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An annotated checklist of the inland fishes of Sulawesi

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Abstract. Sulawesi is the largest island of the Wallacea. Here, we present an annotated checklist of fish species recorded in Sulawesi's inland waters. We recognize a total of 226 species from 112 genera and 56 families. Gobiidae (41 species), Adrianichthyidae (20 species) and Telmatherinidae (19 species) are most species-rich, making up a total of 43% of the total species diversity. 65 species are endemic to Sulawesi's freshwaters, including 19 Tematherinidae, 17 Adrianichthyidae, and 17 Zenarchopteridae. 44% of the inland fish fauna are obligate freshwater fishes, followed by euryhaline (38%) and amphi-, ana- or diadromous (29%) taxa. 65 species have been recorded from lacustrine environments. However, we stress that the data available are not representative for the island's freshwater habitats. The fish species diversity of the spectacular lakes is largely explored, but the riverine ichthyofaunas are in clear need of further systematic exploration.

Keywords. Sulawesi, freshwater, fishes, endemism, Wallacea, SE-Asia

INTRODUCTION

Sulawesi is the largest island of the Wallacea, a biodiversity hotspot located between the Sunda and Sahul shelves (Mokodongan & Yamahira 2015, Myers et al. 2000, Whitten et al. 2002). The onset of the scientific investigation of Sulawesi´s inland waters and its fishes dates back to the late 19th century (Abendanon 1915a, b, Bleeker 1855a, 1858a, b, Boulenger 1897). Exploration of species diversity was, and still is, in the focus of ichthyological research on the island (e.g. Hadiaty 2007, Hadiaty & Wirjoatmodjo 2003, Hadiaty et al. 2004, Kottelat 1989a, b, c, 1990a, b, c, d, 1991, Larson 2001, Parenti 2008, 2011, Weber 1909, 1913), complemented more recently by studies on evolutionary biology (e.g. Herder & Schliewen 2010).

Sulawesi's freshwater environments are home to several endemic animal radiations that include gastropods, crustaceans, and fishes (e.g. de Bruyn et al. 2013, Herder et al. 2006a, Mokodongan & Yamahira 2015, Parenti 2011, Parenti et al. 2013, Rintelen et al. 2007a, b, Rintelen et al. 2012, Tweedley et al. 2013). Much of this diversity is restricted to species flocks confined to a few ancient lakes, systems that serve as models for the study of speciation processes (Herder & Schliewen 2010, Rintelen et al. 2010, 2012, Vaillant et al. 2011). Phylogeographic studies of the island's freshwater animals accordingly focused mostly on lineages of molluscs, shrimps, crabs, and fishes, with focus on the lake radiations (e.g. Mokodongan & Yamahira 2015, Rintelen et al. 2007b, 2014, but see also de Bruyn et al. 2012, 2013; reviewed by Rintelen et al. 2012).

Parenti recognized 57 species of freshwater fishes as endemic to Sulawesi, with the majority being restricted to the ancient lakes (Parenti 2011). Most of the non-endemic fish species are classified as secondary or peripheral freshwater fishes (Berra 2001), with occasional records of marine species (Kottelat 1990a, Tweedley et al. 2013).

Sulawesi´s lakes include some of the oldest lakes on earth. Lake Poso and the Malili Lakes in the highlands of Central Sulawesi are so-called ancient lakes, exceptionally long-lived lakes that have existed for more than 100,000 years (Brooks 1950, Rintelen et al. 2012). The Malili Lakes system is known for its endemic species flock of sailfin silversides (Telmatherinidae) (Herder et al. 2006a), but also includes small radiations of ricefishes (*Oryzias*) and gobies (*Mugilogobius*, *Glossogobius*; Hoese et al. 2015, Kottelat 1990d, Larson et al. 2014). Moreover, the lakes and their surroundings harbour endemic species of halfbeaks (*Dermogenys*, *Nomorhamphus*; Huylebrouck et al. 2012, Meisner 2001). Ricefishes (*Oryzias*, *Adrianichthys*) are the dominant fish radiation of Lake Poso (Kottelat 1990b). Remote lakes Lindu and Tiu are substantially smaller than the ancient lakes, and harbour two (Lindu) or one (Tiu) endemic (rice-) fish species (Mokodongan et al. 2014, Parenti 2008). Lake Tondano on the northern tip of North Sulawesi is the only known habitat of *Tondanichthys kottelati* (Collette 1995), an endemic genus and species of viviparous halfbeak (Collette 1995). Lake Tempe and Lake Sidereng are

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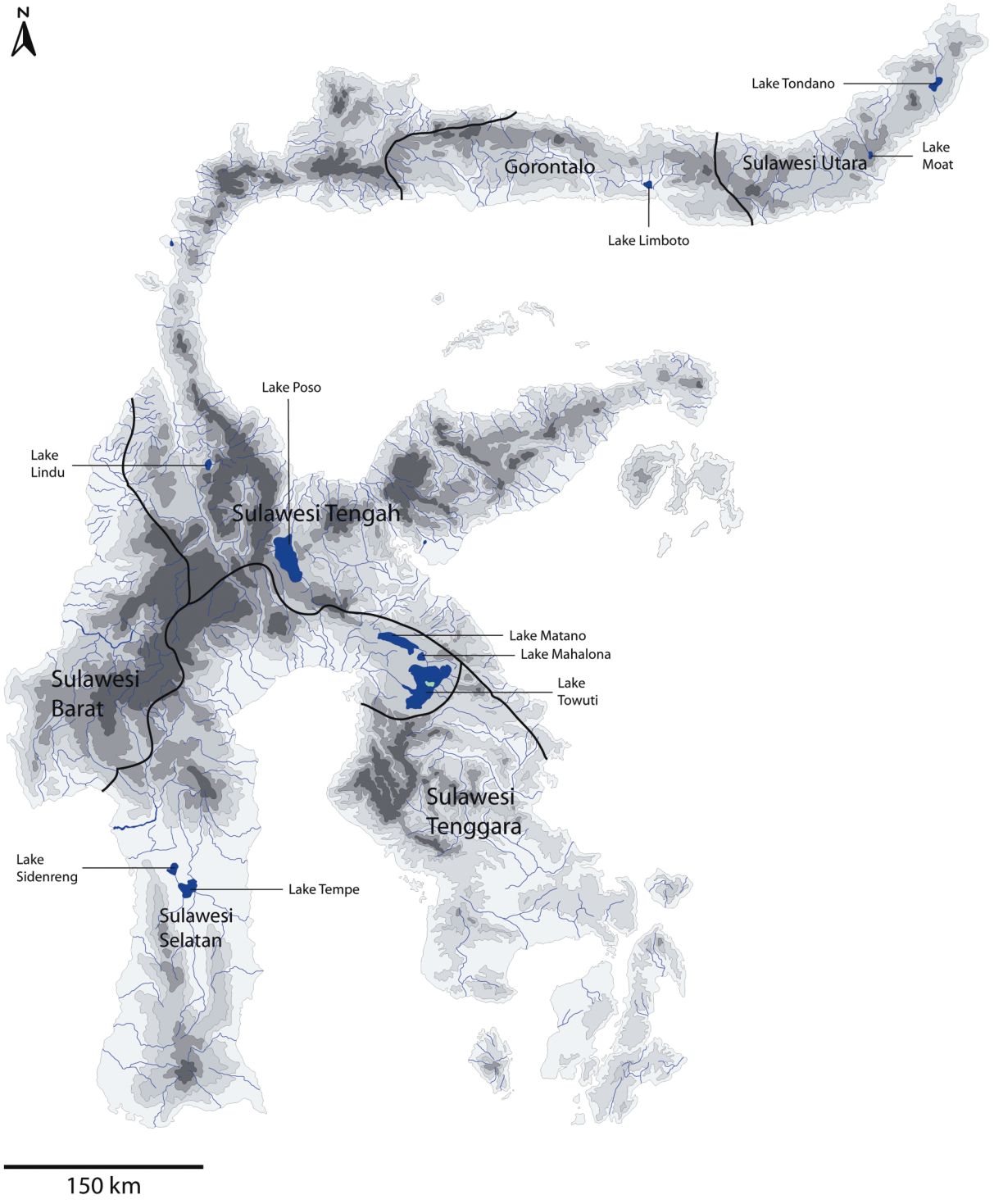

Fig. 1. Map of Sulawesi showing the island´s administrative partition as referred to in this study, major lakes are highlighted.

shallow lakes in southern Sulawesi, but little remains known about their fish fauna, and its present status apart from its use in aquaculture (Hadijah et al. 2014, Tamsil 2000) (for the location of Sulawesi´s lakes see Fig. 1).

In contrast to the ancient lakes, Sulawesi´s riverine fish fauna has attracted far less scientific interest, and the number of studies is limited (de Bruyn et al. 2013, Mokodongan & Yamahira 2015, Schwarzer et al. 2008, Tweedley et al. 2013). A typical feature of Sulawesi´s riverine environments is the absence of large, slow rivers and drainages (Kottelat 1990a), in contrast to the hydrology of most other larger Indonesian islands (Stelbrink et al. 2012). The majority of drainages are rather small and short, typically with medium to high stream velocity (Kottelat 1990a).

Sulawesi´s freshwaters have been subject to massive fish species introduction and alien species invasion (Herder et al. 2012a, Kottelat & Whitten 1996, Parenti 2011, Whitten et al. 1987). Alien fishes were introduced for food production (e.g. *Oreochromis* spp., *Channa* spp.) (Whitten et al. 1987), pest control (*Poecilia reticulata*), or aquarium trade (e.g. flowerhorn cichlids) (Herder et al. 2012a). The spread of populations of alien fish species in freshwater systems of the island is apparently rapid, and may pose as a threat to the native communities (e.g. Herder et al. 2012a, Tweedley et al. 2013).

Purpose of this paper

The literature on freshwater fish species of Sulawesi is complex and dispersed. The most recent comprehensive source covering the island's ichthyofauna dates back to 1993 (Kottelat et al. 1993), but is not focussed on the island's fishes, and meanwhile partially out-dated. Kottelat's recent catalogue on "The Fishes of the Inland Waters of Southeast Asia" (Kottelat 2013) includes Sulawesi, but focuses on the nomenclature of the whole Southeast Asian ichthyofauna, and the related bibliography. The present paper aims at summarizing ichthyological records from Sulawesi's inland waters. It provides an account of actual species records, and species that have not actually been recorded, but are likely to be present according to their known distribution. It is understood that the authors do not claim that this list is complete with respect to all records ever made, but aim at providing a baseline for analysing species records, required for upcoming investigations of the island's fauna.

MATERIAL AND METHODS

Literature records are compiled from the scientific literature; sources or records considered questionable were not included. Material examined was mostly collected during various field campaigns of the senior author´s group in Sulawesi, since 2002. Field methods applied during fieldwork include beach seining, dipnetting, gillnetting, scubadiving and electrofishing. Samples were either fixed in formalin (4%) prior to storage in ethanol (80%), or fixed and stored directly in pure ethanol (~98%). Specimens were determined to the lowest feasible taxonomical level using the most recent literature available. The systematic division largely follows Kottelat (2013). ZFMK: Fish collection of Zoologisches Forschungsmuseum Alexander Koenig Bonn, Germany. Coordinates with reference to ZFMK specimens are own species records, linked to the respective voucher. Records that are not linked to vouchers, represent visual records (F.H.); ZMH: Zoologisches Museum Hamburg in Hamburg, Germany; MZB: Museum Zoologicum Bogoriense in Cibinong, Indonesia.

