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Fish Species and Morphological Characters in Parit Nanas Peat Waters, Pontianak City, West Kalimantan

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Abstract
Peatland aquatic ecosystems are unique and provide critical habitats for various freshwater fish species. However, they are highly susceptible to degradation caused by land clearing, drought, fires, and pollution. These disturbances pose significant threats to the survival of native fish species, many of which remain taxonomically unresolved or insufficiently studied. This study aimed to identify fish species and describe their morphological characteristics, as well as evaluate the environmental parameters of peatland waters in Parit Nanas, North Pontianak District, Pontianak City. Sampling was conducted purposively from October to December 2021 at five stations, with four replications per station. A total of 34 fish species from 26 genera and 14 families were recorded, with *Osphronemidae*, *Siluridae*, *Cyprinidae*, and *Danionidae* being the most frequently encountered families. Each species exhibited distinct morphological traits, analyzed through qualitative descriptive methods. The environmental parameters measured, including temperature, pH, depth, turbidity, current velocity, dissolved oxygen (DO), and total dissolved solids (TDS), indicated that the waters of Parit Nanas still support fish survival. These results suggest that Parit Nanas peatlands sustain a diverse assemblage of freshwater fish, particularly those adapted to acidic and low-oxygen conditions.

Key words: environmental conditions; peatland aquatic ecosystem; morphological uniqueness of fish; West Kalimantan
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INTRODUCTION

The aquatic areas in peatland are considered unique ecosystems and serve as crucial habitats for various freshwater fish species (Haryono *et al.*, 2022). A total of 219 freshwater fish species have been documented in the peat swamp forests of Southeast Asia, 80 of which are endemic (Posa *et al.*, 2011). The characteristics of peatland waters are generally highly acidic, with high organic matter content and low nutrient levels (Thornton *et al.*, 2018). These extreme water conditions influence the diversity of fish species inhabiting the ecosystem. In general, these fish species exhibit a high tolerance to various water quality conditions (Wahyudewantoro, 2010).

According to Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia (2017), West Kalimantan has approximately 2,793,331 hectares of peatland. Parit Nanas is one of the peatland water bodies located in Siantan Hulu Subdistrict, North Pontianak District, Pontianak City, West Kalimantan Province. This aquatic area still supports various fish species that are commonly caught by local residents for recreational purposes, consumption, or commercial sale. The canal water is also frequently used for daily needs such as bathing and washing kitchen utensils or clothing.

The upstream section of Parit Nanas is predominantly peat swamp forest, but as Pontianak City continues to develop, activities around Parit Nanas, such as land clearing for settlements and plantations, have increased. The reduction in tree cover around the water body, along with the presence of waste and litter, may affect water quality and the aquatic biota in the canal. Additionally, unsustainable or excessive fishing practices can negatively impact fish populations. According to information from local residents, there have been incidents of mass fish mortality and the loss of other aquatic biota caused by fish poisoning using plant-based toxins, specifically from the tuba plant, in the area. Since this incident, stricter monitoring of fishing activities has been enforced.

A previous study by Santoso and Gema (2019) conducted in various types of peatland waters in Arut Kumai, West Kotawaringin Regency, Central Kalimantan, recorded a total of 95 fish species from 23 families. The most commonly found fish families were Cyprinidae, Osphronemidae, and Siluridae. The high diversity of fish species in the study area was attributed to relatively natural environmental conditions that still supported fish life, despite land-use changes occurring around the water bodies. In contrast, a previous study by Haryono (2012) in several peatland water bodies in Central Kalimantan documented only 39 fish species from 16 families, with the most commonly found families being Cyprinidae, Belontiidae, and Channidae. The lower number of fish species recorded in this study was likely due to the location being part of the former Peatland Development Project area.

Based on findings from previous studies, fish species richness in peatland waters varies and is influenced by different environmental conditions and human activities. According to Gautama *et al*. (2023), peatland and forest fires that frequently occur during the dry season can cause environmental problems, there by damaging ecosystems and biodiversity. Considering the ecological potential and uniqueness of peatland fish, further research is necessary to identify fish species and their morphological characteristics in the peat waters of Parit Nanas.

The observation of fish morphological traits, including morphometric measurements and meristic counts, is crucial for identifying and distinguishing species, particularly those with similar body forms. Supported by relevan data, this study can serve as a foundation for a deeper understanding of local fish biodiversity, especially in the West Kalimantan region. The reciprocal relationship between the research objectives and their contribution to aquatic resources is expected to serve as a fundamental reference for the conservation of local species, the sustainable management of peatland ecosystems and as a scientific consideration in the fields of freshwater fish ecology and taxonomy in Indonesia.

MATERIALS AND METHODS

This study was conducted from October to December 2021 at Parit Nanas, located in Siantan Hulu Subdistrict, North Pontianak District, Pontianak City, West Kalimantan Province. The research area was divided into five stations, each positioned at specific coordinates: 109°22'7.326"E 0°1'18.323"N (Station 1), 109°22'3.632"E 0°0'38.69"N (Station 2), 109°22'2.496"E 0°0'21.648"N (Station 3), 109°21'53.558"E 0°0'20.902"S (Station 4), and 109°21'53.558"E 0°0'20.902"S (Station 5) (Figure 1). The sample identification process was conducted at the Zoology Laboratory of the Faculty of Mathematics and Natural Sciences, Tanjungpura University, Pontianak City.

The tools used in this study included nylon thread, 250 mL winkler bottles, umbrella traps, current meter, bucket, 100 mL erlenmeyer flasks, fish finder, GPS, scissors, standard gill nets (mesh size 1.5 cm) and double-layer gill nets (mesh sizes 2 cm and 4 cm), digital caliper (micrometer 150 cm), camera, 1 kg plastic bags (1 pack), secchi disk (20 cm diameter), label paper, magnifying glass, 50 m measuring tape, 1 m sewing tape, fishing hooks sizes 1-7, stereo microscope, ruler, pH meter, tweezers, fishing line, fish scoops, 1 mL syringes, raffia strings, TDS meter, alcohol thermometer, and jars. The materials used in this study included 70% alcohol, distilled water, 4% and 10% formalin, starch indicator, concentrated sulfuric acid solution (H_2SO_4), potassium hydroxide-potassium iodide solution (KOH-KI), manganese sulfate solution ($MnSO_4$), sodium thiosulfate solution (Na_2SO_3), water samples, fish samples, and bait (palm kernel, rubber seeds, earthworms, and frogs).

The sampling method in this study was determined by dividing the area into several stations based on different environmental criteria, known as purposive sampling. This method is expected to represent the overall sample data in the peat waters of Parit Nanas. Sampling was conducted four times, with intervals of two weeks. The primary capture tools were installed from 07:00 to 18:00 WIB, and checked every 1-2 hours. The main tools used were umbrella traps, gill nets, fishing rods, and scoops, while additional data at night was collected using several umbrella traps. The umbrella traps were left overnight and retrieved the following morning. This capture method was used to increase the chances of obtaining a variety of fish species. Meanwhile, environmental parameters were measured every four hours to obtain data from morning, noon, and afternoon at each station, including pH, temperature, clarity, depth, current velocity, dissolved oxygen (DO), and total dissolved solids (TDS).

Fish samples were measured for total length prior to preservation. Specimens >15 cm TL were injected with 10% formalin in the abdomen before immersion to prevent gut decay, while smaller specimens (<15 cm TL) were directly immersed in 4% formalin (Wiadnya *et al*., 2012). Each sample was labeled with collection time, location, and capture method. After 3–7 days, samples were rinsed and transferred to 70% ethanol. Specimens were photographed and identified to species level based on morphometric and meristic characters, as well as key external features such as body shape, mouth position, and barbels. The fish identification process was conducted from family to species level using the literature by Kottelat *et al*. (1993), Kottelat (2013), and via online fish database www.fishbase.se (Froese R and D Pauly, 2025). Meanwhile, conservation status is determined through www.iucnredlist.org (IUCN, 2025). This study was analyzed using qualitative descriptive methods. The research data are presented in tables and figures and analyzed descriptively.

