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A preliminary checklist of commercial marine shrimps (Decapoda: Penaeidae) along Peninsular Malaysia coastal waters

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Abstract. This study contributes a preliminary checklist of commercial marine shrimps collected along Peninsular Malaysia coastal waters. Samples collection were carried out between November 2021 to August 2022 either by using bag-net or purchasing from local landing sites if their capture locations could be confirmed. In total, 375 individuals from 18 species and 7 genera, belonging to the Family Penaeidae were recorded. Among this, the genus *Penaeus* exhibits the highest diversity with 8 species, followed by *Metapenaeus* (4 species), *Mierspenaeopsis* (2 species) and one species each from the genera *Alcockpenaeopsis*, *Ganjampenaeopsis*, *Parapenaeopsis* and *Trachysalambria*. This study was conducted to provide a taxonomically verified checklist of the commercial shrimps distributed along the Peninsular Malaysian coast, which would serve as a foundation for further research.

1. Introduction

Peninsular Malaysia has a long coastline of 2,031 kilometers (km) in length. Given this extensive fishing area, fisheries represent a substantial portion of the Malaysian economy. Although fish is the most important commodity, marine shrimp landings have registered a growth rate of 2.7% indicating that the shrimp catch from capture fisheries was approaching its limit [1]. According to Ismail and Abdullah [2], the shrimp production in this country is an important activity as they provide an inexpensive source of protein, employment opportunities and contributed to economic growth.

Penaeidae Rafinesque-Schmaltz, 1815, is the most economically valuable crustacean species [3]. They are widely distributed in tropical and subtropical waters with their highest diversity recorded in the Indo-West Pacific region. Due to their great commercial value, many penaeid species have been economically overexploited, particularly in tropical regions [4, 5, 6]. This overexploitation is concerning because it may result in more severe threats like the depletion of their natural stocks, disruption of the marine food web due to altered competition and predation, changes in species



composition and interaction, potential local extinctions, and eventually declining biodiversity [7].

In Malaysia, the main contributing species in capture production is penaeid shrimps, which contributed 74% of the total capture shrimp production [8]. Hence, it is worrisome that commercial penaeid shrimp species such as *Penaeus monodon*, *Fenneropenaeus merguensis*, *Mierspenaeopsis sculptilis*, *Metapenaeus affinis* and other wild shrimp harvests will eventually be depleted as their stock rely solely on wild population. Therefore, there is an urgent need to sustainably manage the shrimp fisheries in this country.

The basis of managing fisheries resource is to ensure that the resources are correctly identified, recorded, conserved and protected, whereas the fishers and their families have a sustained income and the nation has continuous supply [9]. As a first step in conservation management, checklist constitutes an excellent starting point for this purpose. The development of appropriate and effective conservation plans could be aided by timely checklist dissemination of regional biodiversity assessments [10]. To date, an updated checklist of shrimp fauna of the Peninsular Malaysia coastal waters is not available since the studies of Cob et al. [11]. The current work is aimed at producing a taxonomically verified checklist of commercial shrimps recorded along Peninsular Malaysia coast, which will serve as a foundation for future conservation and related research.

2. Materials & Methods

2.1. Sample collections

The shrimps were collected from November 2021 to August 2022 from several sites along the Peninsular Malaysia coastal waters (Table 1, Figure 1). All specimens were obtained either by using bag-net or purchasing from local landing sites if their capture locations could be confirmed. Whenever possible, individuals were identified down to the species level using morphological keys, most notably Chan [3] and Lovett [12]. Freshly collected specimens were photographed and recorded. The scientific names, taxonomic status, currently accepted and valid names were updated following WoRMS (World Register of Marine Species) database. Voucher specimens were maintained in invertebrate collections at the Biodiversity Reference Centre, Universiti Sains Malaysia.

Table 1. List of sampling sites, geographic coordinates and number of individuals sampled for each location.