Species occurrence is classified to: Euryhaline: species with a broad tolerance towards salinity and thus can be found in marine, brackish and freshwater environments (Hiroi & McCormick 2012); anadromous: species with adults entering marine environments and reproduction in freshwaters (Daverat et al. 2012); catadromous: species that migrate into marine environments for reproduction (Daverat et al. 2012); amphidromous: species that migrate between marine and freshwater environments for purposes other than reproduction (Daverat et al. 2012); freshwater: primary or secondary/obligate freshwater species with no marine stadium or life history phase (Berra 2001); introduced: non-native, introduced species.

Species expected to occur in Sulawesi, but lacking actual records from the island, are included as "potential", and justified. Clearly non-native species are classified as "introduced". Synonyms listed are restricted to the most common ones, with emphasis on publications dealing with Sulawesi's ichthyofauna (see Kottelat 2013 for nomenclature).

RESULTS

CHONDRICHTHYES

CARCHARHINIFORMES

Carcharhinidae

Requiem sharks: Marine; all oceans (Nelson 2006); enter brackish and freshwaters, including lakes (Grace 2001, Nelson 2006).

Carcharhinus leucas (Müller & Henle, 1839)

Carcharias leucas Müller & Henle, 1839

Potential: Euryhaline; worldwide in subtropical and tropical coastal waters; enter brackish and freshwaters (Compagno 1984, Heupel & Simpfendorfer 2008); no actual records for Sulawesi.

PRISTIFORMES

Pristidae
Sawfishes: Euryhaline; enter brackish and freshwaters; distributed in all tropical and subtropical oceans (Nelson 2006, Wueringer et al. 2009).

***Pristis pristis* (Linnaeus, 1758)**
Squalus pristis Linnaeus, 1758
Potential: Euryhaline; worldwide in subtropical and tropical coastal waters; enter brackish and freshwaters; no actual records for Sulawesi (Linnaeus 1758, McEachran & Carvalho 2002).

MYLIOBATIFORMES

Dasyatidae
Stingrays: Marine; distributed throughout the Atlantic and Indo-Pacific; some species enter brackish and freshwaters (Compagno & Roberts 1982, Nelson 2006).

***Himantura leoparda* Manjaji-Matsumoto & Last, 2008**
Potential: Euryhaline; enter brackish and freshwaters; no actual records for Sulawesi; distributed throughout the Indo-West-Pacific (Manjaji-Matsumoto & Last 2008).

***Himantura uarnak* (Gmelin, 1789)**
Raja uarnak Gmelin, 1789
Potential: Euryhaline; enter brackish and freshwaters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Compagno et al. 1989, Gmelin 1789).

***Himantura undulata* (Bleeker, 1852)**
Trygon undulata Bleeker, 1852d
Potential: Euryhaline; enter brackish and freshwaters; no actual records for Sulawesi; distributed throughout the Indo-West Pacific (Last & Stevens 1994).

***Himantura tutul* Borsa, Durand, Shen, Alyza, Solihin & Berrebi, 2013**
Potential: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo Pacific; no actual records from Sulawesi (Borsa et al. 2013).

ACTINOPTERYGII

ELOPIFORMES

Megalopidae
Tarpons: Euryhaline; enter brackish and freshwaters; distributed in tropical and subtropical regions (Adams et al. 2013, Nelson 2006).

***Megalops cyprinoides* (Broussonet, 1782)**
Clupea cyprinoides Broussonet, 1782
Euryhaline; enter brackish and freshwaters; record from Badjoa, Sulawesi Selatan (Adams et al. 2013, Bleeker 1865a, Coates 1987).

ALBULIFORMES

Albulidae
Bonefishes: Euryhaline; enter brackish and freshwaters; distributed throughout tropical regions (Adams et al. 2013, Nelson 2006).

***Albula glossodonta* (Forskål, 1775)**
Argentina glossodonta Forskål, 1775
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Myers 1991, Randall & Bauchot 1999).

ANGUILLIFORMES

Anguillidae
Freshwater eels: Catadromous; adults inhabit freshwaters or estuaries; marine reproduction; juveniles enter freshwaters after metamorphosis; distributed throughout tropical and subtropical regions except the South Atlantic and Eastern Pacific (Arai et al. 1999, Nelson 2006).

***Anguilla bicolor* McClelland, 1844**
Catadromous; distributed throughout the Indo-Pacific (Arai et al. 1999, Kottelat 2013); record from Buton (Tweedley et al. 2013).

***Anguilla celebesensis* Kaup, 1857**
Anguilla ancestralis Ege, 1939
Catadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Arai et al. 1999); recorded from Lake Tondano, Manado, Sulawesi Utara (Ege 1939), Buton and Kabaena (Tweedley et al. 2013), Lakes of Gorontalo (Haryono & Tjakrawidjaja 2004), Sulawesi Utara (Arai et al. 2003), Sulawesi Tengah (Arai et al. 2003).

***Anguilla interioris* Whitley, 1938**
Potential: Catadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific; no actual records for Sulawesi (Arai et al. 1999, Kottelat 2013).

***Anguilla marmorata* Quoy & Gaimard, 1824**
Catadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Arai et al. 1999); records from Sulawesi Utara (Haryono et al. 2002), Sulawesi Tenggara (02°56.035'S 121°06.855'E, ZFMK 066057), Sulawesi Selatan (3°41.589'S 119°38.629'E, ZFMK 69560), Lake Poso, Sulawesi Tengah (visual record F.H.).

***Anguilla nebulosa* McClelland, 1844**
Catadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Arai et al. 1999); record from Sulawesi Barat (2°37.368S 119°08.784'E, ZFMK 69701).

***Anguilla obscura* Günther, 1872**
Potential: Catadromus; distributed throughout the Pacific; no actual records for Sulawesi (Arai et al. 1999, Günther 1872a).

Moringuidae
Worm, Spaghetti eels: Euryhaline; enter brackish and freshwaters; fossorial lifestyle; distributed throughout the tropical Western Atlantic and the Indo-Pacific (Nelson 2006, Tsukamoto et al. 2014).

***Moringua guthriana* (McClelland, 1844)**
Ptyobranchus arundinaceus McClelland, 1844
Potential: Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Kottelat 2013); no actual records from Sulawesi.

***Moringua javanica* (Kaup, 1856)**
Aphthalmichthys javanicus Kaup, 1856
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Allen & Steene 1988); record from Buton (Tweedley et al. 2013).

***Moringua microchir* Bleeker, 1853**
Potential: Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Keith et al. 2006); no actual records for Sulawesi.

***Moringua raitaborua* (Hamilton, 1822)**
Moringua latebrosa Schultz, 1953
Euryhaline; enter brackish waters (Kottelat 2013); record from: Kwandang, Gorontalo (Castle 1968, Kottelat 2013, Smith 1994).

Muraenidae
Moray eels: Euryhaline; enter brackish and freshwaters; worldwide distributed in all tropical regions (Nelson 2006, Tsukamoto et al. 2014).

***Gymnothorax polyuranodon* (Bleeker, 1853)**
Muraena polyuranodon Bleeker, 1853f
Potential: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific; no actual records from Sulawesi (Ebner et al. 2011, Tsukamoto et al. 2014).

***Gymnothorax tile* (Hamilton, 1822)**
Muraenophis tile Hamilton, 1822
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Tsukamoto et al. 2014); record from Buton (Tweedley et al. 2013).

***Strophidon sathete* (Hamilton, 1822)**
Muraenophis sathete Hamilton, 1822
Muraena macrurus Bleeker, 1854b
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific; record from Buton (Tweedley et al. 2013).

Ophichthidae
Snake, Worm eels: Marine; some species enter freshwaters; cosmopolitan, distributed throughout tropical regions (Cosker et al. 2012, Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Cirrhimuraena chinensis* Kaup, 1856**
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific; record from Makassar, Sulawesi Selatan (Kaup 1857).

***Lamnostoma mindora* (Jordan & Richardson, 1908)**
Coecula mindora Jordan & Richardson, 1908
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific; record from Buton (Tweedley et al. 2013).

***Muraenichthys gymnopterus* Bleeker, 1852**
Muraena gymnopterus Bleeker, 1852b
Muraenichthys microstomus Bleeker, 1864
Euryhaline; enter brackish waters; distributed throughout the West-Pacific; record from Makassar, Sulawesi Selatan (Bleeker 1864).

***Ophichthus polyophthalmus* Bleeker, 1864**
Potential: Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Kottelat 2013); no actual records from Sulawesi.

***Pisodonophis cancrivorus* (Richardson, 1848)**
Ophisurus cancrivorus Richardson, 1848
Ophisurus brachyosoma Bleeker, 1852b
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific; record from Makassar, Sulawesi Selatan (Bleeker 1852b).

***Yirrkala kaupii* (Bleeker, 1858)**
Sphagebranchus kaupii Bleeker, 1858b
Catadromous; enter brackish and freshwaters; distribute throughout Asia; record from Klabat Diatas, Sulawesi Utara (Bleeker 1858b).

GONORHYNCHIFORMES

Chanidae

Milkfishes: Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Berra 2001; Nelson 2006).

***Chanos chanos* (Forsskål, 1775)**

Mugil chanos Forsskål, 1775

Euryhaline; enter brackish and freshwaters (Allen et al. 2002); record from Sulawesi Selatan (4°07.456'S 119'37.196'E, ZFMK 69759).

CYPRINIFORMES

Cyprinidae

Minnows, Carps: Freshwater; native throughout Africa, Eurasia and North America, introduced worldwide; cyprinids are naturally absent from Sulawesi (Kottelat 1990a, Nelson 2006).

***Barbonymus gonionotus* (Bleeker, 1849)**

Barbus gonionotus Bleeker, 1849a

Introduced: Freshwater; record from Sulawesi Selatan (3°41.589S 119°38.629'E, ZFMK 69514-69516, 69534, 69552-69555), Lake Poso, Sulawesi Tengah (Kottelat 1990b).

***Carassius auratus* (Linnaeus, 1758)**

Introduced: Freshwater; common ornamental fish; breeding form from East Asia; distributed almost worldwide; record from the Malili Lakes system, Sulawesi Selatan (Nasution & Aisyah 2013), Lake Poso, Sulawesi Tengah (Kottelat 1990b).

***Cyprinus carpio* (Linnaeus, 1758)**

Introduced: Freshwater; native to Central Asia; record from Malili Lakes system, Sulawesi Selatan; Lake Poso, Sulawesi Tengah (Kottelat 1990b); aquaculture escapees or stocked specimens (Herder et al. 2012a).

***Cyprinus* cf. *rubrofuscus* (Lacepéde, 1803)**

Cyprinus rubro-fuscus Lacepéde, 1803

Introduced: Freshwater; ornamental carp varieties; possibly derived from *C. fuscus* or hybrids (See Kottelat & Freyhof 2007, and references therein); record from Poso River, Sulawesi Tengah (visual record F.H.).

***Osteochilus vittatus* (Valenciennes, in Cuvier und Valenciennes, 1842)**

Rohita vittata Valenciennes, in Cuvier und Valenciennes, 1842

Osteochilus hasselti (Valenciennes, in Cuvier und Valenciennes, 1842)

Introduced: Freshwater; native to mainland Southeast Asia; records from Malili Lakes system and Lake Sidenreng, Sulawesi Selatan (Omar 2010); Lake Poso, Sulawesi Tengah (visual record F.H.).

