

Diversity of Freshwater Fishes from Wangtakrai Park in Nakhon Nayok Province, Central Thailand, With Notes on Species Composition and Regional Biogeography

Sirikanya Chungthanawong^{1*}, Jenjit Khudamrongsawat², Chavalit Vidthayanon³, Dome Pratumthong¹, Amonpong Klaipet¹ and Veera Vilasri¹

¹ Division of Zoology, Office of Natural Science Research, National Science Museum Thailand, 39, Moo 3, Khlong 5, Khlong Luang, Pathum Thani, 12120, Thailand

² Department of Biology, Faculty of Science, Mahidol University, Rama VI Road, Ratchathewi, Bangkok, 10400, Thailand

³ Seub Nakhasathien Foundation, 140, Tiwanon Road, Bangkasor, Mueang Nonthaburi, Nonthaburi, 11000, Thailand

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Corresponding author

Sirikanya Chungthanawong

E-mail: Sirikanya.c@nsm.or.th

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Dr. Weeyawat Jaitrong

E-mail: polyrhachis@yahoo.com/

weeyawat@nsm.or.th

Abstract

Surveys of hillstream fishes at Wangtakrai Park, Nakhon Nayok Province, central Thailand, were conducted from November 2022 to July 2024 to assess species number and composition. The checklist of fish diversity was created based on 756 specimens collected during this period representing 22 species across 14 families and 6 orders. The species composition showed that the most dominant family was Cyprinidae with five species (22.7%) followed by the families Danionidae, Bagridae, Mastacembelidae and Channidae, each with two species (9.1%). The most abundant species by individual count was *Poropuntius deauratus* (43.4%) followed by *Channa limbata* (18.7%) and *Xenentodon canciloides* (9.1%). Notably, *Glyptothorax coracinus* was recorded for the first time in the Bang Pakong Basin. The results suggested that Wangtakrai Park can sustainably maintain the equilibrium of its forest-stream habitat, likely serving as a biogeographical overlap zone for ichthyofauna from the Chao Phraya River and Phanom Krawan Range.

Keywords: highland fish, species composition, Bang Pakong Basin, *Glyptothorax coracinus*.

Introduction

Wangtakrai Park is where two swift, clear mountain streams—Khlong Wangtakrai and Khlong Maduea—meet after originating from the southwestern base of Khao Yai Mountain. These streams converge before flowing into the Nakhon Nayok River, an eastern tributary of the Bang Pakong River Basin (Fig. 1). These forest streams are notable for their diverse microhabitats, including riffles, pools, runs, shallow shorelines, diversion weirs, areas at the base of the willow-leaved water croton (*Homonoia riparia* Lour.) and rocky or gravel beds that

support various kinds of fishes providing resources for feeding, shelters and life style needs (Fig. 2). The fishes are brightly colored, attracting tourists during stream activities. However, there is currently no information on fish species available to support eco-tour learning and raise conservation awareness.

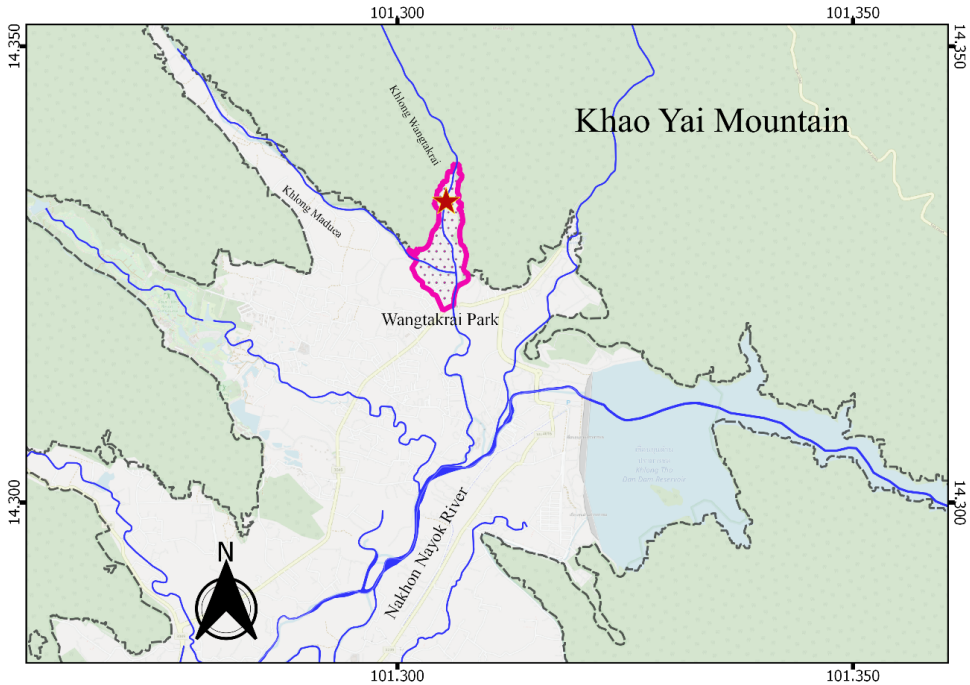


Figure 1. Survey region for fish sampling from November 2022 to July 2024.

Previous studies on fish fauna in Wangtakrai Park and adjacent areas have primarily focused on lowland habitats. Smith (1945) initially documented 17 species of freshwater fish based on specimens collected from the upper Bang Pakong and Nakhon Nayok Basins. Duangsawasdi *et al.* (1983) conducted surveys in Bang Pakong Rivers reporting 39 species of riverine fish from Nakhon Nayok River in Mueang District, Nakhon Nayok Province. Recently, Khowhit *et al.* (2023) recorded 31 fish species across 18 families and 10 orders. Lowland habitats have been increasingly impacted by habitat modification and the introduction of non-native species (Tóth *et al.*, 2019; Yang *et al.*, 2024), while highland habitats are generally less affected due to both private and legal protections. However, highland habitats remain vulnerable to other factors that require further study. Highland habitats tend to support fish fauna distinct from lowland areas (Erős, 2007), though such information is limited for Thailand. To build a database of highland fishes from this region, we selected Wangtakrai Park as an ideal site for a detailed study of fish assemblage in the habitat. This study aims to provide a species list of highland or forest fishes in Wangtakrai Park and to enhance our understanding of the species composition that contributes to the regional biogeography.