No	Location	Coordinates		No. of individuals
1	Sungai Baru, Perlis	6°24'01.5"N	100°07'51.0"E	35
2	Merbok, Kedah	5°40'46.9"N	100°22'15.1"E	23
3	Kuala Muda, Kedah	5°34'42.6"N	100°20'28.2"E	10
4	Penaga, Pulau Pinang	5°31'19.1"N	100°22'21.0"E	21
5	Bagan Panchor, Perak	4°31'44.1"N	100°38'13.6"E	3
6	Kuala Selangor, Selangor	3°20'33.3"N	101°15'12.9"E	38
7	Minyak Beku, Johor	1°47'50.3"N	102°53'16.3"E	46
8	Rengit, Johor	1°39'08.4"N	103°08'19.2"E	29
9	Endau, Johor	2°39'18.7"N	103°37'05.7"E	49
10	Kuantan, Pahang	3°47'09.5"N	103°18'56.9"E	44
11	Kuala Besut, Terengganu	5°49'51.2"N	102°33'42.8"E	48
12	Kuala Besar, Kelantan	6°12'23.0"N	102°14'07.4"E	29

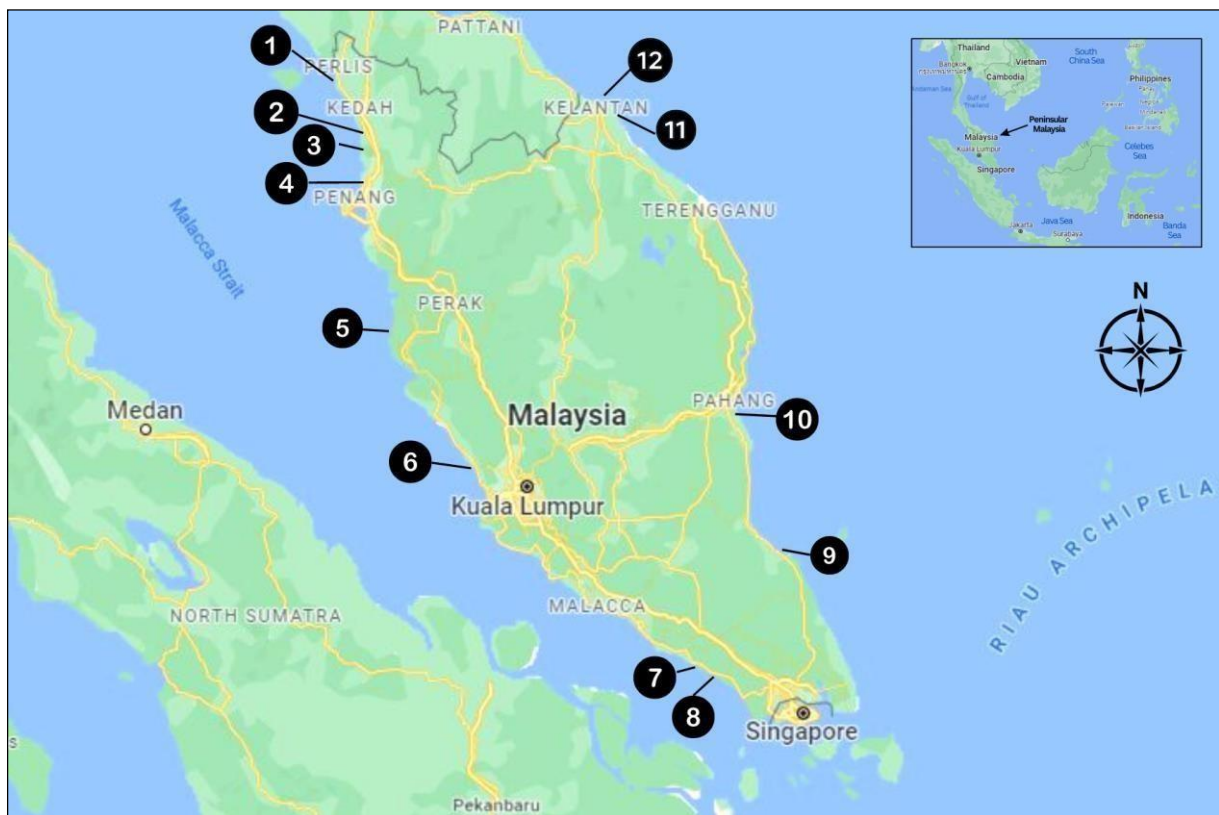


Figure 1. Map showing the sampling locations of shrimp used in this study. Numbers refer to the code of sampling sites in Table 1. The embedded map within the figure indicates the location of Peninsular Malaysia within the Indo Malay Archipelago.