CHARACIFORMES

Characidae

Characins: Freshwater; native to Central America, South America, and Africa; without native members in Asia (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Colossoma macropomum* (Cuvier, 1816)**

Myletes macropomus Cuvier, 1816

Introduced: Freshwater; native South America (Santos et al. 2007); record from Lake Matano, Sulawesi Selatan (Herder et al. 2012a) and Lake Poso, Sulawesi Tengah (visual record F.H.).

SILURIFORMES

Plotosidae

Eeltail catfishes: Euryhaline; enter brackish and freshwaters (Nelson 2006, Usman et al. 2013); distributed throughout the Indo-West Pacific (Eschmeyer 2015, Froese & Pauly 2014, Usman et al. 2013).

***Plotosus canius* Hamilton, 1822**

Introduced: Amphidromous; enter brackish and freshwaters (Usman et al. 2013); record from Sulawesi Selatan (04°07.540S 119°37.295'E, ZFMK 066013).

Clariidae

Airbreathing catfishes: Freshwater; native throughout Africa, Syria, South and West Asia (Nelson 2006, Ng & Kottelat 2007); 16 species ocurring in Asia (Ng & Kottelat 2007).

***Clarias batrachus* (Linnaeus, 1758)**

Introduced: Freshwater; native to India, Indochina, Sundaland and the Philippines; neotype from Java, Indonesia (Nelson 2006, Ng & Kottelat 2007); record from the Malili Lake system, Sulawesi Selatan (Herder et al. 2012a); all non-Java specimens are considered as related species-complex (Ng & Kottelat 2007).

CLUPEIFORMES

Engraulididae

Anchovies: Euryhaline; enter brackish and freshwaters; distributed throughout the Atlantic and Indo-Pacific (Nelson 2006, Whitehead et al. 1988).

***Thrissina baelama* (Forskål, 1775)**
Clupea baelama Forskål, 1775
Thryssa baelama (Forskål, 1775)
Potential: Euryhaline; enter brackish waters (Whitehead et al. 1988); no actual records for Sulawesi; distributed throughout the Indo-Pacific (Kottelat 2013).

***Thrissina encrasicholoides* (Bleeker, 1852)**
Engraulis encrasicholoïdes Bleeker, 1851a
Thriyssa *encrasicholoides* Bleeker, 1852a
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Whitehead et al. 1988, Wongratana et al. 1999).

***Thrissina mystax* (Bloch, in Schneider, 1801)**
Stolephorus hamiltoni Bleeker, 1872
Thryssa mystax (Bloch in Schneider, 1801)
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Wongratana et al. 1999); record from Badjoa, Sulawesi Selatan (Bleeker, 1872).

Clupeidae
Herrings, Shads, Sardines: Euryhaline; distributed worldwide (Nelson 2006, Wongratana et al. 1999).

***Herklotsichthys quadrimaculatus* (Rüppell, 1837)**
Clupea quadrimaculata Rüppell, 1837
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Wongratana et al 1999).

MUGILIFORMES

Mugilidae
Mullets: Euryhaline; enter brackish and freshwaters; distributed throughout all tropical and temperate regions (Cuvier & Valenciennes 1836, Durand 2012, Nelson 2006).

***Cestraeus plicatilis* Valenciennes, in Cuvier & Valenciennes, 1836**
Catadromous; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Harrison & Senou 1999); record from Sulawesi freshwaters (Valenciennes, in Cuvier and Valenciennes 1836).

***Mugil cephalus* Linnaeus, 1758**
Catadromous; marine, enter brackish and freshwaters (Harrison & Senou 1997); record from Sulawesi Selatan (4°07.456'S 119°37.196'E, ZFMK 69741, 69760-69763).

ATHERINIFORMES

Telmatherinidae
Sailfin silversides: With exception of *Kalyptatherina helodes*, on islands off the Vogelkop peninsula, restricted to Sulawesi; adaptive radiations in the Malili Lakes: Lakes Matano, Mahalona, Towuti, Lontoa, and connecting / surrounding rivers and streams (Hadiaty & Wirjoatmodjo 2002, Hadiaty et al. 2004, Herder et al. 2006a, b, Pfaender et al. 2011; reviewed by Herder & Schliewen (2010)).

***Telmatherina abendanoni* Weber, 1913**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; predatory, benthic "sharpfin" species of *Telmatherina* (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a).

***Telmatherina antoniae* Kottelat, 1991**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; a "roundfin" *Telmatherina*; the formal name *Telmatherina antoniae* is currently applied to two distinct populations, *T. antoniae* "small" and "large"; males in distinct colour morphs, females with cryptic polymorphism (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a, Herder et al. 2008, Pfaender et al. 2014).

***Telmatherina bonti* Weber & de Beaufort, 1922**
Freshwater; endemic to rivers and streams of the Malili Lakes system, and adjacent systems; enter Lakes Matano, Mahalona and Towuti, Sulawesi Selatan; the only formal name currently available for stream-dwelling *Telmatherina* (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a).

***Telmatherina celebensis* Boulenger, 1897**
Freshwater; endemic to Lakes Mahalona and Towuti, Sulawesi Selatan; additional record from River Tominanga; common in both lakes; males in distinct colour morphs (Hadiaty et al. 2004, Herder et al. 2006a).

***Telmatherina* cf. *celebensis* "Lontoa"**
Freshwater; endemic to Lake Lontoa [also Lantoa or Wawontoa], and surrounding swamps, Sulawesi Selatan; smaller and deeper bodied than *T. celebensis* from Lakes Mahalona and Towuti, Sulawesi Selatan; males in distinct colour morphs (Herder et al. 2006a).

***Telmatherina* "elongated"**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; predatory, benthic "sharpfin" *Telmatherina* with short fins and slender body (Herder et al. 2006a).

***Telmatherina obscura* Kottelat, 1991**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; small, blackish inshore "sharpfin" *Telmatherina* (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a).

***Telmatherina opudi* Kottelat, 1991**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; small "sharpfin" *Telmatherina* predominantly inhabiting well-structured shallows; males in distinct colour morphs (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a).

***Telmatherina prognatha* Kottelat, 1991**
Freshwater; endemic to Lake Matano Sulawesi Selatan; large, slender "roundfin" *Telmatherina*; conspicuous "beak-like" jaws; epibenthic, predatory ecology; males in distinct colour morphs (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a).

***Telmatherina sarasinorum* Kottelat, 1991**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; benthic "sharpfin" *Telmatherina* specialized on eating eggs of sailfin silversides including conspecifics; males in distinct colour morphs (Hadiaty & Wirjoatmodjo 2002, Cerwenka et al. 2012, Herder et al. 2006a, Gray et al. 2007, Gray et al. 2008a, Gray et al. 2008b, Pfaender et al. 2010).

***Telmatherina* "thicklip"**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; benthic "sharpfin" *Telmatherina* specialized on eating shrimps; deep-bodied species, with pronounced "puffy lips" (Herder et al. 2006a, Pfaender et al. 2010).

***Telmatherina wahjui* Kottelat, 1991**
Freshwater; endemic to Lake Matano, Sulawesi Selatan; "sharpfin" *Telmatherina* occurring at the outlet of Lake Matano to River Petea, and the shallows of the lake (Hadiaty & Wirjoatmodjo 2002, Herder et al. 2006a).

***Paratherina cyanea* Aurich, 1935**
Freshwater; endemic to Lake Towuti and Lake Mahalona, Sulawesi Selatan; slender, conspicuously large-eyed (Hadiaty et al. 2004, Herder et al. 2006a).

***Paratherina labiosa* Aurich, 1935**
Freshwater; possibly endemic to Lake Lontoa, Sulawesi Selatan; holotype destroyed (Kottelat 1990c); Kottelat (1990c) tentatively assigned four juveniles obtained in 1989 to *P. labiosa*; further investigations lacking; no records during recent surveys by F.H. in Lake Lontoa.

***Paratherina striata* Aurich, 1935**
Freshwater; endemic to Lakes Towuti and Mahalona, Sulawesi Selatan; largest sailfin silverside species; males in distinct colour morphs (Hadiaty et al. 2004, Herder et al. 2006a, Kottelat 1990c).

***Paratherina wolterecki* Aurich, 1935**
Freshwater; endemic to Lake Mahalona, Sulawesi Selatan; blackish male colouration (Hadiaty et al. 2004, Herder et al. 2006a).

***Tominanga aurea* Kottelat, 1990**
Freshwater: endemic to Lake Mahalona, Sulawesi Selatan; enter rivers; Kottelat (1990c) distinguished *Tominanga aura* from *Tominanga sanguicauda* by male colour traits, gill raker counts, and occurrence (Lake Mahalona vs. Lake Towuti); Herder et al. (2006a) reported less clear indications for species discrimination based on colour traits, and highlight the need for more detailed examinations (Kottelat 1990c, Hadiaty et al. 2004, Herder et al. 2006a).

***Tominanga sanguicauda* Kottelat, 1990**
Freshwater; endemic to Lake Towuti, Sulawesi Selatan; enter rivers; see *Tominanga aurea* for notes on species discrimination (Hadiaty et al. 2004, Kottelat 1990c).

***Marosatherina ladigesi* (Ahl, 1936)**
Telmatherina ladigesi Ahl, 1936
Freshwater; endemic to the Bantimurung area, Maros karst, Sulawesi Selatan; dwelling in cool karst streams; males with conspicuously elongated blackish rays in second dorsal and anal fins; popular aquarium species (Hadiaty 2007); locally transferred for breeding purposes (F.H., pers. obs.).

Phallostethidae
Priapium fishes: Euryhaline; enter brackish and freshwaters; distributed in Southeast Asia; distinct reproductive morphology: males transfer sperm with a conspicuous priaprium, on the underside of the head (Parenti 1996).

***Neostethus djajaorum* Parenti & Louie, 1998**
Euryhaline; endemic to Sulawesi Selatan; brackish waters of coastal plains (Parenti & Louie 1998).

BELONIFORMES

Adrianichthyidae
Ricefishes: Brackish and freshwaters; distributed throughout the West-Pacific; 17 of the 35 species recognized are endemic to Sulawesi, including species flocks in Lake Poso and the Malili Lakes system, endemics in small, remote lakes (*Oryzias hadiatyae*, *O. soerotoi*), one riverine pelvic brooder *O. eversi,* and a riverine lineage species from Southeast Sulawesi (Herder et al. 2012b, Kottelat 1990d, Mokodongan & Yamahira 2015, Parenti 2008, Parenti & Hadiaty 2010, Parenti et al. 2013).

***Adrianichthys kruyti* Weber, 1913**
Adrianichthys kruytii (Soeroto & Tungka, 1991)
Freshwater; endemic to Lake Poso, Sulawesi Tengah; pelagic; only a few specimens known (Kottelat 1990b, Parenti 2008).

***Adrianichthys oophorus* (Kottelat, 1990)**
Xenopoecilus oophorus Kottelat, 1990a
Freshwater; endemic to Lake Poso, Sulawesi Tengah; pelagic pelvic brooder; abundant in open waters of the lake

in 1995 (Parenti 2008); confirmed by own fieldwork in 2013; caught in the night at the surface; exploited by subsistence fisheries (F.H., pers. obs.).

***Adrianichthys poptae* (Weber & de Beaufort, 1922)**
Xenopoecilus poptae Weber & de Beaufort, 1922
Freshwater; endemic to Lake Poso, Sulawesi Tengah; pelagic, rare; not recorded by the authors (Kottelat 1990a, Mokodongan & Yamahira 2015, Parenti 2008, Parenti & Soeroto 2004, Soeroto & Tungka 1991, 1996).

