Reproductive Biology of Hampala *macrolepidota* from the Kampar River, Kampar Regency, Riau Province

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**Abstract.** *Hampala macrolepidota* is a type of freshwater fish that commonly inhabit the Kampar River and it has high economic value. A research aims to understand the reproductive biology of *H. macrolepidota* from the Kampar River, has been conducted in April-October 2019. The fish was sampled from Kampar River from for 4 months, once/month. Total of samples caught during the research was 47 (17 males and 30 females). The sex ratio was 1 males: 1.76 females, meaning that the number of female populations is greater than that of the male. There were 4 fishes in the 4th maturity stage and the GSI ranged from 0.03-8.07%.

**Keywords:** fish reproduction, *Hampala* sp, Kampar River, Riau, Cyprinid

1. **Introduction**

Kampar Regency is one of the regencies in Riau Province that has an area of ± 11,707.64 km² or 12.38% of the area of Riau Province. In Riau, Kampar River is one of the largest rivers and many fish found in this river, including *Hampala macrolepidota*.

The river condition and human activities conducting in the Kampar River, however, may disturb the life of *H. macrolepidota* in general. The presence of industrial waste, domestic waste and sand mining in the river may decrease the water quality in general and as a consequence negatively affects the fish. Moreover, the uncontrolled fish capture such as the use of fish poison (*Derris elliptica* root), electric fishing and continuous fish capture throughout the year may decrease the fish population in general.

Nowadays, the number of *H. macrolepidota* captured by the fishermen tends to decrease. Without any effort in neither maintaining the water quality in general nor applying proper regulations in fish capture, the fish especially *H. macrolepidota* might be extinct within the next decades. Information on the biological aspects on this fish, including information on the reproductive biology of this fish is needed to keep the sustainability of that fish in its habitat. For this reason, a research on the reproductive biology of *H. macrolepidota* in the Kampar River needs to be carried out.

2. **Materials and Methods**

This research was conducted in April-October 2019. Fish sampling was carried out in Kampar River, Kampar District, Kampar Regency, Riau. While observations on the reproductive biology of *H. macrolepidota* were carried out in the of Laboratory of Aquatic Biology,
Faculty of Fisheries and Marine Science, Riau University. Water quality parameters were measured directly in the field.

The equipment used in this study were cool box, buckets, O’Haus Be series scales (0.1 g), 0.01 g analytical scales, trays, rulers, cameras, surgical instruments, tweezers, film bottles, digital cameras, nets and bamboo trap to catch the fish. While the materials used were 70% alcohol, gilson solution, label paper and millimeter paper.

Sampling of *H. macrolepidota* was conducted monthly, 6 times. The captured fish were kept in the cool box filled with crushed ice and then were transferred to the laboratory. The fish was then dissected and its reproductive biology was studied.

Observation of gonad maturity level and Gonad Somatic Index was based on Cassei’s [3]. Sex ratio was calculated based on this following formula:

$$NK = \frac{Nbi}{Nji}$$

NK is the genital ratio, Nbi the number of female and Nji is the number of male.

The calculation of Gonad Somatic Index (IKG) was conducted by weighing the body weight of the fish and the gonad weight of the fish using analytical scales with a precision of 0.01 grams. Then, the gonad weight was compared with body weight in the form of percent (%).

Gonad maturity level was described based on the gonad morphological form and the maturity level was stated based on Cassei’s [3], using this following formula:

$$GSI = \frac{GW}{BW} \times 100\%$$

Where GSI is gonad maturity index (%), GW is gonad weight (g) and BW is total body weight (g).
3. Results and Discussion

*Hampala macrolepidota* caught during the study were 47, consisting of 17 male and 30 female. The sex ratio of *H. macrolepidota* from the Kampar River during the study can be seen in the Table 1.

### Table 1. *Hampala macrolepidota* Gender Ratio During Research

| Month   | male | Percentage of Male (%) | female | Percentage of Female (%) | Ratio M/F |
|---------|------|-------------------------|--------|--------------------------|-----------|
| May     | 5    | 45.45                   | 6      | 54.55                    | 1 : 1.20  |
| June    | 8    | 47.06                   | 9      | 52.94                    | 1 : 1.12  |
| July    | 1    | 9.09                    | 10     | 90.91                    | 1 : 1.10  |
| August  | 3    | 37.5                    | 5      | 62.5                     | 1 : 1.67  |

Based on Table 2, the sex ratio of *H. macrolepidota* obtained was 1: 1.76. The ideal sex ratio between males and females is 1: 1, but this is different from the conditions in nature that are not balanced. Comparison of the number of sexes can predict the success of spawning, besides it can study the structure of the population in nature to estimate the balance. Based on the results of the study obtained a ratio between male and female *H. macrolepidota* there was a difference in the ratio of different ratios of 1: 1.76, meaning that the female *H. macrolepidota* population was higher than the male population, where 1 male fertilized 2 females during spawning. The results of this study differ from studies in the Kampar Kiri River, where the number of males is higher than females in a 4: 1 ratio [4], whereas from the study of [5] in the PB Soedirman Reservoir in Banjarnegara, Central Java stated that the sex ratio of male and female *H. macrolepidota* was 7: 1. Compare to the study in the Sudirman Reservoir, results of this previous study indicate that the sex ratio of the fish in the Kampar River is normal and it means that the life of this fish may not be under.

