Global Journal of Fisheries and Aquaculture

ISSN: 2408-5464 Vol. 3 (2), pp. 205-210, May, 2015.

http://www.globalscienceresearchjournals.org/

Full Length Research Paper

Gonad maturity level of catfish *Ompok hypopthalmus* caught in a flooding swamp area of Rungan river Central Kalimantan related to water depth

Infa Minggawati[1], Sukoso[2], Untung Bijaksana[3*], Lukman Hakim[4]

[1]Students of Environmental Assessment and Development Brawijaya University
[2]Lecturer Program Environmental Assessment Study and Development Brawijaya University
[3]Lecturer Program Environmental Assessment Study and Development Brawijaya University
[4]Lecturer at the Faculty of Biology, University of Brawijaya

Accepted 13 April, 2015

Abstract

The purpose of this study was to determine the depth of water on the catfish gonad maturity level caught in a flooding swamp area of Rungan River in Palangka Raya, Central Kalimantan, Indonesia. The experiment was conducted in October 2013 to April 2014.The catfish sampling was conducted every month. The fish specimens were analyzed to determine the level of maturity of the gonads. Moreover, water quality was measured. Total fish caught was 353 fishes, with a percentage of 61% males and 39% females, and the total length of fish ranging from 12-29 cm and weight between 10-250 grams. Types of the catfish food were insects and juvenile fish. Spawning peaks in gonad maturity level IV were in December 2013 and January 2014, with water depth from 4.03 to 6.5 meters, the average water temperature 26.9oC, pH 4.6 DO 3.4 mg/l and 27.6 cm water transparency..

Keywords: Gonads maturity level, water depth, catfish, flooding swamp

INTRODUCTION

Palangka Raya is a capital city of Central Kalimantan Province belonging to about 40,000 hectares of flooding swamp, mainly in along Kahayan River and Rungan river (Sulistyarto, et al 2007). Rungan River is a tributary of Kahayan River.

Swamp area is a lowland water formed because of unable the river water to stream, so the water is pooled around the river and has specific characteristics in physical, chemical and biological. Physical characteristics swamp flood waters are waters strongly influenced by the seasons. In the rainy season, the water is flooding and during the dry season the water is drought. Flooding Swamp water is a specific freshwater ecosystem, with high biodiversity of fish and fish productivity but a fragile ecosystem that sustainability is often threatened (Tockner and Stanford, 2002).

Corresponding author. Email: bijaksanau@yahoo.co.id

One of the fish living in the marsh is catfish, Ompok hypopthalmus. The catfish spawns and sustains life. Distributions of the catfish in Indonesia are Kalimantan, Sumatera and Java, with the main distribution on the islands of Sumatra and Kalimantan.

The catfish reactions to water condition change due to changes in the environment can be expressed in various ways, such as the movement, adaptation, morphology, pattern of life, activities of physiology, growth and reproductive behavior, which will affect the production of fish, especially catfish, O. hypopthalmus.

The catfish from larvae to mature and spawn are in the waters with many riparian vegetations. The larvae and post larvae usually are located on the habitats with branches submerged in a lake as detritus supply. Detritus is generally an early meal for the larvae and juvenile of the catfish.

After adult fish Lais will live in waters that are relatively closed, but still has a direct relationship with the free