3. Results

A total of 375 individuals from 18 species and 7 genera, belonging to the Family Penaeidae were recorded. Notes on each species recorded is described.

Phylum Arthropoda

Subphylum Crustacea Brünnich, 1772

Class Malacostraca Latreille, 1802

Subclass Eumalacostraca Grobben, 1892

Superorder Eucarida Calman, 1904

Order Decapoda Latreille, 1802

Suborder Dendrobranchiata Bate, 1888

Superfamily Penaeoidea Rafinesque, 1815
Family Penaeidae Rafinesque, 1815

3.1. *Alcockpenaeopsis hungerfordii* (Alcock, 1905)

Four specimens were collected at the fish landing site of Minyak Beku, Johor. This species is reported to be one of the dominant species in shrimp catches off north western Peninsular Malaysia [3]. A representative image of male *A. hungerfordii* (Voucher No.: USM_INV0048) is shown in Figure 2A.

3.2. *Ganjampenaeopsis uncta* (Alcock, 1905)

Five specimens were collected from the fish landing site in Endau. This species was previously placed

under the genus *Parapenaepsis* sensu lato. In 2011, Sakai and Shinomiya [13] revised the petasma morphology of this species and included it in a new proposed genus, *Ganjampenaepsis*. A representative image of a female *G. uncta* is shown in Figure 2B (Voucher No.: USM_INV0369).

3.3. *Metapenaeus affinis* (H. Milne Edwards, 1837)

A total of 35 individuals were collected from various fish landing sites in Peninsular Malaysia namely Kuala Muda (n=5), Merbok (n=5), Sungai Baru (n=5), and Kuala Besut (n=20). This is the second most commercially important species after *Penaeus* sensu lato group [3]. In Malaysia, *M. affinis* is primarily consumed locally but sometimes exported. A representative photo of *M. affinis* from Sungai Baru is shown in Figure 2C (Voucher No.: USM_INV0027).

3.4. *Metapenaeus brevicornis* (H. Milne Edwards, 1837)

A total of 13 individuals were collected from fish landing site in Sungai Baru. Due to its small size, this species is usually consumed as prawn fritters in Malaysia. A representative photo of *M. brevicornis* is shown in Figure 2D (Voucher No.: USM_INV0037).

3.5. *Metapenaeus ensis* (De Haan, 1844)

Five individuals were collected from fish landing site in Kuala Muda. A representative photo of *M. ensis* is shown in Figure 2E (Voucher No.: USM_INV0131).

3.6. *Metapenaeus lysianassa* (de Man, 1888)

Ten specimens were collected from fish landing site in Rengit. Similar to *M. brevicornis*, it is usually made into prawn fritters in Malaysia. A representative photo of *M. lysianassa* is shown in Figure 2F (Voucher No.: USM_INV0294).

3.7. *Mierspenaeopsis hardwickii* (Miers, 1878)

This species is the most common species throughout Malaysian waters but is most abundant in Peninsular Malaysia compared to Sabah and Sarawak waters. It sometimes constitutes as a bycatch with other prawn species. A total of 150 individuals were obtained from various fish landing sites throughout Peninsular Malaysia namely Sungai Baru (n=17), Kuala Selangor (n=21), Kuala Besar (n=29), Kuala Besut (n=22), Rengit (n=19), Endau (n=18) and Kuantan (n=24). A representative photo of this species from Sungai Baru is shown in Figure 2G (Voucher No.: USM_INV0008).

3.8. *Mierspenaeopsis sculptilis* (Heller, 1862)

A total of 97 specimens were collected from five locations in Peninsular Malaysia coastal waters. The locations included Minyak Beku (n=21), Kuala Selangor (n=16), Penaga (n=19), Endau (n=21), and Kuantan (n=20). A representative photo of this species from Kuala Selangor is shown in Figure 2H (Voucher No.: USM_INV0008).