Materials and Methods

Field surveys were conducted every four months from November 2022 to July 2024 along two main streams, Khlong Wangtakrai and Khlong Maduea. Various kinds of fishing gears (seine nets, hand nets, cast nets and fishing traps) were used to collect fish from shallow to deep waters (Fig. 3). Live fish caught were euthanized in large plastic containers filled with water mixed with clove oil and aerated. Once dead, the fish were positioned on a foam board with fins spread and secured using pins and concentrated formalin solution. The fully fixed specimens were rinsed with clean water and photographed. Then, they were pre-preserved by immersion in 10% formalin contained in a plastic container. After two weeks, the specimens



Figure 2. Khlong Wangtakrai in July 2024, representing microhabitat of sampling station.



Figure 3. Fish sampling by cast nets, in November 2022 at Khlong Wangtakrai.

Table 1. List of fishes collected at Wangtakrai Park.

Species	number (individuals)	note
Order Cypriniformes		
Family Balitoridae		
<i>Homalopteroides smithi</i> (Hora, 1932)	8	
Family Cyprinidae		
<i>Barbodes rhombeus</i> (Kottelat, 2000)	41	
<i>Crossocheilus tchangi</i> Fowler, 1935	30	
<i>Hampala macrolepidota</i> Kuhl and van Hasselt, 1823	29	
<i>Poropuntius deauratus</i> (Valenciennes, 1842)	328	
<i>Systemus rubripinnis</i> (Valenciennes, 1842)	3	
Family Danionidae		
<i>Danio albolineatus</i> (Blyth, 1860)	1	
<i>Rasbora paviana</i> Tirant, 1885	45	
Family Nemacheilidae		
<i>Nemacheilus platiceps</i> Kottelat, 1990	3	
Order Siluriformes		
Family Amblycipitidae		
<i>Amblyceps caecutiens</i> Blyth, 1858	10	
Family Bagridae		
<i>Hemibagrus spilopterus</i> Ng and Rainboth, 1999	7	
<i>Pseudomystus siamensis</i> (Regan, 1913)	5	
Family Clariidae		
<i>Clarias gariepinus</i> x <i>C. macrocephalus</i>	2	hybrid
Family Sisoridae		
<i>Glyptothorax coracinus</i> Ng and Rainboth, 2008	3	(1 st record in Bang Pakong)
Order Gobiiformes		
Family Gobiidae		
<i>Eugnathogobius siamensis</i> (Fowler, 1934)	8	
Order Synbranchiformes		
Family Mastacembelidae		
<i>Macragnathus circumcinctus</i> (Hora, 1924)	3	
<i>Mastacembelus favus</i> Hora, 1923	7	

Table 1. List of fishes collected at Wangtakrai Park. (continue).

Species	number (individuals)	note
Family Synbranchidae		
<i>Monopterus javanensis</i> Lacepède, 1800	7	
Order Anabantiformes		
Family Channidae		
<i>Channa limbata</i> (Cuvier, 1831)	141	
<i>Channa striata</i> (Bloch, 1793)	1	
Family Pristolepididae		
<i>Pristolepis fasciata</i> (Bleeker, 1851)	5	
Order Beloniformes		
Family Belonidae		
<i>Xenentodon canciloides</i> (Bleeker, 1854)	69	

were transferred to 70% ethanol for permanent preservation and deposited at the National History Museum Thailand (THNHM).

Fish identification primarily followed the key by Grudpan *et al.* (2023) with additional references from Rainboth (1996), Ng and Rainboth (2008), Ciccotto *et al.* (2017), Nagao Natural Environment Foundation (2021) and Hoàng *et al.* (2024). Current classification was based on Van der Laan *et al.* (2024). A checklist was alphabetically constructed by order, family, genus and species names. Each species entry includes the scientific name, localities, collection dates, registration numbers, numbers of specimens and specimen sizes, respectively. Size of most specimens are generally expressed by standard length (SL) or total length (TL) following Hubbs and Lagler (1958). Morphometrics and meristic data applied for *Glyptothorax coracinus* follow Ng and Rainboth (2008).

Results

A total of 22 species across 14 families and six orders (Table 1) based on 756 specimens were collected. Among these, the family Cyprinidae was the dominant group with five species (22.7% of the total species count) followed by Danionidae, Bagridae, Mastacembelidae and Channidae, each two species (9.1%). Other families, including Balitoridae, Nemacheilidae, Amblycipitidae, Sisoridae, Gobiidae, Synbranchidae, Pristolepididae and Belonidae, were represented by only one species (4.5%) each (Fig. 4) with an alien species of Clariidae.

At the species level, *Poropuntius deauratus* was the most abundant species comprising 43.4% of the specimens collected at the site, followed by *Channa limbata* (18.7%) and *Xenentodon canciloides* (9.1%). Seven species were of moderate abundance while 12 species were relatively rare. Nearly all fishes were native species, except for the hybrid catfish, *Clarias gariepinus* x *C. macrocephalus*, recognized as an introduced species. In addition, *Glyptothorax coracinus* Ng and Rainboth, 2008 was recorded for the first time in the Bang Pakong Basin.

