ACADEMIA JOURNAL OF BIOLOGY 2023, 45(1): 121–138
DOI: 10.15625/2615-9023/17521

FRESHWATER ICHTHYOFAUNA OF WETLANDS IN TABLAS ISLAND, ROMBLON, THE PHILIPPINES

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Received 18 September 2022; accepted 24 March 2023

ABSTRACT

The Philippines is a hotspot for biological variety and a hub for endemism on a worldwide scale. Despite this, most of the research has focused on terrestrial and marine biodiversity, with little knowledge of freshwater fish diversity and status. There has been no systematic research on these species in Romblon. As a result, this research was conducted. This study aims to evaluate the freshwater fishes of Tablas Island, Romblon, utilizing modified hoop nets, gill nets, scoop nets, and hook and line. A total of 44 species belonging to 36 genera and 19 families were identified. They are often found in rivers, and streams, while most of them are native to the Philippines, where they are being eaten by natives. The IUCN Red List placed the majority of these species in the Least Concern category. The dominating species was *Gambusia affinis*, with *Giuris margaritaceus* being the most frequent across all sites. A new locality record of an indigenous minnow species (*Barbodes hemictenus*) was found. The ichthyofauna of Tablas Island is diverse, with local species dominating. Only two introduced species were identified as threatened (Vulnerable). On the other hand, the rest were classified as Least Concern, Unknown, Not Evaluated, and Data Deficient.

Keywords: Freshwater ichthyofauna, Tablas Island, distribution, diversity, conservation.

Citation: Jeric B. Gonzalez, Vincent Jay H. Gado, Bernie G. Mantes, 2023. Freshwater ichthyofauna of wetlands in Tablas Island, Romblon, the Philippines. *Academia Journal of Biology*, 45(1): 121–138. https://doi.org/10.15625/2615-9023/17521

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INTRODUCTION

Freshwater habitats, such as lakes, swamps, marshes, temporary pools, rivers, streams, and other wetlands, are among the most productive and varied ecosystems (Nelson et al., 2016). Freshwater fauna has yet to be completely cataloged, particularly in tropical latitudes. Nonetheless, a new worldwide study shows that it is considerably bigger than the area covered by inland waterways would suggest (Balian et al., 2008).

The Philippines is one of the seventeen mega-diverse countries identified by the UNEP World Conservation Monitoring Centre, as well as a biodiversity hotspot (Heaney et al., 2004). It contains around 3,010 fish species, with only 343 (10%) of them living in freshwater, 83 of which are endemic, 206 of which are local, 44 of which are imported, and 42 of which are of uncertain status (Froese & Pauly, 2011).

Developing countries account for about 94 percent of all freshwater fisheries (FAO, 2007). Millions of the world's poorest people rely on freshwater fish for sustenance and a livelihood, while simultaneously contributing to the global economy via export goods, leisure, and tourism (Wordfish Center, 2002). Freshwater fish are estimated to provide more than 6% of the world's animal protein supply for humans each year (FAO, 2007). In certain countries, such as the Philippines, freshwater fish accounts for 50% of animal protein intake (Briones et al., 2004).

Habitat loss and modification, the introduction of invasive species, overfishing, pollution, forestry practices, and climate change are all threats to freshwater fish biodiversity. Freshwater fishes may now be the most endangered vertebrate group, according to the IUCN's assessment of more than 5,000 species to far (Reid et al., 2013). Furthermore, according to the ASEAN Centre for Biodiversity, the Philippines faces the greatest danger from population growth and infrastructural development. As a result, we need to evaluate freshwater ecosystems since we don't know what we're losing (ASEAN Centre for Biodiversity, 2010).

Despite the tremendous biodiversity of freshwater fish in the country, no study had been conducted on the biodiversity of freshwater fishes in the archipelagic province of Romblon, specifically in Tablas Island, as evidence of a lack of published literature online. Hence, this study was realized. This study aims to provide information on freshwater fishes of wetlands in Tablas Island, Romblon, such as species composition, distribution, species richness, diversity, evenness, dominance index, utilization, and conservation status.

MATERIALS AND METHODS

Sampling Site

The study was conducted in the whole of Tablas Island, Romblon, Philippines, from August 2018 to May 2019. The island lies about 50 km east of the southern part of Mindoro Island. The northern tip of Tablas Island is about 12 km from Romblon Island. It also lies on Sulu and the Visayan Sea encompassing the Sibuyan Sea and Romblon Passage. The western areas (Calatrava, San Andres, Odiongan, Ferrol) are characterized by lush green forest cover, and agricultural ecosystems like rice fields and coconut plantations. Meanwhile, the eastern areas (San Agustin, Sta. Maria, Alcantara) are rough to rugged topography. The southern section covering Santa Fe and the mid-western portion may be described as having rolling to rough terrain. Extremely rugged areas can be found in the central section of the island. Tablas is the largest island that comprises the province of Romblon in the Philippines. The fish collection was conducted in different large freshwater bodies of nine municipalities, namely, Looc, Sta. Fe, Alcantara, Sta. Maria, San Agustin, Calatrava, San Andres, Odiongan, and Ferrol. Sampling was done in running (stream, river, creek, and irrigation) and standing water (Marsh and Idle Fishpond). Site selection in all municipalities was done before the proper sampling of the study. All chosen sites were marked by GPS for GSI Mapping.

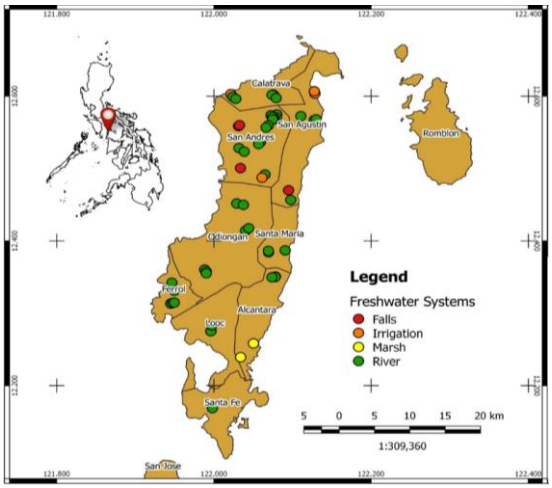

Figure 1. The map of Tablas Island, Romblon, Philippines. The colored circles indicate the different sampling sites on the island

Fish sampling

Multiple sampling techniques were used in the study that included both passive and active gears such as hoop net, set gillnet, scoop net, and hook and line. The fish collection was done between 10 in the morning and 3 in the afternoon. Species caught using different collection schemes were counted and included in the study. The Key Informant Interview and photo documentation were done to determine every species' local uses and threats to its habitat.

