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Short Communications

New Record of A Freshwater Prawn *Macrobrachium sundaicum* in Selat Panjang Island, Riau Province, Indonesia

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ABSTRACT
A freshwater prawn *M. sundaicum*, is an obligate species to acidic peat swamp. Up to the present, *M. sundaicum* has only been reported in the West Kalimantan, the Riau Archipelago, and Jambi Provinces in Indonesia. The aim of this research is to determine the distribution and habitat preferences of peat swamp prawn in Selat Panjang Island, Riau Province, Indonesia. The samples were collected in seven peat swamp rivers by hand net. The study yielded one hundred specimens. The acidic peat swamp is a perfect habitat for *M. sundaicum*. This study provided the basic information about peat swamp prawn in Selat Panjang Island, especially their distribution and habitat preferences.

The Indonesian freshwater shrimp and prawns are consisted of Atyidae and Palaemonidae families of the Decapoda order (Wowor et al. 2004; De Grave et al. 2015). The freshwater shrimps and prawns have unique life style, such as landlocked and amphidromous (Wowor & Choy 2001; Closs et al. 2003; Joy & death 2004). This style affects the distribution of the species (Wowor et al. 2009; Thuesen et al. 2011). Freshwater shrimps and prawns play an important role in their environment, and they are as decomposers maintain ecosystem balance (Wowor et al. 2004) and they act as bio-indicators of the quality of the aquatic environment (Wowor et al. 2009; Taufik 2011).

The freshwater prawn genus *Macrobrachium* comprises 261 valid species (WoRMS 2024). This genus is widely distributed and inhabited various types of habitat from swamps, reservoirs, lakes, lowland up to mountains rivers (Wowor et al. 2004) and can adapt to extreme environment such as water with a low pH (Ng 1992; Wowor 1999; Wowor & Choy 2001; Wowor et al. 2009). Low pH water in peat swamp causes limitation to the organisms that can survive. One of the species

that can survive in this specific environment is *Macrobrachium sundaicum*. The distribution of *M. sundaicum* species has been reported in West Kalimantan (Kapuas Hulu Regency; Pontianak on Sekadau; Rivers Kepayang at Anjungan; Rivers Mungan (Sarawak); Rivers Bejit (between Balai Ringin and Simunjan), Sumatra (Riau Archipelago (Natuna and Kundur island); Riau Province (Bengkalis); Jambi (Arang-Arang Lake), Peninsular Malaysia (Trengganu; Pahang; Johor State), Singapore (Neon Soon stream near Seletar reservoir), and southern Thailand (Wowor & Ng 2010). The presence of the peat swamp rivers in Riau Province including in Selat Panjang Island, raise the questions of the presence of *M. sundaicum*. So, the aims of this research were to determine the distribution and the habitat preferences of *M. sundaicum*.

The research was conducted in seven peat swamp rivers in Selat Panjang Island, Riau Province, Indonesia (Table 1) (Figure 1).

Table 1. Research locations.

River	Village	District	Coordinate
Sai Kundur	Kundur	Tebing Tinggi Barat	0° 57' 10.7994"S; 102° 33' 32.3994"E
Sai Karet	Kundur	Tebing Tinggi Barat	0° 57' 3.5994"S; 102° 33' 3.6"E
Pagar	Kundur	Tebing Tinggi Barat	0° 57' 0"S; 102° 33' 3.6"E
Kayu	Kundur	Tebing Tinggi Barat	0° 57' 3.5994"S; 102° 33' 7.2"E
Sawit	Kundur	Tebing Tinggi Barat	0° 56' 31.1994"S; 102° 33' 50.3994"E
Pinang	Kundur	Tebing Tinggi Barat	0° 57' 14.3994"S; 102° 33' 43.1994"
Pakis	Kundur	Tebing Tinggi Barat	0° 57' 50.3994"S; 102° 33' 57.6"E