3.9. *Parapenaepsis coromandelica* Alcock, 1906

A total of 21 individuals were collected from fish landing sites in Minyak Beku. Another six individuals were caught from Merbok using a bag net. This shrimp is reported to be moderately abundant at the northwestern coast of Peninsular Malaysia [3]. A representative photo of this species is shown in Figure 3A (Voucher No.: USM_INV0141).

3.10. *Penaeus canaliculatus* (Olivier, 1811)

Three specimens were collected from Endau. This species is often confused with *Penaeus pulchricaudatus* due to their similar morphology [3]. A representative photo of this species is shown in Figure 3B (Voucher Np.: USM_INV0378).



Figure 2. Shrimp species collected in this study. A) *Alcockpenaeopsis hungerfordii*; B) *Ganjampenaeopsis uncta*; C) *Metapenaeus affinis*; D) *Metapenaeus brevicornis*; E) *Metapenaeus ensis*; F) *Metapenaeus lysianassa*; G) *Mierspenaeopsis hardwickii*; H) *Mierspenaeopsis sculptilis*. Bar scale on each photo indicates the total length of the species in millimeter (mm).

3.11. *Penaeus merguensis* (de Man, 1888)

We collected five juvenile specimens from the coast of Merbok using a bag net. In Malaysia, this species is one of the most economically important prawn with about half the market value of the highly valued tiger prawn, *Penaeus monodon*. A representative image of a female *P. merguensis* is shown in Figure 3C (Voucher No.: USM_INV0133).

3.12. *Penaeus monodon* Fabricius, 1798

This species is the most commercially important species due to its size and tasty flesh. It is mostly

marketed fresh or frozen, consumed locally or exported [14, 15]. In Malaysia, this species is of high demand and reported to reach a maximum annual price during the Lunar New Year. It is also an important species for aquaculture. Five specimens were collected from Merbok (n=3), Penaga (n=1), and Kuala Besut (n=1). A representative photo of this species from Merbok is shown in Figure 3D (Voucher No.: USM_INV0132).

3.13 *Penaeus penicillatus* (Alcock, 1905)

The distribution of this species is restricted to the southwest coast of Peninsular Malaysia. A single male individual was collected from Kuala Selangor (Figure 3E, Voucher No.: USM_INV0445).

3.14. *Penaeus pulchricaudatus* Stebbing, 1914

Two individuals were collected from the fish landing site in Endau. Due to its size and tasty flesh, this species has a significant commercial value in Malaysia. A representative photo of *P. pulchricaudatus* is shown in Figure 3F (Voucher No.: USM_INV0378).

3.15. *Penaeus semisulcatus* De Haan, 1844

Similar with *P. monodon*, it is considered as one of the most commercially important species in Malaysia due to its size and delicious flesh. One individual was collected from landing site at Penaga. A representative photo of this species is shown in Figure 3G (Voucher No.: USM_INV0443).

3.16. *Penaeus silasi* (Muthu & Motoh, 1979)

Five individuals were collected from the fish landing site in Kuala Besut. Due to its similar morphology, this shrimp can be easily confused with *P. merguensis*, and *P. penicillatus*. A representative image of a female *P. silasi* is shown in Figure 3H (Voucher No.: USM_INV0236).

3.17. *Penaeus vannamei* (Boone, 1931)

Three individuals were collected from the landing site in Bagan Panchor. This introduced species is increasingly reported in natural waters elsewhere in Malaysia, thus immediate action should be taken, such as monitoring their invaded areas. This is because *P. vannamei* has the potential to outcompete the native shrimp species for food due to its efficiency and aggressiveness compared to the latter. A photo of *P. vannamei* from Bagan Panchor is shown in Figure 3I (Voucher No.: USM_INV0467).

3.18. *Trachysalambria* sp. (Burkenroad, 1934)

Four juvenile individuals of *Trachysalambria* sp. were collected from Merbok coast using a bag net. We were unable to identify their species due to their incomplete shape of genital organ. A representative photo of this species is shown in Figure 3J (Voucher No.: USM_INV0132).