Fixation and preservation of freshwater fishes

Specimens having a Standard Length (SL) of less than 100 mm were put immediately in 70% ethyl alcohol and stored for a week before being replaced with newly produced alcohol. Specimens bigger than 100 mm were submerged for 3–4 hours in full-strength formalin (37 percent aqueous solution) before being transferred to 10% formalin (diluted 1: 9 part water v/v) for a week. For formalin absorption, a slit was cut in the specimen's right side or formalin was injected directly into the fish. All of the samples were taken to the lab for proper identification. Specimens were cleaned and immersed in tap water with a daily water change after a week of fixation. While the samples were soaked in tap water for 5–7 days, photo documentation, morphometric, and meristic characterizations were performed. Afterwards, the specimens were exposed to an alcohol series (20%, 50%, and 70% ethyl alcohol) for 5–7 days each. Finally, specimens were sorted by species and summarized by sampling location before being stored in 70 percent ethyl alcohol that had been newly produced. All samples were secured in RSU-San Agustin Campus Biological Repository.

Documentation and identification of freshwater fishes

Identification was based on taxonomic studies by Kottelat et al. (1993, 1996), Rainboth (1996), and Kottelat (2001). FishBase was also utilized as a reference since they are the only sources that provide complete lists of Philippine freshwater fishes. In addition, pictures and unidentifiable samples were sent to freshwater fish specialists and professionals.

Key informant interview

Information on the utilization of freshwater fishes collected was through actual interviews to the local communities that live near the sampling sites.

Data analysis

Biological indices were computed for each representative site. Species richness (D) was determined by the number of species present in a community. The diversity index was calculated following the Shannon Index: $H' = -[(ni/N) \log (ni/N)]$ where; p is the proportion of individuals found in the ith species and ln is the natural logarithm (Shannon & Weaver 1949). Pielou's Evenness Index (e) used the Shannon's Diversity Index and computed as: $e = H'/\log S$ where; S = total number of species (Pielou 1969). Species dominance was calculated using the Simpson's Dominance Index formula: $c = [ni (ni - 1)/N(N - 2)]$, where: ni is the number of individuals in its species; and N is the total number of individuals.

