Mojarra (324).
Distribution: Atlantic slope: Sixaola. 40-150 m.
Remarks: This species is endemic to the Sixaola drainage, Costa Rica (Bussing 1998).

181. *Amphilophus citrinellus* (Günther, 1864). Midas cichlid, mojarra (312).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 0-12 m.

182. *Amphilophus diquis* (Bussing, 1974). Mojarra (327).
Distribution: Pacific slope: Pirrís, Térraba and Coto. 16-700 m.
Remarks: This species is endemic to the Pirrís, Térraba and Coto drainages, Costa Rica (Bussing 1998).

183. *Amphilophus longimanus* (Günther, 1867). Red breast cichlid, cholesca (329).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero. Pacific slope: Nicoya, Tempisque and Bebedero. 0-100 m.

184. *Amphilophus lyonsi* (Gosse, 1966). Mojarra (316).
Distribution: Pacific slope: Coto. 10-20 m.

185. *Amphilophus rhytisma* (López S., 1983). Pearl cichlid, mojarra (332).
Distribution: Atlantic slope: Sixaola. 40-60 m.

186. *Amphilophus rostratus* (Gill, 1877). Masamiche (334).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 0-200 m.

Genus: *Andinoacara* Musilová, Říčan and Novák, 2009 (1).

187. *Andinoacara coeruleopunctatus* (Kner, 1863). Mojarra (310).
Distribution: Pacific slope: Coto. 20-100 m.
Remarks: This species was called *Aequides coeruleopunctatus* in Bussing (1998). In the present account we recognize this species in the genus *Andinoacara* following Musilova *et al.* (2009).

Genus: *Archocentrus* Gill, 1877 (2).

188. *Archocentrus centrarchus* (Gill, 1877). Flier cichlid, mojarra rayada (336).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 0-45 m.

189. *Archocentrus multispinosus* (Günther, 1867). Rainbow cichlid, mojarrita (351).
Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. Pacific slope: Nicoya, Tempisque and Bebedero. 0-75 m.
Remarks: This species was called *Herotilapia multispinosa* in Bussing (1998). In the present account we recognize this species in the genus *Archocentrus* following

Schmitter-Soto (2007a, b).

Genus: *Cryptoheros* Allgayer, 2001 (3). Costa Rican members of this genus were referred to the genus *Archocentrus* by Bussing (1998). In the present account we recognize this species in the genus *Cryptoheros* following Allgayer (2001) and Schmitter-Soto (2007a, b).

190. *Cryptoheros myrnae* (Loiselle, 1997). Topaz cichlid, mojarra (340).

Distribution: Atlantic slope: Sixaola. 40-150 m.

Remarks: This species is endemic to the Sixaola drainage, Costa Rica (Bussing 1998).

191. *Cryptoheros sajica* (Bussing, 1974). T-Bar cichlid, mojarra (346).

Distribution: Pacific slope: Pirrís, Térraba and Coto. 10-680 m.

Remarks: This species is endemic to the Pirrís, Térraba and Coto drainages, Costa Rica (Bussing 1998).

192. *Cryptoheros septemfasciatus* (Regan, 1908). Mojarra (348).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. 12-600 m.

Genus: *Hypsophrys* Agassiz, 1859 (2).

193. *Hypsophrys nematopus* (Günther, 1867). Poor man's tropheus, moga (357).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí and Tortuguero. Pacific slope: Bebedero (UCR 2935-01). 35-535 m.

Remarks: This species was called *Neetroplus nematopus* in Bussing (1998). In the present account we recognize this species in the genus *Hypsophrys* following Chakrabarty and Sparks (2007) and Schmitter-Soto (2007a, b).

194. *Hypsophrys nicaraguensis* (Günther, 1864). Butterfly cichlid, moga amarilla (354).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina. Pacific slope: Bebedero (UCR 2935-02). 5-200 m.

Genus: *Oreochromis* Günther, 1889 (1).

195. *Oreochromis niloticus* (Linnaeus, 1758)*. Tilapia. Addition to fauna.

Distribution: Atlantic slope: Río Frío, San Juan (C. Garita and A. Angulo, pers. comm.), San Carlos, Sarapiquí (C. Garita, A. Angulo and B. Naranjo, pers. comm.), Tortuguero, Parismina (A. Molina, pers. comm.), Matina (A. Angulo, pers. comm.) and Sixaola (A. Angulo, pers. comm.). Pacific slope: Nicoya (A. Angulo, pers. comm.), Bebedero, Tárcoles and Térraba. 0-1250 m.

Remarks: Eight specimens have been collected in freshwaters in the Arenal Lake (UCR 1989-01, n=3), the Aguacate River (UCR 2015-01, n=2), San Carlos drainage, and an unknown pond name in Alajuela (UCR 1043-04, n=3), Tárcoles drainage. Cabrera *et al*. (1993) and Sáenz *et al*. (2006) recorded this species in freshwaters in the Caño Negro National Wildlife Refuge, Río Frío drainage. Oro and Cabrera (1993) recorded this species in freshwaters in the Colorado River, Tortuguero drainage. Pizarro and Rojas (1993) recorded this species in freshwaters in the Bebedero River, Bebedero drainage. Rojas and Rodríguez (2008) collected twenty-two specimens in freshwaters in the Grande de Térraba River, Térraba drainage. This species was introduced in 1963 from El Salvador by government agencies in an attempt to strengthen aquaculture activities (Ruíz 1978).

Genus: *Parachromis* Agassiz, 1859 (3).

196. *Parachromis dovii* (Günther, 1864). Guapote, guapote azul/lagunero (360).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina and Matina; Pacific slope: Nicoya, Tempisque and Bebedero. 0-600 m.

197. *Parachromis loisellei* (Bussing, 1989). Guapotito, viejito (364).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Bebedero and Térraba. 1-70 m.

198. *Parachromis managuensis* (Günther, 1867). Jaguar guapote, guapote tigre (367).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Bebedero (Werner 1983). 0-45 m.

Genus: *Tomocichla* Regan, 1908 (2). Costa Rican members of this genus were referred to the genus *Theraps* by Bussing (1998). In the present account we provisionally recognize this species in the genus *Tomocichla* following Burgues (2000), Allgayer (2002), Kullander (2003) and Chakrabarty (2007); however a comprensive taxomonic work is needed to test the monophyly and position of this clade.

199. *Tomocichla sieboldii* (Kner, 1863). Moga (372).

Distribution: Pacific slope: Tárcoles, Pirrís, Térraba and Coto. 10-840 m.

200. *Tomocichla tuba* (Meek, 1912). Vieja, tuba (376).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-540 m.

Remarks: This species was called *Theraps underwoodi* in Bussing (1998). In the present account we recognize this species as synonym of *Tomocichla tuba* following Burgues (2000), Allgayer (2002), Kullander (2003) and Chakrabarty (2007).

Genus: *Vieja* Fernández-Yépez, 1969 (1).

201. *Vieja maculicauda* (Regan, 1905). Blackbelt cichlid, vieja (380).

Distribution: Atlantic slope: Tortuguero, Parismina,

Matina and Sixaola. 0-5 m.

Remarks: McMahan *et al.* (2010) sugested the genus *Paraneetroplus* for this species based on a molecular phylogeny; however, we provisionally keep this species on *Vieja* until a comprensive morphological diagnosis for the proposed clades are made.

Family: Labridae [1](2). Peripheral.

Genus: *Halichoeres* Rüppell, 1835 (2).

202. *Halichoeres aestuaricola* Bussing, 1972. Mangrove wrasse, señorita de manglar. Addition to fauna.

Distribution: Pacific slope: Pirrís and Térraba. 0-17 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Two specimens have been collected in freshwaters in the Quebrada Aserradero River (UCR 0318-17, n=1), Pirrís drainage, and the Quebrada Sucia River (UCR 1314-12, n=1), Térraba drainage.

203. *Halichoeres notospilus* (Günther, 1864). Banded wrasse, señorita listada. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-15 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2005; 2009). Alpírez (1985) recorded this species in freshwaters in the Punta Mala River, Térraba drainage.

Family: Dactyloscopidae [1](1). Peripheral.

Genus: *Dactyloscopus* Gill, 1859 (1).

204. *Dactyloscopus amnis* Miller and Briggs, 1962. Riverine stargazer, Miraestrellas ribereña. Addition to fauna.

Distribution: Pacific slope: Barranca and Pirrís. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Thirty-three specimens have been collected in freshwaters in the Lagarto River (UCR 1756-03, n=1), Barranca drainage, and the Quebrada Aserradero River (UCR 0308-07, n=32), Pirrís drainage.

Family: Blenniidae [1](1). Peripheral.

Genus: *Hypsoblennius* Gill, 1861 (1).

205. *Hypsoblennius maculipinna* (Regan, 1903). Fin-spot blenny, cachudito aleta manchada. Addition to fauna.

Distribution: Pacific slope: Pirrís. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Two specimens have been collected in freshwaters in the Quebrada Aserradero River (UCR 0308-16), Pirrís drainage.

Family: Eleotridae [7](16). Peripheral.

Genus: *Dormitator* Gill, 1861 (2).

206. *Dormitator latifrons* (Richardson, 1844). Pacific fat sleeper, pocoyo (410).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-145 m (Rojas and Rodríguez 2008).

207. *Dormitator maculatus* (Bloch, 1792). Fat sleeper, guarasapa (411):

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-12 m.

Genus: *Eleotris* Bloch and Schneider, 1801 (5).

208. *Eleotris amblyopsis* (Cope, 1871). Large-scaled spinycheek sleeper, pez perro (413).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-15 m.

209. *Eleotris picta* Kner, 1863. Spotted sleeper, vieja (416).

Distribution: Pacific slope: Isla del Coco (Bussing and López 2005; LACM 26462, UCR 0736-05, UCR 2275-02), Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-100 m.

210. *Eleotris pisonis* (Gmelin, 1789). Spinycheek sleeper, pez perro (417).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-60 m.

211. *Eleotris tecta* Bussing, 1996. Sleeper, pez perro (418).

Distribution: Pacific slope: Térraba and Coto. 0-75 m.

212. *Eleotris tubularis* Heller and Snodgrass, 1903. Cocos sleeper, vieja de Cocos. Addition to fauna.

Distribution: Pacific slope: Isla del Coco. 0-53 m.

Remarks: This species has been reported in the saltwaters of the Cocos Island National Park, Costa Rica by Bussing and López (2005). Twenty-five specimens have been collected in freshwaters in an unknown river name in the Chatam Bay (LACM 25806, n=23; UCR 0736-03, n=2), Isla del Coco drainage. This species is endemic to the Isla del Coco drainage, Costa Rica (Bussing 1996; Pezold and Cage 2002; Bussing and López 2005; Van Tassell 2011).

Genus: *Erotelis* Poey, 1860 (1).

213. *Erotelis armiger* (Jordan and Richardson, 1895). Flathead sleeper, Guavina cabeza plana. Addition to fauna.

Distribution: Pacific slope: Pirrís. 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Fifty-four specimens have been collected in freshwaters in the Barú River (UCR 0308-04, n=8, UCR 0313-12, n=46), Pirrís drainage. Winemiller (1983) recorded this species in freshwaters in the Quebrada Camaronal River, Térraba drainage.

Genus: *Gobiomorus* Lacepède, 1800 (3).

214. *Gobiomorus dormitor* Lacepède, 1800. Bigmouth sleeper, guavina (420).