In this study, the maturity level of *H. macrolepidota* during the research is various(Figures 2 and 3).

The males that were in 1st and 2nd maturity levels was 35%, the 3rd was 0% and the 4th was 30%. In female, 30% was in 1st maturity stage, 50% in the 2nd, 7% in the 3rd, and 50% in 4th or ripe. As fish an all maturity stages were found in the river throughout the study period, indicating that the fish may be reproduce throughout the year. This is in accordance with the opinion of [6], who stated that *H. macrolepidota* is classified as fish that is able to spawn throughout the year, but the spawning season tends to be in the rainy season.

Gonad maturity is a picture of the development of gonad development [1]. Observation of the level of gonad maturity can be done in two ways, morphologically and histologically. Morphological observation is easier as it can be seen directly. Morphological determination of the level of gonad maturity is based on the shape, size, color, and development of gamete contents that can be seen directly.
Fig 2 and 3. Percentage of TKG for Male and Female *Hampala macrolepidota*

The Gonado Somatic Index (GSI) of the 4\textsuperscript{th} maturity stage *H. macrolepidota* found during the study ranged from 1.96-8.07\%. The female’s index (8.07\%) was higher than that of the males (1.96\%). Gonad reaches its maximum size just before spawn [9]. The GSI of male and female *H. macrolepidota* was categorized as “small”, as it is less than 20\%. It means that the fish may be spawn once/ year. The fish that with GSI values less than 20\% are grouped as fish that is able to spawn more than once each year. Results in this study consistent other study [8] which stated that in general, fish that live in the tropical waters may be spawn throughout the year and they have smaller GSI value.

4. Conclusion

*Hampala macrolepidota* from Kampar River shown that the sex ratio was 1: 1.76, and the population was dominated by females. Most female fishes was in the 2\textsuperscript{nd} maturity stage. Small GSI indicates that the fish may be spawn throughout the year.

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References

[1] Saputra, S. W. 2009. Dinamika Populasi Ikan Berbasis Riset. Badan Penerbit Universitas Diponegoro. Semarang.
[2] Arikunto, S. 2002. Prosedur Penelitian Suatu Pendekatan Praktek. PT Rineka Cipta. Jakarta. Hal. 112

[3] Effendie, M. I. 2002. Biologi Perikanan. Yayasan Pustaka Nusantara. Yogyakarta. 163 Hal.

[4] Kartini, T. A. 2018. Biologi Reproduksi Ikan Barau (Hampala macrolepidota Kuhl & Van Hasselt, 1823) di Sungai Kampar Kiri Desa Mentulik Kecamatan Kampar Kiri Hilir Kabupaten Kampar Provinsi Riau. Skripsi. Dalam Bidang Manajemen Sumberdaya Perairan. Fakultas Perikanan dan Kelautan, Universitas Riau, Pekanbaru. 63 Hal.

[5] Musrin, S. Rukayah, dan I. Sulistyo. 2013. Status Reproduksi Ikan Palung (Hampala macrolepidota) di Waduk PB Soedirman Banjarnegara Jawa Tengah. 11-95 Hal.

[6] Abidin, A. Z. 1986. The Reproductive Biology of a Tropical Cyprinid, Hampala macrolepidota from Negara Zoo Lake, Kuala Lumpur, Malaysia. Jour. Fish Biol. XXIX: 381-391.

[7] Bagenal, T. B. 1978. Aspects of Fish Fecundity. Ecology of Freshwater Fish Production. Blackwell Scientific Publications. Oxford: 77-101.

[8] Pulungan, C. P., Nuraini, dan Efriyeldi. 1994. Aspek Biologi Reproduksi Ikan Bujuk (Ophicephalus lucius C.V) dari Perairan Sekitar Teratak Buluh, Riau. Skripsi. Pusat Penelitian Universitas Riau. Pekanbaru.

[9] Atmaja, P. 2008. Biologi Reproduksi Ikan Motan (Thynnichthys thynnoides) di Perairan Rawa Banjaran Sungai Kampar Kiri, Riau. Skripsi. Departemen Manajemen Sumberdaya Perairan. Fakultas Perikanan dan Ilmu Kelautan. Institut Pertanian Bogor.