RESULTS

Species composition of freshwater fish of Tablas Island, Romblon, Philippines

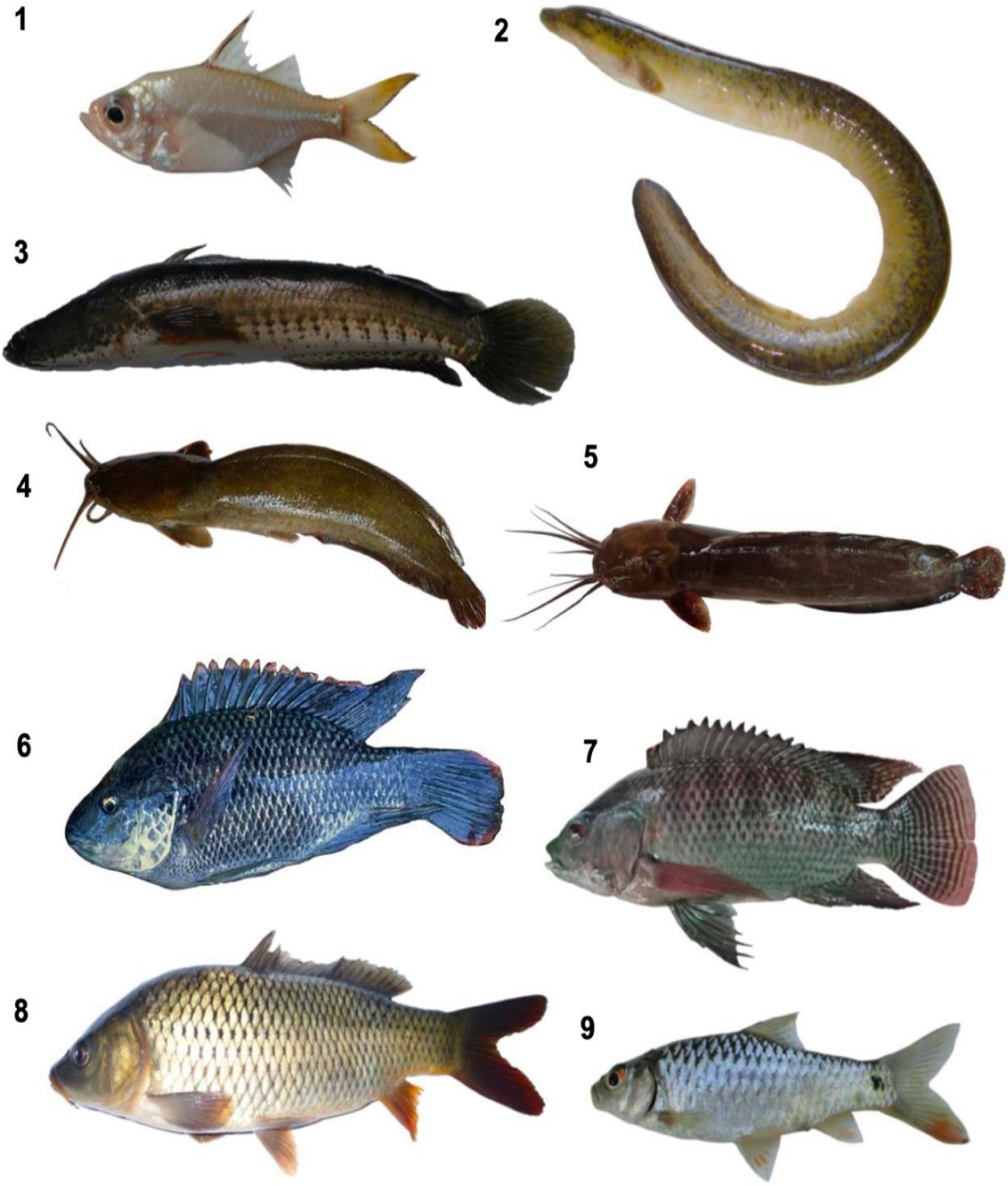

Figure 2. Photos of fish recorded in freshwater habitats of
1. *Ambassis*, 2. *Anguilla marmorata*,
3. *Channa striata*, 4. *Clarias gariepinus*,
5. *Clarias macrocephalus*,
6. *Oreochromis mossambicus*,
7. *Oreochromis niloticus*,
8. *Cyprinus carpio*,
9. *Barbodes hemictenus*

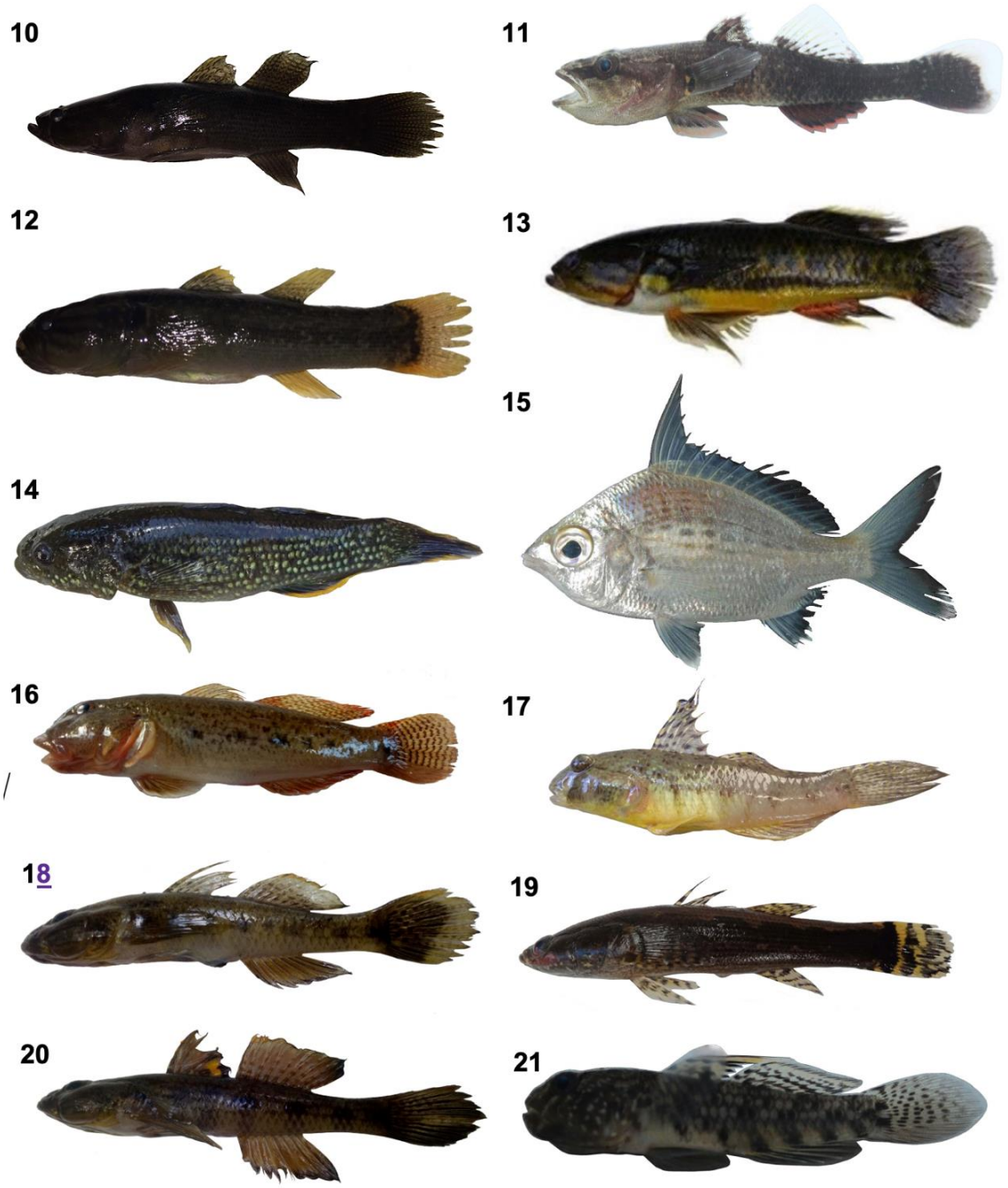

Figure 2 (Continued). 10. *Eleotris fusca*, 11. *Butis gymnopomus*,
12. *Belobranchus segura*, 13. *Guiris margaritaceus*,
14. *Ophiocara porocephala*, 15. *Gerres filamentosus*,
16. *Awaous grammepomus*, 17. *Exyrias puntang*,
18. *Glossogobius clitellus*, 19. *Glossogobius giuris*,
20. *Glossogobius illimis*,
21. *Redigobius bikolanus*

