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Sex ratio and size class of *Trichopsis vittata* in North Sumatra Province

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ABSTRACT
Sumatra Island, especially North Sumatra Province, is a habitat for various freshwater fish species, including *Trichopsis vittata*. This study aimed to assess the sex ratio and size class distribution of *T. vittata* in three different locations: Tebing Linggahara Village, Bulungihit Village, and Silau Rakyat Village. Fish samples were caught using a serving hood, and total length and weight were measured. The results showed that the sex ratio of *T. vittata* was 1:1, indicating a balance of males and females in the population. The size distribution of fish was dominated by the rather large (46.27-52.27 mm) and small (34.25-40.25 mm) classes, indicating a diverse population growth. This condition shows that the recruitment process is still running well in nature. This study is expected to be the basis for the management and conservation of *T. vittata* in North Sumatra waters. It is recommended that further research be conducted on the ecological aspects of the habitat to support the conservation of this species.
Keywords: Sex ratio; Size class; *Trichopsis vittata*

INTRODUCTION

Sumatra Island is located in the western part of Indonesia and has vast inland waters including lakes, swamps, rivers, and reservoirs that are the habitat of various types of fish (Dahruddin et al., 2021). One of the river-dwelling fishes in North Sumatra Province is *Trichopsis vittata*. *Trichopsis vittata* (Cuvier, 1831), this species inhabits a variety of habitats including freshwater swamps, ponds, lake pools, and slow-flowing rivers. This is because the slowly opening habitat has dense aquatic vegetation and is resistant to certain levels of anthropognetic disturbance and pollution (Low, 2019); (Norén et al., 2017). *T. vittata* distribution is found in Java, Sumatra, Borneo (Kalimantan, Sarawak), Peninsular Malaysia and the Mekong and Chao Pharaya river basins originating from Indo China. It is also recorded in the United States, Philippines, India, Bangladesh and Myanmar (Fishbase, 2024).

Trichopsis vittata is one of the fish that has an additional breathing apparatus called a labyrinth (Apriliani et al., 2019); (Watson et al., 2019). *Trichopsis vittata* has a total length of about 3.5 cm, has 6-8 anal spines, there are 24-28 branched anal fin fingers; horizontal scale of 13 columns; 2 or more lines along the body, anal fin has several elongated thread-like rays extending backwards almost to the tip of the caudal fin, there is a black spot at the base of the chest (Fishbase, 2024). The behavior of this fish usually lives in a standing position and moves slowly (Sriwongpuk, 2017). It feeds on small floating crustaceans and insect larvae (Norén et al., 2017).

The species *Trichopsis vittata* red list category and criteria is Least Concern (Low, 2019). However, *Trichopsis vitatta* populations are still widely found in river waters in North Sumatra Province. So far, there is no complete information on its population status or possible utilization. There is no target catch for *Trichopsis vittata*, but this species may be sold in the market as part of a mixed catch. This is often seen in the trade of ornamental fish kept in aquariums (Norén et al., 2017).

Several researchers have conducted research on *Trichopsis vittata* in various locations including (Tanjung et al., 2020) its morphometrics and meristics. Research on the biological aspects of *Trichopsis vittata* has never been conducted, in North Sumatra Province. Therefore, researchers conducted research on the size class, growth pattern and sex ratio of *Trichopsis vittata* in North Sumatra Province, Labuhanbatu Regency, North Labuhanbatu Regency and Serdang Bedagai Regency. This study has novelty related to the latest knowledge of the sex ratio value and size class structure of *Trichopsis vittata* from several waters in North Sumatra Province. According to (Khairul & Hasibuan, 2021), abundant fish consumption by local communities must be based on good management based on supporting information and knowledge of the biological aspects of fish. Hopefully, the data from this study can inform future management and utilization of the fishing industry to prevent future extinction.

METHODS

Sampling was conducted on June 12, 2024 (Tebing Linggahara Village), June 26, 2024 (Bulungihit Village), June 29, 2024 (Silau Rakyat Village). This research is exploratory in nature. The method of determining the observation station point was carried out by purposive sampling. There were 3 observation stations in this study. Station 1 (**Figure 1**) in Tebing Linggahara Baru Village, West Bilah District, LabuhanBatu Regency (2°6'47.91″ LU 99°55′19.848″ BT). Station 2 (**Figure 2**) in Bulungihit Village, Marbau District, North Labuhanbatu Regency (2°17'7.086″ LU 99°53′37.782″ BT). Station 3 (**Figure 3**) in Silau Rakyat Village, Sei Rampah Subdistrict, Serdang Bedagai Regency with coordinates (3°27'46.692″ LU 99°6'36.366″ BT). Fish were caught using a serving hood fishing. Fishing was conducted from 09:00 to 12:00 West Indonesia Time.

Figure 1. Station 1

Figure 2. Station 2

Figure 3. Station 3

Fish were caught using a serving hood fishing gear (Figure 4). Fishing was conducted from 09.00-12.00 am.

Figure 4. Fishing Gear

The total length of *Trichopsis vittata* was measured using digital calipers (0-300 mm), measured from the tip of the mouth to the tip of the caudal fin. The total weight of the fish was weighed with an analytical balance with an accuracy of 0.01 grams.