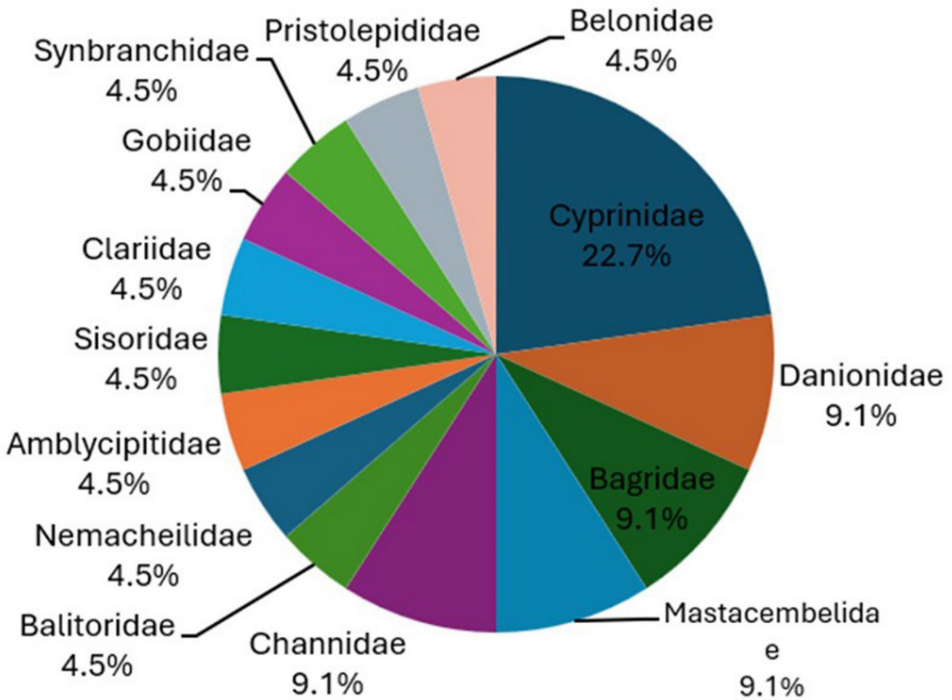


Figure 4. The percentage of fish species across 14 families collected from Khlong Wangtakrai and Khlong Maduea from November 2022 to July 2024.

Species List

Order Cypriniformes

Family Balitoridae

1. *Homalopteroides smithi* (Hora, 1932) (Pl. 1A)

Khlong Wangtakrai: 13–17 Mar. 2023, THNHM-F22936–37 (2 specimens, 37–93 mm SL), THNHM-F22950, (1 specimen, 39 mm SL); 11–15 Mar. 2024, THNHM-F24959–63 (5 specimens, 38–53 mm SL). Total 8 specimens.

Family Cyprinidae

2. *Barbodes rhombeus* (Kottelat, 2000) (Pl. 1B)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21957–60 (4 specimens, 36–38 mm SL), THNHM-F21983 (1 specimen, 47 mm SL); 13–17 Mar. 2023, THNHM-F22916–8 (3 specimens, 48–86 mm SL), THNHM-F22938 (1 specimen, 52 mm SL); 17–21 Jul. 2023, THNHM-F23478 (1 specimen, 72 mm SL), THNHM-F23489 (1 specimen, 61 mm SL), THNHM-F23531 (1 specimen, 49 mm SL); 13–17 Nov. 2023, THNHM-F24105–11 (7 specimens, 24–72 mm SL), THNHM-F24128–30 (3 specimens, 29–46 mm SL), THNHM-F24142–45 (4 specimens, 31–91 mm SL), THNHM-F24181–2 (2 specimens 35–44 mm SL), THNHM-F24230–37 (8 specimens, 33–69 mm SL); 11–15 Mar. 2024, THNHM-F24675 (1 specimen, 68 mm SL), THNHM-F24919–20 (2 specimens, 31–66 mm SL); 8–12 Jul. 2024, THNHM-F25040 (1 specimen, 59 mm SL), THNHM-F25059 (1 specimen, 48 mm SL). Total 41 specimens.

3. *Crossocheilus tchangii* Fowler, 1935 (Pl. 1C)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21986–21989, (4 specimens, 58–125 mm SL); 13–17 Mar. 2023, THNHM-F22902-3 (2 specimens, 65–68 mm SL), THNHM-F22908–13 (6 specimens, 53–73 mm SL), THNHM-F22915 (1 specimen, 63 mm SL); 13–17 Nov. 2023, THNHM-F24192 (1 specimen, 80 mm SL); 11–15 Mar. 2024, THNHM-F24650–62 (13 specimens, 69–124 mm SL), THNHM-F24674 (1 specimen, 86 mm SL), THNHM-F24818–19 (2 specimens, 93–97 mm SL). Total 30 specimens.

4. *Hampala macrolepidota* Kuhl and van Hasselt, 1823 (Pl. 1D)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F 21952 (1 specimen, 70 mm SL), THNHM-F21976–77 (2 specimens, 115–192 mm SL); 13–17 Mar. 2023, THNHM-F22961 (1 specimen, 33 mm SL); 17–21 Jul. 2023, THNHM-F23477 (1 specimen, 84 mm SL), THNHM-F23487–88 (2 specimens, 64 mm SL), THNHM-F23533 (1 specimen, 69 mm SL); 13–17 Nov. 2023, THNHM-F24138–40 (3 specimens, 73–104 mm SL); 11–15 Mar. 2024, THNHM-F24637–40 (4 specimens, 31–133 mm SL), THNHM-F24673 (1 specimen, 32 mm SL), THNHM-F24676–81 (6 specimens, 34–57 mm SL), THNHM-F24811–14 (4 specimens, 36–133 mm SL), THNHM-F24930 (1 specimen, 34 mm SL); 8–12 Jul. 2024, THNHM-F25046 (1 specimen, 54 mm SL), THNHM-F25073 (1 specimen, 97 mm SL). Total 29 specimens.

5. *Poropuntius deauratus* (Valenciennes, 1842) (Pl. 1E)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21941–42 (2 specimens, 109–125 mm SL), THNHM-F21946–21951 (6 specimens, 104–120 mm SL), THNHM-F21956 (1 specimen, 90 mm SL), THNHM-F21962–21975 (14 specimens, 72–141 mm SL); 13–17 Mar. 2023, THNHM-F22901 (1 specimen, 111 mm SL), THNHM-F22904–7 (4 specimens, 31–50 mm SL), THNHM-F22914 (1 specimen, 28 mm SL), THNHM-F22920–30 (11 specimens, 28–53 mm SL), THNHM-F22939–46 (8 specimens, 23–50 mm SL), THNHM-F22962–98 (37 specimens, 21–55 mm SL); 17–21 Jul. 2023, THNHM-F23482–83 (2 specimens, 71–96 mm SL), THNHM-F23491–513 (23 specimens, 36–109 mm SL), THNHM-F23556–62 (7 specimens, 34–70 mm SL), THNHM-F23566 (1 specimen, 95 mm SL), THNHM-F23567-73 (7 specimens, 72–120 mm SL); 13–17 Nov. 2023, THNHM-F24114–15 (2 specimens, 91–95 mm SL), THNHM-F24146–7 (2 specimens, 99–112 mm SL); 11–15 Mar. 2024, THNHM-F24641–49 (9 specimens, 23–125 mm SL), THNHM-F24682–95 (14 specimens, 25–108 mm SL), THNHM-F24809–10 (2 specimens, 28–111 mm SL), THNHM-F24825–33 (9 specimens, 28–61 mm SL), THNHM-F24835–39 (5 specimens, 32–55 mm SL), THNHM-F24840–918 (79 specimens, 18–48 mm SL), THNHM-F24968–74 (7 specimens, 20–49 mm SL); 8–12 Jul. 2024, THNHM-F25001–25 (25 specimens, 43–75 mm SL), THNHM-F25027–31 (5 specimens, 43–52 mm SL), THNHM-F25047–58 (12 specimens, 38–69 mm SL), THNHM-F25074–94 (21 specimens, 53–86 mm SL), THNHM-F25115–25 (11 specimens, 45–75 mm SL). Total 328 specimens.