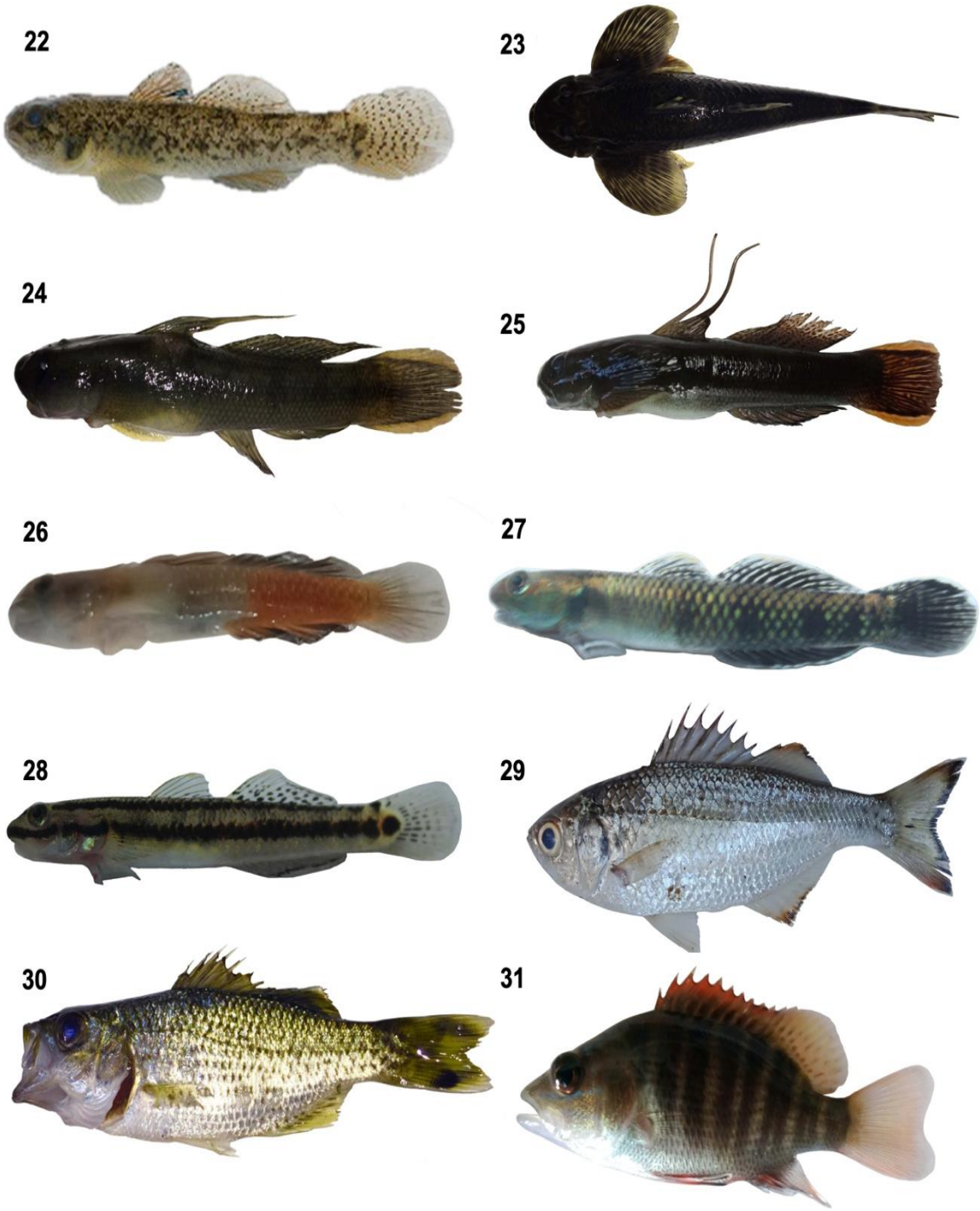

Figure 2 (Continued). 22. *Redigobius chrysosoma*, 23. *Rhyacichthys aspro*, 24. *Sicyopterus lagocephalus* Pallas, 25. *Sicyopterus longifilis*, 26. *Sicyopus cebuensis*, 27. *Stiphodon atropurpureus* (Male), 28. *Stiphodon atropurpureus* (Female), 29. *Kuhlia marginata*, 30. *Kuhlia rupestris*, 31. *Lutjanus argentimaculatus*

