Maturity Gonad Sea Cucumber *Holothuria scabra* Under The Month Cycle

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Abstract. Gonad maturity level of the sea cucumber *Holothuria scabra* is important to note for selection of parent ready spawn. Sea cucumbers are giving a reaction to the treatment of excitatory spawn mature individuals only. For the determination of the level of maturity of gonads of sea cucumbers, the necessary observation of the gonads are microscopic, macroscopic and gonad maturity gonado somatic indeks (GSI). GSI value is important to know the changes that occur in the gonads quantitatively, so that time can be presumed spawning (Effendie, 1997). Reproductive cycle can be determined by observing the evolution of GSI. The study of sea cucumbers *Holothuria scabra* gonad maturity conducted in Langgur, Southeast Maluku. Observations were made at every cycle of the moon is the full moon phase (BP) and new moon (BB) in the period January 29, 2017 until July 23, 2017. Observations *H. scabra* gonad maturity level is done with surgery, observation and calculation GSI gonad histology. GSI highest value obtained in May that full moon cycle at 90% of individuals that are in the spawning stage (phase 5), then 70% of the individuals that are in the spawning stage (phase 5) in March that the full moon cycle. The results obtained show that the peak spawning *H. scabra* period January 2017 to July 2017 occurred on the full moon cycle in May.

1. Introduction

Sea cucumbers are marine products that have significant value and are used as foodstuffs and used as medicines. Sea cucumbers are a fisheries products that have long been known and consumed by coastal communities in Indonesia and is also very well known in the countries of Continental Europe, Japan and the United States. Prospects are good for sea cucumbers commodities led to the arrest of these commodities continue to increase and be done on a large scale without regard to sustainability.

Improved retrieval of sea cucumbers from their natural habitat resulted in a decrease in the population of sea cucumber stocks are characterized by the increasing difficulty of obtaining cucumbers in nature. Resource sea cucumber has received serious attention from CITIES about extinction are likely to increase the types of resources, especially of species of sea cucumber that has commercial value [1]. Sea cucumbers have the nature of a relatively slow movement, usually live solitary and attendance is dependent on the availability of food and habitat conditions. The occurrence of overfishing due to excessive fishing will result in a lower density of population or stock in the habitat. This will affect the success of fertilization between male and female sea cucumbers so that the rate of reproduction decreases. The discrepancy between the level of resource utilization of sea cucumbers at a rate of

regeneration causing low recruitment or addition of sea cucumber populations in habitats that would accelerate the extinction of sea cucumber populations.

Therefore, the availability of sea cucumber populations in the wild needs to be considered. Efforts to maintain the availability of the sea cucumber is the management of sea cucumber capture settings. Reproductive factors are among the factors that can be used as a base or an indication for the management of water resources and in particular for the survival of offspring an organism or population. This approach is employed to provide information when sea cucumber resources can be exploited in line with the sustainability of these resources to the front [10]. Many environmental factors are thought to affect the reproductive aspects such as the temperature of sea cucumbers, blooming phytoplankton and the moon cycle [7]. Reproductive aspects can also be influenced by environmental factors, among others the moon cycle [4]. [9] also supported the argument that the cycles of the moon are one of the environmental factors that can affect the reproductive cycle of sea cucumbers.

This study aims to identify and analyze the level of maturity of the gonad and gonado somatic index (GSI) *H. scabra* based on cycles of the moon, this research target is terdokumentasinya data and information about the reproductive cycle of *H. scabra* which can be used as an input determination system resource management in the waters of sea cucumbers Small Kei, Southeast Maluku.

2. Methodology

2.1. Time and place

The study was conducted during the period January 2017 - July 2017, based on the full moon cycle (BP) and new moon (BB). The research location is in the waters Langgur Small Kei, Southeast Maluku and Hatchery laboratory of Tuat State Fisheries Polytechnic.

2.2. Research design

Observations of sea cucumber gonads maturity level are based on cycles of the moon is the full moon (BP) and new moon (BB) from January 2017 to July 2017. Samples were taken every cycle of sea cucumbers in as many as 10 individuals for observation of gonad maturity.

2.3. Variable and Measurement Methods

Observations gonad maturity level (TKG) and gonado somatic index (GSI) is based on cycles of the moon. Determination of TKG and GSI done by dissected gonado sea cucumbers and observed in histology and GSI value calculation.

2.4. Data analysis

Stage of gonadal development was observed in all phases of development according to [5]. As for knowing the value of using GSI_2 GSI [2] which is the percentage of gonad weight to body weight after surgery using the equation:

$$GSI_2 = \frac{wg}{W} \times 100$$

Where: GSI : Gonado somatic index (%)
wg : gonad weight
W : body weight

3. Results and Discussion

3.1. The maturity level of gonads

H. scabra gonad developmental stages were observed during the period January 2017 to July 2017 on each cycle of the moon is new moon phase (BB) and full moon (BP) shown in Figure 1 below.