Distribution: Atlantic slope: Lago de Nicaragua, Río Frío, San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-60 m.

215. *Gobiomorus maculatus* (Günther, 1859). Pacific sleeper, guavina (422).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-145 m (Rojas and Rodríguez 2008).

216. *Gobiomorus polylepis* Ginsburg, 1953. Finescale sleeper, guavina (424).

Distribution: Pacific slope: Nicoya. 2-15 m.

Genus: *Guavina* Bleeker, 1874 (2).

217. *Guavina guavina* (Valenciennes, 1837). Guavina, guavina. Addition to fauna.

Distribution: Atlantic slope: Sixaola. 0-10 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Sixaola River (UCR 0280-03), Sixaola drainage.

218. *Guavina micropus* Ginsburg, 1953. Guavina, guavina. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-2 m.

Remarks: Three specimens have been collected in freshwaters in the Esquinas River (UCR 1312-04), Térraba drainage.

Genus: *Hemieleotris* Meek and Hildebrand, 1916 (1).

219. *Hemieleotris latifasciata* (Meek and Hidebrand, 1912). Pygmy sleeper, guavinita (425).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 5-100 m.

Genus: *Leptophilypnus* Meek and Hildebrand, 1916 (2).

220. *Leptophilypnus fluviatilis* Meek and Hildebrand, 1916. Dwarf guavina, guavina enana. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-6 m.

Remarks: Five specimens have been collected in freshwaters in the Tortuguergo Lagoon (UF 07196, n=3; UF 11115, n=1; UF 16348, n=1), Tortuguero drainage. Thacker *et al*. (2006) in the redescription of the genus *Leptophilypnus* included material of this species from the Tortuguero Lagoon (UMMZ 180649, n=1), Tortuguero drainage.

221. *Leptophilypnus panamensis* (Meek and Hildebrand, 1916). Dwarf guavina, guavina enana. Addition to fauna.

Distribution: Pacific slope: Tárcoles, Pirrís and Térraba. 0-32 m.

Remarks: Twenty-five specimens have been collected in freshwaters in the Lagarto River (UCR 1268-18, n=1), Barranca drainage, the Quebrada Bonita River (UCR 0086-01, n=3), Tárcoles drainage, the Barú River (UCR 0313-05, n=12), Pirrís drainage, and the Sábalo River (UCR 1315-01, n=9), Coto drainage. Thacker *et al*. (2006) in the redescription of the genus *Leptophilypnus* included material of this species from the Barú River (TU 25132, n=129), Pirrís drainage, and the Grande de Térraba River (TU 84526, n=6), Térraba drainage.

Family: Gobiidae [11](22). Peripheral.

Genus: *Aboma* Jordan and Starks, 1895 (1).

222. *Aboma etheostoma* Jordan and Starks, 1895. Scaly boy, gobio escamoso. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-32 m.

Remarks: Two specimens have been collected in freshwaters in the Lagarto River (UCR 1268-16), Barranca drainage.

Genus: *Awaous* Valenciennes, 1837 (2).

223. *Awaous banana* (Valenciennes, 1837). River goby, lamearena (396).

Distribution: Atlantic slope: San Juan, San Carlos, Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. Pacific slope: Bebedero (UCR 1569-08). 0-300 m.

224. *Awaous transandeanus* (Günther, 1861). River goby, lamearena (396).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís, Térraba and Coto. 0-120 m.

Genus: *Bathygobius* Bleeker, 1878 (3).

225. *Bathygobius andrei* (Sauvage, 1880). Estuarine frillfin, gobio. Addition to fauna.

Distribution: Pacific slope: Barranca, Tárcoles, Pirrís and Térraba. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). One hundred eleven specimens have been collected in freshwaters in the Lagarto River (UCR 1268-09, n=1), Barranca drainage, the Quebrada Aserradero River (UCR 0308-03, n=50), Pirrís drainage, the Esquinas River (UCR 1312-03, n=21; UCR 1314-03, n=35), and the Claro River (UCR 1941-04, n=4), Térraba drainage. Winemiller (1983) and Lyons and Schneider (1990) recorded this species in freshwaters in the Quebrada Camaronal River and the Claro River, Térraba drainage. Alpírez (1985) recorded this species in freshwaters in the Hatillo Nuevo River, Pirrís drainage, and the Punta Mala River, Térraba drainage

226. *Bathygobius ramosus* Ginsburg, 1947. Panamic frillfin, gobio de pozo. Addition to fauna.

Distribution: Pacific slope: Isla del Coco and Térraba (C. Garita, pers. comm.). 0-10 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2005; 2009). One specimen has been collected in freshwaters in an unknown river name in Cocos Island (UCR 0736-04; n=1), Isla del Coco drainage.

227. *Bathygobius soporator* (Valenciennes, 1837). Frillfin goby, mapo aguado. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009, 2010). Five specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 1757-12, n=1), Tortuguero drainage, the Suarez River (UCR 0211-04, n=3), Matina drainage, and the Gandoca River (UCR 1847-10, n=1), Sixaola drainage. Gilbert and Kelso (1971) collected one specimen in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

Genus: *Ctenogobius* Gill, 1858 (5).

228. *Ctenogobius boleosoma* (Jordan and Gilbert, 1882). Darter goby, madrejuile. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Thirteen specimens have been collected in freshwaters in the Suarez River (UCR 0209-04, n=1; UCR 0779-06, n=3), the Quebrada Westfalia River (UCR 0376-08, n=2), Matina drainage, and the Gandoca River (UCR 1847-13, n=7), Sixaola drainage. Gilbert and Kelso (1971) and Winemiller and Leslie (1992), both as *Gobionellus boleosoma*, recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage. In the present account, we recognize this species in *Ctenogobius* following McEachran and Fechhelm (2005), Matamoros *et al*. (2009), Page and Burr (2011) and Van Tassell (2011).

229. *Ctenogobius fasciatus* Gill, 1858. Blotchcheek goby, gobio caramarcada. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Eighteen specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 0260-17, n=2), the Colorado River (UCR 1067-17, n=4), the Caño Chiquero River (UCR 1852-14, n=1), Tortuguero drainage, the Quebrada Westfalia River (UCR 0376-07, n=2), Matina drainage, the Sixaola River (UCR 0280-07, n=1) and the Gandoca River (UCR 1847-04, n=8), Sixaola drainage. Gilbert and Kelso (1971) and Winemiller and Leslie (1992), both as *Gobionellus fasciatus*, recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage. In the present account, we recognize this species in *Ctenogobius* following McEachran and Fechhelm (2005), Matamoros *et al*. (2009), Page and Burr (2011) and Van Tassell (2011).

230. *Ctenogobius pseudofasciatus* (Gilbert and Randall, 1971). Slashcheek goby, gobio imitador. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Tortuguero Lagoon (UF 13516), Tortuguero drainage. Gilbert and Kelso (1971), as *Gobionellus pseudofasciatus*, collected four specimens in freshwaters in Tortuguero Lagoon, Tortuguero drainage. In the present account we recognize this species in the genus *Ctenogobius* following Greenfield and Thomerson (1997), Murdy and Hoese (2003) and Van Tassell (2011).

231. *Ctenogobius sagittula* (Günther, 1862). Longtail goby, gobio aguzado. Addition to fauna.

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Forty-four specimens have been collected in freshwaters in the Calera River (UCR 0935-10, n=1), Nicoya drainage, the Lagarto River (UCR 1268-12, n=4, UCR 1757-04, n=5, UCR 1793-07, n=1), Barranca drainage, the Quebrada Aserradero River (UCR 0308-02, n=23), Pirrís drainage, and the Quebrada Sucia River (UCR 1314-15, n=10), Térraba drainage. Winemiller (1983) and Lyons and Schneider (1990), both as *Gobionellus sagittula*, recorded this species in freshwaters in the Quebrada Camaronal River, Térraba drainage. Alpírez (1985), as *G. sagittula*, recorded this species in freshwaters in the Naranjal River, Tárcoles drainage, the Punta Mala River and the Coronado River, Térraba drainage. In the present account we recognize this species in the genus *Ctenogobius* following Allen and Robertson (1994), Matamoros *et al.* (2009) and Van Tassell (2011).

232. *Ctenogobius smaragdus* (Valenciennes, 1837). Emerald goby, gobio tranquilo. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-4 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Three specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 0260-18).

Genus: *Evorthodus* Gill 1859 (2).

233. *Evorthodus lyricus* (Girard, 1858). Lyre goby, tismiche. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-6 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Nine specimens have been collected in freshwaters in the Colorado River (UCR 1067-13, n=2), Tortuguero drainage, the Suarez River (UCR 0209-12, n=2), the Quebrada Westfalia River (UCR 0376-06, n=1; UCR 1127-06, n=1), Matina drainage, and the Sixaola River (UCR 0280-08, n=3), Sixaola drainage. Gilbert and Kelso (1971) and Winemiller and Leslie (1992) recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

234. *Evorthodus minutus* Meek and Hildebrand, 1928. Small goby, gobio pequeño. Addition to fauna.

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Forty-

eight specimens have been collected in freshwaters in the Calera River (UCR 0935-15, n=39), Nicoya drainage, the Lagarto River (UCR 1268-14, n=1; UCR 1756-05, n=2; UCR 1804-05, n=1), Barranca drainage, the Quebrada Aserradero River (UCR 0308-01, n=2), Pirrís drainage, and the Quebrada Sucia River (UCR 1314-14, n=3), Térraba drainage.

Genus: *Gobioides* Lacepède, 1800 (1).

235. *Gobioides broussonnetii* Lacepède, 1800. Violet goby, gobio violeta. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Parismina. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Three specimens have been collected in freshwaters in the Colorado River (UCR 0990-16, n=1), Tortuguero drainage and the Pacuare River (UCR 2835-01, n=1; UCR 2859-03, n=1), Parismina drainage.

Genus: *Gobionellus* Girard, 1858 (1).

236. *Gobionellus microdon* (Gilbert, 1892). Estuary goby, gobio de esteros. Addition to fauna.

Distribution: Pacific slope: Nicoya, Barranca, Tárcoles, Pirrís and Térraba. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Five hundred fifty-five specimens have been collected in freshwaters in the Calera River (UCR 0935-11, n=159), the Pánica River (UCR 1488-05, n=1), Nicoya drainage, the Lagarto River (UCR 1268-11, n=3), Barranca drainage, the Barú River (UCR 0313-04, n=391), Pirrís drainage, and the Quebrada Indiana River (UCR 0430-04, n=1), Térraba drainage.

Genus: *Gobiosoma* Girard, 1858 (1).

237. *Gobiosoma spes* (Ginsburg, 1939). Vermiculated goby, gobio jaspeado. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 0260-10), Tortuguero drainage. Gilbert and Kelso (1971) and Winemiller and Leslie (1992) recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

Genus: *Lophiogobius* Günther, 1873 (1).

238. *Lophogobius cristulatus* Ginsburg, 1939. Pacific crested-goby, gobio crestado. Addition to fauna.

Distribution: Pacific slope: Térraba. 0-17 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Six specimens have been collected in freshwaters in the Quebrada Sucia River (UCR 1314-16), Térraba drainage.

Genus: *Microgobius* Poey, 1876 (1).

239. *Microgobius miraflorensis* Gilbert and Starks, 1904. Miraflores goby, gobio de Miraflores. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Two specimens have been collected in freshwaters in the Lagarto River (UCR 1268-22), Barranca drainage.

Genus: *Sicydium* Valenciennes, 1837 (4).