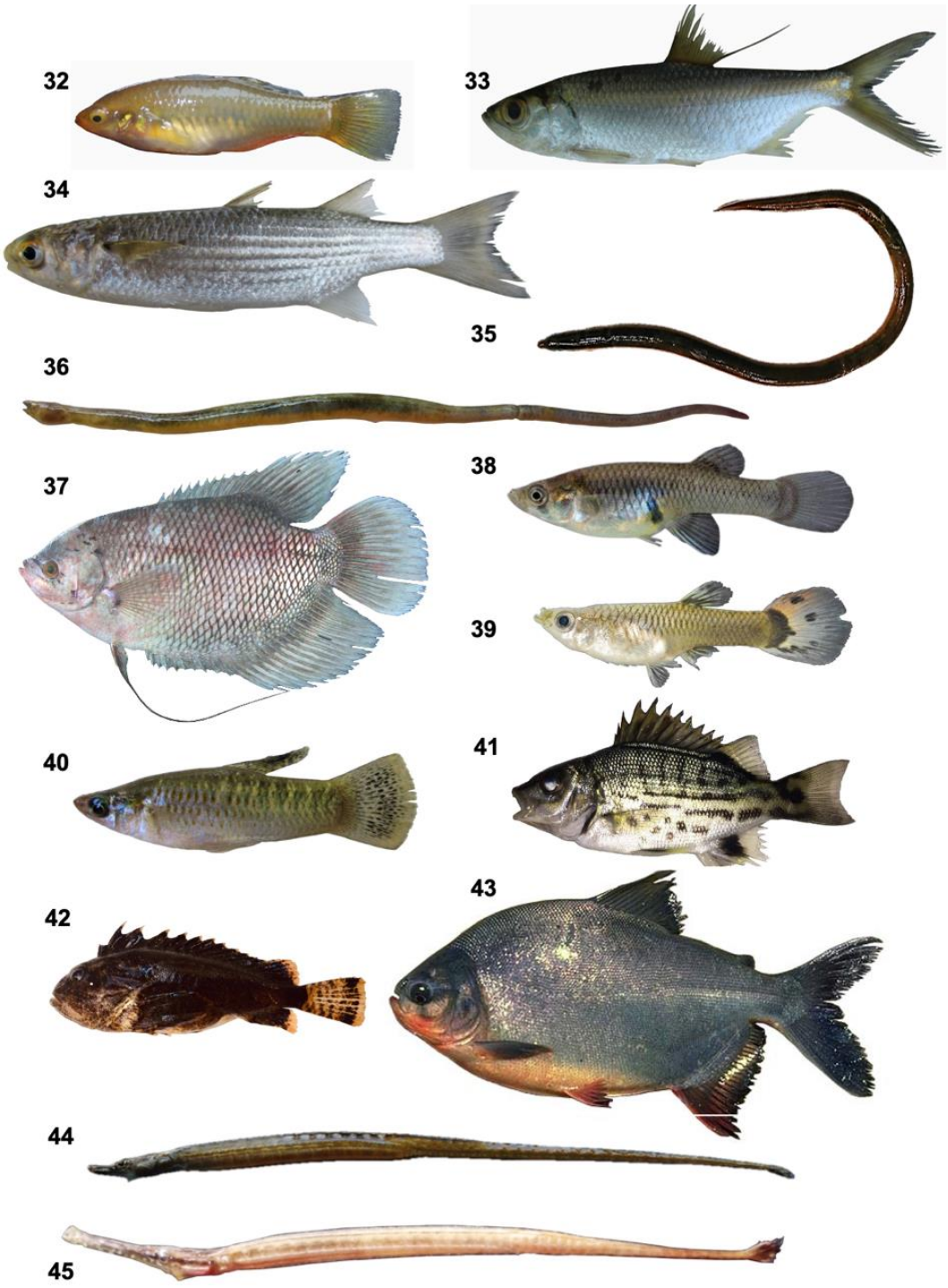

Figure 2 (Continued). 32. *Hypseleotris cyprinoides*, 33. *Megalops cyprinoides*, 34. *Mugil cephalus*, 35. *Monopterus albus*, 36. *Lamnostoma mandora*, 37. *Osphronemus goramy*, 38. *Gambusia affinis*, 39. *Poecilia reticulata*, 40. *Poecilia sphenops*, 41. *Mesopristes cancellatus*, 42. *Neovespicula depressifrons*, 43. *Colossoma macropomum*, 44. *Microphis brachyurus*, 45. *Coelonotus leiaspis*

Table 1. Checklist of the species composition of freshwater fishes in Tablas Island, Philippines

Family	Species	Common Name	Local Name	Sampling Site Collected
Ambassidae	*Ambassis interrupta* Bleeker, 1853	Long-Spined Glassfish	Native	Lo, Ca, SAn,
Anguillidae	*Anguilla marmorata* Quoy & Gaimard, 1824	Giant mottled eel	Native	Fe, SFe, Al, SAg, Ca, SAn, Od
Channidae	*Channa striata* Bloch, 1793	Snakehead Murrel	Introduced	Lo, Al, SAg, Ca, Od
Clariidae	*Clarias gariepinus* Burchell, 1822	North African Catfish	Introduced	Fe, SFe, Al, SAg, Ca, SAn, Od
	Clarias macrocephalus Gunther, 1864	Bighead Catfish	Native	SAg
Cichlidae	*Oreochromis mossambicus* Peters, 1852	Mozambique Tilapia	Introduced	SAg
	Oreochromis niloticus Linnaeus, 1758	Nile Tilapia	Introduced	Lo, Al, SAg, Ca, SAn, Od
Cyprinidae	*Cyprinus carpio* Linnaeus, 1758	Common Carp	Introduced	SAg
	Barbodes hemictenus Jordan & Richardson, 1908	Minnow	Native	Od
Eleotridae	*Eleotris fusca* Forster, 1801	Brown Spine-Cheek	Native	Fe, Lo, SFe, Al, SMa, SAg, Ca, SAn, Od
	Butis gymnopomus Bleeker, 1849	Northern Mud Gudgeon	Native	SAg
	Belobranchus segura Keith, Hadiaty & Lord, 2012	Throatspine Gudgeon	Native	SAg, Ca, Od
	Guiris margaritaceus Valenciennes, 1837	Snakehead Gudgeon	Native	Fe, Lo, SFe, Al, SMa, SAg, Ca, SAn, Od
	Ophiocara porocephala Valenciennes, 1837	Spotted Sleeper	Native	SAg
Gerreidae	*Gerres filamentosus* Cuvier, 1829	Whipfin Silver-Biddy	Native	SAg
Gobiidae	*Awaous grammepomus* Bleeker, 1849	Scribbled Goby	Native	Fe, Lo, Al, SMa, SAg, Ca, SAn, Od
	Exyrias puntang Bleeker, 1851	Puntang Goby	Native	SAg, Ca
	Glossogobius clitellus Hoese & Allen, 2012	Goby	Native	Al, SAg, SAn, Od
	Glossogobius giuris Hamilton, 1822	Tank Goby	Native	SAg, SAn
	Glossogobius illimis Hoese & Allen, 2012	Goby	Native	SAg. SAn, Od
	Redigobius bikolanus Herre, 1927	Speckled Goby	Native	SAg
	Redigobius chrysosoma Bleeker,1875	Spot Fin Goby	Native	SAg
	Rhyacichthys aspro Valenciennes, 1837	Loach Goby	Native	Od