***Adrianichthys roseni* Parenti & Soeroto, 2004**
Adrianichthys kruyti (Weber, 1913)
Freshwater; endemic to Lake Poso, Sulawesi Tengah; known from a single collection; likely pelagic; abdominal concavity points towards pelvic brooding (Parenti & Soeroto 2004).

***Oryzias asinua* Parenti, Hadiaty, Lumbantobing & Herder, 2013**
Freshwater; endemic to Sulawesi Tenggara; known only from the type locality: Asinua River, regency of Kendari (Parenti et al. 2013).

***Oryzias bonneorum* Parenti, 2008**
Xenopoecilus sarasinorum (Rosen, 1964)
Freshwater; endemic to Lake Lindu, Sulawesi Tengah; probably pelagic (Parenti 2008).

***Oryzias celebensis* (Weber, 1894)**
Haplochilus celebensis Weber, 1894b
Aplocheilus celebensis Weber & de Beaufort, 1912
Freshwater; records from rivers, streams and Lake Tempe in Sulawesi Selatan (Herder & Chapuis 2010, Parenti 2008), and East Timor (see Parenti 2008).

***Oryzias eversi* Herder, Hadiaty & Nolte, 2012**
Freshwater; endemic; reported only from the type locality in Sulawei Selatan, Tana Toraja; Salo Sadang drainage, close to village Tilanga, about 8 km south of Rantepao; the only known riverine Adrianichthyid with pelvic-brooding reproduction (Herder et al. 2012b).

***Oryzias hadiatyae* Herder & Chapuis, 2010**
Freshwater; endemic to Lake Masapi, Malili Lakes (Larona) system, Sulawesi Selatan; Lake Masapi is a small and shallow blackwater lake in the hills west of Lake Towuti (Herder & Chapuis, 2010).

***Oryzias javanicus* (Bleeker, 1854)**
Aplocheilus javanicus Bleeker, 1854b
Euryhyaline; enter brackish waters; distributed from Thailand to Lombok, Borneo and Sulawesi (Parenti 2008); records from Sulawesi Barat (3°20.143S 119°10.179E, ZFMK 69890-69947).

***Oryzias marmoratus* (Aurich, 1935)**
Aplocheilus marmoratus Aurich, 1935
Freshwater; endemic to Lakes Towuti, Mahalona, Lontoa [also Lantoa or Wawontoa], and adjacent streams, Sulawesi Selatan; possible hybridization among *O. marmoratus* and *O. profundicola* in Lake Towuti (Herder & Chapuis 2010, Kottelat 1990d, Mokodongan & Yamahira 2015).

***Oryzias matanensis* (Aurich, 1935)**
Freshwater; endemic to Lake Matano, Malili Lakes system, Sulawesi Selatan; abundant around the lake; shallows to deeper habitats along the coast (Kottelat 1990d, F.H., pers. obs.).

***Oryzias nebulosus* Parenti & Soeroto, 2004**
Freshwater; endemic to Lake Poso, Sulawesi Tengah (Parenti & Soeroto, 2004); small *Oryzias* (up to 33 mm SL); benthopelagic; male courtship at rocky, open deeper habitats (F.H., pers. obs.).

***Oryzias nigrimas* Kottelat, 1990**
Freshwater; endemic to Lake Poso, Sulawesi Tengah; benthopelagic, at open habitats in the shallows (Kottelat 1990d, Parenti & Soeroto, 2004); comparatively abundant (F.H., pers. obs.).

***Oryzias orthognathus* Kottelat, 1990**
Freshwater; endemic to Lake Poso, Sulawesi Tengah (Parenti 2008); characterized by conspicuously upwards directed mouth, and rounded body (Kottelat 1990d, F.H., pers. obs.); tentatively pelagic, possibly rather benthopelagic (Parenti 2008).

***Oryzias profundicula* Kottelat, 1990**
Freshwater; endemic to Lake Towuti, Sulawesi Selatan; lacustrine, deep-bodied *Oryzias* with filamentous fin rays; tends to inhabit deeper inshore habitats (Kottelat 1990d, F.H., pers. obs.).

***Oryzias sarasinorum* (Popta, 1905)**
Haplochilus sarasinorum Popta, 1905
Xenopoecilus sarasinorum Regan, 1911
Freshwater; endemic to Lake Lindu, Sulawesi Tengah; slender, pelagic pelvic brooder (Parenti 2008); juveniles recorded in the shallows of the lake in 2013.

***Oryzias soerotoi* Mokodongan, Tanaka & Yamahira, 2014**
Freshwater; endemic to Lake Tiu in Sulawesi Tengah, a small (approx. 2 km long) blackwater lake draining to the Laa River; subadults in structured shallows; habitat of adults unknown (Mokodongan et al. 2014).

***Oryzias wolasi* Parenti, Hadiaty, Lumbantobing & Herder, 2013**
Freshwater; endemic; small, comparatively deep-bodied *Oryzias* from streams in Sulawesi Tenggara, south of Kendari (Parenti et al. 2013).

***Oryzias woworae* Parenti & Hadiaty, 2010**
Freshwater; endemic to Muna island, off Sulawesi Tenggara (Parenti & Hadiaty 2010); small comparatively deep-bodied, with conspicuous, colourful male ornamentation (Parenti & Hadiaty 2010).

Zenarchopteridae
Halfbeaks: Freshwater; distributed in inland and coastal habitats of the Indo-West Pacific; four genera in Sulawesi; *Nomorhamphus* and *Dermogenys* are viviparous, less is known about the reproductive biology of *Tondanichthys* and *Zenarchopterus*; *Nomorhamphus* inhabit hillstreams; 12 species endemic to Sulawesi, especially species-rich (Huylebrouck et al. 2014). Halfbeak taxonomy largely follows the checklist of Collette 2004, supplemented by recent descriptions (Anderson & Collette 1991, Collette 1995, Grier & Collette 1987; Lovejoy et al. 2004, Meisner 2001)

***Dermogenys orientalis* (Weber, 1894)**
Hemiramphus orientalis Weber, 1894b
Dermogenys montanus Brembach, 1982
Freshwater: endemic to a hillstream of Maros Karst, Bantimurung, Sulawesi Selatan (Collette 2004, Parenti 2011).

***Dermogenys vogti* Brembach, 1982**
Freshwater; most likely endemic to a hillstream on Limestone Mountain at "Topobulu", Sulawesi Selatan [locality not confirmed] (Brembach 1982, Collette 2004, Parenti 2011).

***Nomorhamphus brembachi* Vogt, 1978**
Nomorhamphus ravnaki Brembach, 1991
Nomorhamphus ravnaki australe Brembach, 1991
Nomorhamphus sanussii Brembach, 1991
Freshwater; endemic to Maros highland, Sulawesi Selatan (Collette 2004, Parenti 2011).

***Nomorhamphus celebensis* Weber & de Beaufort, 1922**
Freshwater; endemic to Lake Poso, Sulawesi Tengah (Collette 2004, Parenti 2011).

***Nomorhamphus ebrardtii* (Popta, 1912)**
Hemiramphus (*Dermatogenus*) *ebrardtii* Popta, 1912
Freshwater; endemic to Sulawesi Tenggara; records from Wowoni Island (ZMH 7150); Muna Island, off Sulawesi Tenggara; stream leading to Lake Towuti, Sulawesi Selatan; stream crossing the road Soroako to Malili, 02°38.161'S, 121°12.920'E, ZFMK 49156-49176; Maros Regency, Sungai Abbalu, Village Camba, Camba District, MZB 21295 (Huylebrouck et al. 2014).

***Nomorhamphus hageni* (Popta, 1912)**
Hemiramphus hageni Popta, 1912
Freshwater; endemic to Sulawesi Tenggara, Penango and Rumbia valley (Collette 2004, Parenti 2011).

***Nomorhamphus kolonodalensis* Meisner & Louie, 2000**
Freshwater; Sulawesi Tengah, Nuha drainage, north of Lake Matano, Sulawesi Selatan, and city of Poso, district of Kolonodale, Sulawesi Tengah (Collette 2004, Meisner & Louie 2000, Parenti 2011).

***Nomorhamphus lanceolatus* Huylebrouck, Hadiaty & Herder, 2014**
Freshwater: endemic to Sungai Wawolambo, Sulawesi Tenggara (Huylebrouck et al. 2014).

***Nomorhamphus liemi* Vogt, 1978**
Nomorhamphus liemi snijdersi Vogt, 1978
Freshwater; endemic to Maros highland, Sulawesi Selatan (Collette 2004, Parenti 2011, Vogt 1978).

***Nomorhamphus megarrhamphus* (Brembach, 1982)**
Dermogenys megarrhamphus Brembach, 1982
Freshwater; endemic to Lakes Towuti and Mahalona, Sulawesi Selatan (Collette 2004; Parenti 2011).

***Nomorhamphus rex* Huylebrouck, Hadiaty & Herder, 2012**
Freshwater; disjunct distribution in Sulawesi; records from drainage adjacent to Malili Lakes: Stream Wewu, Cerekang drainage, west of Lake Matano; stream within Malili Lakes drainage: Toletole River at village Toletole; and Sulawesi Selatan, Tana Toraja, about 8 km south of Rantepao (Huylebrouck et al. 2012).

***Nomorhamphus sagittarius* Huylebrouck, Hadiaty & Herder, 2014**
Freshwater: Endemic to three streams in Sulawesi Tenggara (Huylebrouck et al. 2014).

***Nomorhamphus towoetii* Ladiges, 1972**
Normorhamphus towoetii Ladiges, 1972
Freshwater; records from Lake Towuti, Sulawesi Selatan and Lake Poso, Sulawesi Tengah (Collette 2004, Ladiges 1972, Parenti 2011).

***Nomorhamphus weberi* (Boulenger, 1897)**
Hemirhamphus weberi Boulenger, 1897
Freshwater; endemic to Lakes Matano and Mahalona, Sulawesi Selatan (Boulenger 1897, Collette 2004, Parenti 2011).

***Tondanichthys kottelati* Collette, 1995**
Freshwater; endemic to Lake Tondano, Sulawesi Utara; monotypic genus (Collette 1995, 2004, Parenti 2011).

***Zenarchopterus gilli* Smith, 1945**
Freshwater; enter brackish and coastal waters (Donaldson & Myers 2002); record from Sulawesi Selatan (4°07.456'S 119'37.196'E, ZFMK 69726-69740, 69838).

***Zenarchopterus dispar* (Valenciennes, in Cuvier & Valenciennes, 1847)**
Hemiramphus dispar Valenciennes, in Cuvier & Valenciennes, 1847
Zenarchopterus maculosus Garman, 1903
Zenarchopterus vaisiganus Jordan & Seale, 1906
Potential: Freshwater; enter brackish and coastal waters; distributed throughout the Indo-Pacific; no actual records from Sulawesi (Donaldson & Myers 2002, Garman 1903).

CYPRINODONTIFORMES

Aplocheilidae
Rivulines: Freshwater; enter brackish waters; native in the Neotropics, Africa and Southern Asia (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Aplocheilus panchax* (Hamilton, 1822)**
Esox panchax Hamilton, 1822
Possibly introduced: Freshwater; native to India and Southeast Asia; records from Buton (Tweedley et al. 2013), Sulawesi Utara (Haryono et al. 2002), Lakes of Gorontalo (Haryono & Tjakrawidjaja 2004), Sulawesi Selatan (3°41.589'S 119°38.629'E, ZFMK 69557), Sulawesi Barat (2°39.081'S 119°12.436'E, ZFMK 69651), Lake Poso, Sulawesi Tengah (visual record F.H.) and the Malili Lakes system, Sulawesi Selatan (Herder et al. 2012a).