Data analysis to determine the sex ratio between male and female fish using the following formula:

$$SR = M/F$$

Description: SR (Sex Ratio); M (Male); F (Female)

Data analysis of size class:

$$K = 1 + 3{,}3 \log n$$

Description: K = Number of classes, and n = the amount of data

Class interval determination with the following formula:

$$C = \frac{Xn - X1}{K}$$

Description: C = Class interval; Xn = largest data value; X1 = the smallest data value, and K = number of classes

After obtaining the class interval, the data is arranged from the smallest to the largest value and grouped into classes. Furthermore, the class values are mapped in a histogram to see the sample size distribution.

Total length (mm) is commonly used to determine the size class of fish. In addition, total length (mm) is often used to determine generalised fish size classes. Data processing was carried out using the Microsoft Excel 2010 application programme.

RESULTS AND DISCUSSION

Sex Ratio

The following is the data from the sex ratio analysis of *Trichopsis vittata* for male and female fishes

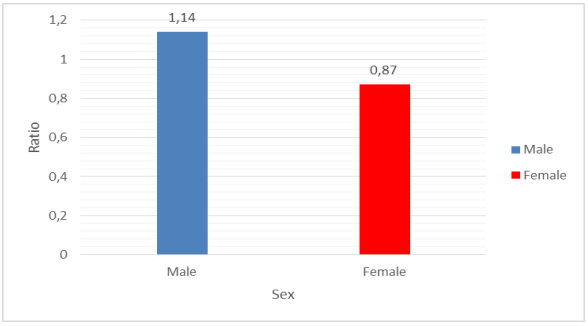

Figure 5. Sex Ratio of *Trichopsis vittata*

In **Figure 5**, the sex ratio of *Trichopsis vittata* is male (56.72%) and female (43.28%). The sex ratio of male and female *Trichopsis vittata* is 1:1. Based on this, it can be said that the sex ratio of fish is in a balanced condition, this can still guarantee the recruitment process and to maintain survival in nature. Related research on fish sex ratio has been done by (Sari & Khairul, 2022) on *Belontia hasselti* species getting sex ratio (1: 2). Then in the research of (Soetignya et al., 2023) the sex ratio in the Belontia hasselti species showed that the sex ratio between males and females was balanced with a ratio of (1: 1.15). (Purnomo, 2019) research obtained the sex ratio of female and male *Betta imbillis* (2: 1). The sex ratio in *Betta raja* species was obtained 1.2: 1 in the study of which showed that females were more females than males caught (Manullang & Khairul, 2020). Furthermore explained that sex can be distinguished between male and female fish by looking at primary and secondary sexual characteristics (Tambunan et al., 2023). Male fish have the ability to produce spermatozoa while females produce ovarium. Both cells are needed in the reproductive process in fish for regeneration.

Size Class

There were 35 fish caught during the study. Furthermore, size class data were analysed based on total length (mm). The complete data can be seen in **Table 1**.

Table 1. Fish size class distribution

No	Class Interval	Frequency	Category
1	34.25 - 40.25	10	Small
2	40.26 – 46.26	9	Medium
3	46.27 – 52.27	15	Somewhat Large
4	52.28 – 58.28	1	Lange

The size class intervals of *Trichopsis vittata* in North Sumatra were highest in the size ranges 46.27 - 52.27 mm (15 individuals), 34.25 - 40.25 mm (10 individuals), 40.26 - 46.26 mm (9 individuals) and minimum values in the size range 52.28 - 58.28 mm (1 individual). The results of this study show that the small and large size classes dominate. The results of research conducted by (Supeni & Azizah, 2020) obtained the length distribution of *Trichogaster trichopterus* in the dominant results caught in August in the 65 - 69 mm length class, September was in the 85 - 89 mm length class, while in October it was in the 80 - 84 mm length class. Another study found that the total length of *Trichogaster trichopterus* was 82.13 - 112.46 mm (Jusmaldi et al., 2022). In the research results of (Samuel et al., 2021) the population of *Trichopodus pectoralis* species is dominated by individuals measuring 14.0 - 17.0 cm. The results found that the total length of *Osphrenemus gouramy* ranged from 63.87 - 163.51 mm for males and 87.75 - 193.72 mm for females (Dewi et al., 2017). Furthermore, another study obtained small and medium sizes in *Belontia hasselti* species (Osphronemidae family) (Sari & Khairul, 2022). Fish growth is influenced by food sources, both body weight and length. (Jafaryan et al., 2014) explained that one of the important factors for fish growth is the variety of food consumed. In nature, *Trichopsis vittata* is found in the same habitat as *Trichichopodus trichopterus*. It is suspected that *Trichopsis vittata* competes for food with *Trichichopodus trichopterus*.

CONCLUSIONS

The sex ratio of *Trichopsis vittata* in North Sumatra was found to be 1 : 1, indicating a balanced number of males and females with a percentage of 1.14% for males and 0.87% for females. This balanced sex ratio is important to maintain the survival and sustainability of the population in nature. The size class intervals that dominated were rather large (46.27-52.27 mm) and small (34.25-40.25 mm), indicating variable growth. It is recommended that future research be conducted on ecology, especially the condition of the waters that are the habitat of *Trichopsis vittata* in North Sumatra.

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