Family	Species	Common Name	Local Name	Sampling Site Collected
	Sicyopterus lagocephalus Pallas, 1770	Goby	Native	Fe, Al, SMa, SAg, Ca, SAn
	Sicyopterus longifilis Beaufort, 1912	Goby	Native	SAn
	Sicyopus cebuensis Chen & Shao, 1998	Goby	Native	SAn
	Stiphodon atropurpureus Herre, 1927	Goby	Native	Lo, SFe, SMa, SAg, Ca, SAn
Kuhliidae	*Kuhlia marginata* Cuvier, 1829	Mountain Bass	Native	Lo, Al, SMa, SAg, Ca, SAn, Od
	Kuhlia rupestris Lacepede, 1802	Rock Flagtail	Native	Lo, SMa, SAn
Lutjanidae	*Lutjanus argentimaculatus* Forsskal, 1775	Mangrove Jack Snapper	Native	SAg
Megalopidae	*Hypseleotris cyprinoides* Valenciennes, 1837	Tropical Carp-Gudgeon	Native	Fe, SAg, Ca
	Megalops cyprinoides Broussonet, 1782	Indo-Pacific Tarpon	Native	Lo, Al, SAg
Mugilidae	*Mugil cephalus* Linnaeus, 1758	Flathead Grey Mullet	Native	SMa, Ca, Od
Ophichtidae	*Monopterus albus* Zuiew, 1793	Rice Swamp Eel	Native	SAg, Ca, SAn, Od
	Lamnostoma mindora Jordan & Richardson, 1908	Snake Ell	Native	SAn
Osphronemidae	*Osphronemus goramy* Lacepede, 1801	Giant Gourami	Introduced	SAg
Poeciliidae	*Gambusia affinis* Baird & Girard, 1853	Mosquito Fish	Introduced	SAg, Ca, SAn, Od
	Poecilia reticulata Peters, 1859	Guppy	Introduced	SAg
	Poecilia sphenops Valencienes, 1821	Guppy	Introduced	Fe
Terapontidae	*Mesopristes cancellatus* Cuvier, 1829	Tapiroid Grunter	Native	Lo, Al, SMa, Ca, SAn, Od
	Neovespicula depressifrons Richardson, 1848	Leaf Goblin Fish	Native	Lo, SAn
Serrasalmidae	*Colossoma macropomum* Cuvier, 1816	Black Pacu	Introduced	SAg
Syngnathidae	*Coelonotus leiaspis* Bleeker, 1854	Barhead Pipefish	Native	SMa, SAg, Ca, SAn
	Microphis brachyurus Bleeker, 1854	Opossum Pipefish	Native	SAg, Ca

Note: Al (Alcantara), Ca (Calatrava), Fe (Ferrol), Lo (Looc), Od (Odiongan), SAn (San Andres), SAg (San Agustin), SFe (Sta. Fe, SMa (Sta. Maria).

This ichthyofaunal survey recorded 2,957 specimens belonging to 44 species, 35 genera, and 19 families (Table 1 & Fig. 2). Fish species composition in Tablas Island was primarily composed of native species (41 species) and predominated by gobiids (12 species). *Gambossia affinis* was the dominant species among all species comprising more than half of the samples collected (1,420), while *Eleotris fusca* and *Guiris margaritaceus* were the most common in all sites; it was found in all municipalities. A new record of an endemic species of minnow was identified named *Barbodes hemictenus* under the family Cyprinidae.

Species distribution of freshwater fishes in different habitats

Five habitats were identified during the survey: creek, irrigation, marsh, idle fishpond, and river or stream (Fig. 3). Among all these habitats, the river or stream has the highest number of freshwater fishes caught and identified with 35 species, followed by the idle fishpond with 17 species, irrigation with 16 species, creek with eight species, and marsh with five species, respectively. Freshwater fishes recorded in the river/stream were dominated by species belonging to the family Gobiidae. Meanwhile, introduced species such as *O. niloticus* and *C. gariepinus* were recorded in all of the freshwater habitats of Tablas Island.

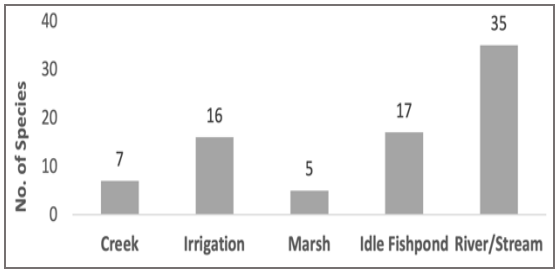

Figure 3. Species distribution in different freshwater habitats of Tablas Island, Philippines

Diversity, evenness, and dominance index of freshwater fishes Tablas Island, Romblon, Philippines

Table 2. The computed value of species richness, diversity, evenness, and dominance index of freshwater fishes across Tablas Island, Philippines

Sites	No. of species	Species richness	Shannon Diversity Index	Pielou's Evenness Index	Simpson's Dominance Index
Ferrol	8	2.289	1.421	1.421	2.708
Looc	11	2.798	2.093	1.939	6.458
Alcantara	12	2.543	1.367	1.313	2.650
St. Fe	5	1.017	1.258	1.800	0.041
Sta. Maria	10	2.798	1.586	1.470	0.007
San Agustin	34	10.173	0.870	0.539	1.380
Calatrava	20	5.341	1.926	1.435	4.181
San Andres	22	7.121	2.521	1.724	9.128
Odiongan	17	5.087	1.774	1.342	4.009
Tablas Island	44	12.717	2.156	0.621	3.876

The highest number of freshwater fishes identified was recorded in the municipality of San Agustin, and the lowest was recorded in Sta. Fe, Romblon. The same result was also recorded in terms of species richness. The highest record was observed in San Andres, and the lowest was in San Agustin in terms of diversity index. Meanwhile, the Municipality of Looc has the highest value of the evenness index, and the town of San Agustin has the

lowest value. In terms of the dominance index, the highest value was recorded in San Andres, and the lowest was observed in San Sta. Fe, Romblon (Table 2).

Utilization of freshwater fish of Tablas Island, Romblon, Philippines

Out of 44 species identified on the island, 32 were utilized as food by the locals or 73%, followed by 10 species (23%) as ornamental, three species as fish control. Meanwhile, there were six species has no record of utilization (Table 3).