6. *Systemus rubripinnis* (Valenciennes, 1842) (Pl. 1F)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21940 (1 specimen, 75 mm SL); 13–17 Nov. 2023, THNHM-F24112–13 (2 specimens, 66–71 mm SL). Total 3 specimens.

Family Danionidae7. *Danio albolineatus* (Blyth, 1860) (Pl. 1G)

Khlong Wangtakrai: 13–17 Nov. 2023, THNHM-F24125 (1 specimen, 20 mm SL). Total 1 specimen.

8. *Rasbora paviana* Tirant, 1885 (Pl. 1H)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21981–82 (2 specimens, 45–69 mm SL); 17–21 Jul. 2023, THNHM-F23480–81 (2 specimens, 62–65 mm SL), THNHM-F23490 (1 specimen, 65 mm SL), THNHM-F23532 (1 specimen, 61 mm SL), THNHM-F23545–7 (3 specimens, 20–24 mm SL); 13–17 Nov. 2023, THNHM-F24104 (1 specimen, 48 mm SL), THNHM-F24126–7 (2 specimens, 35–39 mm SL), THNHM-F24157–65 (9 specimens, 38–62 mm SL), THNHM-F24167–70 (4 specimens, 37–47 mm SL), THNHM-F24183–4 (2 specimens, 32–40 mm SL), THNHM-F24238–46 (9 specimens, 36–53 mm SL); 8–12 Jul. 2024, THNHM-F25042 (1 specimen, 20 mm SL). Khlong Maduea: 14–16 Nov. 2022, THNHM-F21992–7 (6 specimens, 29–38 mm SL), THNHM-F22002–3 (2 specimens, 27–37 mm SL). Total 45 specimens.

Family Nemacheilidae9. *Nemacheilus platiceps* Kottelat, 1990 (Pl. 1I)

Khlong Wangtakrai: 17–21 Jul. 2023, THNHM-F23473 (1 specimen, 56.0 mm SL); 8–12 Jul. 2024, THNHM-F24383–4 (2 specimens, 49–51 mm SL). Total 3 specimens.

Order Siluriformes**Family Amblycipitidae**10. *Amblyceps caecutiens* Blyth, 1858 (Pl. 1J)

Khlong Wangtakrai: 13–17 Nov. 2023, THNHM-F24117–20 (4 specimens, 35–53 mm SL), THNHM-F24141 (1 specimen, 46 mm SL); 11–15 Mar. 2024, THNHM-F24808 (1 specimen, 55 mm SL), THNHM-F24965 (1 specimen, 63 mm SL); 8–12 Jul. 2024, THNHM-F25032–34 (3 specimens, 47–60 mm SL). Total 10 specimens.

Family Bagridae11. *Hemibagrus spilopterus* Ng and Rainboth, 1999 (Pl. 2A)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21985 (1 specimen, 151 mm SL); 11–15 Mar. 2024, THNHM-F24663–5 (3 specimens, 129–148 mm SL), THNHM-F24805–7 (3 specimens, 93–195 mm SL). Total 7 specimens.

12. *Pseudomystus siamensis* (Regan, 1913) (Pl. 2B)

Khlong Wangtakrai: 13–17 Nov. 2023, THNHM-F24116 (1 specimen, 56 mm SL); 11–15 Mar. 2024, THNHM-F 24666–7 (2 specimens, 81–104 mm SL), THNHM-F24696–7 (2 specimens, 66–73 mm SL). Total 5 specimens.

Family Clariidae13. *Clarias gariepinus* x *C. marocephalus* (Pl. 2C)

Khlong Wangtakrai: 13–17 Nov. 2023, THNHM-F24193–4 (2 specimens, 193–140 mm SL). Total 2 specimens.

Family Sisoridae14. *Glyptothorax coracinus* Ng and Rainboth, 2008 (Pl. 2D)

Khlong Wangtakrai: 11–15 Mar. 2024, THNHM-F24964 (1 specimen, 89 mm SL); 8–12 Jul. 2024, THNHM-F25041 (1 specimen, 120 mm SL), THNHM-F25095 (1 specimen, 88 mm SL). Total 3 specimens.