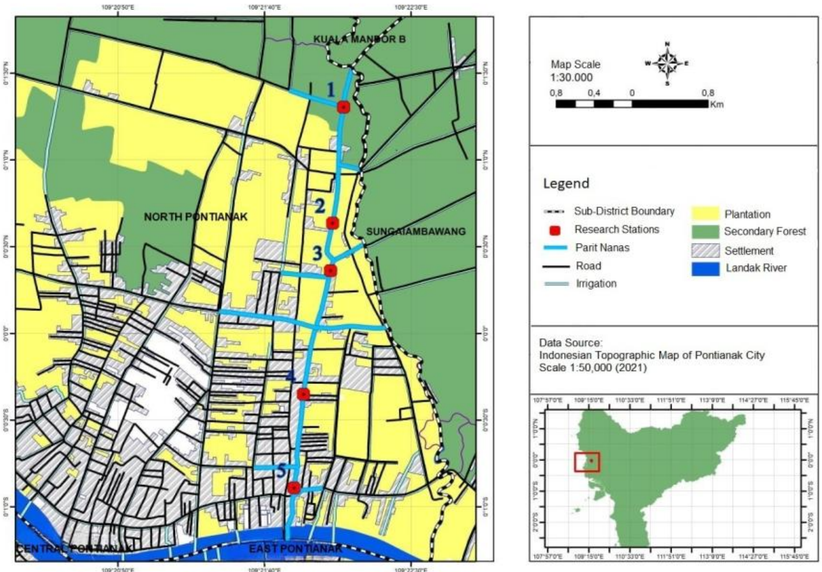

Figure 1. Sampling locations covering stations 1, 2, 3, 4, and 5 in Parit Nanas peat waters

RESULTS

The results of the research in the peat waters of Parit Nanas, North Pontianak District, Pontianak City, found 34 fish species distributed across 26 genera and 14 families (Table 1). The most abundant family was Osphronemidae (17%), whereas several families, including Anabantidae, Helostomatidae, Nandidae, Pristolepididae, Clariidae, Schilbeidae, and Cobitidae, were each represented by only a single genus (3%) (Figure 2). The classification of the fish species found in this study is presented in Table 1.

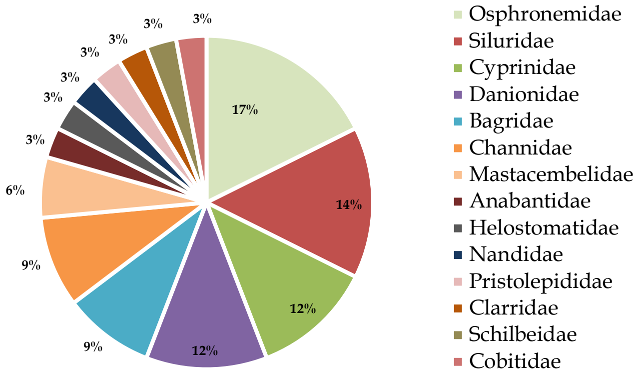

Figure 2. Percentage of species count in each fish families in Parit Nanas peat waters

Based on data obtained from Froese and Pauly (2025), the freshwater fish species in the peat swamp waters of Parit Nanas are predominantly native, comprising 33 species, with only one introduced species. According to the IUCN (2025) conservation status, most of these species are categorized as Least Concern (LC), accounting for 30 species, while the remaining species are classified as Near Threatened (NT) (3 species) and Vulnerable (VU) (1 species) (Table 1).

The results of fish identification in the peat waters of Parit Nanas exhibit variations in morphometric characteristics (total length [TL], standard length [SL], body depth [BD], and head length [HL]) and meristic characteristics (fin formula abbreviations follow standard notation: D = dorsal fin, A = anal fin, P = pectoral fin, and V = ventral fin) (Table 2). The morphological parameters observed were compared to identification keys in reference books or previous studies. Each identified species is presented in Figure 3.

Trichopterus pectoralis specimens in this study had TL ranging from 35.74 to 40.18 mm, SL from 31.68 to 36.53 mm, BD from 10.42 to 14.21 mm, and HL from 5.22 to 5.80 mm. The species is distinguished by a fin formula of D.VI–VII.10, A.IX–X.33–37, and 53 lateral line scales. One of the pelvic fin rays is modified into a filament reaching the base of the caudal fin. The body exhibits irregular black lines from behind the eyes to the base of the tail and is covered with black spots, both serving as diagnostic features that differentiate *T. pectoralis* from other members of *Trichopterus* in the family Osphronemidae.

Table 1. Classification and local names of fish species found in Parit Nanas peat waters

Families	Genera	Species	Local Names	IUCN Redlist	Occurrence
Osphronemidae	*Belontia*	*Belontia hasselti*	Kepar	Least Concern	Native
	Betta	*Betta edithae*	Cupang	Least Concern	Native
	Luciocephalus	*Luciocephalus pulcher*	Buaya	Least Concern	Native
	Trichopodus	*Trichopodus pectoralis*	Sepat siam	Least Concern	Introduced
		T. trichopterus	Sepat rawa	Least Concern	Native
	Trichopsis	*Trichopsis vittata*	Cupang	Least Concern	Native
Siluridae	*Kryptopterus*	*Kryptopterus macrocephalus*	Lais	Near Threatened	Native
	Micronema	*Micronema hexapterus*	Lais	Least Concern	Native
	Ompok	*Ompok hypophthalmus*	Lais	Least Concern	Native
	Silurichthys	*Silurichthys hasselti*	Lais	Least Concern	Native
	Wallago	*Wallago leerii*	Tapah	Least Concern	Native
Cyprinidae	*Desmopuntius*	*Desmopuntius rhomboocellatus*	Berbaju	Least Concern	Native
		D. trifasciatus	Karit	Least Concern	Native
	Osteochilus	*Osteochilus melanopleura*	Kelabau	Least Concern	Native
		O. spilurus	Bantak batu	Least Concern	Native
Danionidae	*Brevibora*	*Brevibora cheeya*	Seluang	Least Concern	Native
	Rasbora	*Rasbora cephalotaenia*	Seluang badar	Least Concern	Native
		R. tornieri	Seluang kuning	Least Concern	Native
	Trigonopoma	*Trigonopoma gracile*	Seluang	Least Concern	Native
Bagridae	*Hemibagrus*	*Hemibagrus hoevenii*	Baung	Near Threatened	Native
		H. olyroides	Patik	Least Concern	Native
		H. planiceps	Baung	Least Concern	Native
Channidae	*Channa*	*Channa bankanensis*	Runtuk	Near Threatened	Native
		C. lucius	Runtuk	Least Concern	Native
		C. striata	Gabus	Least Concern	Native
Mastacembelidae	*Mastacembelus*	*Mastacembelus erythrotaenia*	Tilan	Least Concern	Native
	Macrognathus	*Macrognathus maculatus*	Tilan	Least Concern	Native
Anabantidae	*Anabas*	*Anabas testudineus*	Betok	Least Concern	Native
Helostomatidae	*Helostoma*	*Helostoma temminckii*	Biawan	Least Concern	Native
Cobitidae	*Kottelatlimia*	*Kottelatlimia pristes*	Emplunyu	Vulnurable	Native
Nandidae	*Nandus*	*Nandus nebulosus*	Daun	Least Concern	Native
Pristolepididae	*Pristolepis*	*Pristolepis grootii*	Patung	Least Concern	Native
Clariidae	*Clarias*	*p nieuhofii*	Limbat	Least Concern	Native
Schilbeidae	*Pseudeutropius*	*Pseudeutropius brachypopterus*	Nuayang	Least Concern	Native

Belontia hasselti specimens found in this study had TL ranging from 58.81 to 139.91 mm, SL from 43.21 to 111.40 mm, BD from 49.13 to 61.22 mm, and HL from 15.27 to 31.82 mm. This species can be identified by several distinctive diagnostic characters, including a fin formula of D XIII,11; A XVI,12; P II,7–12; and V I,5–6, along with an incomplete (interrupted) lateral line consisting of 31 scales. The body is laterally compressed, with a terminal mouth and rounded caudal fin. Dorsal and anal fins are similar in shape and size. Body coloration is dark brown with a black mesh pattern on the caudal fin. Juveniles show a black blotch at the dorsal fin base, aiding identification in early stages.