240. *Sicydium adelum* Bussing, 1996. River goby, chupapiedras (400).

Distribution: Atlantic slope: Parismina, Matina and Sixaola. 10-800 m (Bussing 1996).

Remarks: This species is endemic to the Parismina, Matina and Sixaola River drainages, Costa Rica (Bussing 1996; 1998).

241. *Sicydium altum* Meek, 1907. River goby, chupapiedras (402).

Distribution: Atlantic slope: Sarapiquí, Tortuguero, Parismina, Matina and Sixaola. 0-1180 m.

242. *Sicydium cocoensis* (Heller and Snodgrass, 1903). River goby, chupapiedras. Addition to fauna.

Distribution: Pacific slope: Isla del Coco. 0-62 m.

Remarks: This species has been reported in the saltwaters of the Cocos Island National Park, Costa Rica by Bussing (1996). Four hundred seventy-three specimens have been collected in freshwaters in several rivers and streams of unknow name in the Chatam and Wafer Bays (CAS 37542, n=37; LACM 26166, n=37; LACM 35473-008, n=5; LACM 38113-001, n=21; LACM 38113-002, n=11; UCR 0006-01, n=3; UCR 0008-02, n=1; UCR 0736-06, n=205; UCR 1960-01, n=2), the Genio River (LSUMZ 08755, n=83; LSUMZ 08756, n=44; UCR 2020-02, n=7) and the San José River (LSUMZ 08757, n=17), Isla del Coco drainage. This species is endemic to the Isla del Coco drainage, Costa Rica (Bussing 1996; 1998; Bussing and López 2005; Van Tassell 2011).

243. *Sicydium salvini* Ogilvie-Grant, 1884. River goby, chupapiedras (406).

Distribution: Pacific slope: Nicoya, Tempisque, Bebedero, Barranca, Tárcoles, Pirrís and Térraba. 0-660 m.

Family: Microdesmidae [1](1). Peripheral.

Genus: *Microdesmus* Günther, 1864 (1).

244. *Microdesmus dorsipunctatus* Dawson, 1968. Spotback wormfish, pez lombriz lomo punteado. Addition to fauna.

Distribution: Pacific slope: Pirrís. 0-3 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (2009). Two specimens have been collected in freshwaters in the Quebrada Aserradero River (UCR 0308-06), Pirrís drainage.

Order: Pleuronectiformes 2[3](11).

Family: Paralichthyidae [1](4). Peripheral.

Genus: *Citharichthys* Bleeker, 1862 (4).

245. *Citharichthys arenaceus* Evermann and Marsh, 1900. Sand whiff, lenguado arenero. Addition to fauna.

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-60 m.

Remarks: Eleven specimens have been collected in freshwaters in the Pacuare River (UCR 0209-07, n=1), Parismina drainage, the Suarez River (UCR 0590-01, n=1), the Banano River (UCR 0374-09; n=1) and the Hone Creek River (UCR 1352-13, n=8), Matina drainage

246. *Citharichthys gilberti* Jenkins and Evermann, 1889. Bigmouth sanddab, lenguado tapadero. Addition to fauna.

Distribution: Pacific slope: Nicoya, Barranca, Tárcoles, Pirrís and Térraba. 0-80 m (A. Molina, pers. comm.).

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Fifty-four specimens have been collected in freshwaters in the Calera River (UCR 0935-09, n=1), Nicoya drainage, the Lagarto River (UCR 1268-02, n=4; UCR 1793-04, n=14), Barranca drainage, the Quebrada Doña María River (UCR 0115-08, n=1), Tárcoles drainage, the Quebrada Aserradero River (UCR 0308-11, n=30), Pirrís drainage, the Esquinas River (UCR 1312-06, n=1) and the Quebrada Sucia River (UCR 1314-07, n=3), Térraba drainage. Alpírez (1985) recorded this species in freshwaters in the Montaña River, the Nosara River, the Garza River, the Buenavista River, the Pánica River, Nicoya drainage, the Tulín River, Tárcoles drainage, the Parrita River, the Paquita River, the Portalón River, Pirrís drainage, and the Punta Mala River, Térraba drainage.

247. *Citharichthys spilopterus* Günther, 1862. Bay whiff, lenguado pardo (428).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-60 m.

248. *Citharichthys uhleri* Jordan, 1889. Voodoo whiff, lenguado albimoteado (430).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-60 m.

Family: Achiridae [2](7). Peripheral.

Genus: *Achirus* Lacepède, 1802 (3).

249. *Achirus declivis* Chabanaud, 1940. Plainfin sole, suela común. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Parismina. 0-3 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Two specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 0260-16, n=1), Tortuguero drainage, and the Pacuare River (UCR 2859-01, n=1), Parismina drainage.

250. *Achirus lineatus* (Linnaeus, 1758). Lined sole, suela listada. Addition to fauna.

Distribution: Atlantic slope: Tortuguero and Matina. 0-5 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). One specimen has been collected in freshwaters in the Quebrada Westfalia River (UCR 0376-14), Matina drainage. Winemiller and Leslie (1992) recorded this species in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

251. *Achirus mazatlanus* (Steindachner, 1869). Mazatlan sole, lenguado listado. Addition to fauna.

Distribution: Pacific slope: Nicoya, Barranca and Pirrís. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Twelve specimens have been collected in freshwaters in the Calera River (UCR 0935-14, n=2), Nicoya drainage, the Lagarto River (UCR 1268-21, n=8), Barranca drainage, and the Quebrada Aserrader River (UCR 0308-10, n=2), Pirrís drainage.

Genus: *Trinectes* Rafinesque, 1832 (4).

252. *Trinectes fimbriatus* (Günther, 1862). Fringed sole, lenguado manchado. Addition to fauna.

Distribution: Pacific slope: Barranca. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Two specimens have been collected in freshwaters in the Lagarto River (UCR 1268-15), Barranca drainage.

253. *Trinectes fonsecensis* (Günther, 1862). Spottedfin sole, lenguado rayado (432).

Distribution: Pacific slope: Barranca, Tárcoles, Pirrís and Térraba. 0-55 m (Rojas and Rodríguez 2008).

254. *Trinectes inscriptus* (Gosse, 1851). Scrawled sole, suela reticulada. Addition to fauna.

Distribution: Atlantic slope: Matina. 0-5 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Four specimens have been collected in freshwaters in the Suarez River (UCR 0209-11, n=1) and the Quebrada Westfalia River (UCR 0376-14, n=3), Matina drainage.

255. *Trinectes paulistanus* (Miranda Ribeiro, 1915). Slipper sole, suela carioca (434).

Distribution: Atlantic slope: Tortuguero, Parismina, Matina and Sixaola. 0-10 m.

Order: Tetraodontiformes 1[1](3).

Family: Tetraodontidae [1](3). Peripheral.

Genus: *Sphoeroides* [Lacepède], 1798 (3).

256. *Sphoeroides annulatus* (Jenyns, 1842). Bullseye puffer, timboril anillado. Addition to fauna.

Distribution: Pacific slope: Barranca and Térraba. 0-5 m.

Remarks: This species has been reported in the

Pacific coast of Costa Rica by Bussing and López (1994; 2009; 2011). Seven specimens have been collected in freshwaters in the Lagarto River (UCR 1793-05, n=5), Barranca drainage, and the Sirena River (UCR 1872-03, n=2), Térraba drainage. Winemiller (1983), Winemiller and Morales (1989) and Lyons and Schneider (1990) recorded this species in freshwaters in the Quebrada Camaronal River and the Claro River, Térraba drainage. Alpírez (1985) recorded this species in freshwaters in the Paquita River, Pirrís drainage.

257. *Sphoeroides rosenblatti* Bussing, 1996. Bullseye puffer, timboril imitador. Addition to fauna.

Distribution: Pacific slope: Barranca and Térraba. 0-32 m.

Remarks: This species has been reported in the Pacific coast of Costa Rica by Bussing and López (1994, as *Sphoeroides* sp.; 2009). Twenty-nine specimens have been collected in freshwaters in the Lagarto River (UCR 1268-04, n=14; UCR 1793-06, n=12), Barranca drainage, the Rincón River (UCR 0262-04, n=1) and the Claro River (UCR 1869-01, n=2), Térraba drainage.

258. *Sphoeroides testudineus* (Linnaeus, 1758). Checkered puffer, botete sapo. Addition to fauna.

Distribution: Atlantic slope: Tortuguero. 0-12 m.

Remarks: This species has been reported in the Caribbean coast of Costa Rica by Bussing and López (2009; 2010). Sixty-two specimens have been collected in freshwaters in the Tortuguero Lagoon (UCR 0260-06, n=13; UCR 0261-04, n=40; UCR 1757-04, n=3; UCR 1854-02, n=1; UCR 2495-10, n=3), the Colorado River (UCR 1078-03, n=1) and the Gandoca River (UCR 1882-03, n=1), Tortuguero drainage. Gilbert and Kelso (1971) collected two specimens in freshwaters in the Tortuguero Lagoon, Tortuguero drainage.

Discussion

Bussing (1998) reported a total of 142 native species for the country, 22.5% (32 species) of which, based on published salinity tolerances (Myers 1949), are primary or obligate freshwater, 40.2% (57 species) are secondary and 37.3% (53 species) are peripheral. Our results indicate the presence of a total of 250 species, 33 (13.2%) of which are native primary species, 59 (23.6%) native secondary species and 158 (63.2%) native peripheral species. These results are not surprising, given Myers' (1966) suggested history and composition of the Central American freshwater fish fauna.

With the exception of Panama, all Central American countries now have fairly recent formal freshwater fish species lists. These lists include: Nicaragua (Villa 1982), El Salvador (McMahan *et al.* 2013), Honduras (Matamoros *et al*. 2009), Guatemala (Kihn-Pineda *et al*. 2006) and Belize (Greenfield and 1997). The last formal list for Panama dates back to 1965 (Loftin 1965).

Compared with the other Central American countries, except Panama, Costa Rica appears to have the greatest primary freshwater fish diversity with 33 species. About 60% (19) of those species are known to be present both in Costa Rica and Panama (Bussing 1998; Froese and Pauly 2013), whereas less than 40% (13) are known to be present both in Costa Rica and Nicaragua (Villa 1982; Bussing 1998; Froese and Pauly 2013). Northward the number of shared primary species decreases gradually: Honduras (7), Guatemala (6), Mexico (5), El Salvador (4) and Belize (3) (Greenfield and Thomerson 1997; Bussing 1998; Kihn-Pineda *et al*. 2006; Matamoros *et al*. 2009; Froese and Pauly 2013; McMahan *et al.* 2013).

Bussing (1998) reported a total of nineteen endemic species from the country; our results indicate the presence of a total of twenty-four endemic species. In this account, we exclude *Gobiesox potamius* reported by McMahan *et al.* (2013) from El Salvador, but include three endemic species of the Cocos Island (*Eleotris tubularis*, *Gobiesox fulvus* and *Sicydium cocoensis*), the recently described *Poeciliopsis santaelena*, and *Cynodonichthys siegfriedi* herein recognized as valid species, to the list of endemic species of Costa Rica. Finally, Bussing (1998) mentioned at least seven exotic species from the country; in this account we confirmed the presence of at least eight exotic species in natural water bodies of the country.

The results of this checklist provide a framework for future biogeographic works on fishes from this region, particularly by providing up-to-date knowledge on distributions. In addition, data provided in this checklist will help on monitoring fish distributional changes in the future due to human introductions and global change and will aid in conservation decisions concerning Costa Rican fishes.