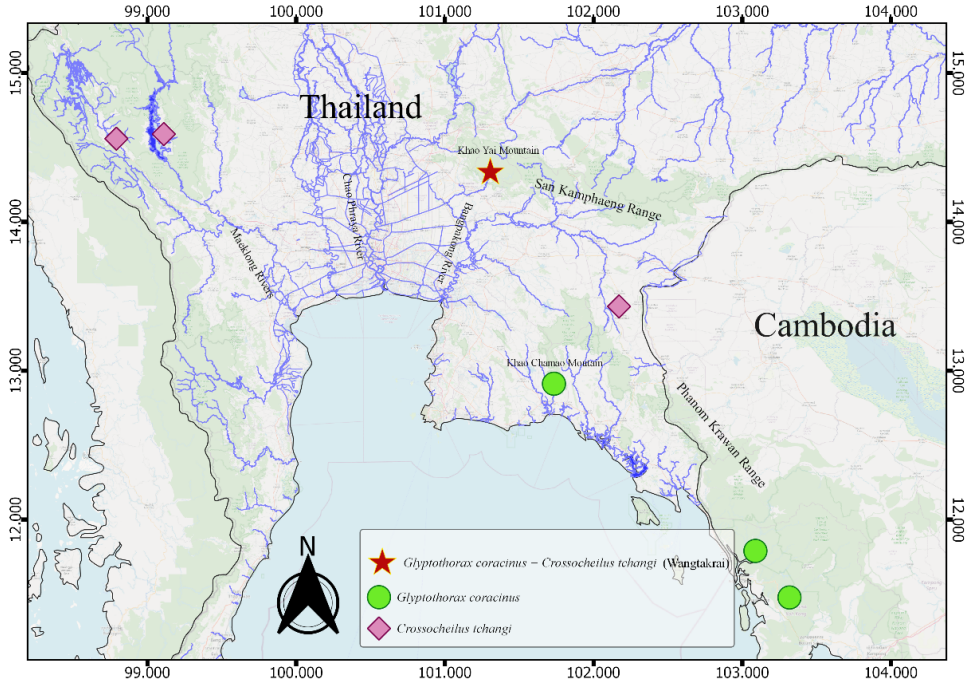


Figure 5. Distribution of *Glyptothorax coracinus* (circle) and *Crossocheilus tchangii* (diamond), based on previous records; and *Glyptothorax coracinus* and *Crossocheilus tchangii* in present study (star).

Remarks. The three specimens possess meristics with dorsal fin I,5 rays; anal fin iv,9 rays; pectoral fin I,9,i rays; pelvic fin i,5 rays; caudal-fin rays and vertebrae (abdominal + caudal vertebrae) $14 + 20 = 34(1)$, $15 + 20 = 35(1)$ and $15 + 21 = 36(1)$. Morphometrics of the specimens express proportion in % standard length (SL) with predorsal length 34.9–36.5, preanal length 65.7–67.7, prepelvic length 46.0–47.8, prepectoral length 19.9–20.4, length of dorsal-fin base 9.9–10.1, dorsal-spine length 17.4–19.0, length of anal-fin base 14.9–15.1, pelvic-fin length 17.3–17.9, pectoral-fin length 20.3–23.5, pectoral-spine length 20.1–23.5, caudal-fin length 27.2–30.5, length of adipose-fin base 14.1–15.1, dorsal to adipose distance 22.4–25.8, post-adipose distance 19.5–20.4, length of caudal peduncle 19.4–21.6, depth of caudal peduncle 9.0–10.7, body depth at anus 14.0–17.1, head length 22.1–24.6 and head width 18.6–20.0; and proportion in % head length (HL) with snout length 49.3–54.9, interorbital distance 27.4–31.3, eye diameter 9.1–9.7, nasal barbel length 18.5–24.7, maxillary barbel length 93.2–108.0, inner mandibular barbel length 22.4–28.2, and outer mandibular barbel length 39.7–47.6.

Ng and Rainboth (2008) described *Glyptothorax coracinus* from Ket River at Pursat and Areng River at Koh Kong, two drainages of Phanom Krawan Range in southwestern Cambodia. The species can be distinguished from other congeners in having blackish brown body with indistinct pale longitudinal stripes on the lateral lines and mid-dorsal regions, eye diameter 6.3–7.2% HL, length of adipose-fin base 12.3–14.5% SL, length of caudal peduncle 18.6–21.0% SL, depth of caudal peduncle 7.9–9.4% SL, vertebrae 36–37, tubercles on the dorsal surface of the head with a single, median ridge, absence of pale markings on the nuchal plate, and a thoracic adhesive apparatus with less convex lateral edges, posterior edge not reaching to level of base of last pectoral-fin ray and in which anastomosing striate are absent. Most morphological characteristics of present specimens agree well with those of *G. coracinus* in having blackish brown