Poeciliidae
Livebearers: Freshwater; enter brackish waters; native to North, Central and South America; several worldwide introduced species (Nelson 2006).

***Gambusia affinis* (Baird & Girard, 1853)**
Heterandria affinis Baird & Girard, 1853
Introduced: Freshwater; native to North and Central America; introduced into warm waters almost worldwide (Pyke 2006); record from Lake Poso, Sulawesi Tengah (visual record F.H.).

***Gambusia holbrooki* Girard, 1859**
Introduced: Freshwater; native to North and Central America; introduced to warm waters almost worldwide; likely confused with G. affinis (Girard 1859, Pyke 2006).

***Poecilia reticulata* Peters, 1859**
Introduced: Freshwater; native to northern South America; introduced almost worldwide; record from Malili Lakes system, Sulawesi Selatan (Herder et al. 2012a), Lake Poso, Sulawesi Tengah (1°46.29'S 120°42.98'E, ZFMK 69801-69803).

GASTEROSTEIFORMES

Syngnathidae
Pipefishes, Seahorses: Catadromous; enter marine, brackish and freshwaters; distributed throughout the Atlantic, Indo-Pacific (Nelson 2006, Wilson & Orr 2011).

***Belonichthys mento* (Bleeker, 1856)**
Syngnathus mento Bleeker, 1856a
Catadromous; record from Manado, Sulawesi Utara (Bleeker 1856a), Buton (Tweedley et al. 2013).

***Coelonotus biocellatus* Günther, 1870**
Potential: Catadromous; no actual records for Sulawesi; distributed throughout the East Indian Archipelago (Günter 1870, cited in Kottelat 2013).

***Coelonotus leiaspis* (Bleeker, 1854)**
Syngnathus leiaspis Bleeker, 1854c
Microphis leiaspis Bleeker, 1854c
Syngnathus budi Bleeker, 1856a
Catadromous; distributed throughout the Indo-Pacific (Dawson 1985); records from Manado, Sulawesi Utara (Bleeker 1856a), Buton (Tweedley et al. 2013).

***Doryichthys boaja* (Bleeker, 1850)**
Syngnathus boaja Bleeker, 1850
Doryichtys spinosus Kaup, 1856
Catadromous; distributed throughout Asia (Dawson 1985); record from Makassar, Sulawesi Selatan (Kaup 1856).

***Hippichthys cyanospilos* (Bleeker, 1854)**
Potential: Catadromous; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Bleeker 1854c).

***Hippichthys heptagonus* Bleeker, 1849**
Potential: Catadromous; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Bleeker 1849b).

***Hippichthys spicifer* (Rüppell, 1838)**
Syngnathus spicifer Rüppell, 1838
Catadromous; distributed throughout the Indo-Pacific (Dawson 1985); record from Sulawesi Selatan (04°14.475'S 119°36.826'E, ZFMK 066326).

***Hippocampus waleananus* Gomon & Kuiter, 2009**
Catadromous; endemic to the Togian islands, off Sulawesi Tengah (Gomon & Kuiter 2009).

***Lophocampus retzii* (Bleeker, 1856)**
Syngnathus retzii Bleeker, 1856a
Catadromous; distributed throughout the Indo-Pacific; record from Manado, Sulawesi Utara (Bleeker 1856a).

***Microphis ocellatus* (Duncker, 1910)**
Doryichthys ocellatus Duncker, 1910
Catadromus; distributed throughout the Indo-Pacific (Dawson 1984); record from Sulawesi Tengah (00°55.395'S 122°52.962'E, ZFMK 066065).

***Oostethus brachyurus* (Bleeker, 1854)**
Syngnathus brachyurus Bleeker, 1854c
Syngnathus polyacanthus Bleeker, 1856a
Doryichthys auronitens Kaup, 1856
Catadromous; distributed throughout the Indo-Pacific; record from Manado, Sulawesi Utara (Bleeker 1856a), Makassar, Sulawesi Selatan (Dawson 1985, Kaup 1856).

***Oostethus manadensis* (Bleeker, 1856)**
Syngnathus manadensis Bleeker, 1856a
Catadromous; distributed throughout the Indo-Pacific (Dawson 1985); record from Manado, Sulawesi Utara (Bleeker 1856a).

SYNBRANCHIFORMES

Synbranchidae
Swamp eels: Freshwater; entering brackish waters; distributed throughout Central and South America, Mexico, the Indo Australian Archipelago, Asia and West Africa (Nelson 2006, Rosen & Greenwood 1976).

***Monopterus albus* (Zuiew, 1793)**
Muraena alba Zuiew, 1793
Introduced: Freshwater; enter brackish waters; records from Sulawesi Utara (Haryono et al. 2002), Malili Lake drainage, Sulawesi Selatan (Herder et al. 2012a).

SCORPAENIFORMES

Tetrarogidae
Wasp fishes: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Eschmeyer 2015, Froese & Pauly 2014 Nelson 2006).

***Neovespicula depressifrons* (Richardson, 1848)**
Apistus plagiometopon Bleeker, 1853a
Euryhaline; entering brackish waters; record from Bulukumba, Sulawesi Selatan (Bleeker 1853a).

***Tetraroge barbata* (Cuvier, in Cuvier & Valenciennes, 1829)**
Apistus barbatus Cuvier, in Cuvier & Valenciennes, 1829
Euryhaline; enter brackish and freshwaters (Fricke et al. 2011); record from Sulawesi Tengah (00°55.395'S 122°52.962'E, ZFMK 066003).

***Tetraroge nigra* (Cuvier, in Cuvier & Valenciennes, 1829)**
Apistus nigra Cuvier, in Cuvier & Valenciennes, 1829
Euryhaline; enter brackish waters; record from Buton (Tweedley et al. 2013).

Platycephalidae
Flatheads: Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Nelson 2006).

***Grammoplites scaber* (Linnaeus, 1758)**
Cottus scaber Linnaeus, 1758
Potential: Euryhaline; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Knapp 1999).

PERCIFORMES

PERCOIDEI

Ambassidae
Asiatic glassfishes: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Anderson & Heemstra 2003, Nelson 2006).

***Ambassis gymnocephala* (La Cepéde, 1802)**
Lutjan gymnocéphale La Cepéde, 1802
Ambassis dussumieri Cuvier, in Cuvier & Valenciennes, 1828
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Anderson & Heemstra 2003); record from Sulawesi Tengah (00°55.395'S 122°52.962'E, ZFMK 066031-066039).

***Ambassis interrupta* Bleeker, 1853**
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Anderson & Heemstra 2003); type locality in Sulawesi (Bleeker 1853c).

***Ambassis miops* Günther, 1872**
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Kottelat 2013); record from Buton (Tweedley et al. 2013).

***Ambassis urotaenia* Bleeker, 1852**
Potential: Euryhaline; enter brackish and freshwaters (Anderson & Heemstra 2003); no actual records for Sulawesi; distributed throughout the Indo-West Pacific (Bleeker 1852c).

***Ambassis vachellii* Richardson, 1846**
Ambassis telkara Whitley, 1935a
Potential: Euryhaline; enter brackish and freshwaters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Kottelat 2013).

Opistognathidae
Jawfishes: Euryhaline; enter brackish waters; distributed throughout the Western and Central Atlantic and Indo-Pacific (Kottelat 2013; Nelson 2006, Smith-Vaniz 1999).

***Stalix moenensis* (Popta, 1922)**
Gnathypops moenensis Popta, 1922
Euryhaline; enter brackish waters (Smith-Vaniz 1999); record from Muna Island, off Sulawesi Tenggara (Popta1922).

Family Carangidae
Jacks, Pompanos: Marine; juveniles enter brackish waters; distributed throughout the Indo-Pacific and Atlantic (Holland et al. 1996, Nelson 2006).

***Caranx melampygus* Cuvier, in Cuvier & Valenciennes, 1833**
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Holland et al. 1996).

***Caranx papuensis* Alleyne & Macleay, 1877**
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Holland et al. 1996); record from Buton (Tweedley et al. 2013).

***Caranx sexfasciatus* Quoy & Gaimard, 1825**
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Holland et al. 1996).

***Scomberoides lysan* (Forskâl, 1775)**
Scomber lysan Forskâl, 1775
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Smith-Vaniz 1999).

***Selaroides leptolepis* (Cuvier, in Cuvier & Valenciennes, 1833)**
Caranx leptolepis Cuvier, in Cuvier & Valenciennes, 1833
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Smith-Vaniz 1999).

Leiognathidae
Slimys, Slipmouths, Ponyfishes: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Eschmeyer 2015, Froese & Pauly 2014; Nelson 2006).

***Eubleekeria splendens* (Cuvier, 1829)**
Equula splendens Cuvier, 1829
Potential: Euryhaline; no actual records for Sulawesi; distributed throughout the Indo-Pacific; enter brackish waters (Kottelat 2013).

Lutjanidae
Snappers: Euryhaline; enter brackish waters; distributed throughout the Atlantic and Indo-Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Lutjanus argentimaculatus* (Forskål, 1775)**
Sciaena argentimaculata Forskål, 1775
Mesoprion taeniops Valenciennes, in Cuvier & Valenciennes, 1830
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Anderson & Allen 1999); record from Sulawesi freshwaters (Valenciennes, in Cuvier & Valenciennes 1830).

***Lutjanus bohar* (Forskål, 1775)**
Sciaena bohar Forskål, 1775
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-West Pacific (Anderson & Allen 1999).

***Lutjanus ehrenbergii* (Peters, 1869)**
Mesoprion ehrenbergii Peters, 1869
Lutjanus oligolepis Bleeker, 1873a
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Anderson & Allen 1999); record from Makassar, Sulawesi Selatan (Bleeker 1873a).

***Lutjanus fulviflamma* (Forskål, 1775)**
Sciaena fulviflamma Forskål, 1775
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Anderson & Allen 1999).

***Lutjanus fulvus* (Forster, in Schneider, 1801)**
Holocentrus fulvus Forster, in Schneider, 1801
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Anderson & Allen 1999).

***Lutjanus fuscescens* (Valenciennes, in Cuvier & Valenciennes, 1830)**
Mesoprion fuscescens Valenciennes, in Cuvier & Valenciennes, 1830
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Anderson & Allen 1999); record

from Sulawesi freshwaters (Valenciennes, in Cuvier & Valenciennes 1830).

***Lutjanus maxweberi* Popta, 1921**
Lutianus max weberi Popta, 1921
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Anderson & Allen 1999); record from Kali La River, Muna Island, off Sulawesi Tenggara (Popta 1921).

Haemulidae
Grunts: Euryhaline; enter brackish and freshwaters distributed throughout the Atlantic and Indo-Pacific (Eschmeyer 2015, Froese & Pauly 2014).

***Pomadasys argenteus* (Forskål, 1775)**
Sciaena argentea Forskål, 1775
Pristipoma manadense Günther, 1872b
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (McKay 2001); record from Manado, Sulawesi Utara (Günther 1872b).

Nemipteridae
Threadfin breams: Euryhaline; enter brackish waters; distributed throughout the Indo-West-Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Nemipterus peronii* (Valenciennes, in Cuvier & Valenciennes, 1830)**
Dentex peronii Valenciennes, in Cuvier & Valenciennes, 1830
Dentex Smithii Steindachner, 1868
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Russell 2001); record from Tiworo, Muna Island, off Sulawesi Tenggara (Steindachner 1868).

Lethrinidae
Emperors, Scavengers: Euryhaline; enter brackish waters; distributed from West Africa to the Indo-West Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Lethrinus nebulosus* (Forskål, 1775)**
Sciaena nebulosa Forskål, 1775
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Carpenter 2001a).