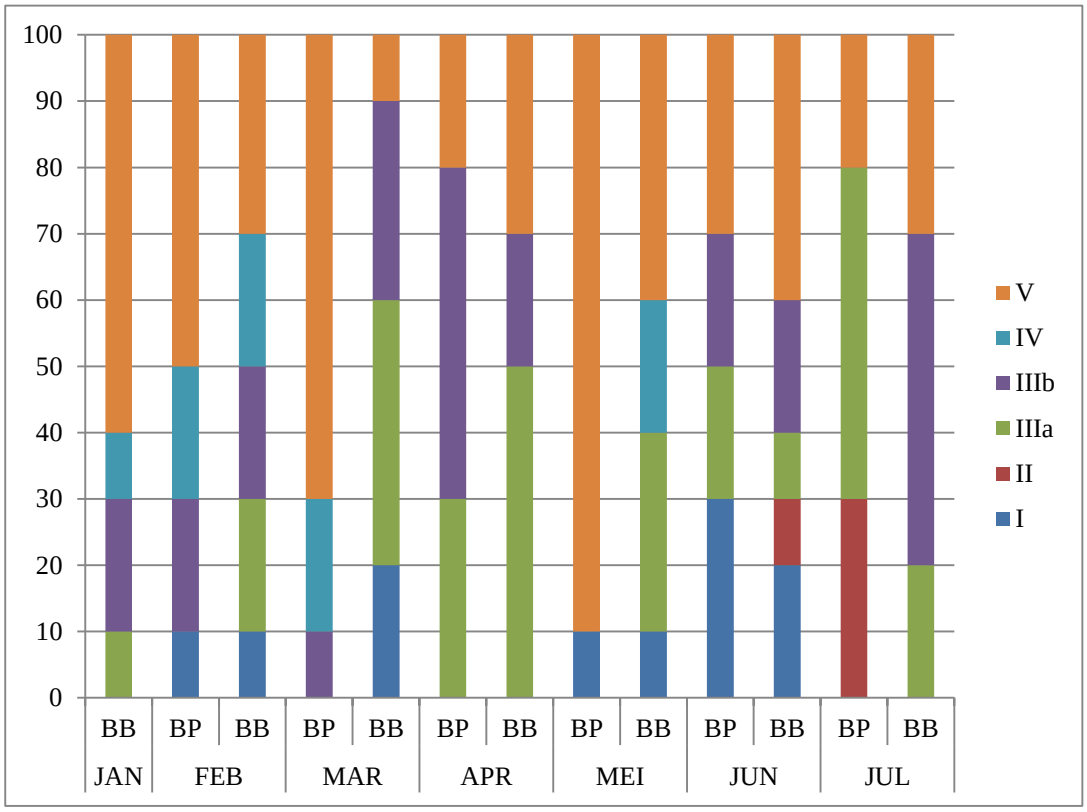

Figure 1. Percentage of gonadal development stage *H. scabra*

Where: BB: New Moon
BP: Full Moon

Figure 1 shows that the highest maturity level of gonads (spawning phase or phase V) occurs in May that the BP cycle of (90%), and in March, BP cycle spawning phase (V) equal to (70%). Cycle months in others observed that, the stage of gonad development vary where all phases of the development was observed both in the phase of emptying (I), the phase of development (II), the phase of activation of I (IIIa), phase activation II (IIIb), the maturation phase (IV) and spawning phase (V).

3.2 Gonado somatic index

The reproductive cycle of *H. scabra* can be determined by observing the evolution of GSI. Cycle *H. scabra* observed GSI shown in Figure 2 below. Sometimes the cycle GSI locally need to know because GSI sand sea cucumbers vary from one place to another [2, 11]. The highest peak of the cycle GSI observed period January 2017 - July 2017 occur at full moon cycle (BP) in May amounted to 16.8%. Average GSI is based on cycles of the moon is observed that the highest GSI occurs in cycles BP, except in January because there was no observation GSI on BP cycle. The average value of GSI *H. scabra* at the time of the full moon is higher than the new month in which the highest value occurs in May. This shows that during the reproduction process *H. scabra* research culminated in full, especially in May.