Betta edithae specimens in this study had TL ranging from 35.12 to 47.21 mm, SL from 26.10 to 38.41 mm, BD from 7.06 to 10.21 mm, and HL from 7.08 to 10.15 mm. The species is characterized by a superior mouth, rounded caudal fin, and a fin formula of D.I.6–8, A.I–II.25–30, P.12, and V.9, with 29 lateral line scales. The pelvic fins bear slightly elongated filaments, while the unpaired fins, especially the caudal fin, exhibit distinct dark spots. Additionally, 3–4 longitudinal dark stripes are present along the flanks, serving as key diagnostic features, from other members of *Betta* in family Osphronemidae.

Luciocephalus pulcher specimens in this study had TL ranging from 78.62 to 121.00 mm, SL from 65.21 to 99.92 mm, BD from 10.29 to 19.65 mm, and HL from 29.82 to 51.26 mm. This species is distinguished from other *Luciocephalus* and members of the family Osphronemidae by several diagnostic characters, including a superior, elongated mouth, large eyes, and fusiform body with a truncate caudal fin. Fin formula is D.10, A.19, P.14, and V.I.5, with 40 lateral line scales. The anal fin is positioned far posteriorly and extends toward the caudal peduncle. A notable trait is the modified pelvic fin, where the first ventral ray forms a long filament reaching the anal fin. The body is generally dark brown with irregular light markings.

Trichopodus trichopterus specimens in this study had TL ranging from 59.32 to 88.41 mm, SL from 37.60 to 69.50 mm, BD from 12.20 to 19.40 mm, and HL from 23.20 to 38.80 mm. The species is characterized by a terminal mouth, a slightly concave (emarginate) caudal fin with yellowish-white spots, and a fin formula of D.VI–VII.7–8, A.X–XII.30–33, P.9, and V.3, with 36 lateral line scales. One of the pelvic fin rays is modified into a filament reaching the base of the caudal fin. The body coloration ranges from greenish-brown to reddish-brown, with oblique stripes along the flanks and distinct black spots on the mid body and at the base of the caudal fin, serving as key diagnostic features that distinguish *T. trichopterus* from other members of *Trichopterus* in the family Osphronemidae.

Trichopsis vittata specimens in this study had TL ranging from 29.21 to 42.53 mm, SL from 23.15 to 35.80 mm, BD from 8.12 to 11.93 mm, and HL from 10.14 to 14.31 mm. The species is characterized by a superior mouth with a slightly pointed snout, a rounded caudal fin, and pelvic fins bearing elongated filaments extending beyond the midpoint of the anal fin. It has a fin formula of D.II–V.6–8, A.VIII.23–25, P.8–11, and V.I.5–7, with 36 lateral line scales. Distinctive diagnostic features include 2–4 dark longitudinal stripes along the flanks, black spots on all fins, and a posteriorly positioned dorsal fin aligned with or behind the tip of the pectoral fins. The body coloration varies from pale to dark brown, with dark brown fins, distinguishing *T. vittata* from other members of the family Osphronemidae.

Kryptopterus macrocephalus specimens in this study had TL ranging from 54.47 to 75.04 mm, SL from 47.82 to 66.44 mm, BD from 7.21 to 8.43 mm, and HL from 8.43 to 13.32 mm. The species is characterized by a terminal mouth, two pairs of barbels, and a small, weak dorsal fin. The upper jaw barbels are long, reaching the anal fin, while the lower jaw barbels are shorter than the head. The pectoral fins are equal in length to the head, measuring 8.43–13.35 mm. Fin formula is D.1, A.49–51, P.9–10, and V.6. The body is slightly convex dorsally and displays a striped and spotted pattern, with spots visible mainly in live specimens, distinguishing *K. macrocephalus* from other members of the family Siluridae and congeners in *Kryptopterus*.

Kryptopterus microcephalus specimens in this study had TL ranging from 54.47 to 75,04 mm, SL from 47.82 to 66.44 mm, BD from 7.21 to 8.43 mm, and HL from 8.43 to 13.32 mm. *K. macrocephalus* can be identified based on a number of distinctive diagnostic characters that differentiate it from other species within the family Siluridae and other *Kryptopterus* species. It has a terminal mouth position and two pairs of barbels. The upper jaw barbels are very long, reaching the anal fin, while the lower jaw barbels are shorter than the head length. *K. macrocephalus* exhibits an equal length between the head and pectoral fins, with the pectoral fin length ranging from 8.43 to 13.35 mm. Important diagnostic characters include the fin formula D.1; P.9-10; V.6; A.49-51, and the dorsal fin is very small and weak. The body of *K. macrocephalus* features a striped and spotted pattern with spots typically visible only when the fish is alive, and the dorsal profile is slightly convex.

Micronema hexapterus specimens in this study had TL ranging from 109.26 to 114.42 mm, SL from 102.07 to 107.38 mm, BD from 21.54 to 22.48 mm, and HL from 17.32 to 17.58 mm. The species is characterized by a terminal mouth with four pairs of barbels; the mandibular barbels are longer than the head, and the maxillary barbels reach the base of the fin. The eyes are small and located at the mouth corners. Fin formula is D.0, A.77, P.I.2, and V.8. Distinctive diagnostic features include a rudimentary or absent dorsal fin, pectoral fins longer than the head, and a long anal fin extending from just behind the pelvic fins to the caudal peduncle. The body is dark brown, with a darker dorsal region, distinguishing this species from other members of the family Siluridae, including other *Micronema*.

Ompok hypophthalmus specimens in this study had TL ranging from 82.69 to 148.35 mm, SL from 79.23 to 148.35 mm, BD from 14.30 to 36.03 mm, and HL from 18.69 to 27.05 mm. The species is characterized by a terminal, upward facing mouth, and a fin formula of D.3–4, P.I.13, V.6–7, and A.76–80. Distinctive diagnostic features include eyes positioned very low near the corner of the mouth, mandibular barbels shorter than the head, a strongly dorsoventrally flattened body, and a forked caudal fin with pointed lobes. A small dark spot is present at the base of the caudal fin, further distinguishing *O. hypophthalmus* from other *Ompok* species and members of the family Siluridae.

