Sizes and Aspects of Reproductive Caung Fish (Arius Sagor) in The Water of Cileureum River Water in Cilacap District

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Abstract. Arius sagor is a fish that grow and thrive in tropical waters, and an abundance of demersal fish resources in the waters of Indonesia, particularly in Cibeureum estuaries. The purpose of this research to determine the size of Arius sagor on various habitat types and determine gonad somatic index Arius sagor in estuaries Cibeureum, Cilacap Regency. This research was carried out from December 2014 to January 2015 in estuaries Cibeureum, Cilacap Regency. The research method used purposive random sampling method based on different types of habitat. The number of samples obtained by 90 consisted of 32 females and 58 male fish. Fish length and weight data on different habitat types were analyzed by using ANOVA and Tukey test using, the gonad somatic index analyzed descriptively. The results of the analysis show that there is a real or significant differences (P <0.05). The length of Arius sagor on habitat types 1 and 2, and 2 and 3. While the weight of the fish is different in each habitat type 1 and 2, 1 and 3, 2 and 3. The ranged of the gonad somatic index value 1.10% - 2.33% (male) and 1.15% - 1.77% (female). The results showed that the value of the IGS Arius sagor is in phase II.

I. Introduction

River is one of the important habitats in the water area which impact to water reservoir and estuary {39}. According to {22} river estuaries are used for foraging and nurturing areas on the beach. Cibeureum River is one of the rivers in Cilacap Regency which empties into Segara Anakan. This area is brackish water because it is connected with the sea through the west and east canals. The condition is very potential for mangrove growth, as well as being a spawning area, upbringing, and looking for food for various types of fish, shrimp, crabs, shellfish, and other biota {12}.

Caung fish (Arius Sagor) is a fish that grows and develops in tropical waters. In general, the shape of Caung fish is similar to catfish or patin fish, frowning three pairs (two pairs on the lower jaw and one pair on the upper jaw). Caung fish live in estuarine waters and are classified as demersal fish. These fish into the genus Arius are native species of fish that inhabit fresh and brackish water habitats such as the Cibeureum River Estuary and are widespread in temperate and tropical regions, both on the coast and estuaries {19}.

Study fish biology in indonesian were important from larva until mature {40}. Reproduction is one of the important aspects of fish biology. Assessment of reproductive aspects can be done by observing the length and weight of the body, the level of maturity and the place where the fish spawn. The method that can be used in observing reproduction aspects of fish is visual observation and direct observation of fish gonads by looking at the somatic gonad index in fish. Knowledge of the somatic gonad index (IGS) is one aspect that has an important role in fisheries biology, where the value of IGS is used to predict when the fish will be ready to do spawning {5}.

Efforts to manage Caung fish optimally and sustainably require information on the size and reproduction aspects of Caung fish on the river. This research is important as a basis for efforts to optimally and sustainably manage cassava fish at the estuary of the cibeureum river.
2. Material and Methods

*fish*

The research material in the form of caung fish samples (Arius sagor.) Was caught at the mouth of the Ci Beureum river, Cilacap Regency, Central Java.

**Methods and Sampling Techniques**

This research was conducted in December-January 2017 at the Cibeureum River Estuary using the survey method. Sampling is done by purposive random sampling. Samples were taken using fish seser (D-net), with a mesh size of 1 mm. Determination of the sampling station was taken based on the hue of the environment on the banks of the river around the Cibeureum river mouth, including:

- Station I is in the rice fields.
- Station II is in a residential area.
- Station III around the mangrove (Nipah sp.)

Sampling is done during high tide. Each station was sampled with three replications. When sampling is done during the day, it is expected that sampling can be carried out properly.

![Figure 1. sampling collection area, (Google, 2014)](image)

*Figure 1. sampling collection area, (Google, 2014)*

**Measurement of the length and weight of Caung Fish**

The measured fish length is the standard length, namely the distance between the tip of the mouth to the base of the tail fin using millimeter blocks, while the measurement of the weight of the fish used is by weighing the wet weight using a digital scale with a scale of 0.1 gram, then recorded.

**Gender Ratio**

Every fish sample is dissected and the gonad is taken. The sex of each fish is identified by gonadal examination. The proportions of the two sexes relative to each other are used to calculate the sex ratio.

**Determination of the Somatic Gonad Index**
Weighing the body weight of each fish sample, then dissecting it and taking the gonad obtain the Somatic Gonad Index (IGS) of Caung fish. Furthermore, the gonad was weighed with a precision of 0.01 gram. The Somatic Gonad Index is calculated using the formula \[10\].

2.6 Water Sampling and Sampling

Water samples were taken to measure physical-chemical parameters, namely water temperature, salinity, light penetration, pH, dissolved oxygen (DO) \[3,4\].

2.7 Data Analysis

Data on caung fish size (Arius sagor) were analyzed using ANOVA analysis to differentiate size at three stations and somatic gonad index (IGS) caung (Arius sagor). The three different stations are treated as such, and the repetition is three times, then the somatic gonadal index and the size of the fish are the responses. Water quality data were analyzed descriptively.