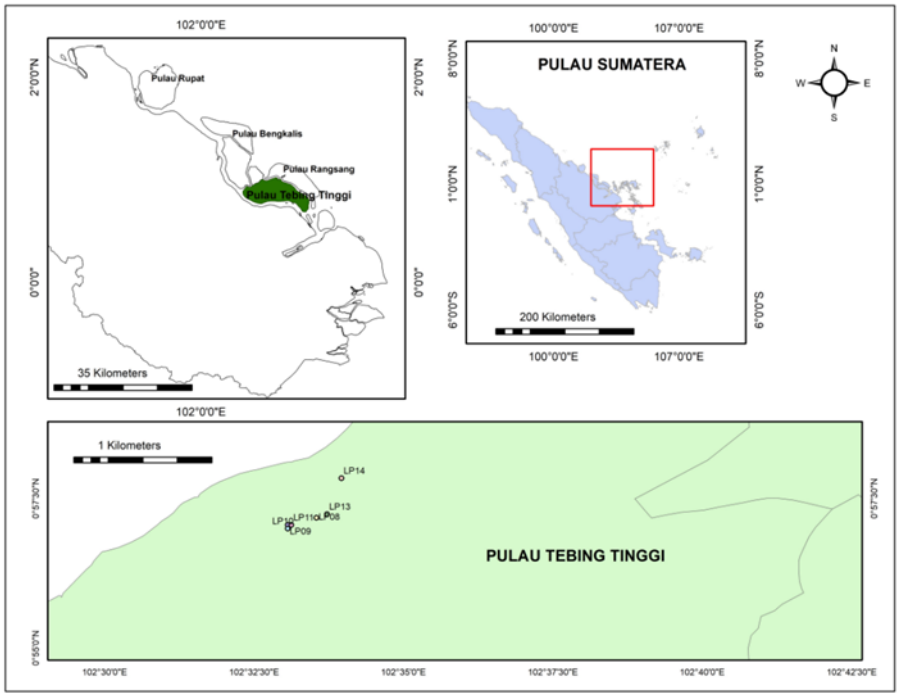

Figure 1. Sampling map sites in Selat Panjang Island, Riau Province.

The sampling was conducted by purposive sampling in October 2022. Sampling started at 05.00-11.00 pm using a hand net. The water temperature, water current, pH, canopy, substrate, the presence of

aquatic plant, and surrounding environment are the abiotic parameters measured and observed. The samples were preserved in 96% alcohol. The specimens are deposited in Museum Zoologicum Bogoriense (MZB), Research Centre for Biosystematics and Evolution, National Research and Innovation Agency (BRIN) Indonesia. The Global Position System (GPS) with GLONASS system of smartphone. Samples of the freshwater prawns were identified at the Research Centre for Biosystematics and Evolution, BRIN Cibinong in Bogor. Identification key by Wowor et al. (2004) based on morphological characteristics was used to determine the identity of the species.

Only one species was identified from the sampled locations, i.e, *M. sundaicum*. A total of 100 individuals consisting of 55 males, 34 females, and 11 ovigerous females were obtained (Table 2).

The life coloration of *M. sundaicum* the overall body is reddish-brown, with black stripes along the body. The color of the species is generally influenced by the color of the substrate. The color of the species resembles the color of the water where they coloration inhabit.

Prawn coloration morphologically, the obtained specimens are very similar to the original description of *M. sundaicum* described by Wowor & Ng (2010). The specimens from Selat Panjang Island have short rostrum, with tip not extending beyond distal end of scaphocerite but extending beyond distal end of third segment of antennular peduncle or tip slightly extending beyond distal end of scaphocerite in young specimens. The rostrum was armed dorsally with at least with 9-12 teeth (mode 11), 4 teeth completely postorbital (3 or 4 in other specimens, mode 4). Ventral carina with 4–6 teeth (mode 5). Second pereiopods dissimilar in shape, unequal in size, robust and fingers covered by soft dense pubescence especially in adult specimens. Second pereiopods with carpus shorter than chela and merus subcylindrical (Figure 2). This finding shows the presence of *M. sundaicum* in Selat Panjang Island, Riau Province is new record for this species.

Figure 2. *Macrobrachium sundaicum* in Selat Panjang Island, Riau Province.

Table 2. Samples gained from the sampling locations in Selat Panjang Island, Riau Province, Indonesia.