Table 2. Morphometric and meristic characteristics of fish in Parit Nanas peat waters

Families	Species	Morphometric Characteristic (mm)				Meristic Characteristic (mm)				
		TL	SL	BD	HL	D	A	P	V	Li
Osphronemidae	*Belontia hasselti* (n: 57)	58.81-139.91	43.21-111.40	49.13-61.22	15.27-31.82	XIII.11	XVI.12	II.7-12	I.5-6	31
	Betta edithae (n: 52)	35.12-47.21	26.10-38.41	7.08-10.15	7.06-10.21	I.6-8	I-II.25-30	12	9	29
	Luciocephalus pulcher (n: 2)	78.62-121	65.21-99.9	10.29-19.65	29.82-51.26	10	19	14	I.5	40
	Trichopodus pectoralis (n: 3)	35.74-40.18	31.68-36.53	10.42-14.21	5.22-8.24	VI-VII.10	IX-X.33-37	8	6	53
	T. trichopterus (n: 33)	59.32-88,41	37.64-69.48	23.17-38.75	12.16-19.37	VI-VII.7-8	X-XII.30-33	9	5	36
	Trichopsis vittata (n: 18)	29.21-42.53	23.15-35.80	8.12-11.93	10.14-14.31	I-IV.6-8	VII.23-25	8-11	I.5-7	25
Siluridae	*Kryptopterus macrocephalus* (n: 6)	54.47-75.04	47.82-66.44	7.21-8.43	8.43-13.32	1	9-10	6	49-51	-
	Micronema hexapterus (n: 3)	109.26-114.42	102.07-107.38	21.54-22.48	17.32-17.58	0	I.2	8	77	-
	Ompok hypophthalmus (n: 2)	82.69-148.35	79.23-148.35	14.3-36.03	18.69-27.05	3	76-78	I.13	6-7	-
	Silurichthys hasselti (n: 3)	34.14-71.12	27.82-61.45	5.61-10.05	6.47-10.59	5	70	I.12	9	-
	Wallago leerii (n: 4)	71.53-290.0	62.31-252.0	2.38-59.12	14.50-68.81	4	58	I.6	I.6	-
Cyprinidae	*Desmopuntius rhomboocellatus* (n: 271)	23.17-51.92	18.21-41.37	8.13-15.82	6.21-9.42	I.8	6	12-13	9	24-25
	D. trifasciatus (n: 63)	22.12-85.99	18.83-68.26	7.53-23.06	6.54-11.42	I.9	6-7	15	9	25-27
	Osteochilus melanopleura (n: 4)	162.10-250.05	121.07-198	57.11-73.08	29.87-46.31	III.15	6	14	12	49-53
	O. spilurus (n: 154)	23.15-65.37	15.1-45.56	5.11-15.63	2.14-11.15	12	8	10	9	29
Danionidae	*Brevibora cheeya* (n: 15)	20.18-39.15	15.19-32.31	4.12-6.27	5.71-8.11	I.8	7	8	8	25-28
	Rasbora cephalotaenia (n: 3)	41.05-78.03	37.7-65.2	7.72-15.16	9.35-16.56	I.7	I.5	I.12	I.8	32
	R. tornieri (n: 5)	79.73-83.67	65.39-68.84	15.27-17.63	10.15-10.61	7	12	I.9	9	35
	Trigonopoma gracile (n: 12)	38.41-49.18	28.32-31.51	6.16-8.14	6.16-8.14	8	7	6	7	29-31
Bagridae	*Hemibagrus hoevenii* (n: 8)	124.38-228.41	99.14-164,27	25.7-37.15	30.94-49.83	I.7	10-11	I.7-8	I.6	-
	H. olyroides (n: 2)	161.21-164.68	121.63-124.6	19.78-20.65	35.49-36.30	I.7	12	I.8	6	-
	H. planiceps (n: 2)	85.93-105.75	67.22-78.59	18.56-24.62	10.37-12.23	I.7	11	I.8	I.5	-
Channidae	*Channa bankanensis* (n: 2)	130.82-250.32	112.26-210.13	25.64-50.18	43.16-72.35	40	30	10	7	64
	C. lucius (n: 10)	78.45-305.1	65.13-250.03	23.06-75.31	20.12-66.41	38-39	27-28	15	5	56-57
	C. striata (n: 2)	131.67-185.13	123.56-150.2	23.11-42.19	41.50-62.17	41	26	21	5	55
Mastacembelidae	*Mastacembelus erythrotaenia* (n: 1)	225.93	212.42	22.47	26.18	XXXIII.71	III.69	13	-	-
	Macrognathus maculatus (n: 1)	152.1	143.51	21.30	21.34	XXVII.57	III.56	14	-	-
Anabantidae	*Anabas testudineus* (n: 32)	130.83-170.52	108.54-132.31	43.64-66.51	29.25-43.12	XV-XVII.7-9	IX-X.9-12	14-15	I.5	27
Helostomatidae	*Helostoma temminckii* (n: 12)	53.41-117.19	46.25-95.05	22.57-45.31	18.85-31.16	XVI-XVII	XIV-XV.15-17	II.11	I.5	41
Cobitidae	*Kottelatlimia pristes* (n: 7)	32.4-35.31	26.96-30.12	3.58-5.41	5.91-6.13	7-9	9	6	6	-
Nandidae	*Nandus nebulosus* (n: 8)	40.74-81.12	31.78-60.03	14.49-29.23	15.31-27.98	XIV.12	III.5-6	I.14	I.5	23
Pristolepididae	*Pristolepis grootii* (n: 1)	108.21	82.58	45.11	33.46	XIII.16	III.8	I.5	I.5	35
Clarridae	*Clarias nieuhofii* (n: 2)	244.21-273.85	219.42-244.62	29.54-47.32	42.63-51.33	87	66-67	14	8	-
Schilbeidae	*Pseudeutropius brachypopterus* (n: 1)	76.25	62.32	17.16	17.44	I.4	31	I.7	V.5	-

Note : TL = Total Length; SL = Standard Length; BH = Body Height; HL = Head Length; D = Number of Dorsal Fin Rays; A = Number of Anal Fin Rays; P = Number of Pectoral Fin Rays; V = Number of Pelvic Fin Rays; Li = Lateral Line; n = Number of Individuals

Figure 3. Fish species in Parit Nanas peat waters; 1) *Belontia hasselti*, 2) *Betta edithae*, 3) *Luciocephalus pulcher*, 4) *Trichogaster pectoralis*, 5) *T. trichopterus*, 6) *Trichopsis vittata*, 7) *Kryptopterus macrocephalus*, 8) *Micronema hexapterus*, 9) *Ompok hypopthalmus*, 10) *Silurichthys hasselti*, 11) *Wallago leerii*, 12) *Desmopuntius trifasciatus* 13) *D. trifasciatus*, 14) *Osteochilus melanopleura*, 15) *Osteochilus spilurus*, 16) *Brevibora cheeya*, 17) *Rasbora cephalotaenia*, 18) *R. tornieri*, 19) *Trigonopoma gracile*, 20) *Hemibagrus hoevenii*, 21) *H. olyroides*, 22) *H. planiceps*, 23) *Channa bankanensis*, 24) *C. lucius*, 25) *C. striata*, 26) *Mastacembelus erythrotaenia*, 27) *Macrognathus maculatus*, 28) *Anabas testudineus*, 29) *Helostoma temminckii*, 30) *Kottelatlimia pristes*, 31) *Nandus nebulosus*, 32) *Pristolepis grootii*, 33) *Clarias nieuhofii*, 34) *Pseudeutropius brachypopterus*

Silurichthys hasselti specimens in this study had TL ranging from 14.00 to 71.12 mm, SL from 27.82 to 61.45 mm, BD from 5.61 to 10.05 mm, and HL from 6.47 to 10.59 mm. The species is characterized by a dorsoventrally flattened and rounded head with small eyes, and a subterminal mouth accompanied by two pairs of barbels extending to the anal fin. The dorsal fin is short and positioned slightly anterior to the pelvic fins, while the anal fin is long and continuous with the caudal fin. Fin formula is D.4, A.58–60, P.I.6, and V.I.6. The body is reddish brown with marbled blotches along the flanks, and the ventral head region to the pectoral fins appears reddish white. An asymmetrical lunate caudal fin, with the upper lobe longer than the lower, serves as a key diagnostic feature distinguishing *S. hasselti* from other Siluridae members.

Wallago leerii specimens in this study had TL ranging from 71.53 to 290.00 mm, SL from 62.31 to 252.00 mm, BD from 2.38 to 59.12 mm, and HL from 14.50 to 68.81 mm. The species is characterized by a long, broad head with an enlarged lower jaw extending beyond the upper jaw, and a terminal, slightly upturned mouth reaching the anterior margin of the eyes. It has small eyes, a laterally compressed and elongated body, and a deeply forked caudal fin. Fin formula is D.5, A.70, P.I.12, and V.9. The body is scaleless and predominantly black, with white pigmentation along the ventral surface from the lower head to just before the anal fin. Two pairs of barbels are present, with the maxillary barbels extending beyond the anal fin and the mandibular barbels longer than the pelvic fins. The anal fin originates near the tip of the longest pectoral fin and extends to the caudal peduncle, serving as a key diagnostic feature.