3. Result and Discussion

The Ciberum River estuary is one of the estuaries located in the western pelawangan Sagara Anakan which is precisely located in the Cibeureum village, Kampung Laut District, Cilacap Regency. Catching Caung fish in the Cibeureum River Estuary is carried out using seser (D-net). D-net is a fishing tool that has a simple construction, the main part is a net with 1mm net mesh, then it is equipped with bamboo. The location of the study is three points, the first with coordinates 7°39'38.25"S-108°48'48.06"T shows the point of extraction in the rice fields, the second coordinate point is 7°39'51.55"S-108°48'50.96"T This point is around the settlement, the third coordinate point is 7°40'16.06"S-108°48'45.00"T This sampling point is located in the mangrove area (Nipah sp).

Total Length of Caung Fish
The total length of Caung fish taken from the Cibeureum river estuary is presented in Figure 2 with an average total fish length:

![Figure 2. The average chart of the total length of Caung fish in three locations](image)

The observation of the size of the total length of caung fish at three locations in the estuary of the Cibeureum river, namely location 1 was in rice fields, at location 1 the average total length of Caung fish was 13.63 cm. The average total length of caung fish at location 2 is 11.16 cm where at location 2 is located in a settlement. The average total length of caung fish at location 3 in the mangrove area (Nipah sp) is 12.51 cm. According to \[17\] the size of the total length of Caung fish (Arius Sagor)
can reach an average of 4.1-19.0 cm and the maximum size of caung fish is 35 cm.

The results of the sample data obtained were tested using data normality tests to see the data can be tested by ANOVA or not. First, the data on the total length of caung fish was tested for normality by the Anderson-Darling and Kolmogorov-Smirnov tests and the results were not normal, in the Anderson-Darling test the P-Value value was 0.097 and the value obtained in the Kolmogorov-Smirnov P-Value 0.010. Total length data to get a normal value then the total length data is transformed using the Log (x) formula. The total length transformed data were then tested statistically by Anderson-Darling and Kolmogrov-Smirnov tests to see the data in the normal distribution line. According to Anderson-Darling's statistical test, there is a P-Value value <0.005 and the Kolmogorov-Smirnov test shows that the P-value <0.010 shows that the data is normal and can be analyzed using ANOVA to determine the difference in total length at the three sampling locations.

The results of ANOVA data analysis state that the P value is smaller than 0.05, so there is a significant difference in the size of the total length in each sample location. To find out the difference in the size of the total length at which locations are different, then a further test was performed using a double comparison test or the Tukey method. The comparison test results can be seen in the attachment.

The Tukey test results that there are differences in the sampling location, location 1 and location 3 from the results of the comparative analysis are stated equal (AA) and at location 2 is stated to be different (B). The results of the double comparison test stated that these two locations were the same, namely location 1 and location 3 due to the presence of vegetation even though at location 1 there was land shifting which had become a rice fields, but this area still had the same characteristics as location 3, where location this is in the mangrove area (Nipah sp). The difference in location 2, the size of total length is influenced by land conversion, because location 2 is located in a residential area located in the estuary area of the Cibeureum river, the function of land in the river estuary habitat that is used as settlement causes a difference in location and thus affects the presence of Caung fish with the fish's natural feed.

The water quality at the three locations of the sample shows has the same characteristics. Based on the results of the study it was found that the waters in the three locations had water brightness which meant that the ability of light to penetrate into the waters ranged between 16-20 cm. Other parameters such as water temperature based on the results of the study are known at the three locations of 29 °C. The value of acidity (pH) of waters ranging from 91-9.2 will greatly affect the biochemical processes of the waters. Salinity value 0 ‰ due to taking samples during the rainy season, this is in accordance with Zarochman's statement (37) that the Cibeureum river estuary waters in the rainy season will tend to turn into freshwater ecosystems. The value of dissolved oxygen is 5-6 mg/L, these results indicate that water quality has no effect on caung fish habitat.

3.1. Somatic Gonad index

The average range of body weight and gonad weight obtained by station I were 10.4-28.7 grams and 0.14-0.35 grams. At station II, the average body weight and gonad weight ranges from 17.2 to 40.6 grams and 0.23 to 0.42 grams. At station III the average range of body weight and gonadal weight was 24.1-48.4 grams and 0.72-0.91 grams. The results showed that the greater the weight of the body, the greater the weight of the gonad. These results are in accordance with {32} that in general the increase in body weight will result in increasing gonadal weight.
Figure 3. the average somatic gonad index of Caung female fish

In the reproductive process before spawning occurs, most metabolic results are aimed at gonadal development. To find out the changes that occur in gonads quantitatively can be expressed by an index called the Somatic Gonad Index (IGS). In line with the development of gonads, fish IGS will increase in size and will reach the maximum range when spawning will occur [8,9,10]. From the results of calculations, the IGS value of Caung fish at the Gonad Maturity Level (TKG) I and IV. Based on the observation that the increase in TKG is directly proportional to the increase in Caung fish IGS (Arius Sagor), this can be seen from Figure 4 at each level of maturity of the Caung fish gonads (Arius Sagor). IGS is indeed a value used to measure gonadal activity. IGS value will increase with increasing maturity of gonads of fish. In this female fish, IGS reaches the peak at IV TKG and again decreases after spawning. The average IGS in IV TKG which is the spawning stage is 3%.

4. Conclusion
The total length of Caung fish (Arius sagor) obtained during the study at the Cibeureum river mouth ranged from 8.92-15.15 and had differences in location 2 with the characteristics of residential environment. The somatic gonad index value increases with increasing fish weight. The Caung somatic gonad index (Arius sagor) which was caught in the Cibeureum river estuary was entered into the IV TKG with an average of 3% IGS.

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