River	Species	Male	Female	Ovigerous female	Number of individuals
Sai Kundur	*M. sundaicum*	13	5	2	20
Sai Karet	*M. sundaicum*	11	13	1	25
Pagar	*M. sundaicum*	4	6	0	10
Kayu	*M. sundaicum*	5	6	1	12
Sawit	*M. sundaicum*	2	0	2	4
Pinang	*M. sundaicum*	13	1	4	18
Pakis	*M. sundaicum*	7	3	1	11

Habitat characteristic data was taken in the form of vegetation and canopy conditions. Conditions of abiotic factor include temperature, water current, and pH (Table 3). The highest pH at Sai Kundur River (4.6) and the lowest at Pinang River (3.9). The highest water temperature at Pakis and Pagar Rivers (27°C) and low water temperature in Sai Karet River (25°C). The water velocity was fast in Pagar and Kayu Rivers and slow in Sai Karet, Pinang, and Pakis Rivers. The highest canopy coverage is in Sai Kundur, Sawit, and Pakis River.

Based on this study, *M. sundaicum* is found in peat swamp rivers in Selat Panjang Island. The water comes from undisturbed forest and no anthropogenic activities. The characteristic of the habitat of the seven sampling sites varied which affecting the number of specimens obtained. The high density of *M. sundaicum* was found in Sai Kundur, Sai Karet, and Pinang rivers. The high density of prawn is related to the substrate on which they live. The substrate with leaf litter does not only provide as food source but also serves as a hiding place for the prawns. The high abundance of the shrimp is related to the large amount of accumulated vegetation debris on the bottom of the stream which in turn provides food sources for the shrimp (Bentes et al. 2011). The middle density was found in Pagar and Kayu Rivers, characterized by mud substrate and ferm roots. The hard ferm roots do not provide adequate hiding place and the root is also hard to be clanged by *Macrobrachium* spp. Annawaty et al. (2016) noted that the hard and sparse nature of water plant root is not suitable for *Caridina* spp. to cling around, making it less prefer habitat for the prawn. Besides that, low density was observed in Sawit River with mud substrate only. The mud substrate does not provide hiding place for the prawns so this kind of substrate is not prefer by the prawns. *Macrobrachium sundaicum* is found more often in habitats with aquatic plants. Based on Wowor et al. (2004) the presence of aquatic plants in water bodies can support the survival rate of the prawns. The dominant aquatic plants at the study site are grass. Besides that, *M. sundaicum* can be found in river with acidic water, riparian forests, hanging roots and leaf litter (Cai 2016).

Table 3. Samples gained from the sampling locations in Selat Panjang Island, Riau Province, Indonesia.

River	pH	Water temperature (°C)	Water current	Canopy	Environment around sampling site	Presence of aquatic plant	Substrate
Sai Kundur	4.6	26	Middle	70%	Rubber, Traditional village Pterydophyta, Grass	+	Mud, leaf litter, ferm roots, dead wood
Sai Karet	4.5	25	Slow	10%	Oil palm, Rubber, traditional village	+	Mud, leaf litter, dead wood
Kayu	4.4	26	Fast	30%	Pterydophyta, Traditional village	-	Mud, trailing roots
Sawit	4.0	26	Middle	70%	Oil palm, Pterydophyta	-	Mud
Pinang	3.9	26	Slow	50%	Oil palm, Rubber	+	Mud, leaf litter
Pakis	4.1	27	Slow	70%	Oil palm	+	Mud, leaf litter

*Information:
(+): present of aquatic plant
(-): not present of aquatic plant

The water color in all sampled rivers has dark tea-colored to almost black on reflected light with a pH between 3.9 to 4.7. The water temperature varied between 25 to 27°C. These unusual water conditions fit very well with the biological needs of *M. sundaicum*. According to Wowor & Ng (2010), the *M. sundaicum* species is most abundant in riparian rivers with cool and acidic water with a pH range of 4.5–6.0. However, it can also live at high water temperatures which varies between 24.5–35.5°C with low oxygen (Johnson 1967; Ng 1993).

AUTHOR CONTRIBUTION

All authors have contributed to the writing. LP was in charge of sampling, analysing the data and writing the manuscript. DY-F, AF. DW and A designed the study, supervised laboratory work, and wrote the manuscript.

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CONFLICT OF INTEREST

In this research there is no conflict of interest.

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