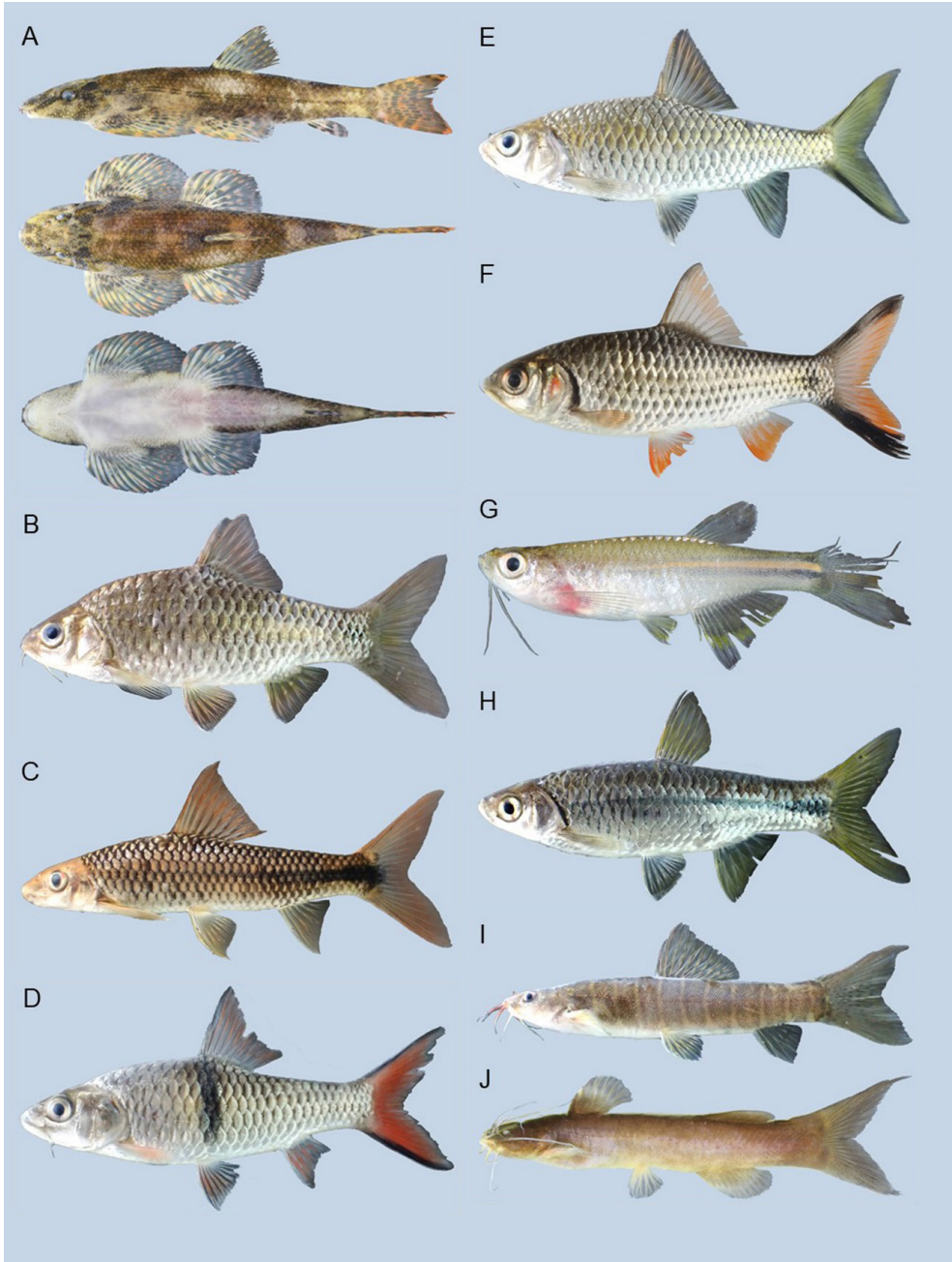


Plate 1. A. *Homalopteroides smithi* (THNHM-F24960, 47 mm SL); B. *Barbodes rhombeus* (THNHM-F23478, 78 mm SL); C. *Crossocheilus tchangi* (THNHM-F22093, 68 mm SL); D. *Hampala macrolepidota* (THNHM-F23477, 84 mm SL); E. *Poropuntius deauratus* (THNHM-F23483, 96 mm SL); F. *Systomus rubripinnis* (THNHM-F24113, 66 mm SL); G. *Danio albolineatus* (THNHM-F24125, 20 mm SL); H. *Rasbora paviana* (THNHM-F23480, 65 mm SL); I. *Nemacheilus platiceps* (THNHM-F23473, 56 mm SL); J. *Amblyceps caecutiens* (THNHM-F24141, 46 mm SL).

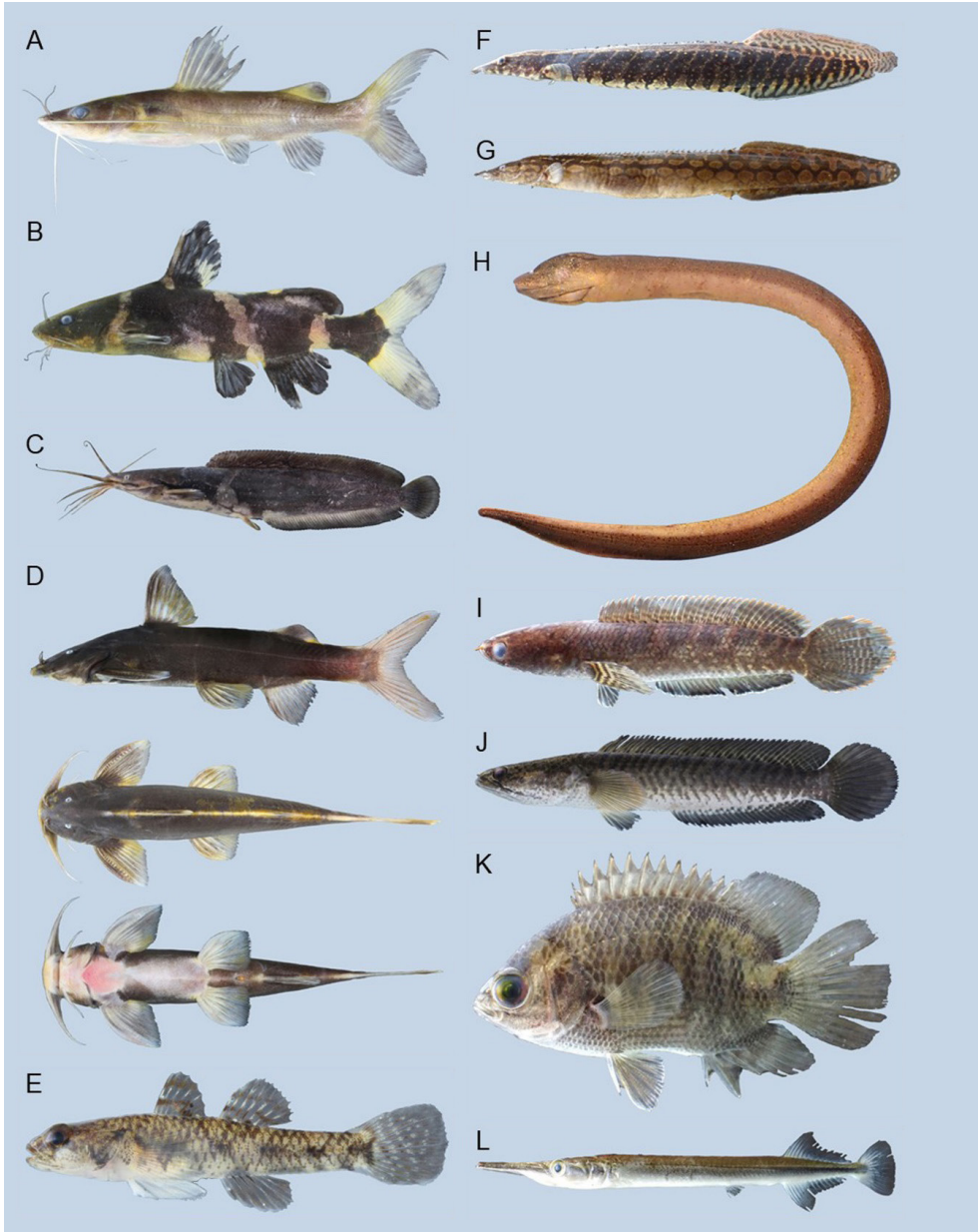


Plate 2. A. *Hemibagrus spilopterus* (THNHM-F24807, 93 mm SL); B. *Pseudomystus siamensis* (THNHM-F24696, 66 mm SL); C. *Clarias gariepinus* x *C. macrocephalus* (THNHM-F24194, 193 mm SL); D. *Glyptothorax coracinus* (THNHM-F24964, 89 mm SL); E. *Eugnathogobius siamensis* (THNHM-F25130, 18 mm SL); F. *Macrognathus circumcinctus* (THNHM-F23476, 84 mm SL); G. *Mastacembelus favus* (THNHM-F23486, 259 mm SL); H. *Monopterus javanensis* (THNHM-F22957, 550 mm TL); I. *Channa limbata* (THNHM-F23479, 82 mm SL); J. *Channa striata* (THNHM-F25060, 136 mm SL); K. *Pristolepis fasciata* (THNHM-F23474, 44 mm SL); L. *Xenentodon canciloides* (THNHM-F23485, 175 mm SL).