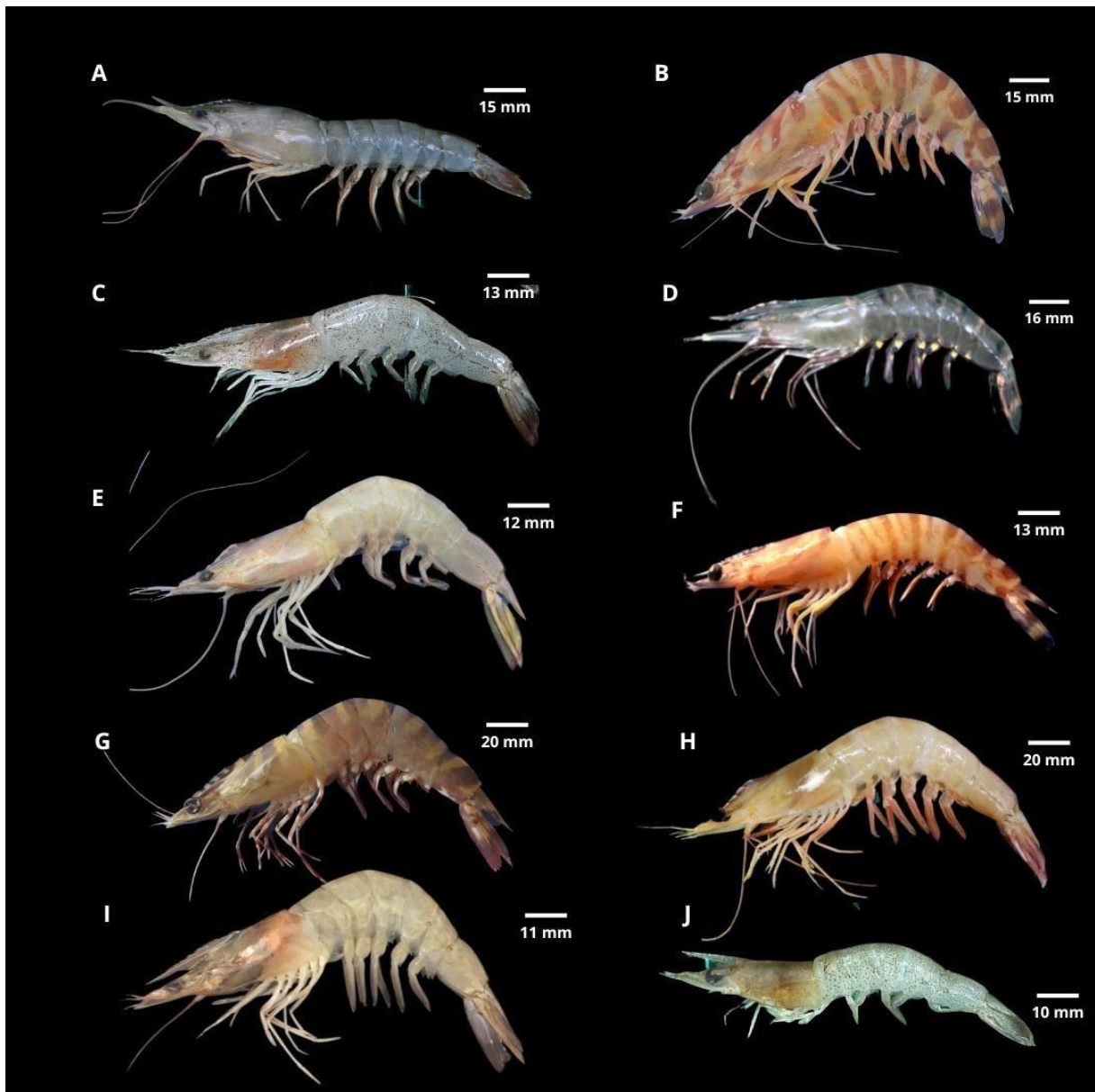


Figure 3. Penaeid shrimps collected in this study. A) *Parapenaeopsis coromandelica*; B) *Penaeus canaliculatus*; C) *Penaeus merguensis*; D) *Penaeus monodon*; E) *Penaeus penicillatus*; F) *Penaeus pulchricaudatus*; G) *Penaeus semisulcatus*; H) *Penaeus silasi*; I) *Penaeus vannamei*; J) *Trachysalambria* sp. Bar scale on each photo indicates the total length of the species in millimeter (mm).