Polynemidae
Threadfins: Euryhaline; enter brackish and freshwaters; distributed in all tropical and subtropical regions (Motomura 2004, Nelson 2006).

***Polydactylus microstoma* (Bleeker, 1851)**
Polynemus microstoma Bleeker, 1851a
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Feltes 2001); record from Bulukumba, Sulawesi Selatan (Bleeker 1851a).

Sciaenidae
Drums: Euryhaline; enter brackish and freshwaters; Distributed throughout the Atlantic and Indo-Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Nibea soldado* (La Cepède, 1802)**
Holocentrus soldado La Cepède, 1802
Corvina celebica Bleeker, 1854d
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Sasaki 2001); record from Makassar, Sulawesi Selatan (Bleeker 1854d).

Mullidae
Goatfishes: Euryhaline; enter brackish waters; distributed throughout the Atlantic and Indo-Pacific (Eschmeyer 2015, Froese & Pauly 2014; Nelson 2006).

***Upeneus tragula* Richardson, 1846a**
Upeneus sundaicus var. *caudalis* Popta, 1921
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Randall 2001); record from Tiworo, Muna Island, off Sulawesi Tenggara (Popta 1921).

Toxotidae
Archerfishes: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Berra 2001, Nelson 2006).

***Toxotes chatareus* (Hamilton, 1822)**
Coius chatareus Hamilton, 1822
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Allen 1991, 2001).

***Toxotes jaculatrix* (Pallas, in Schlosser, 1767)**
Sciaena jaculatrix Pallas, in Schlosser, 1767
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Allen 1991, 2001).

Terapontidae
Grunters, Tigerperches: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Berra 2001, Nelson 2006, Vari 2001).

***Lagusia micracanthus* (Bleeker, 1860)**
Datnia micracanthus Bleeker, 1860
Therapon (*Datnia*) *micracanthus* Bleeker, 1873b
Terapon micracanthus Fowler, 1931
Papuservus micracanthus Munro, 1958
Euryhaline; endemic to Sulawesi; enter brackish and freshwaters; records from Lagusi, Amparang, Bantimurung,

Cendrana, Leang-leang, Maros, Menralang, Samanggi and Saripa rivers, Manjali Spring, Sulawesi Selatan (Bleeker 1860, Fowler 1931, Vari & Hadiaty 2012).

***Terapon jarbua* (Forskål, 1775)**
Sciaena jarbua Forskål, 1775
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Vari 2001); record from Sulawesi Selatan (04°14.475'S 119°36.826'E, ZFMK 066043).

Kuhliidae
Flagtails: Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Berra 2001, Nelson 2006).

***Kuhlia marginata* (Cuvier, in Cuvier and Valenciennes, 1829)**
Dules marginatus Cuvier, in Cuvier & Valenciennes, 1829
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Carpenter 2001b); records from Buton (Tweedley et al. 2013), Sulawesi Utara (Haryono et al. 2002), Sulawesi Selatan (3°30.822'S 119°32.267'E, ZFMK 69614-69615).

Kulia rupestris (La Cepède, 1802)
Centropomus rupestris La Cepède, 1802
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Carpenter 2001b); record from Buton (Tweedley et al. 2013).

LABROIDEI

Cichlidae
Cichlids: Diverse group in marine, brackish and freshwater environments; distributed throughout the Neo- and Palaeotropics; not native to Sulawesi; several species introduced worldwide (Berra 2001, Eschmeyer 2015, Froese & Pauly 2014; Nelson 2006).

"Flowerhorn" cichlid
Introduced: Freshwater; hybrid of neotropical species; records from the Malili Lakes system, Sulawesi Selatan (Herder et al. 2012a), Poso River, Sulawesi Tengah (visual record F.H.).

***Melanochromis cyaneorhabdos* (Bowers & Stauffer, 1997)**
Introduced: Freshwater; native to Lake Malawi, East Africa; record from the Malili Lakes system, Sulawesi Selatan (Herder et al. 2012) and Lake Poso, Sulawesi Tengah (visual record F.H.).

***Oreochromis mossambicus* (Peters, 1852)**
Chromis mossambicus Peters, 1852
Introduced: Freshwater; native to Africa; record from the Malili Lakes system, Sulawesi Selatan (Herder et al. 2012a, Nasution & Aisyah 2013), Lake Poso, Sulawesi Tengah, and various streams (visual record F.H.).

***Oreochromis niloticus* (Linnaeus, 1758)**
Introduced: Freshwater; native to Africa; record from the Malili Lakes system (Nasution & Aisyah 2013), Sulawesi Selatan and Sulawesi Barat (2°39.081´S 119°12.436'E, ZFMK 69650).

Scaridae
Parrotfishes: Euryhaline; enter brackish waters; distributed throughout the Atlantic and Indo-Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Chlorurus sordidus* (Forskål, 1775)**
Scarus sordidus Forskål, 1775
Scarus celebicus Bleeker, 1854d
Euryhaline; enter brackish waters (Bellwood 2001), record from Makassar, Sulawesi Selatan (Bleeker 1854d).

BLENNIOIDEI

Blenniidae
Combooth blennies: Euryhaline; enter brackish and freshwaters; distributed throughout the Atlantic and Indo-Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Meiacanthus anema* (Bleeker, 1852)**
Petroskirtes anema Bleeker, 1852c
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Allen 1991); record from Kabaena (Tweedley et al. 2013).

CALLIONYMOIDEI

Callionymidae
Dragonets: Euryhaline; two species in freshwaters; distributed throughout the Indo-West Pacific (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Eleutherochir opercularis* (Valenciennes, in Cuvier & Valenciennes, 1837)**
Callionymus opercularis Valenciennes, in Cuvier & Valenciennes, 1837
Brachycallionymus mirus Herre, 1936
Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Talwar & Jhingran 1991); record from Lembeh Strait, north coast of Sulawesi (Herre, 1936).

GOBIOIDEI

Rhyacichthyidae
Loach gobies: Freshwater; distributed throughout the Indo-West Pacific (Berra 2001, Nelson 2006).

***Rhyacichthys aspro* (Valenciennes, in Cuvier and Valenciennes, 1837)**
Platyptera aspro Valenciennes, in Cuvier & Valenciennes, 1837
Anadromous; enter brackish and freshwaters; distributed throughout Indo-Pacific (Allen 1991); records from Buton (Tweedley et al. 2013), Sulawesi Utara (Haryono et al. 2002), Sulawesi Barat (3°16.651'S 118°51.929'E, ZFMK 6848-6850).

Eleotrididae
Sleepers: Euryhaline; enter brackish and freshwaters; distributed worldwide in tropical and subtropical regions (Berra 2001, Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Belobranchus belobranchus* (Valenciennes, in Cuvier & Valenciennes, 1837)**
Eleotris belobrancha Valenciennes, in Cuvier & Valenciennes, 1837
Anadromous; distributed throughout the Indo-Pacific (Allen 1991); records from Manado, Sulawesi Utara (Valenciennes, in Cuvier & Valenciennes, 1837), Buton and Kabaena (Tweedley et al. 2013), Sulawesi Utara (Haryono et al. 2002) and Sulawesi Barat (2°39.308'S 119°12.095'E, ZFMK 69631; 2°39.081'S 119 12.436'E, ZFMK 69642-69647; 2°38.428'S 119°09.294'E, ZFMK 69670; 2°37.368'S 119°08.784'E, ZFMK 69699).

***Belobranchus segura* Keith, Hadiaty & Lord, 2012**
Freshwater; enter brackish and freshwaters; described from Halmahera and Irian Jaya (Keith et al. 2012); record from Sulawesi Barat (3°16.651'S 118°51.929'E, ZFMK 69814-69815).

***Bostrychus microphthalmus* Hoese & Kottelat, 2005**
Freshwater; endemic to Gua Tanette cave, Sulawesi Selatan; genus poorly defined and likewise poorly known (Hoese & Kottelat 2005).

***Bunaka gyrinoides* (Bleeker, 1853)**
Eleotris gyrinoïdes Bleeker, 1853c
Anadromous; distributed throughout the Indo-West Pacific (Allen 1991); records from Buton (Tweedley et al. 2013), Sulawesi Selatan (3°41.589'S 119°38.629'E, ZFMK 69556, 69558-69559), Sulawesi Barat (3°16.651'S 118°51.929'E, ZFMK 69823).

***Butis amboinensis* (Bleeker, 1854)**
Eleotris amboinensis Bleeker, 1854a
Anadromous; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Yokoo et al. 2006); record from Buton (Tweedley et al. 2013).

***Butis butis* (Hamilton, 1822)**
Cheilodipterus butis Hamilton, 1822
Potential: Anadromous; enter brackish and freshwaters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Allen et al. 2002).

***Eleotris fusca* (Schneider, 1801)**
Poecilia fusca Schneider, 1801
Potential: Anadromous; enter brackish and freshwaters as adults; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Maeda et al. 2007).

***Eleotris melanosoma* Bleeker, 1853**
Anadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Bleeker 1853c, Maeda et al. 2007); records from Sulawesi Selatan (3°30.822´S 119°32.267'E, ZFMK 69595, 69616-69617), Sulawesi Barat (3°16.651´S 118°51.929'E, ZFMK 69806).

***Giuris margaritaceus* (Valenciennes, in Cuvier & Valenciennes, 1837)**
Eleotris margaritacea Valenciennes, in Cuvier & Valenciennes, 1837
Anadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Allen et al. 2002); record from Sulawesi Barat (3°16.651´S 118°51.929'E, ZFMK 69804-69805, 69822).

***Oxyleotris marmorata* (Bleeker, 1852)**
*Eleotris marmorat*a Bleeker, 1852e
Anadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Larson & Murdy 2001); record from Sulawesi Selatan (3°41.589´S 119°38.629'E, ZFMK 69512-69513, 69550-69551).

Gobiidae
Gobies: Euryhaline, catadromous, anadromous and freshwater; includes a total of 1725 species in 251 genera (Berra 2001, Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Acentrogobius janthinopterus* (Bleeker, 1853)**
Gobius janthinopterus Bleeker, 1853b
Gobius hemigymnopomus Bleeker, 1856a
Amphidromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Donaldson & Myers 2002); record from Makassar, Sulawesi Selatan (Bleeker 1853b).

***Acentrogobius moloanus* (Herre, 1927)**
Anadromous; enter brackish and freshwaters; distributed throughout the Western Pacific (Blaber & Milton 1990); record from Sulawesi Selatan (119°36.826'E 04°14.475'S, ZFMK 066064).

***Amblygobius decussatus* (Bleeker, 1855)**
Gobius decussatus Bleeker, 1855a
Anadromous; enter brackish and freshwaters; distributed throughout the Western Central Pacific (Myers 1991); record from Manado, Sulawesi Utara (Bleeker 1855a).

***Awaous grammepomus* (Bleeker, 1849)**
Gobius grammepomus Bleeker, 1849c
Anadromous; enter brackish and freshwaters; distributed throughout Asia (Watson 1992); records from Sulawesi Selatan (3°41.589´S 119°38.629'E, ZFMK 69502-69511, 69535-69549; 3°30.822'S 119°32.267'E, ZFMK 69602-69603, 69628), Sulawesi Barat (2°38.428´S 119°09.294'E, ZFMK 69653-69659; 2°37.915´S 119°09.488'E, ZFMK 69673-69676).