Table 3. The checklist of the utilization of freshwater fishes of Tablas Island, Romblon, Philippines

Species	Usage			
	Food	Ornamental	Fish control	None
Ambassis interrupta Bleeker, 1853	x			
Anguilla marmorata Quoy & Gaimard, 1824	x			
Awaous grammepomus Bleeker, 1849	x			
Barbodes hemictenus Jordan & Richardson, 1908	x			
Belobranchus segura Keith, Hadiaty & Lord, 2012	x			
Butis gymnopomus Bleeker, 1849				x
Channa striata Bloch, 1793	x			
Clarias gariepinus Burchell, 1822	x			
Clarias macrocephalus Gunther, 1864	x			
Coelonotus leiaspis Bleeker, 1854				x
Colossoma macropomum Cuvier, 1816	x	x		
Cyprinus carpio Linnaeus, 1758	x	x		
Eleotris fusca Forster, 1801	x			
E1yrias puntang Bleeker, 1851	x			
Gambusia affinis Baird & Girard, 1853			x	
Gerres filamentosus Cuvier, 1829	x			
Glossogobius clitellus Hoese & Allen, 2012	x			
Glossogobius giuris Hamilton, 1822	x			
Glossogobius illimis Hoese & Allen, 2012	x			
Guiris margaritaceus Valenciennes, 1837	x			
Hypseleotris cyprinoides Valenciennes, 1837		x		
Kuhlia marginata Cuvier, 1829	x			
Kuhlia rupestris Lacepede, 1802	x			
Lamnostoma mindora Jordan & Richardson, 1908	x			
Lutjanus argentimaculatus Forsskal, 1775	x			
Megalops cyprinoides Broussonet, 1782	x			
Mesopristes cancellatus Cuvier, 1829	x			
Microphis brachyurus Bleeker, 1854				x
Monopterus albus Zuiew, 1793				x
Mugil cephalus Linnaeus, 1758	x			
Neovespicula depressifrons Richardson, 1848				x
Ophiocara porocephala Valenciennes, 1837	x		x	
Oreochromis mossambicus Peters, 1852	x			

Species	Usage			
	Food	Ornamental	Fish control	None
Oreochromis niloticus Linnaeus, 1758	x			
Osphronemus goramy Lacepede, 1801	x			
Poecilia reticulata Peters, 1859	x	x		
Poecilia sphenops Valencienes, 1821		x	x	
Redigobius bikolanus Herre, 1927		x		
Redigobius chrysosoma Bleeker,1875	x			
Rhyacichthys aspro Valenciennes, 1837				x
Sicyopterus lagocephalus Pallas, 1770	x	x		
Sicyopterus longifilis Beaufort, 1912	x	x		
Sicyopus cebuensis Chen & Shao, 1998		x		
Stiphodon atropurpureus Herre, 1927		x		
Total	32 (73%)	10 (23%)	3 (7%)	6 (14%)

Conservation status of freshwater fishes of Tablas Island, Romblon as well as its habitat

Based on the IUCN Redlist information, the 51 species of Tablas Island were listed in six categories. 20 species were categorized as List Concern followed by Not Evaluated with 13 species, six species were Data Deficient and both Vulnerable and Near Threatened have two species while one species was Unknown (Fig. 4). On the other hand, two threatened species were introduced in the country, namely, *C. macropomum* and *C. carpio*.

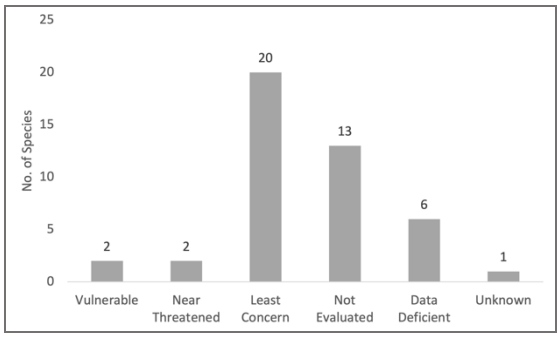

Figure 4. Conservation status of freshwater fishes of Tablas Island, Romblon, Philippines

DISCUSSION

From 2,957 samples collected during the survey, 51 species were identified belonging to 22 families. According to FishBase (Frosese & Pauly, 2022), currently, there are 341 freshwater fishes present in the Philippines. Thus, Tablas Island holds about 15% of the country's freshwater fish composed of 41 native species including the endemic species of minnow (*Barbodes hemictenus*) and 11 introduced species to the country.

Among the fish group recorded, the Gobiidae species make up the majority of the freshwater fish of Tablas Island in Romblon, numbering 15 species. This family of fish is one of the most structurally and numerically diversified fish families on the entire planet (Miller, 1986). These are stream gobies that have evolved to live in pure, forested, rapid, and cold headwater reaches (Kenzie, 1997). Many goby species have a condition known as amphidromous, in which the larvae are carried out to sea but later return to rivers, where they develop into adults. Gobies' migratory behavior is widespread among species found on small, subtropical islands (Tweedley et al., 2013). The migration of these species from sea to river or vice versa is possible as the downstream part where these species were found near the coastal area, hence outlet of the stream flows into the ocean.

Although there were three marine species were recorded in this study, these species

were also thriving in freshwater. For instance, the *Gerres filamentusos* was reported in different countries found in freshwater. The adults of this species are coastal inhabitants found on soft bottoms (Allen et al., 2002), over the sandy substrate (Rainboth, 1996). While the juveniles are found in brackish mangrove estuaries, sometimes enter freshwater (Allen, 1991; Allen et al., 2002), In the case of *Mugil cephalus*, the adults are found in coastal waters (Eschmeyer et al., 1983; Allen et al., 2002,). They often entering estuaries up to rivers (Albaret, 2003; Allen, 1991; Allen et al., 2002; Thomson, 1986; Yamada et al., 1995), sometimes far-up-river, lagoons and hypersaline environments (Eschmeyer et al., 1983). They are usually in schools over sand or mud bottom (Eschmeyer et al., 1983). Juveniles feed on zooplankton until about 3.0 cm SL (Kottelat & Freyhof, 2007). Reproduction takes place at sea, at various times of the year depending on the location (Albaret, 2003). Adults form schools and migrate offshore to spawn and developing larvae migrate back inshore and upstream (Thompson, 1986). There is an absence of an obligatory freshwater phase in the life cycle (Whitfield et al., 2012). The *Lutjanus argentimaculatus* is a euryhaline species (Lewis & Pring, 1986). The juveniles and young adults of this species occur in mangrove estuaries, the lower reaches of freshwater streams (Sommer et al., 1996; Zagars et al., 2012; Allen et al., 2002), and tidal creeks (Allen et al., 2002). Adults are often found in groups around coral reefs (Zagars et al., 2012).