Table 1. Costa Rican freshwater fish species by major River drainage basins (Figure 1). Ele refers to altitudinal distribution in meters above sea level. Sal refers to tolerance to salinity based on Meyers (1949); primary = Pri; secondary = Sec; and peripheral = Per. CSt stands for conservation status; species were classified as native (Nat), endemic (End) and exotic (Exo). Afa refers to additions to fauna on the basis of Bussing (1998).

FAMILY/Species	Atlantic slope								Pacific slope										Ele	Sal	CSt	Afa
	LN	RF	SJ	SC	Sa	To	Pa	Ma	Si	IC	Ni	Te	Be	Ba	Ta	Pi	Tr	Co				
CARCHARHINIDAE (1)																						
Carcharhinus leucas	X	X	X	X	X	X											X		0-35	Per	Nat	
PRISTIDAE (2)																						
Pristis pectinata	X		X			X											X		0-35	Per	Nat	X
Pristis pristis	X	X	X	X	X	X						X							0-35	Per	Nat	
LEPISOSTEIDAE (1)																						
Atractosteus tropicus	X	X	X	X	X	X	X												0-45	Sec	Nat	
ELOPIDAE (1)																						
Elops affinis											X								0-10	Per	Nat	X
MEGALOPIDAE (1)																						
Megalops atlanticus	X	X	X	X	X	X													0-45	Per	Nat	

Table 1. ***Continued.***

FAMILY/Species	Atlantic slope										Pacific slope								Ele	Sal	CSt	Afa
	LN	RF	SJ	SC	Sa	To	Pa	Ma	Si	IC	Ni	Te	Be	Ba	Ta	Pi	Tr	Co				
ALBULIDAE (1)																						
Albula vulpes								X											0-2	Per	Nat	X
ANGUILLIDAE (1)																						
Anguilla rostrata	X	X	X	X	X	X	X	X	X										0-20	Per	Nat	
OPHICHTHIDAE (2)																						
Myrophis punctatus								X											0-3	Per	Nat	X
Myrophis vafer																	X		0-17	Per	Nat	X
CLUPEIDAE (4)																						
Dorosoma chavesi	X	X	X	X	X	X													0-50	Per	Nat	
Lile piquitinga									X										0-66	Per	Nat	X
Lile stolifera																	X		0-10	Per	Nat	X
Sardinella brasiliensis						X													0-3	Per	Nat	X
ENGRAULIDAE (5)																						
Anchoa curta																	X		0-12	Per	Nat	X
Anchoa lucida														X					0-32	Per	Nat	X
Anchovia macrolepidota																	X		0-17	Per	Nat	X
Anchoviella elongata						X	X												0-5	Per	Nat	X
Lycengraulis grossidens						X													0-3	Per	Nat	X
CYPRINIDAE (2)																						
Carassius auratus															X				100-1779	Pri	Exo	
Cyprinus carpio															X				112-1516	Pri	Exo	X
CURIMATIDAE (1)																						
Cyphocharax magdalenae																		X	12-100	Pri	Nat	
ERYTHRINIDAE (1)																						
Hoplias microlepis																		X	20-40	Pri	Nat	
LEBIASINIDAE (1)																						
Lebiasina boruca																X	X	X	10-1000	Pri	End	
CHARACIDAE (19)																						
Astyanax aeneus	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	0-1000	Pri	Nat	
Astyanax cocibolca	X	X	X	X	X	X													5-20	Pri	Nat	
Astyanax orthodus									X										1-60	Pri	Nat	
Bramocharax bransfordii	X	X	X	X	X	X	X												5-530	Pri	Nat	
Brycon behreae																X	X	X	10-640	Pri	Nat	
Brycon costaricensis	X	X	X	X	X	X	X	X											0-600	Pri	Nat	
Bryconamericus gonzalezi									X										69	Pri	Nat	X
Bryconamericus scleroparius	X	X	X	X	X	X	X	X	X			X							12-600	Pri	Nat	
Bryconamericus terrabensis																	X		60-940	Pri	End	
Carlana eigenmanni	X	X	X	X	X	X	X												35-90	Pri	Nat	
Hyphessobrycon panamensis									X										40-60	Pri	Nat	
Hyphessobrycon savagei																X	X		0-70	Pri	End	
Hyphessobrycon tortuguerae	X	X	X	X	X	X													0-50	Pri	Nat	
Odontostilbe dialeptura																		X	20-90	Pri	Nat	
Pseudocheirodon Térrabae																X	X		0-680	Pri	End	
Pterobrycon myrnae																X	X		10-80	Pri	End	
Roeboides bouchellei	X	X	X	X	X	X	X	X			X	X	X	X					0-610	Pri	Nat	
Roeboides bussingi																		X	11-118	Pri	Nat	
Roeboides ilseae																X	X		10-660	Pri	End	
ARIIDAE (6)																						
Cathorops steindachneri												X					X		0-55	Per	Nat	X
Cathorops tuyra												X					X		0-55	Per	Nat	X
Notarius cookei											X								0-6	Per	Nat	X
Sciades assimilis							X												0-7	Per	Nat	X
Sciades guatemalensis												X							0-11	Per	Nat	
Sciades seemanni											X	X	X	X	X		X		0-32	Per	Nat	
HEPTAPTERIDAE (5)																						
Imparfinis lineatus																	X		80-980	Pri	End	
Pimelodella chagresi																	X	X	20-660	Pri	Nat	
Rhamdia guatemalensis	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	0-680	Pri	Nat	
Rhamdia laticauda	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	35-1350	Pri	Nat	
Rhamdia nicaraguensis	X	X	X	X	X	X	X					X	X		X				20-1160	Pri	Nat	

Table 1. ***Continued.***

FAMILY/Species	Atlantic slope									Pacific slope									Ele	Sal	CSt	Afa
	LN	RF	SJ	SC	Sa	To	Pa	Ma	Si	IC	Ni	Te	Be	Ba	Ta	Pi	Tr	Co				
TRICHOMYCTERIDAE (1)																						
Trichomycterus striatus																	X	X	20-660	Pri	Nat	
LORICARIDAE (3)																						
Fonchiiichthys uracanthus																		X	20-160	Pri	Nat	
Hemiancistrus aspidolepis		X					X										X	X	20-560	Pri	Nat	
Pterygoplichthys pardalis							X												20-110	Pri	Exo	X
GYMNOTIDAE (2)																						
Gymnotus cylindricus	X	X	X	X	X	X	X	X	X										1-50	Pri	Nat	
Gymnotus maculosus	X	X	X	X	X	X					X	X	X						20-540	Pri	Nat	
HYPOPOMIDAE (1)																						
Brachyhypopomus occidentalis									X										1-60	Pri	Nat	
SALMONIDAE (1)																						
Oncorhynchus mykiss							X									X			654-2202	Per	Exo	
GOBIESOCIDAE (3)																						
Gobiesox fulvus										X									0-304	Per	End	
Gobiesox nudus				X	X	X	X	X	X										25-580	Per	Nat	
Gobiesox potamius											X	X	X	X	X	X	X		0-140	Per	Nat	
ATHERINOPSIDAE (7)																						
Atherinella argentea											X	X	X	X	X	X	X	X	0-7	Per	Nat	
Atherinella blackburni						X													0-3	Per	Nat	X
Atherinella chagresi						X	X	X	X										8-60	Per	Nat	
Atherinella hubbsi	X	X	X	X	X	X	X	X											35-540	Per	Nat	
Atherinella milleri	X	X	X	X	X	X	X	X	X										0-40	Per	Nat	
Atherinella sardina	X																		0-40	Per	Nat	
Membras gilberti														X	X	X	X		0-7	Per	Nat	X
RIVULIDAE (7)																						
Cynodonichthys fuscolineatus					X								X						525-695	Sec	End	
Cynodonichthys glaucus																	X	X	540-680	Sec	End	
Cynodonichthys hildebrandi																	X	X	10-90	Sec	Nat	
Cynodonichthys isthmensis	X	X	X	X	X	X	X	X	X				X		X				0-1500	Sec	Nat	
Cynodonichthys rubripunctatus									X										2-40	Sec	Nat	
Cynodonichthys siegfriedi																	X		20-80	Sec	End	
Cynodonichthys uroflammeus																	X	X	750-1100	Sec	Nat	
ANABLEPIDAE (1)																						
Oxyzygonectes dovii											X	X	X	X	X	X	X	X	0-15	Sec	Nat	
POECILIIDAE (25)																						
Alfaro cultratus	X	X	X	X	X	X	X	X	X			X							0-300	Sec	Nat	
Belonesox belizanus	X	X	X	X	X	X	X	X											0-45	Sec	Nat	
Brachyrhaphis cascajalensis									X										5-125	Sec	Nat	
Brachyrhaphis holdridgei	X	X	X	X	X	X	X												35-620	Sec	Nat	
Brachyrhaphis olomina	X						X				X	X	X	X	X				10-900	Sec	End	
Brachyrhaphis parismina	X	X	X	X	X	X	X	X											5-50	Sec	Nat	
Brachyrhaphis rhabdophora																X	X		3-1450	Sec	End	
Brachyrhaphis roseni																		X	20-100	Sec	Nat	
Brachyrhaphis terrabensis																X	X	X	40-1450	Sec	Nat	
Gambusia nicaraguensis								X											0-15	Sec	Nat	
Phallichthys amates	X	X	X	X	X	X	X	X	X			X	X		X				0-1120	Sec	Nat	
Phallichthys quadripunctatus									X										0-40	Sec	End	
Phallichthys tico	X		X	X	X														35-600	Sec	Nat	
Poecilia gillii	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	0-1220	Sec	Nat	
Poecilia mexicana	X	X	X	X	X	X	X	X											2-45	Sec	Nat	
Poecilia reticulata							X								X				30-1250	Sec	Exo	
Poeciliopsis elongata											X	X	X	X	X	X	X	X	0-40	Sec	Nat	
Poeciliopsis paucimaculata																	X	X	20-940	Sec	End	
Poeciliopsis retropinna																	X	X	0-940	Sec	Nat	
Poeciliopsis santaelena											X								90-115	Sec	End	X
Poeciliopsis turrubarensis											X	X	X	X	X	X	X	X	0-120	Sec	Nat	
Priapichthys annectens	X	X	X	X	X	X	X	X	X		X	X	X	X	X				25-1270	Sec	End	
Priapichthys panamensis											X	X	X	X	X	X	X	X	0-95	Sec	Nat	
Xenophallus umbratilis	X	X	X	X	X	X	X						X						35-590	Sec	Nat	
Xiphophorus variatus							X												45	Sec	Exo	