Desmopuntius rhomboocellatus specimens in this study had TL ranging from 23.17 to 51.99 mm, SL from 18.21 to 41.37 mm, BD from 8.13 to 15.82 mm, and HL from 6.20 to 9.40 mm. The species is characterized by two pairs of barbels, with maxillary barbels extending to the anterior margin of the eyes and mandibular barbels reaching the posterior portion. Fin formula is D.I.8, A.6, P.13, and V.9, with 24–25 lateral line scales. The body is generally reddish-orange with six vertical black bars, including one passing through the eyes and another faintly visible across the caudal peduncle, serving as key diagnostic features that distinguish this species from other members of the genus *Desmopuntius*.

Desmopuntius trifasciatus specimens in this study had TL ranging from 22.12 to 85.99 mm, SL from 18.83 to 68.26 mm, BD from 7.53 to 23.06 mm, and HL from 6.54 to 11.42 mm. The species is characterized by a terminal mouth and two pairs of very short barbels on both the upper and lower jaws. Fin formula is D.I.9, A.7, P.15, and V.9, with 25–27 lateral line scales. Juveniles display distinct vertical black bars that gradually transition into a solid black longitudinal stripe in adults, forming a key diagnostic feature. Additional distinguishing characters include a slender, laterally compressed body, slightly forked caudal fin, and a coloration ranging from silvery to pale yellowish, with darker pigmentation enhancing the striped pattern.

Osteochilus melanopleura specimens in this study had TL ranging from 162.10 to 250.05 mm, SL from 121.07 to 198.00 mm, BD from 57.11 to 73.08 mm, and HL from 29.87 to 46.31 mm. The species is characterized by a terminal mouth with thick, folded lips typical of the genus, and two pairs of short barbels (maxillary and rostral) on the upper jaw. Fin formula is D.15, P.14, V.12, and A.6, with a lateral line consisting of 49–53 scales. Additional diagnostic features include a deep, laterally compressed body, a relatively long head, and a distinctly forked caudal fin. The body coloration is generally grayishwhite, with faint blackish blotches near the operculum or above the base of the pectoral fins, serving as key distinguishing characteristics.

Osteochilus spilurus specimens in this study had TL ranging from 23.15 to 65.37 mm, SL from 16.71 to 52.88 mm, HL from 2.14 to 11.15 mm, and BD from 5.11 to 15.63 mm. The species is characterized by a terminal mouth with two pairs of barbels on the upper (maxillary) and lower (mandibular) jaws. Fin formula is D.12, A.8, P.10, and V.9, with 29–30 lateral line scales. A distinct black blotch on the caudal peduncle contrasts with the generally silvery-gray, laterally compressed body. The head is relatively small in proportion to the body, serving as an additional diagnostic feature distinguishing *O. spilurus* from related species.

Brevibora cheeya specimens in this study had TL ranging from 20.18 to 39.51 mm, SL from 15.19 to 32.31 mm, BD from 4.12 to 6.27 mm, and HL from 5.71 to 8.11 mm. The species is characterized by a terminal mouth, forked caudal fin, and a fin formula of D.I.8, A.7, P.8, and V.8, with a complete lateral line consisting of 25–28 scales. The body coloration ranges from silvery to greenish, while the fins are yellow. These features distinguish *B. cheeya* from other congeners within the genus *Brevibora* and the family Cyprinidae.

Rasbora cephalotaenia specimens in this study had TL ranging from 20.18 to 39.51 mm, SL from 15.19 to 32.31 mm, BD from 4.12 to 6.27 mm, and HL from 5.71 to 8.11 mm. The species is distinguished by a terminal mouth, forked caudal fin, and a fin formula of D.I.8, A.7, P.8, and V.8, with a complete lateral line containing 25–28 scales. The body is silvery to greenish, and the fins are yellow. These characters, including its coloration pattern, serve as key diagnostic traits separating *R. cephalotaenia* from other species within the genus *Rasbora* and the family Cyprinidae.

Rasbora tornieri specimens in this study had TL ranging from 79.73 to 83.67 mm, SL from 65.39 to 68.84 mm, BD from 15.27 to 17.63 mm, and HL from 10.15 to 10.61 mm. The species is characterized by a superior mouth, forked caudal fin, and a fin formula of D.7, A.12, P.I.9, and V.9, with 35 lateral line scales. The body exhibits brownish orange coloration on the dorsal and dorsolateral surfaces, while the ventrolateral and ventral regions are unpigmented. A faint dark midline is present along the flanks, with a second, less distinct line positioned above it, separated by a bright elongated area. The caudal fin is reddish orange with narrow black margins, distinguishing *R. tornieri* from other members of the genus *Rasbora* within the family Cyprinidae.

Trigonopoma gracile specimens in this study had TL ranging from 38.4 to 49.2 mm, SL from 28.3 to 30.5 mm, BD from 6.16 to 8.14 mm, and HL from 5.16 to 6.87 mm. The species is distinguished by a terminal mouth, pointed head, and a fin formula of D.8, A.7, P.6, and V.7. It has 29–31 lateral line scales. The dorsal fin is tall, pointed, and longer than the body width, while the anal fin is similarly pointed and located posterior to the dorsal fin base. The body width is 4.5–4.9 times shorter than the standard length. A key diagnostic feature is the presence of a prominent black longitudinal stripe along the lateral side, accompanied by a yellow to orange stripe above it, differentiating *T. gracile* from other members of the genus *Trigonopoma* within Cyprinidae.

Hemibagrus hoevenii specimens in this study had TL ranging from 124.38 to 228.41 mm, SL from 99.14 to 164.27 mm, BD from 25.70 to 37.15 mm, and HL from 30.98 to 49.83 mm. The species is characterized by a rough head surface, terminal mouth, and four pairs of barbels with varying lengths: nasal barbels reaching the eyes, maxillary barbels extending to the anal fin, outer mandibular barbels to the pectoral fins, and inner mandibular barbels to the base of the pectoral fins. Fin formula is D.I.7, A.10–11, P.I.7–8, and V.I.6. The adipose fin base is nearly equal in length to the anal fin base. The pectoral fin spine is rigid and serrated. Coloration includes a brown dorsal body and white ventral surface. A key diagnostic feature distinguishing *H. hoevenii* is the presence of a black spot on the posterior part of the adipose fin and a filamentous extension on the upper lobe of the caudal fin.

Hemibagrus olyroides specimens in this study had TL ranging from 161.21 to 164.68 mm, SL from 121.63 to 124.60 mm, BD from 19.78 to 20.65 mm, and HL from 35.49 to 36.30 mm. The species is characterized by a subterminal mouth and four pairs of barbels. Maxillary barbels are extremely long, reaching the base of the caudal fin, nasal barbels extend to the posterior margin of the eyes, and mandibular barbels reach the pectoral fins. A notably long adipose fin extends from just behind the dorsal fin to the base of the caudal fin. Fin formula is D.I.7, P.I.8, A.12, and V.6, with a weak dorsal spine. The caudal fin is asymmetrical, with an elongated, pointed upper lobe and a shorter lower lobe. The body is uniformly brownish black, and the body width is approximately 6.03–6.14 times shorter than the standard length. These features distinguish *H. olyroides* from other congeners within the family Bagridae.