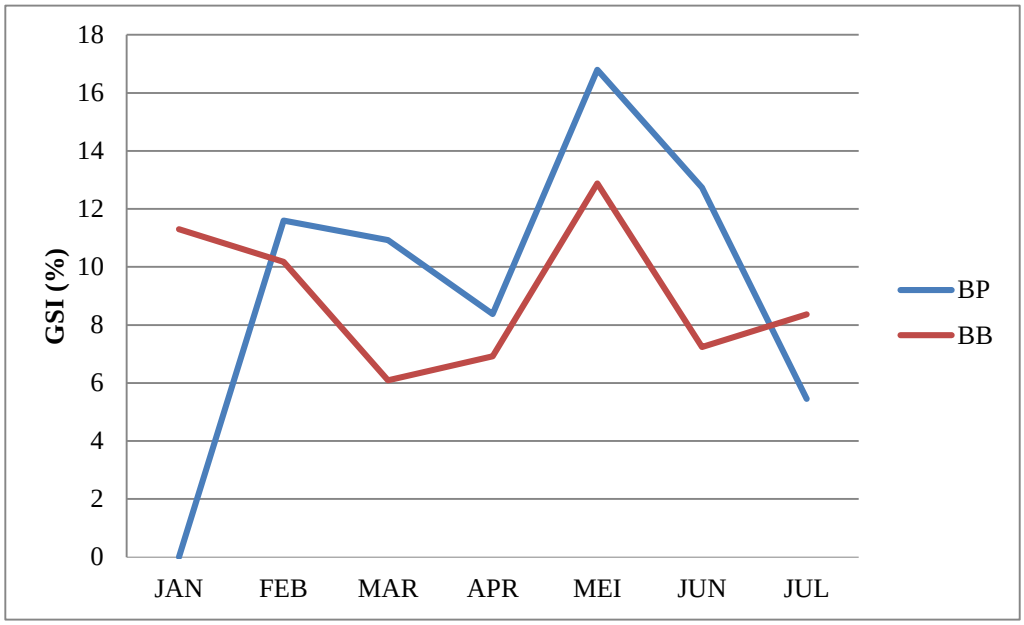

Figure 2. Mean of GSI *H. scabra* on BP and BB

The weight ratio of the gonads and GSI can be seen in Figure 3. The mean weight of the gonads was highest in June amounted to 10.9 grams BP cycle and gonad weight average lows in July of 2.7 grams on BP cycle. While the highest average on May GSI BP cycle is equal to 16.8%, then 12.88% also in May cycles BB and 12.74% in June that BP cycle. Lowest GSI during the observation period occurred in July on BP cycle is equal to 5:45%. Cycle BP in May finds that on average the highest GSI 16.8% and the highest maturity level of gonads (spawning phase or phase V) equal to (90%). [3], states that the value of the gonado somatic index (GSI) in line with the development of the gonads, the index will increase in size and the value will reach the maximum range limit during the spawning will occur. [10] also agree that the GSI will reach the maximum limit before the spawning, then decline after spawning individuals.

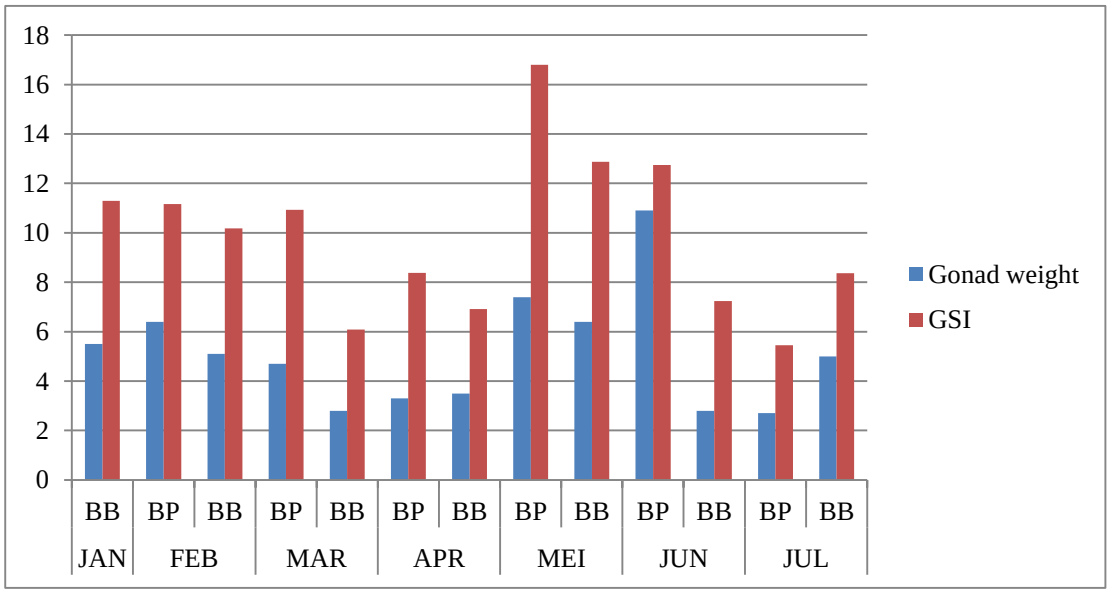

Figure 3. The mean weight of gonads and value GSI *H. scabra*

The usefulness of knowing the value of GSI was to determine the changes that occur in the gonads quantitatively, so that time can be presumed spawning [3]. [7], stated that the external factors affecting the spawning Holothuria are cycles of the moon. [6] also pointed out that can control the lunar cycle in the sea cucumber spawning by stimulating endogenous hormones. This month period or affect spawning cycle by stimulating endogenous factors. According to [9], cycles of the moon appear to collect all the stimuli that can cause sea cucumber spawning. *H. scabra* also shows lunar spawning rhythm during mating season, which spawn at dawn at the approach of a new moon or a full moon or when the highest tide [8].

4. Conclusion

Based on this research can be concluded that the average maturity of the gonad index (GSI), the highest of 16.8% occurred in the BP cycle in May and the maturity level of gonads (TKG) by 90% in the spawning phase or phases in the cycle V BP May.

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