body with indistinct pale longitudinal stripes on the lateral lines and mid-dorsal regions, length of caudal peduncle 19.4–21.6 % SL, tubercles on the dorsal surface of the head with a single, median ridge, absence of pale markings on the nuchal plate and all aspects of thoracic adhesive apparatus (Ng and Rainboth, 2008; Vidthayanon, 2010). However, the specimens differ from *G. coracinus* in having larger eye (9.1–9.7 vs. 6.3–7.2% HL), longer adipose-fin base (14.1–15.1 vs. 12.3–14.5% SL), deeper caudal peduncle (9.0–10.7 vs. 7.9–9.4% SL) and slightly lower number of vertebrae (34–36 vs. 36–37) which are likely considered as intraspecific variations because of the original description based on only two type specimens from a small region in southwestern Cambodia before the present discovery.

Glyptothorax coracinus was originally known from watersheds of Phanom Krawan Range (referred to as Khao Banthat in Thai). Subsequently, this fish was photograph recorded from waterfalls of adjacent Klong Maduea, Nakonnayok and Khao Chamao Mountain, a hill of the middle of Chanthaburi Range in Rayong Province, eastern Thailand (Ng and Rainboth, 2008). Therefore, this presence of *G. coracinus* in Wangtakrai Park marks its first recorded occurrence in the Bang Pakong Basin, extending its distribution westward from Phanom Krawan Range in southwestern Cambodia to the southwestern of Khao Yai Mountain, a western hill of San Kamphaeng Range separating the highlands of southern Khorat Plateau in northeastern Thailand from the lowlands in eastern Thailand (Fig. 5).

Order Gobiiformes

Family Gobiidae

15. *Eugnathogobius siamensis* (Fowler, 1934) (Pl. 2E)
Klong Wangtakrai: 8–12 Jul. 2024, THNHM-F25129–36 (8 specimens, 11–18 mm SL). Total 8 specimens.

Order Synbranchiformes

Family Mastacembelidae

16. *Macragnathus circumcinctus* (Hora, 1924) (Pl. 2F)
Klong Wangtakrai: 14–16 Nov. 2022, THNHM-F21961 (1 specimen, 159 mm SL); 17–21 Jul. 2023, THNHM-F23476 (1 specimen, 84 mm SL); 13–17 Nov. 2023, THNHM-F24136 (1 specimen, 186 mm SL). Total 3 specimens.
17. *Mastacembelus favus* Hora 1923 (Pl. 2G)
Klong Wangtakrai: 14–16 Nov. 2022, THNHM-F21984 (1 specimen, 360 mm SL); 13–17 Mar. 2023, THNHM-F22931–32 (2 specimens, 205–214 mm SL), THNHM-F22956 (1 specimen, 114 mm SL); 17–21 Jul. 2023, THNHM-F23486 (1 specimen, 259 mm SL); 13–17 Nov. 2023, THNHM-F24137 (1 specimen, 213 mm SL); 8–12 Jul. 2024, THNHM-F25039 (1 specimen, 196 mm SL). Total 7 specimens.

Family Synbranchidae

18. *Monopterus javanensis* Lacepède, 1800 (Pl. 2H)
Klong Wangtakrai: 13–17 Mar. 2023, THNHM-F22957 (1 specimen, 550 mm TL); 17–21 Jul. 2023, THNHM-F23536–9 (4 specimens, 213–595 mm TL), THNHM-F23563 (1 specimen, 529 mm TL); 11–15 Mar. 2024, THNHM-F24958 (1 specimen, 244 mm TL). Total 7 specimens.

Order Anabantiformes

Family Channidae

19. *Channa limbata* (Cuvier, 1831) (Pl. 2I)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21953–55 (3 specimens, 69–118 mm SL); 13–17 Mar. 2023, THNHM-F22933–34 (2 specimens, 60–111 mm SL), THNHM-F22947 (1 specimen, 54 mm SL), THNHM-F22951–55 (5 specimens, 50–95 mm SL); 17–21 Jul. 2023, THNHM-F23479 (1 specimen, 82 mm SL), THNHM-F23514–30 (17 specimens, 46–142 mm SL), THNHM-F23534–5 (2 specimens, 67–137 mm SL), THNHM-F23540–43 (4 specimens, 56–122 mm SL), THNHM-F23548–53 (6 specimens, 23–90 mm SL), THNHM-F23564 (1 specimen, 84 mm SL); 13–17 Nov. 2023, THNHM-F24121–3 (3 specimens, 95–126 mm SL), THNHM-F24131–5 (5 specimens, 81–147 mm SL), THNHM-F24148–56 (9 specimens, 65–145 mm SL), THNHM-F24185–90 (6 specimens, 78–136 mm SL), THNHM-F24195–200 (6 specimens, 87–133 mm SL), THNHM-F24228–9 (2 specimens, 62–65 mm SL); 11–15 Mar. 2024, THNHM-F24668–71 (4 specimens, 43–126 mm SL), THNHM-F24698–9 (2 specimen, 86–109 mm SL), THNHM-F24820–24 (5 specimens, 28–109 mm SL), THNHM-F24931–41 (11 specimens, 49–144 mm SL), THNHM-F24943–57 (15 specimens, 31–59 mm SL), THNHM-F24966–7 (2 specimens, 100–106 mm SL); 8–12 Jul. 2024, THNHM-F 25036–8 (3 specimens, 73–75 mm SL), THNHM-F25043–45 (3 specimens, 65–107 mm SL), THNHM-F25069–71 (3 specimens, 74–128 mm SL), THNHM-F25096–114 (19 specimens, 44–142 mm SL). Khlong Maduea: 14–16 Nov. 2022, THNHM-F22004 (1 specimen, 105 mm SL). Total 141 specimens.