Hemibagrus planiceps specimens in this study had TL ranging from 85.93 to 105.75 mm, SL from 67.22 to 78.59 mm, BD from 18.56 to 24.62 mm, and HL from 10.37 to 12.23 mm. The species is characterized by a moderately broad, dorsoventrally flattened head with a subterminal mouth and short snout. The lower jaw does not project beyond the upper jaw. It has four pairs of barbels, maxillary barbels extend to the base of the dorsal fin, nasal barbels reach the posterior margin of the eyes, and both mandibular barbels extend to the level of the pectoral fins. The body is elongated and robust, with a forked caudal fin and a well-developed adipose fin located posterior to the dorsal fin. Fin formula is D.I.7, A.11, P.I.8, and V.I.5. The dorsal spine is weak, and the skin is smooth. A key distinguishing feature from *H. hoevenii* is the smooth head surface, as opposed to the rough texture observed in its congener.

Channa bankanensis specimens found in this study had total lengths ranging from 91.67 to 193.15 mm, standard lengths from 79.53 to 173.87 mm, head lengths from 3.21 to 52.31 mm, and body depths (TB) from 18.19 to 40.21 mm. This species possesses a terminal mouth and a rounded caudal fin. The body is elongated and laterally compressed, with the lateral surface displaying a series of numerous dark blotches arranged in an elongated pattern. Scales are present between the lateral line and the anterior base of the dorsal fin. The lateral line consists of 64 scales. Important characters include the fin formula D.40; A.30; P.10; V.7. *C. bankanensis* closely resembles *C. lucius* in overall morphology and coloration; however, it can be reliably distinguished by its more rounded head shape, in contrast to the distinctly pointed head of *C. lucius*. These features provide clear diagnostic criteria for the identification of *C. bankanensis* among other sympatric snakehead species.

Channa lucius specimens in this study had TL ranging from 78.45 to 305.10 mm, SL from 65.13 to 250.03 mm, BD from 23.06 to 75.30 mm, and HL from 20.12 to 66.41 mm. The species is characterized by a terminal mouth, a rounded caudal fin, and a slightly concave dorsal head profile. The elongated dorsal fin extends from just behind the operculum to near the caudal fin. Fin formula is D.38–39, A.27–28, P.15, and V.5, with 58–63 lateral line scales. Additional scales are present between the lateral line and the base of the dorsal fin. The body is brown with dark blotches and an oblique band along the ventral side. Head scales are noticeably wider than body scales, distinguishing *C. lucius* from other Channidae members.

Channa striata specimens in this study had TL ranging from 130.82 to 250.32 mm, SL from 112.26 to 210.13 mm, BD from 23.64 to 50.18 mm, and HL from 43.16 to 72.35 mm. The species features a terminal mouth and a slightly depressed head resembling that of a snake. The dorsal fin is long, extending to but not fused with the caudal fin. Fin formula is D.41, A.26, P.21, and V.5, with 55 lateral line scales. Additional scales are present between the lateral line and the base of the dorsal fin. The dorsal body is dark brown, while the lateral to ventral regions exhibit irregular black and white patterning. These features differentiate *C. striata* from other species within the family Channidae.

Mastacembelus erythrotaenia specimens in this study had TL of 90.98 mm, SL of 116.42 mm, BD of 22.47 mm, and HL of 26.18 mm. The species is characterized by an inferior, forward-extending mouth and a caudal fin continuous with the dorsal and anal fins. Fine, sharp spines are present along the back and anal fin (three on the anal fin), while the opercular margin also bears sharp spines. The nostrils are marked by smooth protrusions with small bumps. Body coloration includes distinctive orange-reddish stripes and spots. Red bands are present from the head to the anterior body, which fade to yellow or white post-mortem. The posterior body exhibits red spots or elongated marks on a dark background. These characters distinguish *M. erythrotaenia* from other members of the family Mastacembelidae, especially within the genus *Mastacembelus*.

Macrognathus maculatus specimens in this study had TL of 151.21 mm, SL of 143.51 mm, BD of 21.30 mm, and HL of 21.32 mm. The species is distinguished by fine protrusions on the nasal region and a rounded caudal fin. Dorsal and anal fins are elongated and fused with the caudal fin. Fin formula is D.XXVII.57, A.III.56, and P.14. The body is dark brown, marked by 18 small continuous lateral stripes, and covered with relatively small scales. These features differentiate *M. maculatus* from other members of Mastacembelidae, particularly in fin configuration and body patterning.

Anabas testudineus specimens in this study had TL ranging from 130.83 to 170.52 mm, SL from 108.54 to 132.31 mm, BD from 29.25 to 43.12 mm, and HL from 43.64 to 67.51 mm. The species is characterized by a terminal mouth, serrated opercular margin resembling spines, and a rounded caudal fin. The dorsal fin contains rigid spines and extends to the caudal peduncle, while the anal fin, also spiny, is shorter but reaches the same region. Fin formula is D.XV–XVII.7–9, A.IX–X.9–12, P.14–15, and V.I.5, with 27 lateral line scales. The lateral line is interrupted below the soft dorsal rays. The body is covered with stiff, rigid scales and displays yellowish-brown to dark brown coloration, while the fins are darker, nearly black, with paler tips. These features distinguish *A. testudineus* from other members of the family Anabantidae.

Helostoma temminckii specimens in this study had TL ranging from 53.41 to 117.19 mm, SL from 46.25 to 95.05 mm, HL from 18.85 to 31.16 mm, and BD from 22.57 to 45.31 mm. The species is characterized by a terminal, protrusible mouth and an emarginate caudal fin. Dorsal and anal fins are similar in shape and size, with the dorsal fin originating just behind the opercular slit and the anal fin beginning posterior to the pelvic fins. Fin formula is D.XVI–XVII.10–12.3–5, A.XIV–XV.15–17, P.2.5–11, and V.I.5. The lateral line is interrupted at the 31st scale and consists of 41 scales (31 upper, 10 lower). The body is dark gray to greenish with thin horizontal stripes extending from the opercular slit to the caudal fin base. As the sole representative of the family Helostomatidae, *H. temminckii* is distinguished by its unique combination of fin morphology, interrupted lateral line, and body coloration.

Kottelatlimia pristes specimens in this study had TL ranging from 32.40 to 35.31 mm, SL from 26.96 to 30.12 mm, BD from 3.58 to 5.41 mm, and HL from 5.91 to 6.13 mm. The species is characterized by a terminal mouth, mid positioned eyes, and protruding tubular nostrils. It lacks long nasal barbels, and the lower lip is split, resembling a pair of short barbels. Fin formula is D.9, A.9, P.6, and V.6, with the dorsal fin comprising two unbranched and seven branched rays. The caudal fin is truncate and slightly rounded. These features distinguish *K. pristes* from other members of the family Cobitidae, particularly in lip morphology and barbel absence

Clarias nieuhofii specimens in this study had TL ranging from 244.21 to 273.85 mm, SL from 219.40 to 244.60 mm, BD from 29.54 to 47.32 mm, and HL from 42.63 to 51.33 mm. The species is characterized by a depressed head, small eyes, and a subterminal mouth, with four pairs of barbels (nasal, maxillary, and inner and outer mandibular) extending to the operculum margin and reaching the pectoral fins. The caudal fin is rounded, and both dorsal and anal fins are continuous with the caudal fin. The dorsal fin originates just posterior to the pectoral fin tip, while the anal fin begins after the pelvic fins and reaches the caudal fin. Fin formula is D.87, A.66–67, P.14, and V.8. The body is smooth, scaleless, and dark brown dorsally and laterally, with a brownish-white ventral surface. Diagnostic coloration includes 10–12 vertical lines of white dots along the lateral body, accompanied by two rows of elongated white dots below, distinguishing *C. nieuhofii* from other members of the family Clariidae.

Pseudeutropius brachypopterus specimens in this study had TL of 76.25 mm, SL of 62.32 mm, BD of 17.16 mm, and HL of 17.44 mm. The species is characterized by a laterally compressed body, forked caudal fin, and four pairs of barbels extending to the base of the dorsal fin. A small adipose fin is present, positioned far posterior to the dorsal fin. Fin formula is D.I.4, A.31, P.I.7, and V.5. The body is silvery-gray in life, marked by four distinct dark horizontal stripes along the lateral sides, which serve as key diagnostic features distinguishing *P. brachypopterus* from other members of the family Schilbeidae.