4. Discussion

The present work records a total of 375 individuals from 18 species and 7 genera, all belonging to the Family Penaeidae. The genus *Penaeus* contributed the highest species diversity with 8 species followed by *Metapenaeus* (4 species), *Mierspenaeopsis* (2 species) and one species each from the genera *Alcockpenaeopsis*, *Ganjampenaeopsis*, *Parapenaeopsis* and *Trachysalambria*.

As earlier mentioned, species identification was based on current taxonomic classification. For example, four genera, viz., *Fenneropenaeus*, *Litopenaeus*, *Marsupenaeus* and *Melicertus* have been synonymised with the currently accepted genus *Penaeus* [16]. Four species formerly placed under the genus *Parapenaeopsis*, viz., *P. hungerfordii*, *P. hardwickii*, *P. sculptilis* and *P. uncta*, are accepted as *Alcockpenaeopsis hungerfordii* [17], *Mierspenaeopsis hardwickii* [18], *M. sculptilis* [19] and *Ganjampenaeopsis uncta* [20], following taxonomic classification by Sakai and Shinomiya [13]. One species formerly placed under the genus *Trachypenaeus* is accepted as *Trachysalambria* sp. Burkenroad, 1934.

The present study successfully identified all penaeid species except for *Trachysalambria* sp., due to the incomplete shape of its genital organ. In penaeids, the shapes of genitalia are variable between sexes and among species. Genitalia in male is called petasma, while in female, is called thelycum. Thus, this species specific character is particularly useful for penaeid identification. However, in juvenile specimens where their genital organs are not fully developed, positive identification is often difficult. Chan [3] highly recommended to use, if possible, adult specimens rather than juveniles when using the taxonomic keys for Penaeidae.

Globally, many important marine shrimp are severely depleted due to overexploitation, poor management practice and weak governance [21, 22]. Hence, the information on the current shrimp diversity resources is essential in order to strategize an effective shrimp management and policy development at the national level.

5. Conclusion

In conclusion, we believe that in order to properly enhance our understanding of marine biodiversity, taxonomically verified checklist constitutes a fundamental knowledge on which further monitoring, management and conservation of biodiversity resources are built. Besides, we expect that the present study will encourage more marine checklists to be generated, thus opening new perspectives for a better awareness of our marine diversity, biogeography, and ecology of Malaysian marine species.

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References

- [1] Marzuki H and Kathamuthu S 2005 *Shrimp farming in Malaysia* (Philippines: SEAFDEC Aquaculture Department)
- [2] Ismail M M and Abdullah A M 2013 Shrimp trade competitiveness of Malaysia and selected ASEAN countries *Journal of International Food and Agribusiness Marketing* **25** 98-115