Only one endemic species was recorded in this study, the *Barbodes hemictenus*. In this survey, this species was only recorded in the Patu-o River of Odiongan, Romblon. Interestingly, *B. hemictenus* is a species of cyprinid fish endemic to the island of Mindoro in the Philippines. It is only known to occur in the Sabaan, Mamboc, Baco rivers and Lake Naujan (Kottelat, 2013). However, the reason for the occurrence of this endemic species in Tablas Island, Philippines is still unknown.

Freshwater native fish assemblage in Tablas Island is primarily composed of well-adapted stream gobies in pristine, vegetated, fast-flowing, and cool headwater reaches (Vorwerk et al., 2007). Unlike the populations of *Gambusia affinis* and *G. margaritaceus* distributed throughout all habitats on the island, all other native species (eel, native cyprinid, pipefish, leaf globin, mullet, bass, and gudgeons) were observed to be restricted in the upstream and midstream. In ecological viewpoint, the occurrence (also preference) of these fish populations are generally dependent on the environmental components and habitat feature of their ecosystem, including vegetation structure (Herre, 1927a), water depth (Ross, 1986), elevation (May & Brown, 2000), water velocity (Herder & Freyhof, 2006), and bottom substratum type (May & Brown, 2000). Mainly because they relied on the habitats in which they live. These native fish species can be considered ecologically important bioindicators of riverine health status (Cagauan, 2007). A high count of native species implies a healthy aquatic ecosystem such that native fish species are representative of local eco-environments for their high adaptation and dependence (He, 2010). Meanwhile, Marine (2013) reported that native species are indicators of the health of aquatic ecosystems. The endemic species *Barbodes hemictenus* was only collected in Patu-o River in Odiongan which significantly dominated in fish individual counts in these two sites, therefore implying a stable river ecosystem.

Although introduced species made up a tiny percentage of the fish composition (10 species), they were one of the most dominating fish species. *Gambossia affinis* was the most numerous species, accounting for at least half of all fish specimens (1420). The invasion success of introduced fish species occupies the river systems of the study site, albeit the overall pattern of their abundance is relatively high in downstream areas. The expansive nature of these fishes is accounted for their high reproductive capacity and for being habitat generalists (Guerrero,

2014; Cagauan, 2006). Their populations also tend to occupy warmer, shallow low gradient streams and rivers. The inadvertent and intentional introduction of imported species by inhabitants, as well as their escape from adjacent rice fields and cum ponds, is associated with increased incidence of their presence (Jeric Gonzalez, personal communication). According to Kennard et al. (2005), their existence may be both a warning indicator and a cause of declining river health and native fish assemblage integrity.

The different freshwater habitat of Tablas Island is relatively diverse ichthyofauna (species= 51, H'= 2.156), represented mainly by native species (Table 2). The richness and diversity are somewhat higher compared to the mountain streams of Mount Makiling Forest Reserve, including Dampalit (species = 12, H' = 1.12) and Molawin (species= 12, H' = 1.19) (Paller et al., 2011), but lower than those have been calculated in Bulusan River in Sorsogon (species = 16, H' = 2.41) and Pansipit River in Batangas (species = 21, H' = 3.05) (Corpuz et al., 2010; 2011). The freshwater fish assemblage diversity and distribution are often influenced by biotic and abiotic causes (Paul & Meyer, 2001). These factors include, among others, the variability of stream water levels and flow (Bradford & Heinonen, 2008), the geo-hydrological feature of the river (Angermeier & Davideanu, 2004), the heterogeneity of microhabitats (Shervette et al., 2007), and, to some extent, are adversely affected by urbanization, habitat alteration, anthropogenically-induced climate change (Welcomme, 1995; Guerrero, 2002).

The majority of the freshwater fish identified (31 species, or 71 percent) were eaten by the inhabitants. Freshwater fish is an essential part of the food of village people who live near freshwater sources, just as it is in other nations (Bidisha & Angsuman, 2019). Around 94 percent % of all freshwater fisheries are found in developing countries (FAO, 2007). Millions of the world's poorest people rely on them for food and resources, and they contribute to the global economy via export goods, trade, tourism, and leisure (Worldfish Center, 2002). In the Mekong River basin alone, 55.3 million people depend on freshwater fish for subsistence and livelihood, with an estimated average fish consumption of 56.6 kg/person/year (Baran et al., 2007). Freshwater fish are estimated to provide more than 6% of the world's animal protein supply for humans each year (FAO, 2007). In Bangladesh, Indonesia, and the Philippines, freshwater fish account for 50% of animal protein intake, while in Thailand and Vietnam, they account for 40%. It is often the only source of animal protein for low-income families (Briones et al., 2004). Notably, the threatened species in Tablas Island have introduced species (Common Carp & Black Pacu). Both species were introduced to the Philippines because of their economic importance for the aquaculture industry FAO (2007). It was noticed that most of the native species were categorized as Least Concern, Unknown, Not Evaluated, and Data Deficient (Fig. 4). Based on more than 5,000 species evaluated by the IUCN so far, freshwater fishes may currently be the most endangered category of vertebrates, according to Reid et al. (2013). Habitat alteration, fragmentation, and destruction; invasive species; overfishing; pollution; forestry practices; and climate change are major risks to freshwater fishes and another freshwater biodiversity. Species or biodiversity often decrease as a result of several threats. The actual risk comes from the cumulative or synergistic effects of human-caused changes. These natural species in our province may become endangered in the future due to the province's fast growth and development.

CONCLUSION

This study revealed that the Ichthyofauna of Tablas Island is diverse. It holds the country's 44 out of 346 freshwater species, and one is endemic to the Philippines. Most of the species belonged to gobiids and were native to the Philippines. They are common in rivers, streams, irrigation creeks, and canals, and the majority of them were utilized as food by the locals. Most of these species were classified in the Least Concern

category by the IUCN Red List. An introduced species dominated the freshwater ecosystem of Tablas Island.

Acknowledgements: Romblon State University provided funding for the fieldwork and equipment. We thank the LGUs and Barangays in Tablas Island, Romblon for granting permits to make this research possible. Special thanks to Maria Cristina Joana Macalisang and Einstein Ronnie Manipol who supported the project in various ways.

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