Nandus nebulosus specimens in this study had TL ranging from 40.74 to 81.01 mm, SL from 31.78 to 60.00 mm, BD from 14.49 to 29.23 mm, and HL from 15.31 to 27.98 mm. The species is characterized by a protrusible mouth, relatively large eyes, and a truncate caudal fin. Fin formula is D.XIV.12, A.III.5–6, P.14, and V.I.5, with a laterally interrupted line at approximately the 26th scale. The body coloration is generally dark brown with scattered blotches along the flanks, which appear more distinct in clear water. In contrast, specimens from peat swamp environments exhibit predominantly black coloration with faint patterns, likely as an adaptive response to dark, tannin rich waters. These features distinguish *N. nebulosus* from other members of the family Nandidae, particularly in coloration variability and lateral line interruption.

Pristolepis grootii specimens in this study had TL of 108.21 mm, SL of 82.58 mm, BD of 45.11 mm, and HL of 33.46 mm. The species is characterized by dorsolaterally positioned eyes near the terminal mouth, a laterally compressed body, and a rounded caudal fin. It possesses an interrupted lateral line with 23 upper and 12 lower scales. Fin formula is D.XIII.16, A.III.8, P.I.5, and V.I.5. The dorsal fin is divided into spiny and soft portions, with the soft dorsal ray origin aligning with the anal fin spine origin. Scales are present between the lateral line and the midpoint of the dorsal fin. The anterior dorsal profile is slightly convex. Body coloration is yellowish brown with eight dark vertical bands along the flanks, distinguishing *P. grootii* from other related species.

The environmental parameters of the peatland waters at the observed research site include temperature, pH, current velocity, depth, transparency, dissolved oxygen (DO), and total dissolved solids (TDS). The average measurements of these environmental parameters are as follows water temperature ranges from 27 to 29,63°C, water pH ranges from 3,53 to 4,4, water current velocity ranges from 0,08 to 0,29 m/s, water depth ranges from 0,79 to 1,85 m, water transparency ranges from 21,25 to 31,3 cm, dissolved oxygen (DO) ranges from 2,63 to 3,83 mg/L, and total dissolved solids (TDS) range from 32,5 to 42,5 mg/L (Table 4).

Tabel 4. Environmental parameters of Parit Nanas peat waters

Environmental Parameters	Stations				
	I	II	III	IV	V
Temperature (°C)	27.00–28.25	27.25–28.88	27.25–28.93	27.25–28.25	27.25–29.63
pH	3.53–3.58	3.65–4.20	3.65–4.10	3.63–3.73	3.68–4.40
Current speed (m/s)	0.10–0.29	0.08–0.14	0.08–0.10	0.08–0.11	0.10–0.23
Depth (m)	1.48–1.85	0.91–1.57	0.79–1.32	0.83–1.69	0.79–1.37
Brightness (cm)	22.25–30.13	21.75–26.75	21.75–27.63	21.25–27.88	22.75–31.30
DO (mg/L)	3.03–3.83	2.68–3.10	2.63–2.93	2.68–2.93	2.68–3.55
TDS (mg/L)	33.00–42.5	32.50–37.50	36.00–39.00	32.50–38.25	33.75–39.00

DISCUSSION

A study conducted in the peat swamp waters of Parit Nanas, North Pontianak District, Pontianak City, recorded 34 fish species distributed across 26 genera and 13 families (Table 1). The fish diversity in this study was relatively high compared to that of the peat swamp waters of the Sembakung River, North Kalimantan, where only 11 species from 7 genera and 7 families were reported (Azis *et al*. 2021). This difference may be influenced by variations in fishing gear and sampling frequency, as the present study employed four types of fishing gear with four sampling occasions, whereas Azis *et al*. (2021) used only three types of gear and conducted two sampling occasions. Conversely, Santoso and Gema (2019) reported 95 species from 50 genera and 23 families in an area that remains largely natural, with samples collected across various aquatic habitat types, resulting in higher species diversity compared to the present study.

The highest number of species found in the peat water of Parit Nanas belongs to the family Osphronemidae (Figure 2). The results of this study are consistent with the findings of Ahmad and Samat (2015), which also showed that the Osphronemidae family was the most commonly found compared to other families. According to Kottelat *et al*. (1993), the Osphronemidae family possesses a labyrinth organ that enables them to extract oxygen directly from the air. The peat water of Parit Nanas has a relatively low dissolved oxygen concentration, ranging from 2,63 to 3,83 mg/L (Table 4). As a result, species from this family can adapt well, even under low dissolved oxygen conditions. Many species from this family can adapt to extreme environmental conditions, such as black water with high acidity (pH between 3 and 5) (Tan and Ng, 2005). These results are consistent with the acidic conditions of the study site, where pH ranged from 3.53 to 4.40.

The Anabantidae and Helostomatidae families in this study are represented by only one species. This finding is consistent with Froese and Pauly (2025), which also records only one species within these families. Similarly, the Pristolepididae and Nandidae families each consist of only one genus and two species, reflecting the limited natural diversity of these families in West Kalimantan. Meanwhile, within the Cobitidae family, only one species was recorded, which is likely due to limitations of the sampling gear and water depth, as members of this group are benthic fishes that inhabit bottom substrates, making them difficult to detect. The low number of species observed in certain families may also be attributed to habitat degradation, human activities, or overfishing (Kottelat *et al*., 1993).

Based on their occurrence, the majority of the fish species recorded are native to Indonesia, with the exception of *Trichopodus pectoralis*, which is classified as an introduced species. Introduced species are those whose natural distribution does not originally include Indonesia waters. According to Sulaiman and Mayden (2012), over 60% of fish species in Kalimantan are endemic. Ecologically, fish species identified in this study are endemic to Kalimantan (Borneo), these include *Desmopuntius rhomboocellatus*, *D. trifasciatus* and *Hemibagrus olyroides*. These species are naturally restricted to Borneo, including parts of Malaysian Borneo (Froese R and D Pauly, 2025). Most of these three species are currently categorized as Least Concern (LC) by the IUCN (2025), except for *H. olyroides* is classified as Near Threatened (NT). Fish species categorized as LC are considered to have a low risk of extinction in the future, whereas species categorized as NT are close to qualifying for a threatened category in the near future.

Each fish species found in the peat swamp waters of Parit Nanas exhibits distinct morphological characteristics, ranging from family level differences to species specific traits. The research findings indicate variations in body features, morphometric characteristics, and meristic counts among species. The families Cyprinidae and Danionidae are generally recognizable and distinguishable from other families by their clearly visible scales, fusiform body shape, and forked caudal fin. Morphologically, these two families are highly similar, however, Danionidae species typically have a smaller and more slender body compared to Cyprinidae. Fish species from the genera *Rasbora*, *Brevibora*, and *Trigonopoma* have distinguishing features, such as a projection at the tip of the lower jaw that fits into a groove in the upper jaw, whereas such a feature is absent in the genera *Osteochilus* and *Desmopuntius* (Kottelat *et al*., 1993 & Froese R and D Pauly, 2025). Each species can be further distinguished based on body patterns, the presence or absence of a lateral line, the number of scales along the lateral line, and the fin ray formula (Table 4).

According to Kottelat *et al*. (1993), fish species from the family Cobitidae can be distinguished from other fish groups by their highly recognizable fusiform body shape, absence of scales, and inferior mouth position. Similarly, the family Mastacembelidae also lacks scales and has an inferior mouth position. However, in terms of body shape, this family exhibits an elongated, eel like (*anguilliform*) form. The distinguishing characteristics between genera include the presence of six small finger like projections on the margins of the anterior nostrils in *Macrognathus*, whereas *Mastacembelus* has two small, smooth finger-like projections and two flattened-based tubercles on the margins of the anterior nostrils (Kottelat *et al*., 1993).