Table 1. ***Continued.***

FAMILY/Species	Atlantic slope										Pacific slope								Ele	Sal	CSt	Afa
	LN	RF	SJ	SC	Sa	To	Pa	Ma	Si	IC	Ni	Te	Be	Ba	Ta	Pi	Tr	Co				
BELONIDAE (2)																						
Strongylura marina						X													0-3	Per	Nat	X
Strongylura timucu						X		X											0-13	Per	Nat	X
HEMIRAMPHIDAE (2)																						
Hemiramphus brasiliensis						X													0-2	Per	Nat	X
Hyporhamphus roberti						X													0-2	Per	Nat	X
SYNGNATHIDAE (5)																						
Microphis lineatus						X		X	X										0-12	Per	Nat	
Pseudophallus elcapitanensis											X	X	X	X	X	X	X	X	0-20	Per	Nat	
Pseudophallus mindi					X	X	X	X	X										0-35	Per	Nat	
Pseudophallus starksi											X	X	X	X	X	X	X	X	0-155	Per	Nat	
Syngnathus scovelli						X													0-3	Per	Nat	X
SYNBRANCHIDAE (2)																						
Synbranchus marmoratus	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	0-640	Sec	Nat	
Ophisternon aenigmaticum		X																	43	Sec	Nat	X
CENTROPOMIDAE (11)																						
Centropomus armatus														X					0-6	Per	Nat	X
Centropomus ensiferus						X	X	X	X										0-11	Per	Nat	X
Centropomus medius											X	X	X	X	X	X	X	X	0-250	Per	Nat	
Centropomus mexicanus						X	X	X	X										0-4	Per	Nat	X
Centropomus nigrescens											X	X	X	X	X	X	X	X	0-145	Per	Nat	X
Centropomus parallelus		X	X	X	X	X	X	X	X										0-43	Per	Nat	
Centropomus pectinatus						X	X	X	X										0-12	Per	Nat	
Centropomus robalito											X	X	X	X	X	X	X	X	0-50	Per	Nat	
Centropomus undecimalis						X	X	X	X										0-50	Per	Nat	
Centropomus viridis												X					X		0-145	Per	Nat	X
Centropomus unionensis												X				X			0-88	Per	Nat	X
SERRANIDAE (1)																						
Epinephelus guttatus						X													0-3	Per	Nat	X
CENTRARCHIDAE (1)																						
Micropterus salmoides															X				854	Pri	Exo	
CARANGIDAE (9)																						
Carangoides vinctus															X				0-7	Per	Nat	X
Caranx caballus																	X		0-55	Per	Nat	X
Caranx caninus															X	X	X		0-55	Per	Nat	X
Caranx hippos						X		X											0-5	Per	Nat	X
Caranx latus						X	X	X	X										0-20	Per	Nat	
Hemicaranx amblyrhynchus						X													0-3	Per	Nat	X
Oligoplites altus																	X	X	0-10	Per	Nat	X
Oligoplites palometa					X	X													0-10	Per	Nat	
Oligoplites saurus						X													0-4	Per	Nat	X
LUTJANIDAE (7)																						
Lutjanus analis						X		X											0-3	Per	Nat	X
Lutjanus argentiventris											X	X	X	X	X	X	X	X	0-20	Per	Nat	
Lutjanus colorado										X						X	X		0-17	Per	Nat	X
Lutjanus griseus						X													0-3	Per	Nat	X
Lutjanus jocu						X	X	X	X										0-9	Per	Nat	X
Lutjanus jordani																	X		0-145	Per	Nat	X
Lutjanus novemfasciatus															X	X	X		0-95	Per	Nat	X
GERREIDAE (11)																						
Diapterus auratus						X													0-3	Per	Nat	X
Diapterus peruvianus														X		X	X		0-10	Per	Nat	X
Diapterus rhombeus						X	X												0-12	Per	Nat	X
Eucinostomus argenteus								X											0-6	Per	Nat	X
Eucinostomus currani											X	X	X	X	X	X	X	X	0-145	Per	Nat	
Eucinostomus dowii																X			0-10	Per	Nat	X
Eucinostomus melanopterus						X	X	X											0-10	Per	Nat	X
Eugerres brevimanus											X	X	X	X	X	X	X	X	0-145	Per	Nat	
Eugerres plumieri			X	X	X	X													0-31	Per	Nat	
Gerres cinereus						X													0-12	Per	Nat	X
Gerres simillimus											X					X	X		0-640	Per	Nat	X

Table 1. ***Continued.***

FAMILY/Species	Atlantic slope										Pacific slope								Ele	Sal	CSt	Afa
	LN	RF	SJ	SC	Sa	To	Pa	Ma	Si	IC	Ni	Te	Be	Ba	Ta	Pi	Tr	Co				
HAEMULIDAE (8)																						
Conodon nobilis						X	X	X	X										0-51	Per	Nat	X
Haemulopsis corvinaeformis						X													0-5	Per	Nat	X
Haemulopsis leuciscus																	X		0-145	Per	Nat	X
Pomadasys bayanus											X	X	X	X	X	X	X		0-640	Per	Nat	
Pomadasys branickii																	X		0-17	Per	Nat	X
Pomadasys crocro					X	X	X	X	X										0-40	Per	Nat	
Pomadasys empherus														X					0-10	Per	Nat	X
Pomadasys macracanthus														X					0-32	Per	Nat	X
SCIAENIDAE (5)																						
Bairdiella ronchus						X													0-5	Per	Nat	X
Cynoscion albus													X						0-6	Per	Nat	X
Larimus breviceps						X													0-3	Per	Nat	X
Micropogonias furnieri						X	X												0-3	Per	Nat	X
Ophioscion typicus																	X		0-43	Per	Nat	X
POLYNEMIDAE (1)																						
Polydactylus virginicus						X	X	X											0-6	Per	Nat	X
KYPHOSIDAE (1)																						
Kyphosus sectatrix						X													0-3	Per	Nat	X
MUGILIDAE (4)																						
Agonostomus monticola	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0-650	Per	Nat	
Joturus pichardi					X	X	X	X	X										0-600	Per	Nat	
Mugil cephalus						X													0-3	Per	Nat	X
Mugil curema						X	X	X	X		X	X	X	X	X	X	X	X	0-145	Per	Nat	X
CICHLIDAE (26)																						
Amatitlania kanna									X										0-65	Sec	Nat	
Amatitlania siquia	X	X	X	X	X	X	X	X			X	X	X	X	X				0-540	Sec	Nat	
Amphilophus alfari	X	X	X	X	X	X	X	X				X	X		X				2-1150	Sec	Nat	
Amphilophus altifrons																		X	20-400	Sec	Nat	
Amphilophus bussingi									X										40-150	Sec	End	
Amphilophus citrinellus	X	X	X	X	X	X	X	X											0-12	Sec	Nat	
Amphilophus diquis																X	X	X	16-700	Sec	End	
Amphilophus longimanus	X	X	X	X	X	X					X	X	X						0-100	Sec	Nat	
Amphilophus lyonsi																		X	10-20	Sec	Nat	
Amphilophus rhytisma									X										40-60	Sec	Nat	
Amphilophus rostratus	X	X	X	X	X	X	X	X											0-200	Sec	Nat	
Andinoacara coeruleopunctatus																		X	20-100	Sec	Nat	
Archocentrus centrarchus	X	X	X	X	X	X	X	X											0-45	Sec	Nat	
Archocentrus multispinosus	X	X	X	X	X	X	X	X			X	X	X						0-75	Sec	Nat	
Cryptoheros myrnae									X										40-150	Sec	End	
Cryptoheros sajica																X	X	X	10-680	Sec	End	
Cryptoheros septemfasciatus	X	X	X	X	X	X	X	X											12-600	Sec	Nat	
Hypsophrys nematopus	X	X	X	X	X	X							X						35-535	Sec	Nat	
Hypsophrys nicaraguensis	X	X	X	X	X	X	X	X					X						5-200	Sec	Nat	
Oreochromis niloticus	X	X	X	X	X	X	X	X	X		X		X		X		X		0-1250	Sec	Exo	X
Parachromis dovii	X	X	X	X	X	X	X	X			X	X	X						0-600	Sec	Nat	
Parachromis loisellei	X	X	X	X	X	X	X	X	X				X	X					1-70	Sec	Nat	
Parachromis managuensis	X	X	X	X	X	X	X	X	X				X						0-45	Sec	Nat	
Tomocichla sieboldii															X	X	X	X	10-840	Sec	Nat	
Tomocichla tuba	X	X	X	X	X	X	X	X	X										0-540	Sec	Nat	
Vieja maculicauda						X	X	X	X										0-5	Sec	Nat	
LABRIDAE (2)																						
Halichoeres aestuaricola																X	X		0-17	Per	Nat	X
Halichoeres notospilus																	X		0-15	Per	Nat	X
DACTYLOSCOPIDAE (1)																						
Dactyloscopus amnis														X		X			0-10	Per	Nat	X
BLENNIIDAE (1)																						
Hypsoblennius maculipinna																X			0-10	Per	Nat	X
ELEOTRIDAE (16)																						
Dormitator latifrons											X	X	X	X	X	X	X	X	0-145	Per	Nat	
Dormitator maculatus						X	X	X	X										0-12	Per	Nat	

Table 1. ***Continued.***

FAMILY/Species	Atlantic slope									Pacific slope								Ele	Sal	CSt	Afa
	LN	RF	SJ	SC	Sa	To	Pa	Ma	Si	IC	Ni	Te	Be	Ba	Ta	Pi	Tr	Co				
Eleotris amblyopsis						X	X	X	X										0-15	Per	Nat	
Eleotris picta										X	X	X	X	X	X	X	X	X	0-100	Per	Nat	
Eleotris pisonis						X	X	X	X										0-60	Per	Nat	
Eleotris tecta																	X	X	0-75	Per	Nat	
Eleotris tubularis										X									0-53	Per	End	X
Erotelis armiger																X			0-10	Per	Nat	X
Gobiomorus dormitor	X	X	X	X	X	X	X	X	X										0-60	Per	Nat	
Gobiomorus maculatus											X	X	X	X	X	X	X	X	0-145	Per	Nat	
Gobiomorus polylepis											X								2-15	Per	Nat	
Guavina guavina									X										0-10	Per	Nat	X
Guavina micropus																	X		0-2	Per	Nat	X
Hemieleotris latifasciata											X	X	X	X	X	X	X	X	5-100	Per	Nat	
Leptophilypnus fluviatilis						X													0-6	Per	Nat	X
Leptophilypnus panamensis															X	X	X		0-32	Per	Nat	X
GOBIIDAE (22)																						
Aboma etheostoma														X					0-32	Per	Nat	X
Awaous banana			X	X	X	X	X	X	X				X						0-300	Per	Nat	
Awaous transandeanus											X	X	X	X	X	X	X	X	0-120	Per	Nat	
Bathygobius andrei														X	X	X	X		0-32	Per	Nat	X
Bathygobius ramosus										X							X		0-10	Per	Nat	X
Bathygobius soporator						X	X	X	X										0-12	Per	Nat	X
Ctenogobius boleosoma						X	X	X	X										0-12	Per	Nat	X
Ctenogobius fasciatus						X	X	X	X										0-12	Per	Nat	X
Ctenogobius pseudofasciatus						X													0-12	Per	Nat	X
Ctenogobius sagittula											X	X	X	X	X	X	X		0-32	Per	Nat	X
Ctenogobius smaragdus						X													0-4	Per	Nat	X
Evorthodus lyricus						X	X	X	X										0-6	Per	Nat	X
Evorthodus minutus											X	X	X	X	X	X	X		0-32	Per	Nat	X
Gobioides broussonnetii						X	X												0-3	Per	Nat	X
Gobionellus microdon											X	X	X	X	X	X	X		0-32	Per	Nat	X
Gobiosoma spes						X													0-3	Per	Nat	X
Lophogobius cristulatus																	X		0-17	Per	Nat	X
Microgobius miraflorensis														X					0-32	Per	Nat	X
Sicydium adelum							X	X	X										10-800	Per	End	
Sicydium altum					X	X	X	X	X										0-1180	Per	Nat	
Sicydium cocoensis										X									0-62	Per	End	X
Sicydium salvini											X	X	X	X	X	X	X		0-660	Per	Nat	
MICRODESMIDAE (1)																						
Microdesmus dorsipunctatus																X			0-3	Per	Nat	X
PARALICHTHYIDAE (4)																						
Citharichthys arenaceus						X	X	X	X										0-60	Per	Nat	X
Citharichthys gilberti											X	X	X	X	X	X	X		0-88	Per	Nat	X
Citharichthys spilopterus						X	X	X	X										0-60	Per	Nat	
Citharichthys uhleri						X	X	X	X										0-60	Per	Nat	
ACHIRIDAE (7)																						
Achirus declivis						X	X												0-3	Per	Nat	X
Achirus lineatus						X		X											0-5	Per	Nat	X
Achirus mazatlanus											X			X		X			0-32	Per	Nat	X
Trinectes fimbriatus														X					0-32	Per	Nat	X
Trinectes fonsecensis														X	X	X	X		0-55	Per	Nat	
Trinectes inscriptus								X											0-5	Per	Nat	X
Trinectes paulistanus						X	X	X	X										0-10	Per	Nat	
TETRAODONTIDAE (3)																						
Sphoeroides annulatus														X			X		0-5	Per	Nat	X
Sphoeroides rosenblatti														X			X		0-32	Per	Nat	X
Sphoeroides testudineus						X													0-12	Per	Nat	X