20. *Channa striata* (Bloch, 1793) (Pl. 2J)

Khlong Wangtakrai: 8–12 Jul. 2024, THNHM-F25060 (1 specimen, 136 mm SL). Total 1 specimen.

Family Pristolepididae

21. *Pristolepis fasciata* (Bleeker, 1851) (Pl. 2K)

Khlong Wangtakrai: 17–21 Jul. 2023, THNHM-F23474–5 (2 specimens, 41–44 mm SL); 13–17 Nov. 2023, THNHM-F24191 (1 specimen, 61 mm SL); 11–15 Mar. 2024, THNHM-F24700 (1 specimen, 35 mm SL); 8–12 Jul. 2024, THNHM-F25072 (1 specimen, 61 mm SL). Total 5 specimens.

Order Beloniformes

Family Belontiidae

22. *Xenentodon canciloides* (Bleeker, 1854) (Pl. 2L)

Khlong Wangtakrai: 14–16 Nov. 2022, THNHM-F21943–5 (3 specimens, 141–201 mm SL), THNHM-F21978–80 (3 specimens, 145–224 mm SL); 13–17 Mar. 2023, THNHM-F22919 (1 specimen, 94 mm SL), THNHM-F22948–9 (2 specimens, 70–108 mm SL), THNHM-F22958–60 (3 specimens, 46–92 mm SL); 17–21 Jul. 2023, THNHM-F23484–5 (2 specimens, 160–175 mm SL), THNHM-F23544 (1 specimen, 95 mm SL), THNHM-F23554–5 (2 specimens, 106–145 mm SL), THNHM-F23565 (1 specimen, 160 mm SL); 13–17 Nov. 2023, THNHM-F24101–3 (3 specimens, 191–295 mm SL), THNHM-F24124 (1 specimen, 142 mm SL), THNHM-F24166 (1 specimen, 168 mm SL), THNHM-F24171–80 (10 specimens, 27–200 mm SL); 11–15 Mar. 2024, THNHM-F24633–36 (4 specimens, 56–184 mm SL), THNHM-F24672 (1 specimen, 48 mm SL), THNHM-F24801–4 (4 specimens, 59–99 mm SL), THNHM-F24815–7 (3 specimens, 114–198 mm SL), THNHM-F24921–9 (9 specimens, 65–145 mm SL);

8–12 Jul. 2024, THNHM-F25035 (1 specimen, 92 mm SL), THNHM-F25061–8 (8 specimens, 114–246 mm SL), THNHM-F25126–8 (3 specimens, 103–140 mm SL). Khlong Maduea: 14–16 Nov. 2022, THNHM-F 21998-9 (2 specimens, 77–78 mm SL), THNHM-F22001 (1 specimen, 235 mm SL). Total 69 specimens.

Discussion

Asian tropical forest-streams often share similar fish communities at the family level, including Cyprinidae, Danionidae, Bagridae, Mastacembelidae, Channidae, Balitoridae, Nemacheilidae, Amblycipitidae and Sisoridae (Sutin *et al.*, 2007; Azahar *et al.*, 2021; Philavong *et al.*, 2024). This pattern was also observed in Wangtakrai Park. Most species are typically known as dwellers of fast-flowing streams, except for *Channa striata* and *Pristolepis fasciata* that are usually found in sluggish or standing waters (Rainboth, 1996; Kottelat, 2001; Nagao Natural Environment Foundation, 2021). The unusual presence of these two species may result from modifications in certain stream zones such as diversion weirs, which altered primary habitat from fast-running to slow flow or sluggish water. This change may have created favorable conditions for their presence.

The presence of the non-native *Clarias gariepinus* x *C. marocephalus*, a hybrid highly favored for its high productivity in freshwater aquaculture in Thailand, was likely an intentional or merit release, a popular religious practice in Thailand, because the specimens were juveniles and no fish farm was located near the study site. This hybrid fish has been reported as fully established in the wild throughout Chao Phraya and Mekong River Basins and evaluated as invasive status (Welcomme and Vidthayanon, 2003).

The fish composition in Wangtakrai Park differed from the lowland communities, which are typically dominated by the families Cyprinidae, Clupeidae and Gobiidae but also showed similarities due to species such as *Poropuntius deauratus* from highland streams moving downstream (Termvidchakorn and Hanpongkittikul 2008). Common non-native species in lowland habitats include *Oreochromis niloticus* and *Labeo rohita*, often intentionally introduced as food sources in weirs and later escaping into natural habitats. Nevertheless, the presence of non-native fish and species adapted to slow-flowing water in Wangtakrai Park suggested the anthropogenic influences in highland habitats, which could pose a threat to native fish communities.

Regarding fish biogeography, most species observed are common across mainland Southeast Asia aligning with Rainboth (1996) hypothesis of a close resemblance among the fish fauna of the middle and lower Mekong River, Chao Phraya and MaeKlong Rivers of central Thailand and eastern Malay Peninsula. However, *Crossocheilus tchangi* and *Glyptothorax coracinus* found in this study exhibited very restricted distributions. The former is distributed in southern Thailand, MaeKlong, Chao Phraya and Bang Pakong Basins (Ciccotto *et al.*, 2017), whereas the latter species occurs in Phanom Krawan Range in southwestern Cambodia extending to the Chanthaburi Range and southwestern of Khao Yai Mountain in eastern Thailand (Ng and Rainboth, 2008; this study) (Fig. 5). Vidthayanon *et al.* (1997) assumed the Bang Pakong River represents the eastern part of the Chao Phraya River system given its relict populations of the Chao Phraya species, such as *Albulichthys albuloides*, *Macrochirichthys macrochirus*, and *Cyclocheilichthys heteronema*. The presence of *C. tchangi* and *G. coracinus* in Wangtakrai Park, a western watershed of Bang Pakong River, suggests that the upper Bang Pakong River contains an overlap ichthyofauna from both Chao Phraya River to the west and Phanom Krawan Range in the east.

A checklist of fishes in Wangtakrai Park provided insights into the community composition. Most species are common inhabitants of tropical highland streams, but the presence of species associates with slow-flowing water and non-native species indicated increasing anthropogenic activities in the area. The presence of *Glyptothorax coracinus* at the study site also enhances our understanding of species distribution and biogeography of the region. Given the limited information available on fish communities in highland forested streams in Thailand, the data from this study provide valuable findings and can inform future research and the development of conservation plans.

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