The Osphronemidae family is generally recognizable by the characteristic elongated filament-like extension of one of its fin rays in most species. Additionally, the majority of species within this family exhibit a laterally compressed body shape. Differences among species are observed in genera such as *Betta* and *Trichopsis*, which share similar body shapes but can be distinguished by the length of the pelvic fin filaments. In *Betta* species, the filamentous fin does not extend beyond the anal fin, whereas in *Trichopsis*, it extends past the anal fin. This genus can also be distinguished from other fish species by the length of its filament, which is nearly equal to its body length, and its crescent-shaped, slightly concave caudal fin. The *Luciocephalus* genus exhibits the most distinct characteristics, featuring an elongated snout and a superior mouth position, with the dorsal and anal fins positioned far back, extending toward the caudal peduncle.

The Anabantidae and Helostomatidae families resemble Osphronemidae at first glance but lack the filamentous elongated fin rays. A distinguishing characteristic of Anabantidae species is the presence of sharp, serrated gill covers, as well as pointed dorsal and anal fin rays. The Helostomatidae genus is differentiated by its thick, protruding lips, laterally compressed body, and dorsal and anal fins that are nearly equal in length, extending toward the caudal fin. According to *FishBase*, each of these two genera consists of only one species (Froese R and D Pauly, 2025).

According to Kottelat *et al*. (1993), the Pristolepididae family is closely related to the Nandidae family. Fish species belonging to the Nandidae family have distinguishing characteristics, including a more pointed head shape, a larger mouth, a truncate caudal fin, and a body coloration resembling dried brown leaves, with irregular blotches or lines that mimic leaf veins when living in clear water. In contrast, species from the Pristolepididae genus have a more rounded head shape, a smaller mouth, a plainer body pattern with transverse bands along the sides, and a more rounded caudal fin.

Fish species of the Siluridae family are characterized by a laterally compressed and elongated body, a very short or absent dorsal fin, and an elongated anal fin. Each species possesses distinguishing traits that can be identified through the shape and number of dorsal fins or the position of the eyes. Species from the genera *Kryptopterus*, *Micronema*, and *Silurichthys* have reduced or absent dorsal fins, whereas *Wallago* has a broader dorsal fin compared to other genera. Additionally, the Wallago genus has a shorter anal fin than other genera within the Siluridae family (Kottelat *et al*., 1993).

The families Bagridae and Schilbeidae have distinct body characteristics and share similarities, such as the presence of an adipose fin located behind the dorsal fin and the presence of barbels. The distinguishing feature between these two families is that the Schilbeidae family has a long anal fin, whereas the Bagridae family has a shorter one. Additionally, the adipose fin in Schilbeidae species is relatively very small and positioned far behind the dorsal fin. Species within each genus of these two families can be differentiated by examining body patterns, the characteristics and number of barbels, and the fin ray formula (Kottelat *et al*., 1993; Froese and Pauly, 2025).

The Clariidae family has distinct body characteristics, with an anguiliform or elongated body shape and a flattened (depressed) head. Fish species from this family lack scales and can be easily distinguished based on body patterns, the number of barbels, and fin ray formulas. *Clarias nieuhofii* possesses a unique characteristic, featuring body patterns with spots forming regular lines and a caudal fin that is fused with the anal fin.

In general, the families and genera of fish that have been found exhibit distinguishing morphological characteristics. Each species within a genus of a particular family can be differentiated based on specific body features, unique body patterns, morphometric traits, and meristic counts. Based on observations, the body coloration of the fish found often differs from that of fish reported in previous studies. Identifying fish solely by body color is not always a reliable approach. According to Qi *et al*. (2024), fish have the ability to adjust their body coloration to match their environment. Environmental factors, such as light intensity, significantly influence pigmentation development, ultimately affecting overall body coloration. Moreover, the coloration of preserved or deceased fish often differs from that of live specimens.

The condition of aquatic environmental parameters greatly influences fish life. The research results show that the temperature at the study site ranges from 27.25–29.63°C. A suitable temperature for fish life ranges between 25 and 30°C (Hasibuan *et al*., 2019). This indicates that the temperature conditions in the peatland waters of Parit Nanas still support fish life.

According to Fujaya (2004), the minimum to maximum pH range tolerated by freshwater fish is generally between 4.0 and 11.0. Based on the research findings, the average pH values at stations 1, 2, 3, and 4 were below 4. Peat water exhibits high acidity (pH 3–5), which is related to the high level of organic matter. Although the pH value is relatively low, many fish species still inhabit these peatland waters (Arifianingsih *et al*., 2020). A similar condition was observed in the peatland canal waters of Central Kalimantan, where the pH ranged from 3.83–3.99, and 16 fish species were successfully recorded

(Haryono, 2012). These findings indicate that many fish species can tolerate the low pH conditions of peatland waters.

According to Solstorm *et al*. (2016), relatively fast currents have velocities ranging from 0.20 to 0.50 m/s, whereas slow currents are less than 0.20 m/s and are often frequented by fish. The results of the study indicate that current velocities range from 0.08 to 0.23 m/s. Based on these results, the current conditions at the study site are still favorable for fish survival.

The water transparency in the peat swamp waters of Parit Nanas ranged from 21.25 to 31.3 cm. According to Koniyo Y and Lamadi A (2017), the optimal water transparency for fish life in freshwater habitats ranges from 25 to 40 cm. Based on the results of this study, the water transparency was still within the range that supports fish life, although some values were recorded below 25 cm. According to Kordi & Tancung (2005), when water transparency reaches depths of less than 25 cm, it indicates a drastic decline in dissolved oxygen levels.

The water depth in the peatland waters of Parit Nanas ranges from 0.79–1.85 m. Yuningsih *et al*. (2014) stated that the ideal water depth for photosynthesis to occur is approximately 2.5 m. Based on the research results, the water depth conditions in the peatland waters of Parit Nanas still support fish life. Meanwhile, the dissolved oxygen levels in the study area range from 2.63–3.83 mg/L. According to Pescod (1973), waters that adequately support the normal life of organisms must have a minimum dissolved oxygen content of 2 mg/L, provided no toxic compounds are present. Based on the research findings, the peatland waters of Parit Nanas still support fish life, particularly fish species that can survive in low oxygen environments.

According to Peraturan Pemerintah No. 82 Tahun 2001, the TDS (Total Dissolved Solids) values in the study area range from 32.5–42.5 mg/L, which are within the water quality standards for Class II and III waters (less than 1000 mg/L) for freshwater fish cultivation. These TDS values are considered low, indicating a low concentration of inorganic substances in the waters. TDS originates from inorganic materials in the form of ions commonly found in aquatic environments, such as Magnesium (Mg), Calcium (Ca), and Sodium (Na) (Effendi, 2003). Based on the research findings, the fish species found in this peatland water exhibit unique and unusual resilience, as they are able to adapt to environments with relatively low dissolved oxygen levels and low pH. This is consistent with the statement of Ng and Tan (1994), who noted that many freshwater fish, particularly those from peat swamp ecosystems, have physiologically adapted to survive under extreme conditions such as low pH and minimal dissolved oxygen.

CONCLUSION

The findings of this study indicate that freshwater fish species diversity in Parit Nanas is relatively high within the scope of research conducted in ditch and river environments. A total of 34 species belonging to 26 genera and 14 families were recorded. The family with the highest number of species was Osphronemidae, which exhibits strong adaptive capacity to extreme peatland water conditions, such as acidic pH and low dissolved oxygen levels. The morphological traits of each fish species varied and displayed distinct diagnostic characteristics. Evaluation of environmental quality parameters suggests that the habitat remains in good condition and support the sustainability of fish populations.

CONFLICT OF INTEREST

We declare that there is no conflict of interest.

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