Acknowledgments: We thank to the staff of the Museo de Zoología, Escuela de Biología and the Centro de Investigación en Ciencias del Mar y Limnología (CIMAR) of the Universidad de Costa Rica, particularly to Ana Rosa Ramirez, Rita Vargas and Monika Springer for all the help and facilities offered. Many thanks to Bernald Pacheco and all AquaBiolab S.A. staff for partial support, arranging logistics and fieldwork. We are also very grateful to everyone who has contributed to this project with their fieldwork and/or partial support including: Beatriz Naranjo, Aldo Farah, Ana María Arias, Helena Molina, Gerardo Umaña, Prosanta Chakrabarty, Wilfredo Matamoros, Caleb McMahan, Michael Arroyo and Carlos Sánchez, among others. Finally, we also thank Wilfredo Matamoros and an anonymous reviewer for their valuable comments to the manuscript and their constructive suggestions.

Literature Cited

Albert, J.S. 2001. Species diversity and phylogenetic systematic of American knifefishes (Gymnotiformes, Teleostei). *Miscellaneous Publications of the Museum of Zoology, University of Michigan* 190: 1-127.

Albert, J.S. and R. Campos-da-Paz. 1998. Phylogenetic systematics of Gymnotiformes with diagnoses of 58 clades: a review of the available data; p. 419-446 *In* L.R. Malabarba, R.E. Reis, R.P. Vari, Z.M.S. Lucena and C.A.S. Lucena (ed.). *Phylogeny and classification of neotropical fishes*. Porto Alegre: EDIPUCRS.

Alda, F., A.G. Reina, I. Doadrio and E. Bermingham. 2013. Phylogeny and biogeography of the *Poecilia sphenops* species complex (Actinopterygii, Poeciliidae) in Central America. *Molecular Phylogenetics and Evolution* 66(3): 1011-1026.

Allen, G.R. and D.R. Robertson. 1994. Fishes of the tropical eastern Pacific. Bathurst: Crawford House Press. 332 p.

Allgayer, R. 2001. Description d'un genre nouveau, *Cryptoheros*, d'Amerique central et d'une espece nouvelle du Panama (Pisces: Cichlidae). *L'an Cichlidé* 1: 13-20.

Allgayer, R. 2002. Un cichlide nouveau du genre *Tomocichla* Regan, 1908 (Perciformes: Labroidei) du Rio Guarumo, Panama. *L'an Cichlidé* 2: 32-36.

Alpírez, O.Q. 1985. Ictiofauna de la vertiente Pacífica de Costa Rica. *Brenesia* 24: 297-318.

Angulo, A. 2013. Nombres comunes y técnicos de los peces de agua dulce de Costa Rica. *Revista de Filología y Lingüística* (*accepted*).

Angulo, A. and J.M. Gracian-Negrete. 2013. A new species of *Brycon* (Teleostei: Characiformes: Characidae) from Nicaragua and Costa Rica, with a key to the lower Mesoamerican species of the genus. *Zootaxa* (*accepted*).

Ardila-Rodríguez, C.A. 1994. *Lebiasina floridablancaensis*, una nueva especie de pez para Colombia (Teleostei: Characiformes: Lebiasinidae). *Revista Unimetro* 10(9): 1-8.

Ardila-Rodríguez, C.A. 1999. *Lebiasina provenzanoi*, una nueva especie de pez para Venezuela (Teleostei: Characiformes: Lebiasinidae). *Revista Unimetro* 13(5): 1-10.

Ardila-Rodríguez, C.A. 2000. *Lebiasina yuruaniensis*, una nueva especie de pez para Venezuela (Teleostei: Characiformes: Lebiasinidae). *Revista Unimetro*, Separata Especial 2(25): 1-16.

Ardila-Rodríguez, C.A. 2001. *Lebiasina chucuriensis* una nueva especie de pez para Colombia (Teleostei: Characiformes: Lebiasinidae). *Revista Unimetro* 13(27): 1-20.

Ardila-Rodríguez, C.A. 2002. *Lebiasina nariñensis*, una nueva especie de pez para Colombia (Teleostei: Characiformes, Lebiasinidae). *Dahlia* 5: 11-18.

Ardila-Rodríguez, C.A. 2004. *Lebiasina taphorni* (Pisces: Characiformes, Lebiasinidae), una nueva especie. *Dahlia* 7: 57-65.

Ardila-Rodríguez, C.A. 2008a. *Lebiasina ortegai* (Characiformes: Lebiasinidae), nueva especie, sistema del río Cauca, Colombia. *Dahlia* 10: 17-25.

Ardila-Rodríguez, C.A. 2008b. *Lebiasina colombia* (Characiformes: Lebiasinidae), nueva especie cuenca del río Sinú, Colombia. *Dahlia* 10: 27-32.

Ardila-Rodríguez, C.A. 2009. *Lebiasina colombia* (Ardila-Rodriguez, 2008). *Peces del Alto río Sinu* 1: 1-20.

Ardila-Rodríguez, C.A. 2010. *Lebiasina chocoensis*, una nueva especie de pez para Colombia (Teleostei: Characiformes: Lebiasinidae, Lebiasininae). *Peces del Departamento del Chocó* 1: 1-20.

Berkenkamp, H.O. and V. Etzel.1999. Die *Rivulus*-Arten von Panamá. *Rivulus wassmanni* spec. nov., eine neue Bachlingsart der *Rivulus birkhahni-kuelpmanni*-Gruppe aus der Provinz Bocas del Toro; Nordost-Panamá. *Aquaristik aktuell* 1999(7): 62-66.

Betancur-R, R. and A.P. Acero. 2004. Description *of Notarius biffi* n. sp. and redescription *of N. Insculptus* (Jordan and Gilbert) (Siluriformes: Ariidae) from the eastern Pacific, with evidence of monophyly and limits *of Notarius. Zootaxa* 703: 1-20.

Betancur-R, R. and A.P. Acero. 2006. A new species of *Notarius* (Siluriformes: Ariidae) from the Colombian Pacific. *Zootaxa* 1249: 47-59.

Bockmann, F.A. and G.M. Guazzelli, 2003. Family Heptapteridae; p. 406-431 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Briggs, J.C. 1955. A monograph of the clingfishes (Order Xenopterygii). *Stanford Ichthyological Bulletin* 6: 1-224.

Bührnheim, C.M. and L.R. Malabarba. 2006. Redescription of the type species of *Odontostilbe* Cope, 187 (Teleostei: Characidae: Cheirodontinae), and description of three new species from the Amazon basin. *Neotropical Ichthyology* 4(2): 167-196.

Burgess, W.E. 1989. *An atlas of freshwater and marine catfishes. A preliminary survey of the Siluriformes*. Neptune City: T.F.H. Publications. 784 p.

Burgess, W.E. 2000. The *Cichlasoma* story. *Herichthys*, the break-up. *Tropical Fish Hobbyist*: 48(11): 44-54.

Bussing, W.A. 1980. Status of the cyprinodontid fish genus *Rivulus* in Costa Rica, with descriptions of new endemic species. *Brenesia* 17: 327-364.

Bussing, W.A. 1987. *Peces de las aguas continentales de Costa Rica/ Freshwater fishes of Costa Rica*. San José: Editorial Universidad de Costa Rica. 271 p.

Bussing, W.A. 1996. A new species of eleotridid, *Eleotris tecta*, from Pacific slope streams of tropical America (Pisces: Eleotrididae). *Revista de Biologia Tropical* 44(1): 251-257.

Bussing, W.A. 1996. *Sicydium adelum*, a new species of gobiid fish (Pisces: Gobiidae) from Atlantic slope streams of Costa Rica. *Revista de Biologia Tropical* 44(2): 819-825.

Bussing, W.A. 1998. *Peces de las aguas continentales de Costa Rica/ Freshwater fishes of Costa Rica*. San José: Editorial Universidad de Costa Rica. 468 p.

Bussing, W.A. 2008. A new species of poeciliid fish, *Poeciliopsis santaelena*, from Peninsula Santa Elena, Area de Conservación Guanacaste, Costa Rica. *Revista de Biologia Tropical* 56(2): 829-838.

Bussing, W.A. 2008. *Astyanax cocibolca*, a new characid (Pisces: Ostariophysi) from Lake Nicaragua, Central America. *Revista de Biologia Tropical* 56(3): 1361-1370.

Bussing, W.A. and M.I. López. 1994. *Peces demersales y pelagicos costeros del Pacífico de Centro América Meridional: guía ilustrada/Demersal and pelagic inshore fishes of the Pacific coast of lower Central America: an illustrated guide.* San José: Editorial Universidad de Costa Rica. 164 p.

Bussing, W.A. and M.I. López. 2005. *Peces de la Isla del Coco y peces arrecifales de la costa pacífica de América Central Meridional: guía ilustrada/Fishes of Cocos Island and reef fishes of the pacific coast of lower Central America: an illustrated guide*. San José: Editorial Universidad de Costa Rica. 192 p.

Bussing, W.A. and M.I. López. 2009. Marine fish; p. 453-458 *In* L.S. Wehrtmann and J. Cortés (ed.). *Marine biodiversity of Costa Rica, Central America*. New York: Springer.

Bussing, W.A. and M.I. López. 2010. *Peces costeros del Caribe de Centroamérica Meridional: guía ilustrada/Marine fishes of the Caribbean coast of lower Central America: an illustrated guide*. San José: Editorial Universidad de Costa Rica. 232 p.

Bussing, W.A. and M.I. López. 2011. *Peces demersales y pelagicos costeros del Pacífico de Centro América Meridional: guía ilustrada/Demersal and pelagic inshore fishes of the Pacific coast of lower Central America: an illustrated guide.* San José: Editorial Universidad de Costa Rica. 166 p.

Cabrera, J., C. Ampié, and G. Galeano. 1993. Presencia de *Oreochromis niloticus* (Pisces: Cichlidae) en las lagunas estacionales del Refugio Nacional Caño Negro, Costa Rica. *Brenesia* 38: 169-170.

Castro-Aguirre, J.L., H. Espinosa-Pérez and J.J. Schmitter-Soto. 1999. *Ictiofauna estuarino-Lagunar y vicaria de México*. Balderas: Editorial Limusa. 711 p.