***Bathygobius petrophilus* (Bleeker, 1853)**
Gobius petrophilus Bleeker, 1853d
Gobius villosus Weber, 1909
Anadromous; entering brackish and freshwaters; distributed throughout the Indo-West Pacific; record from Manado, Sulawesi Utara (Weber 1909, Weber & de Beaufort 1953).

***Cryptocentroides insignis* (Seale, 1910)**
Amblyogobius insignis Seale, 1910
Cryptocentroides dentatus Popta, 1922
Anadromous; entering brackish and freshwaters; distributed throughout the Western Pacific; record from Raha, Muna Island, off Sulawesi Tenggara (Popta 1922).

***Drombus bontii* (Bleeker, 1849)**
Gobius bontii Bleeker, 1849c
Acentrogobius elberti Popta, 1921
Anadromous; entering brackish and freshwaters; distributed throughout the Indo-West Pacific (Kottelat 2013); record from Raha, Muna Island, off Sulawesi Tenggara (Popta 1921).

***Glossogobius celebius* (Valenciennes, in Cuvier & Valenciennes, 1837)**
Freshwater; endemic to Sulawesi; records from Lake Towuti, Sulawesi Selatan (119°37.295'E 04°07.540'S, ZFMK 066014); Sulawesi Selatan (3°41.589´S 119°38.629'E, ZFMK 69517; 3°30.822'S 119°32.267'E, ZFMK 69596-69601, 69612-69613, 69626-69627), Sulawesi Barat (2°37.368'S 119°08.784'E, ZFMK 69697-69698).

***Glossogobius flavipinnis* (Aurich, 1938)**
Freshwater; endemic to Lake Towuti, Sulawesi Selatan; lacustrine dwarf species (Hoese et al. 2015).

***Glossogobius intermedius* (Aurich, 1938)**
Freshwater; endemic to Lakes Mahalona and Towuti, Sulawesi Selatan (Kottelat et al. 1993).

***Glossogobius matanensis* (Weber, 1913)**
Freshwater; endemic to Lakes Matano, Mahalona, Towuti, and Lontoa, Sulawesi Selatan (Kottelat et al. 1993).

***Glossogobius mahalonensis* Hoese, Hadiaty & Herder, 2015**
Freshwater; endemic to Lake Mahalona, Sulawesi Selatan; so far known from one single site within the lake (Hoese et al. 2015).

***Gnatholepis anjerensis* (Bleeker, 1851)**
Gobius anjerensis Bleeker, 1851b
Anadromous; enter brackish waters; distributed throughout the Indo-Pacific; record from Bunaken Island, off Manado, Sulawesi Utara (Bleeker, 1851b).

***Lentipes mekonggaensis* Keith, Hadiaty, Hubert, Busson & Lord, 2014**
Presumably amphidromous; terra typica is a fast flowing stream in Sulawesi Tenggara (Keith et al. 2014).

***Lentipes watsoni* Allen, 1997**
Presumably anadromous; record from Sulawesi Tenggara (02°65.035´S 121°06.855´E, ZFMK 45041); type locality in Papua New Guinea; determination based on one male specimen matching the diagnosis of the species description (Allen 1997).

***Lophogobius bleekeri* Popta, 1921**
Anadromous; enter brackish and freshwaters; distributed throughout the Western Pacific; recorded from Raha, Muna Island, off Sulawesi Tenggara (Popta 1921).

***Mugilogobius adeia* Larson & Kottelat, 1992**
Freshwater; endemic to Lake Matano, Malili Lakes system, Sulawesi Selatan (Larson 2001, Larson & Kottelat 1992).

***Mugilogobius amadi* (Weber, 1913)**
Gobius amadi Weber, 1913
Weberogobius amadi Koumans, 1953
Freshwater; endemic to Lake Poso, Sulawesi Tengah; originally abundant, not reported since 1985 (Larson 2001).

***Mugilogobius chulae* (Smith, 1932)**
Vaimosa chulae Smith, 1932
Freshwater; distributed throughout the South-East Asian

archipelago, southern Japan, Sri Lanka, Thailand, Malaysia, Taiwan and Singapore (Huang et al. 2013, Tan & Lim, 2004); record from Boloang, Sulawesi Utara (Larson 2001, Larson et al. 2008).

***Mugilogobius hitam* Larson, Geiger, Hadiaty & Herder, 2014**
Freshwater; most likely endemic to Lake Towuti, Sulawesi Selatan (Larson et al. 2014).

***Mugilogobius latifrons* (Boulenger, 1897)**
Gobius latifrons Boulenger, 1897
Gobius latifrons Weber, 1913
Vaimosa latifrons Aurich, 1938
Freshwater; endemic to streams and lakes of the Malili Lakes system, Sulawesi Selatan (Larson et al. 2014).

***Mugilogobius lepidotus* Larson, 2001**
Freshwater; endemic to Lake Towuti, Malili Lakes system, Sulawesi Selatan; recorded by F.H. in 2002 and 2004.

***Mugilogobius mertoni* (Weber, 1911)**
Gobius mertoni Weber, 1911
Tamanka mindora Herre, 1945
Vaimosa layia Herre, 1953
Tamanka mertoni Koumans, 1953
Potential: Anadromous; distributed throughout the Indo-Pacific; no actual records for Sulawesi (Heemstra et al. 2004, Huang et al. 2013, Larson 2001, Larson et al. 2013, Manilo & Bogorodsky 2003).

***Mugilogobius rexi* Larson, 2001**
Freshwater; endemic to Lake Mahalona and Lake Towuti, Sulawesi Selatan (Larson 2001).

***Mugilogobius sarasinorum* (Boulenger, 1897)**
Gobius sarasinorum Boulenger, 1897
Tamanka sarasinorum Koumans, 1953
Freshwater; endemic to Lake Poso, Sulawesi Tengah; highly abundant in 2013 (F.H. pers. obs.).

***Oxyurichthys tentacularis* (Valenciennes, in Cuvier & Valenciennes, 1837)**
Gobius tentacularis Valenciennes, in Cuvier & Valenciennes, 1837
Oxyurichthys rumbia Popta, 1922
Anadromous; enters brackish and freshwaters; distributed throughout the Indo-West Pacific (Maugé 1986); record from Rumbia, Sulawesi Tenggara (Popta 1922).

***Periophthalmus kalolo* Lesson, 1831**
Periophthalmus argentilineatus Valenciennes, in Cuvier & Valenciennes, 1837
Anadromous; enter brackish and freshwaters; records from Buton (Tweedley et al. 2013), Sulawesi Selatan (04°14.475´S 119°36.826´E, ZFMK 066001-066002).

***Redigobius bikolanus* (Herre, 1927)**
Vaimosa bikolana Herre, 1927
Anadromous; enter brackish and freshwaters; distributed throughout Borneo, Sulawesi and the Philippines (Kottelat et al. 1993); record from Buton (Tweedley et al. 2013).

***Redigobius penango* (Popta, 1922)**
Pseudogobius penango Popta, 1922
Anadromous; enter brackish and freshwaters; distributed in Indonesia; record from Penango, Sulawesi Tenggara (Larson 2010, Popta 1922).

***Schismatogobius bruynisi* de Beaufort, 1912**
Anadromous; enter brackish and freshwaters; distributed throughout Indonesia and the Philippines (de Beaufort 1912, Keith & Lord 2011, Kottelat & Whitten 1996, Kottelat et al. 1993); record from Sulawesi Tengah (121°06.855'E 02°56.035'S, ZFMK 45049).

***Schismatogobius marmoratus* (Peters, 1868)**
Gobiosoma marmorata Peters, 1868
Anadromous; enter brackish and freshwaters; distributed throughout Sulawesi, Philippines and Japan (Keith & Lord 2011, Kottelat et al. 1993); record from Sulawesi Tengah (02°56.035'S 121°06.855'E, ZFMK 066059; 00°55.395'S 122°52.962'E, ZFMK 066060).

***Sicyopterus cynocephalus* (Valenciennes, in Cuvier & Valenciennes, 1837)**
Sicydium cynocephalum Valenciennes, in Cuvier & Valenciennes, 1837
Anadromous; enter brackish and freshwaters; distributed throughout Indonesia and the Philippines (Keith & Lord 2011, Koumans 1953); records from Manado harbour, Sulawesi Utara (Valenciennes, in Cuvier & Valenciennes 1837), Sulawesi Utara (Haryono et al. 2002) and Buton (Tweedley et al. 2013).

***Sicyopterus longifilis* de Beaufort, 1912**
Anadromous; enter brackish and freshwaters (Allen 1991, Keith & Lord 2011); distributed throughout Seram, Sulawesi, Sumatra and the Philippines (Koumans 1953); records from Sulawesi Utara (Haryono et al. 2002), Sulawesi Selatan (3°27.242'S 119°32.357'E, ZFMK 69563-69573, 69575-69577; 3°30.822'S 119°32.267'E, ZFMK 69604-69609, 69618-69619), Sulawesi Barat (2°39.081'S 119°12.436'E, ZFMK 69632-69641; 2°38.428'S 119 09.294'E, ZFMK 69667-69673; 2°37.915'S 119°09.488'E, ZFMK 69677-69678; 2°37.368'S 119°08.784'E, ZFMK 69689-69696; 3°16.651'S 118°51.929'E, ZFMK 69816-69821, 69837).

***Sicyopterus macrostetholepis* (Bleeker, 1853)**
Sicydium macrostetholepis Bleeker, 1853c
Sicydium gymnauchen Bleeker, 1858a
Anadromous; enter brackish and freshwaters; distributed throughout Indonesia and the Philippines (Allen 1991, 2011, Keith & Lord 2011); record from Manado, Sulawesi Utara (Bleeker 1858a), Buton and Kabaena (Tweedley et al. 2013), Sulawesi Utara (Haryono et al. 2002).

***Sicyopterus microcephalus* (Bleeker, 1855)**
Sicydium microcephalus Bleeker, 1855b
Anadromous; enter brackish and freshwaters; distributed throughout Asia (Allen 1991, Keith & Lord 2011); record from Buton (Tweedley et al. 2013).

***Sicyopterus micrurus* (Bleeker, 1854)**
Sicydium micrurus Bleeker, 1854a
Anadromous; enter brackish and freshwaters; distributed throughout Asia (Allen 1991, Keith & Lord 2011); records from Buton and Kabaena (Tweedley et al. 2013).

***Sicyopus zosterophorus* (Bleeker, 1856)**
Sicydium zosterophorum Bleeker, 1856b
Anadromous; enter brackish and freshwaters; distributed throughout Asia (Allen 1991); record from Sulawesi Barat (3°16.651'S 118°51.929'E, ZFMK 69810-69813, 69835-69836).

***Stenogobius ophthalmoporus* (Bleeker, 1854)**
Gobius ophthalmoporus Bleeker, 1854a
Chonophorus lachrymosus Weber, 1894a
Anadromous; enter brackish and freshwaters; distributed throughout Asia; records from Sulawesi Selatan (Watson 1991, Weber 1894a) and Buton (Tweedley et al. 2013).

***Stiphodon elegans* (Steindachner, 1879)**
Anadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Watson 1995); records from Buton and Kabaena (Tweedley et al. 2013), Sulawesi Tengah (02°56.035'S 121°06.855'E, ZFMK 066027-066028), Sulawesi Selatan (3°27.242'S 119°32.357'E, ZFMK 69578-69584; 3°30.822'S 119°32.267'E, ZFMK 69620-69622), Sulawesi Barat (2°39.081'S 119°12.436'E, ZFMK 69648-69649; 2°38.428´S 119°09.294'E, ZFMK 69667-69669; 2°37.915'S 119°09.488'E, ZFMK 69702-69704; 3°16.651'S 118°51.929'E, ZFMK 69832-69834); specimens recorded outside the Society, Tubuai and Samoa Islands are considered as closely related to *S. elegans* (Kottelat 2013).