- [3] Chan T Y (1998). *FAO species identification guide for fishery purposes The living marine resources of the Western Central Pacific Shrimps and prawns* (vol 2) ed K E Carpenter and V H Niem (Rome: Food and Agriculture Organization of the United Nations) pp 851–972
- [4] de Francisco A K, Pinheiro A P, Silva T B and Galetti P M 2009 Isolation and characterization of microsatellites in three overexploited penaeid shrimp species along the Brazilian coastline *Conservation Genetics* **10** 3 563-566
- [5] Maheswarudu G, Sreeram M P, Dhanwanthari E, Varma J B, Sajeev C K, Rao S S and Rao K N 2018 Trends in penaeid shrimp landings by sona boats at Visakhapatnam Fishing Harbour, Andhra Pradesh *Indian Journal of Fisheries* **65** 2 58-65
- [6] Hartono S, Riani E, Yulianda F and Puspito G 2020 Pemanfaatan Sumber Daya Udang Penaeid di Teluk Ciletuh Palabuhan ratu Berdasarkan Analisis Kesesuaian Kawasan *Jurnal Ilmu dan Teknologi Kelautan Tropis* **12** 1 195-209
- [7] Pauly D, Christensen V, Guénette S, Pitcher T J, Sumaila U R, Walters C J, Watson R A and Zeller D 2002 Towards sustainability in world fisheries *Nature* **418** 6898 689-695
- [8] Manap M G A 2016 Establishment of marine refugia in Malaysia: Conservation and protection of wild Penaeid shrimp stock in Baram, Sarawak and wild lobster population in Tanjung Leman, Johor *Proceedings of the Symposium on Strategy for Fisheries Resources Enhancement in the Southeast Asian Region* (Pattaya: Thailand) pp 59-63
- [9] Ardura A, Linde A R, Moreira J C and Garcia-Vazquez E 2010 DNA barcoding for conservation and management of Amazonian commercial fish *Biological Conservation* **143** 6 1438- 1443
- [10] Samuel V K D, Sreeraj C R, Krishnan P, Parthiban C, Sekar V, Chamundeeswari K, Immanuel T, Shesdev P, Purvaja R and Ramesh R 2016 An updated checklist of shrimps on the Indian coast *Journal of Threatened Taxa* **8** 7 8977-8988
- [11] Cob Z C, Samat A, Muda W M L W and Mazlan A G 2012 Preliminary checklist of marine invertebrate fauna within the intertidal of Teluk Penyabong and Teluk Gorek, Mersing, Johor, Malaysia. *Journal of Tropical Marine Ecosystem*, **2** 1
- [12] Lovett L 1981 *A guide to the shrimps, prawns, lobsters, and crabs of Malaysia and Singapore* (Selangor: Universiti Pertanian Malaysia)
- [13] Sakai K and Shinomiya S 2011 Preliminary report on eight new genera formerly attributed to *Parapenaeopsis* Alcock, 1901, sensu lato (Decapoda, Penaeidae) *Crustaceana* **84** 4 491
- [14] Benzie J A H, Ballment E, Forbes A T, Demetriades N. T, Sugama K and Moria S 2002 Mitochondrial DNA variation in Indo-Pacific populations of the giant tiger prawn, *Penaeus monodon* *Molecular Ecology* **11** 12 2553-2569
- [15] Waqairatu S S, Dierens L, Cowley J A, Dixon T J, Johnson K N, Barnes A C and Li Y 2012 Genetic analysis of Black Tiger shrimp (*Penaeus monodon*) across its natural distribution range reveals more recent colonization of Fiji and other South Pacific islands *Ecology and Evolution* **2** 8 2057-2071
- [16] Fransen C and De Grave S 2015 *Penaeus* Accessed through: World Register of Marine Species at <https://www.marinespecies.org/aphia.php?p=taxdetails&id=106822> Downloaded on 29 September 2022
- [17] Fransen C 2011 *Alcockpenaeopsis hungerfordii* (Alcock, 1905) Accessed through: World Register of Marine Species at <https://www.marinespecies.org/aphia.php?p=taxdetails&id=584932> Downloaded on 29 September 2022.
- [18] De Grave S 2022a *Mierspenaeopsis hardwickii* (Miers, 1878) Accessed through: World Register of Marine Species at <https://www.marinespecies.org/aphia.php?p=taxdetails&id=585389> Downloaded on 29 September 2022.
- [19] De Grave S 2022b *Mierspenaeopsis sculptilis* (Heller, 1862) Accessed through: World Register of Marine Species at <https://www.marinespecies.org/aphia.php?p=taxdetails&id=585386>

Downloaded on 29 September 2022.

- [20] Fransen C 2022 *Ganjampenaeopsis uncta* (Alcock, 1905) Accessed through: World Register of Marine Species at <https://www.marinespecies.org/aphia.php?p=taxdetails&id=584966>.
Downloaded on 29 September 2022.
- [21] Hurzaid A, Chan T Y, Mohd Nor S A, Muchlisin Z A and Chen W J 2020 Molecular phylogeny and diversity of penaeid shrimps (Crustacea: Decapoda) from South-East Asian waters. *Zoologica Scripta* **49** 5 596-613
- [22] Wong H S and Yong C C 2020 Fisheries regulation: A review of the literature on input controls, the ecosystem, and enforcement in the Straits of Malacca of Malaysia *Fisheries yulklResearch* **230** 105682.