Cervigón, F., R. Cipriani, W. Fischer, L. Garibaldi, M. Hendrickx, A.J. Lemus, R. Márquez, J.M. Poutiers, G. Robaina and B. Rodriquez. 1992. *Guía de Campo de las Especies Comerciales Marinas y de Aguas Salobres de la Costa Septentrional de Sur America*. Rome: FAO. 513 p.

Chakrabarty, P. 2007. A morphological phylogenetic analysis of Middle American cichlids with special emphasis on the section '*Nandopsis*' *sensu* Regan. *Miscellaneous Publications, Museum of Zoology, University of Michigan* 198: 1-31.

Chakrabarty, P. and J.S. Sparks. 2007. Relationships of the New World cichlid genus *Hypsophrys* Agassiz 1859 (Teleostei: Cichlidae), with diagnoses for the genus and its species. *Zootaxa* 1523: 59-64.

Constantz, G.D., W.A. Bussing and W.G. Saul. 1981. Fresh-water fishes of Corcovado National Park, Costa Rica. *Proceedings of the Academy of Natural Sciences of Philadelphia* 133(1981): 15-19.

Costa, W.J.E.M. 2003. Family Rivulidae; p. 526-548 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Costa, W.J.E.M. 2006. Relationships and taxonomy of the killifish genus *Rivulus* (Cyprinodontiformes: Aplocheiloidei: Rivulidae) from the Brazilian Amazonas River basin, with notes on historical ecology. *Journal of Ichthyology and Aquatic Biology* 11: 133-175.

Costa, W.J.E.M. 2011. Phylogenetic position and taxonomic status of *Anablepsoides, Atlantirivulus, Cynodonichthys, Laimosemion* and *Melanorivulus* (Cyprinodontiformes: Rivulidae). *Ichthyological Exploration of Freshwaters* 22(3): 233-249.

Dahl, G. 1971. *Los Peces del norte de Colombia*. Bogotá: Instituto de Desarrollo de Los Recursos Naturales Renovables (INDERENA). 391 p.

De la Cruz Agüero, J., M.A. Martínez, V.M.C. Gómez and G. De la Cruz Agüero. 1997. *Catalogo de los peces marinos de Baja California Sur*. La Paz, Baja California Sur: Instituto Politécnico Nacional, Centro Interdisciplinario de Ciencias Marinas. 346 p.

Devezé, P., J. Lorenzo and B. Sánchez. 2004. Cultivo de *Poecilia reticulata* (Pisces: Poecilidae) en cuerpos de agua tropicales, Veracruz, México. *Revista de Biología Tropical* 52(4): 951-958.

Dyer, B.S. and B. Chernoff. 1996. Phylogenetic relationships among atheriniform fishes (Teleostei: Atherinomorpha). *Zoological Journal of the Linnean Society* 117(1): 1-69.

Eigenmann, C.H. and W.R. Allen. 1942. *Fishes of western South America. I. The Intercordilleran and Amazonian lowlands of Peru. II. The high pampas of Peru, Bolivia and northern Chile*. Lexington: University of Kentucky. 494 p.

Eschmeyer, W.N. 2013. Catalog of Fishes electronic version. Electronic Database accessible at http://research.calacademy.org/ichthyology/catalog/fishcatsearch.html. Captured on 22 January 2013.

Eschmeyer, W.N. and J.D. Fong. 2013. Species of Fishes by family/subfamily. Electronic Database accessible at http://research.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.html. Captured on 22 January 2013.

Froese, R. and D. Pauly. 2013. FishBase. Electronic Database accessible at http://www.fishbase.org. Captured on 22 January 2013.

Ferraris, C.J. Jr. 2003. Family Syngnathidae; p. 591-593 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Ferraris, C.J. Jr. 2007. Checklist of catfishes, recent and fossil (Osteichthyes: Siluriformes), and catalogue of siluriform primary types. *Zootaxa* 1418: 1-628.

Fisch-Muller, S. 2003. Family Ancistrinae; p. 373-400 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Fowler, H. 1932. Notes on fresh water fishes from Central America. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 84(1932): 379-385.

Géry, J. 1977. *Characoids of the World*. Neptune City: Tropical Fish Hobbyist Publications. 672 p.

Gilbert, C.R. and D.P. Kelso. 1971. Fishes of the Tortuguero area, Caribbean Costa Rica. *Bulletin of Florida State Museum Biological Sciences* 16(1): 1-54.

Greenfield, D.W. and J.E. Thomerson. 1997. *Fishes of the continental waters of Belize*. Florida: University Press of Florida. 311 p.

Grove, J.S. and R.J. Lavenberg. 1997. *The fishes of the Galapagos Islands*. Palo Alto, California: Stanford University Press. 863 p.

Herrera, D.S. 2012. Identificacón de *Pterygoplichthys* en el río Reventazón, Costa Rica. *Repertorio Científico* 15(1): 3-6.

Isbrücker, I.J.H. 2001. Nomenklator der Gattungen und Arten der Harnischwelse, Familie Loricariidae Rafinesque, 1815 (Teleostei, Ostariophysi). *DATZ Harnischwelse* 2: 25-32.

Isbrücker, I.J.H. 2002. Nomenclator of the 108 genera with 692 species of the mailed catfishes, family Loricariidae Rafinesque, 1815 (Teleostei, Ostariophysi). *Cat Chat, Journal of the catfish study group* 3(1): 11-30.

Kihn-Pineda, P.H., E.B. Cano and A. Morales. 2006. Peces de las aguas interiores de Guatemala; p 457-486 *In* E.B. Cano (ed.). *Biodiversidad de Guatemala*. Guatemala: Universidad del Valle de Guatemala.

Kuiter, R.H. 2009. *Seahorses and their Relatives*. Seaford, Australia: Aquatic Photographics. 333 p.

Kullander, S.O. 2003. Family Cichlidae; p. 605-654 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Kullander, S.O. and K.E. Hartel. 1997. The systematic status of cichlid genera described by Louis Agassiz in 1859: *Amphilophus, Baiodon, Hypsophrys* and *Parachromis* (Teleostei: Cichlidae). *Ichthyological Exploration of Freshwaters* 7(3): 193-202.

Lima, F.C.T., L.R. Malabarba, P.A. Buckup, J.F. Pezzi da Silva, R.P. Vari, A. Harold, R. Benine, O.T. Oyakawa, C.S. Pavanelli, N.A. Menezes, C.A.S. Lucena, M.C.S.L.Z. Malabarba, M.S. Lucena, R.E. Reis, F. Langeani, L. Cassati, V.A. Bertaco, C. Moreira and P.H.F. Lucinda. 2003. Family Characidae, genera *incertae sedis*; p. 106-169 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Lody, E. 1978. Chromosome complement of the guppy, *Poecilia reticulata* Peters. (Pisces: Osteichthyes). *Caryología* 31(4): 475-477.

Loiselle, P.V. 1997. Diagnoses of two new cichlids from the Rio Sixaola Drainage, Costa Rica. *Buntbarsche Bulletin* 180: 1-8.

Lucinda, P.H.F. 2003. Poeciliidae, Livebearers; p. 555-581 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Lucinda, P.H.F. and T.E. Reis. 2005. Systematics of the subfamily Poeciliinae Bonaparte (Cyprinidontiformes: Poeciliidae), with an emphasis on the tribe Cnesterodontini Hubbs. *Neotropical Ichthyology* 3(1): 1-60.

Lyons, J. and D.W. Schneider. 1990. Factors influencing fish distribution and community structure in a small coastal River in southwestern Costa Rica. *Hydrobiologia* 203(1): 1-14.

Machado-Allison, A. 1974. Etapas del desarrollo del pez *Piabucina pleurotaenia* Regan 1903 (Characiformes: Lebiasinidae). *Acta Biológica Venezoelana* 8: 579-622.

Mago-Leccia, F. 1994. *Electric fishes of the continental waters of America: classification and catalogue of the electric fishes of the order Gymnotiformes (Teleostei: Ostariophysi) with descriptions of new genera and species*. Caracas: Fundación para el Desarrollo de las Ciencias Fisicas, Matematicas y Naturales. 219 p.

Malabarba, L.R. 2003. Subfamily Cheirodontinae; p. 215-221 *In* R.E. Reis, S.O. Kullander and C.J. Ferraris (ed.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre: EDIPUCRS.

Malabarba, L.R. and S.H. Weitzman. 1999. A new genus and species of South American fishes (Teleostei: Characidae: Cheirodontinae) with a derived caudal fin, including comments about inseminating cheirodontines. *Proceedings of the Biological Society of Washington* 112: 410-432.

Malabarba, L.R. and S.H. Weitzman. 2000. A new genus and species of inseminating (Teleostei: Characidae: Cheirodontinae: Compsurini) from South America with uniquely derived caudal-fin dermal papillae. *Proceedings of the Biological Society of Washington* 113: 269-283.

Marceniuk, A.P. and N.A. Menezes. 2007. Systematics of the family Ariidae (Ostariophysi, Siluriformes), with a redefinition of the genera. *Zootaxa* 1416: 1-126.

Marceniuk, A.P., N.A. Menezes and M.R. Britto. 2012. Phylogenetic analysis of the family Ariidae (Ostariophysi: Siluriformes), with a hypothesis on the monophyly and relationships of genera. *Zoological Journal of the Linnean Society* 165(3): 534-669.

Matamoros, W.A., J.F. Schaefer and B.R. Kreiser. 2009. Annotated checklist of the freshwater fishes of continental and insular Honduras. *Zootaxa* 2307: 1-38.

Matamoros, W.A., P. Chakrabarty, A. Angulo, C.A. Garita-Alvarado and C.D. McMahan. 2013. A new species of *Roeboides* (Teleostei: Characidae) from Costa Rica and Panama, with a key to the middle American species of the genus. *Neotropical ichthyology* 11(2): 285-290.

McEachran, J.D. and J.D. Fechhelm. 2005. *Fishes of the Gulf of Mexico. Volume 2: Scorpaeniformes to Tetraodontiformes*. Austin: University of Texas Press. 1004 p.

McMahan, C.D., A.D. Geheberm and K.R. Piller. 2010. Molecular systematics of the enigmatic Middle American genus *Vieja* (Teleostei: Cichlidae). *Molecular Phylogenetics and Evolution* 57(3): 1293-1300.

McMahan, C.D., W.A. Matamoros, F.S. Álvarez-Calderón, W.Y. Henríquez, H.M. Recinos, P. Chakrabarty, E. Barraza and N. Herrera. 2013. Checklist of the inland fishes of El Salvador. *Zootaxa* 3608 (6): 440-456.

Meek, S.E. 1914. An annotated list of fishes known to occur in the freshwaters of Costa Rica. *Field Museum of Natural History, Publications, Zoölogical Series* 10(10): 101-134.

Mees, G.F. and P. Cala. 1989. Two new species of *Imparfinis* from northern South America (Pisces, Nematognathi, Pimelodidae). *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen* 92(3): 379-394.

Meyer, M.K. and V. Etzel. 1998. Notes on the genus *Brachyrhaphis* Regan 1913, with the description of a new species from Panama (Pisces: Teleostei: Cyprinodontiformes: Poecilidae). *Senckenbergiana Biologica* 77(2): 155-160.

Meyer, M.K. and V. Etzel. 2001. Additional notes on the genus *Brachyrhaphis* Regan, 1913, with description of a new species from Panama (Teleostei: Cyprinodontiformes: Poeciliidae). *Zoologische Abhandlungen* 51(4): 33-39.