***Stiphodon semoni* Weber, 1895**
Anadromous; enter brackish and freshwaters; distributed throughout the Indo-Pacific (Watson 1996); records from Buton (Tweedley et al. 2013), Sulawesi Utara; (Haryono et al. 2002).

***Yongeichthys nebulosus* (Forskål, 1775)**
Gobius nebulosus Forskål, 1775
Acentrogobius nebulosus (Forsskål, 1775)
Potential: Anadromous; enter brackish and freshwaters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Randall et al. 1990).

ACANTHUROIDEI

Scatophagidae
Scats: Euryhaline; enter brackish waters; distributed throughout the Indo-West Pacific (Berra 2001, Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Scatophagus argus* (Linnaeus, 1766)**
Chaetodon argus Linnaeus, 1766
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Allen 1984); record from Buton (Tweedley et al. 2013).

SCOMBROIDEI

Sphyraenidae
Barracudas: Marine; enter brackish waters; distributed in all tropical and subtropical parts of the Atlantic, Indian and Pacific Ocean (Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Sphyraena barracuda* (Edwards, in Catesby, 1771)**
Esox barracuda Edwards, in Catesby, 1771
Euryhaline; juveniles enter brackish waters (Kottelat 2013; Senou 2001); record from Sulawesi Selatan (4°07.456'S 119'37.196'E, ZFMK 69758); original description is a rejected work and not available as a source, author of the species description follows Kottelat (2013).

***Sphyraena obtusata* Cuvier, in Cuvier & Valenciennes, 1829**
Potential: Euryhaline; enter brackish waters; no actual records for Sulawesi; distributed throughout the Indo-Pacific (Senou 2001).

ANABANTOIDEI

Anabantidae
Climbing gouramies: Freshwater; enter brackish waters; distributed throughout the Indo-West Pacific (Berra 2001, Eschmeyer 2015, Froese & Pauly 2014, Nelson 2006).

***Anabas testudineus* (Bloch, 1792)**
Anthias testudineus Bloch, 1792
Anabas variegatus Bleeker, 1851a
Introduced: Freshwater; enter brackish waters; native to India, South and Southeast Asia; record from Kema, Sulawesi Utara (Bleeker 1851a), Malili Lakes system (Na-

Table 1. Summary of species and records according to i) region and ii) salt tolerance / ecology. Total numbers of records and species are highlighted, numbers of introduced and endemic species refer to these total numbers. Species with no actual record for Sulawesi are listed as "potential". Note that obligate and primary freshwater fishes are combined as freshwater fishes. The islands of Buton and Kabaena, off Sulawesi Tenggara, are treated as individual regions (Tweedley et al. 2013).

	Region	Euryhaline	Amphidromous	Anadromous	Catadromous	Freshwater	Total	Introduced	Endemic
Records	Sulawesi Utara	3	-	9	7	5	24	3	1
	Gorontalo	1	-	-	1	1	3	1	-
	Sulawesi Tengah	3	-	3	3	30	39	15	14
	Sulawesi Barat	1	-	7	1	4	13	3	-
	Sulawesi Selatan	23	2	9	5	65	104	19	41
	Sulawesi Tenggara	4	1	6	1	7	19	-	5
	Buton	10	-	13	4	1	28	1	-
	Kabaena	1	-	4	1	-	6	-	-
	Unspecified region	4	-	-	1	1	6	1	3
	Potential	29	-	4	5	1	39	-	-
Species	Sulawesi	77	5	35	20	89	226	22	65

sution & Aisyah 2013), Sulawesi Selatan, Lake Poso, Sulawesi Tengah (Kottelat 1990b, confirmed in 2012 by F.H.).

Osphronemidae
Gouramies: Freshwater; distributed throughout Sumatra, Java and Borneo; able to breath atmospheric air using a specialised respiratory organ (Berra 2001, Kottelat et al. 1993, Nelson 2006).

***Trichopodus* (*Trichogaster*) *pectoralis* Regan, 1910**
Introduced: Freshwater; native to Thailand; record from the Malili Lakes system, Sulawesi Selatan (Herder et al. 2012a, Kottelat et al. 1993,).

***Trichopodus* (*Trichogaster*) *trichopterus* Pallas, 1770**
Introduced: Freshwater; native to Sundaland and Indochina; record from the Malili Lakes system, Sulawesi Selatan (Herder et al. 2012a, Kottelat et al. 1993), Lake Poso, Sulawesi Tengah (Kottelat 1990b, visual record F.H.).

Channidae
Snakeheads: Freshwater; native to tropical Africa and Southern Asia (Berra 2001; Nelson 2006).

***Channa lucius* (Cuvier, in Cuvier and Valenciennes, 1831)**
Ophicephalus lucius Cuvier, in Cuvier and Valenciennes, 1831
Introduced: Freshwater; native to Sundaland and Indochina; record from the Malili Lakes system, Sulawesi Selatan (Kottelat et al. 1993).

***Channa striata* (Bloch, 1793)**
Ophicephalus striatus Bloch, 1793
Introduced: Freshwater; native to India, China and Southeast Asia; records from the Malili Lake system, Sulawesi Selatan (Hadiaty & Wirjoatmodjo 2002, Hadiaty et al. 2004, Herder et al. 2012a), Lake Poso, Sulawesi Tengah (3°41.589'S 119°38.629'E, ZFMK 69518; 3°30.822'S 119°32.267'E, ZFMK 69625) and Sulawesi Barat (2°38.428'S 119°09.294'E, ZFMK 69671-69672).

PLEURONECTIFORMES

Paralichthyidae
Sand flounders: Euryhaline, enter brackish and freshwaters; distributed throughout the Atlantic and Indo-Pacific (Froese & Pauly 2014, Eschmeyer 2015, Nelson 2006).

***Pseudorhombus malayanus* Bleeker, 1865**
Euryhaline; enter brackish waters (Amaoka & Hensley 2001), record from Makassar, Sulawesi Selatan, (Bleeker 1865a).

***Pseudorhombus neglectus* Bleeker, 1865**
Euryhaline; enter brackish waters (Amaoka & Hensley 2001); record from Makassar, Sulawesi Selatan (Bleeker, 1865a).

Soleidae
Soles: Euryhaline; enter brackish and freshwaters; distributed throughout tropical and temperate regions; usually flat, bottom dwelling fishes (Froese & Pauly 2014, Nelson 2006).

***Achirus poropterus* (Bleeker, 1851)**
Euryhaline; enter brackish and freshwaters (Bleeker 1851c); record from Sulawesi Selatan (4°07.456'S 119'37.196'E, ZFMK 69766-69767).

TETRAODONTIFORMES

Triacanthidae
Triplespines: Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Nelson 2006, Santini & Tyler 2002).

***Triacanthus biaculeatus* (Bloch, 1786)**
Balistes biaculeatus Bloch, 1786
Triacanthus russellii Bleeker, 1851d
Euryhaline; enter brackish waters (Matsuura 2001); record from Makassar, Sulawesi Selatan (Bleeker 1851d).

Tetraodontidae
Puffers: Euryhaline; enter brackish and freshwaters; distributed throughout all tropical and subtropical parts of the Atlantic and Indo-Pacific (Nelson 2006, Yamanoue et al. 2011).

***Arothron manilensis* (Marion de Procé, 1822)**
Tetrodon Manilensis Marion de Procé, 1822
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Randall 1985); record from Sulawesi Selatan (04°07.540'S 119°37.295'E, ZFMK 066046-066052).

***Chelonodontops patoca* (Hamilton, 1822)**
Tetrodon patoca Hamilton, 1822
Chelonodon patoca (Hamilton, 1822)
Euryhaline; enter brackish waters; distributed throughout the Indo-Pacific (Talwar & Jhingran 1991); record from Sulawesi Selatan (04°07.540'S 119°37.295'E, ZFMK 060060).

***Dichotomyctere erythrotaenia* (Bleeker, 1853)**
Tetraodon erythrotaenia Bleeker, 1853e
Euryhaline; enter brackish and freshwaters; distributed throughout the Indo-West Pacific (Allen, 1991); record from Maros, Sulawesi Selatan (Bleeker 1853e).

DISCUSSION

Actual records and likely occurrences of fishes in inland waters of Sulawesi sum up to a total of 226 species (see Table 1 for details). This ichthyofauna is composed of 112 genera and 56 families, dominated by Gobiidae (41 species, 18%), Adrianichthyidae (20 species, 9%), Telmatherinidae (19 species, 8%), and Zenarchopteridae (17 species, 7%). Taken together, these four families account for 43% of the island's total inland fish species diversity.

Sulawesi´s native inland ichthyofauna is heterogeneous in terms of salt tolerance: Only 89 species (44% of all native species) are obligate freshwater fishes, whereas 77 species (38% of all native species) are euryhaline. 60 species (29% of all native species) are amphi-, ana- or catadromous, migrating between marine and freshwater environments. 65 species (32% of all native species) of the species inventory are endemic. 46 (71% of all endemic species) of these endemic species are from radiations in the ancient lakes of Sulawesi while only 18 riverine including three euryhaline species are considered endemic. In addition, endemism also appears to be unevenly distributed among the families. Telmatherinidae (19 species), Adrianichthyidae (17 species) and Zenarchopteridae (17 species) contain in sum 86% of all endemic Sulawesi fishes.

In 2011, Parenti reported a total of 76 native freshwater fish species from Sulawesi, of which 56 were considered endemic. This significantly higher number reported here arises to a smaller proportion from additional, recent species descriptions (e.g. Hoese et al. 2015, Huylebrouck et al. 2012, 2014, Larson et al. 2014, Mokodongan et al. 2014, Parenti et al. 2013). However, it is largely due to the wider focus of the present list, which includes all fish species recorded from Sulawesi´s inland waters, also widespread fish species that are very likely to be expected in the island's inland waters, but without actual records.

Sulawesi's freshwater and coastal habitats are facing substantial and manifold threats from habitat degradation (e.g. urbanization, damming, surface mining), and stocking with alien fish species (African cichlids, Asian carps, snakeheads, or gouramis, and others – see Kottelat et al. 1993, Herder, et al. 2012, Tweedley et al. 2013). The list presented here includes 22 introduced species, some of which have been recognized as potential threats to the indigenous fauna of Sulawesi´s ancient lakes (see Herder et al. 2012a for alien fish species recorded in the Malili Lakes area).

The total number of fish species of Sulawesi's freshwater and brackish habitats is significantly lower than that of the Sundaic islands, like closeby Borneo with its at least 430 fish reported species (Kottelat et al. 1993, McGinley & Hogan 2003, Tan 2006; but note that no actual checklist of the inland fishes is available). However, the actual size of Sulawesi is four times smaller than that of Bor-

neo (Rachman et al. 2015). With values between 37% (160 species, McGinley & Hogan 2003) to 62% (267 species, Tan 2006) Borneos rate of endemism is exceptionally high, however the four times smaller island of Sulawesi with its endemism rate of 32% (65 species), appears surprisingly close to its larger neighbour.

The actual state of exploration of the inland ichthyofauna of Sulawesi shows clear regional sampling biases.

However, it appears clear that the total species account of fishes occurring in Sulawesi's inland waters is strongly dominated by the lake species flocks (see also Tweedley et al. 2013, Parenti 2011, Herder & Schliewen 2010), but the exploration of the riverine fish species diversity, and its distribution across the island, remains in a generally fragmentary stage.

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