Miller, R.R., W.L. Minckley and S.M. Norris. 2005. *Freshwater Fishes of México*. Chicago: The University of Chicago Press. 490 p.

Mirande, J.M. 2010. Phylogeny of the family Characidae (Teleostei: Characiformes): from characters to taxonomy. *Neotropical Ichthyology* 8(3): 385-568.

Mojica, C.L., A. Meyer and G.W. Barlow. 1997. Phylogenetic relationships of species of the genus *Brachyrhaphis* (Poeciliidae) inferred from partial mitochondrial DNA sequences. *Copeia* 1997(2): 298-305.

Molina, A.A., D.S. Herrera and L.R. Rodríguez. 2010. Informe de peces

diablo (Siluriformes: Loricáriidae) en la cuenca del río Reventazón, Costa Rica. *Brenesia* 73: 135-136.

Murdy, E.O. and D.F. Hoese. 2003. Gobiidae; p. 1781-1796 *In* K.E. Carpenter (ed.). *The living marine resources of the Western Central Atlantic. Volume 3: Bony fishes part Two (Opistognathidae to Molidae).* Rome: FAO.

Musilová, Z., O. Říčan and J. Novák. 2009. Phylogeny of the Neotropical cichlid fish tribe Cichlasomatini (Teleostei: Cichlidae) based on morphological and molecular data, with the description of a new genus. *Journal of Zoological Systematics and Evolutionary Research* 47(3): 234-247.

Myers, G.S. 1949. Salt-tolerance of fresh-water fish groups in relation to zoogeographical problems. *Bijdragen tot de Dierkunde* 28(1949): 315-322.

Myers, G.S. 1966. Derivation of the freshwater fish fauna of Central America. *Copeia* 1966(4): 766-733.

Nelson, J.S. 2006. *Fishes of the world*. New Jersey: John Wiley and Sons, Inc., Hoboken. 601 p.

Netto-Ferreira, A.L., O.T. Oyakawa, J. Zuanon and J.C. Nolasco. 2011. *Lebiasina yepezi*, a new Lebiasininae (Characiformes: Lebiasinidae) from the Serra Parima-Tapirapecó mountains. *Neotropical Ichthyology* 9(4): 767-775.

Ornelas-Garcia, C.P., O. Dominguez-Dominguez and I. Doadrio. 2008. Evolutionary history of the fish genus *Astyanax* Baird and Girard (1854) (Actinopterygii, Characidae) in Mesoamerica reveals multiple morphological homoplasies. *BMC Evolutionary Biology* 8: 340.

Oro, G. and P. Cabrera. 1993. La tilapia *Oreochromis niloticus* (Pisces: Cichlidae) en el Caribe norte de Costa Rica. *Revista de Biología Tropical* 4(3): 920-921.

Ortega-Lara, A., N. Milani, C. DoNascimiento, F. Villa-Navarro and J.A. Maldonado-Ocampo. 2011. Two new trans-Andean species of *Imparfinis* Eigenmann and Norris, 1900 (Siluriformes: Heptapteridae) from Colombia. *Neotropical Ichthyology* 9(4): 777-793.

Page, L.M. and B.M. Burr. 2011. *Peterson field guide to freshwater fishes of North America north of Mexico. Freshwater Fishes of North America*. Boston: Houghton Mifflin Harcourt. 663 pp.

Parenti, L.R., J.M. Clayton and J.C. Howe. 1999. Catalog of type specimens of Recent fishes in the National Museum of Natural History, Smithsonian Institution, 9: Family Poeciliidae (Teleostei: Cyprinodontiformes). *Smithsonian Contributions to Zoology* 604: 1-22.

Perdices, A., E. Bermingham, A. Montilla and I. Doadrio. 2002. Evolutionary history of the genus *Rhamdia* (Teleostei: Pimelodidae) in Central America. *Molecular Phylogenetics and Evolution* 25(1): 172-189.

Pezold, F. and B. Cage. 2002. A review of the spinycheek sleepers, genus *Eleotris* (Teleostei: Eleotridae), of the Western Hemisphere, with comparisons to the west African species. *Tulane Studies in Zoology and Botany* 31(2): 19-63.

Pizarro F. and J. Rojas. 1993. Presencia de *Oreochromis niloticus* en la desembocadura del río Bebedero, Golfo de Nicoya, Costa Rica. *Revista de Biología Tropical* 41(3): 921-924.

Ptacek, M.B. and F. Breden. 1998. Phylogenetic relationships among the mollies (Poeciliidae: Poecilia: Mollienesia) based on mitochondrial DNA sequences. *Journal of Fish Biology* 53: 64-82.

Radda, A.C. and M.K. Meyer. 1981. Revalidisierungder Gattung *Xenophallus* Huubs (Poeciliidae, Osteichthyes). *Aquaria* 28: 115-118.

Regan, C.T. 1907. Pisces; p 1-203 *In* F.D. Goldman and O. Salvin (ed.). *Biologia Centrali-Americana*. London: Porter, R.H.

Rojas, J.R. and O. Rodríguez. 2008. Diversidad y abundancia ictiofaunística del río Grande de Térraba, sur de Costa Rica. *Revista de Biología Tropical* 56(3): 1429-1447.

Román-Valencia, C. 2002. Revisión sistemática de las especies del género *Bryconamericus* (Teleostei: Characidae) de Centroamérica. *Revista de Biología Tropical* 50(1): 173-192.

Rosen, D.E. 1972. Origin of the characid fish genus *Bramocharax* and a description of a second, more primitive, species in Guatemala. *American Museum Novitates* 2500: 1-21.

Rosen, D.E. and R.M. Bailey. 1963. The poeciliid fishes (Cyprinodontiformes), their structure, zoogeography, and systematics. *Bulletin of the American Museum of Natural History* 126: 1-176.

Rosen, D.E. and P.H. Greenwood. 1976. A fourth neotropical species of synbranchid eel and the phylogeny and systematics of synbranchiform fishes. *Bulletin of the American Museum of Natural History* 157(1): 1-69.

Ruíz, R. 1978. Introducción de la Tilapia en Costa Rica. Aspectos fenotípicos y taxonómicos. *Asbana* 4: 6-10.

Saeed, B., W. Ivantsoff and L.E.L.M. Crowley. 1993. A new species of the surf-inhabiting atheriniform (Pisces: Isonidae). Records of the *Western Australian Museum* 16(3): 337-346.

Sáenz, I., M. Protti-Quesada and J. Cabrera. 2006. Composición de especies y diversidad de peces en un cuerpo de agua temporal en el Refugio Nacional de Vida Silvestre Caño Negro, Costa Rica. *Revista de Biología Tropical* 54(2): 639-645.

Scharpf, C. 2006. Annotated checklist of North American freshwater fishes, including subspecies and undescribed forms. Part II: Catostomidae through Mugilidae. *American Currents* 32: 1-40.

Schmitter-Soto, J.J. 2007a. A systematic revision of the genus *Archocentrus* (Perciformes: Cichlidae), with the description of two new genera and six new species. *Zootaxa* 1603: 1-76.

Schmitter-Soto, J.J. 2007b. Phylogeny of species formerly assigned to the genus *Archocentrus* (Perciformes: Cichlidae). *Zootaxa* 1618: 1-50.

Silfvergrip, A.M.C. 1996. *A systematic revision of the neotropical catfish genus Rhamdia (Teleostei, Pimelodidae)*. Stockholm: Department of Zoology, Stockholm University and Department of Vertebrate Zoology, Swedish Museum of Natural History. 156 p.

Springer, V.G. and W.F. Smith-Vaniz. 2008. Supraneural and pterygiophore insertion patterns in carangid fishes, with description of a new Eocene carangid tribe, Paratrachinotini, and a survey of anterior anal-fin pterygiophore insertion patterns in Acanthomorpha. *Bulletin of the Biological Society of Washington* 16: 1-73.

Taphorn, D. 1992. *Characiform fishes of the Apure River drainage, Venezuela*. Guanare, Venezuela: BioLlania, UNELLEZ. 537 p.

Thacker, C.E., F. Pezold and R.D. Suttkus. 2006. Redescription of the dwarf Neotropical eleotrid genus *Leptophilypnus* (Teleostei: Gobioidei), including a new species and comments on *Microphilypnus*. *Copeia* 2006(3): 489-499.

Thorson, T.B. 1976. Observations on the Reproduction of the Sawfish, *Pristis perotteti*, in Lake Nicaragua, with Recommendations for its Conservation; p. 641-650 *In* T.B. Thorson (ed.). *Investigations of the Ichthyofauna of Nicaraguan Lakes*. Lincoln: University of Nebraska-Lincoln.

Thorson, T.B., C.M. Cowan and D.E. Watson. 1966. Sharks and sawfishes in the Lake Izabal-Rio Dulce system, Guatemala. *Copeia* 1966(3): 620-622.

Urriola, M, J. Cabrera and M. Protti. 2004. Composición, crecimiento e índice de condición de una población de *Poecilia reticulata* (Pisces: Poeciliidae), en un estanque en Heredia, Costa Rica. *Revista de Biología Tropical* 52(1): 157-162.

Van Tassell, J.L. 2011. Gobiiformes of the Americas; p. 139-176 R.A. Patzner, J.L. Van Tassell, M. Kovacic and B.G. Kapoor (ed.). *The biology of gobies*. CRC Press, Science Publishers.

Vargas, R. 2003. Evaluación de la reproducción de trucha arcoirirs (*Oncorhynchus mykiss*) producida en Costa Rica. *Agronomía Mesoamericana* 14(1): 123-127.

Villa, J. 1982. *Peces nicaraguenses de agua dulce*. Managua: Editorial Unión Cardoza y Cía. Ltda. 253 p.

Weber, A. and H. Wilkens. 1998. *Rhamdia macuspanensis*: a new species of troglobitic pimelodid catfish (Siluriformes; Pimelodidae) from a cave in Tabasco, Mexico. *Copeia* 1998(4): 998-1004.

Weber, A., G. Allegrucci and V. Sbordoni. 2003. *Rhamdia laluchensis*, a new species of troglobitic catfish (Siluriformes: Pimelodidae) from Chiapas, Mexico. *Ichthyological Exploration of Freshwaters* 14(3): 273-280.

Weitzman, S.H. 1964. Osteology and relationships of South American characid fishes of subfamilies Lebiasinidae and Erythrinidae with special references to subtribe Nannostomina. *Proceedings of the United States National Museum* 116(3499): 127-170.

Welcomme, R.L. 1988. *International introductions of inland aquatic species*. Rome: FAO, Tech. Pap. 294. 318 pp.

Werner, U. 1983. Guapotes - die grossen Hübschen. Der Managubuntbarsch un sein Formenkreis. *Aquarien Magazin* 17: 396-401.

Winemiller, K.O. 1983. An introduction to the freshwater fish communities of Corcovado National Park, Costa Rica. *Brenesia* 21: 47-66.

Winemiller, K.O. and M.A. Leslie. 1992. Fish communities across a complex freshwater-marine ecotone. *Environmental Biology of Fishes* 34(1): 29-50.

Winemiller, K.O. and N.E. Morales. 1989. Comunidades de peces del Parque Nacional Corcovado luego del cese de las actividades mineras. *Brenesia* 31: 75-91.

Received: July 2013
Accepted: September 2013
Published online: October 2013
Editorial responsibility: Tiago Pinto Carvalho