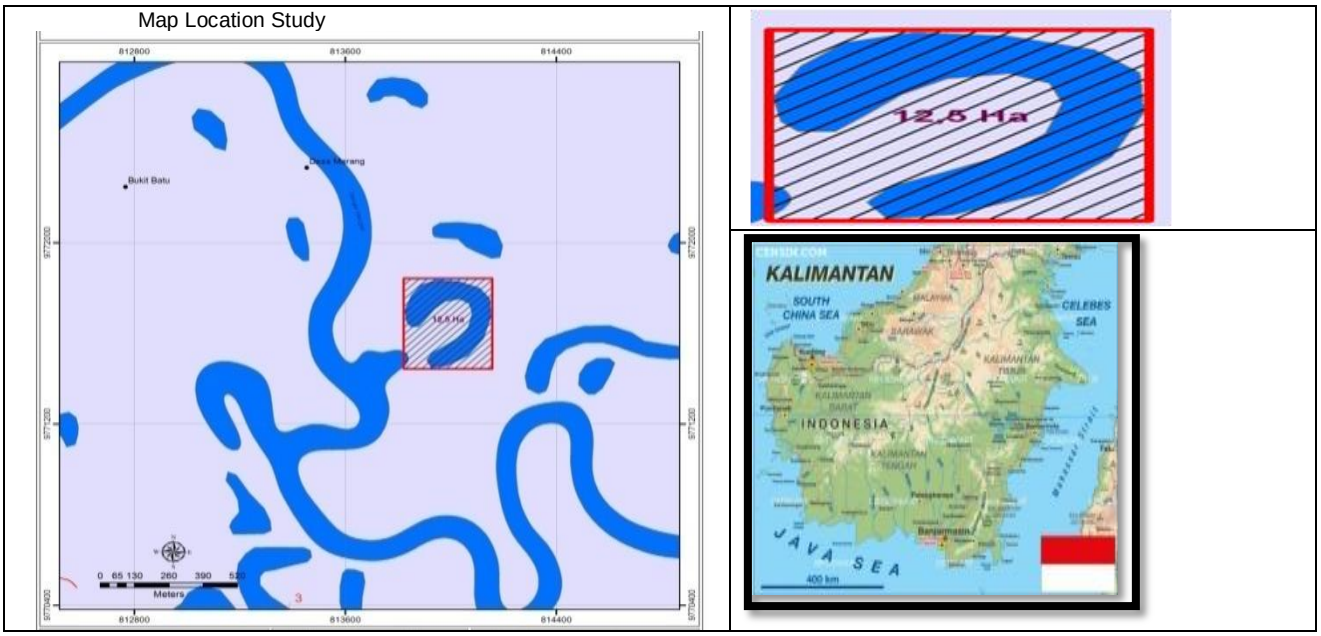

Figure 1. Research Sites

water (limnetik). Lais adult fish get food from insects or insects that fall from riparian vegetation located on the edge of the waters. Therefore, the role of marshTherefore, vegetation Rungan huge flood of the river for fish survival Lais.

Lais fish spawn in areas with riparian vegetation Oxbow lake that submerged alsosubmerged, shelter and foraging (Hartoto el al., 1998). At the beginning of the rainy season along with rising water levels in rivers, swamps will be inundated by the flood at the time the fish will come to spawning. When spawning Lais issued ripe eggs simultaneously in a single spawning (total spawner) Lais not spawning throughout the year, but depending on the entry of the rainy season (Elvyra *et al*, 2009). In tropical regions, changes in water temperature and water 2009) surface elevation amplitude caused by the change of seasons can be a trigger for spawning fish do (Zairin et al. 2001 in Wise 2012). In natural conditions the fish gonad development isWise, strongly influenced by environmental factors such as temperature, precipitation changesprecipitation, fotoperiodisitas, substrate and petrikhor through axle-pituitary-gonad hipothalmus that will trigger gonadal development and spawning.

The purpose of this study was to determine the depth of water on fish gonad maturity level Lais (Ompok hypopthalmus in river flood swamps Rungan Palangka Raya City. hypopthalmus) City.

RESEARCH METHODOLOGY

The research was carried out in a flood swamps Rungan River town of PalangkarayaPalangkaraya, Central Kalimantan, Indonesia. By the time the study for six months, the month of October, 2013 to April 2014. The samples dibangi into four observation stations. Here's a map of the location of the study are presented in Figure 1.

How it works in this study is the first stage of morphological observation of fish gonad maturity level Lais conducted in the laboratory or in the field. The basis used to determine the level of maturity of gonad by means of morphology is the shape length andshape, weight, color and contents of gonad development. Maturity Level Assessment criteria fish gonads can be seen in Table 1. The second stage of the analysis of water quality in the swamp flood, the observed parameter is the depth of water, pH, temperature, DO and water transparency..

RESULTS AND DISCUSSION

Hydrology Swamp Flood

Swamp flood located on both sides of the river are separated by natural levees, in the form of periodic inundation. Flood swamp water source comes from the main river, which in the rainy season flood swamps will blend with the river forming a sea of fresh water. In the dry season there is a swamp flood drought, but the area lebung or part there is still water in the swamp. Exchange of water in the main river flood swamps occur through the canals that connect to the main river flood swamps. Kana also used the fish to migrate from the main river to flood the marsh when entering the dry season and vice versa in the rainy season.

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Table 1: Criteria Assessment Maturity Level In Morphological fish gonads Lais (*Ompok hypophthalmus*).

Fish Lais	TKG	Morphological
Female	I (not yet developing)	Ovary-shaped two small bags, filling 1/9 of the abdominal cavity. Ovarian surface smooth and pink
	II (development beginning)	Ovarian size larger than the TKG I and fill 1/6 of the abdominal cavity. Ovariun dark red. Eggs are not apparent to the eye.
	III (growing)	Ovary maroon, fill 1 / 3-1 / 2 of the abdominal cavity. Eggs began to look with the eyes, structured sequential, but not easily separated.
	IV (ripe)	Ovary yellow, fill 2/3 of the abdominal cavity. Eggs are yellow, compact, easy to separate eggs.
	V (post-spawning)	Ovary fill about ¼ of the abdominal cavity. Ovary somewhat wrinkled, pale red, eggs rest sparsely arranged.
Male	I (not yet developing)	The testes form of two strands of yarn short jagged, filling the abdominal cavity 1/18. Testes milky white, reddish.
	II (development beginning)	Larger testes size and shape of serrations clearer than TKG I, filling the abdominal cavity 1/12. Testes milky white, reddish.
	III (growing)	Testicular serrations appear more clearly than TKG II. Testicular color more white, the greater size, filling 1/8 of the abdominal cavity.
	IV (ripe)	Testes fill about ¼ of the abdominal cavity. Serrations on testicular wider and thicker. Testes more solid.
	V (post-spawning)	Testes wrinkled, pale red color, fill 1 / 6-1 / 4 of the abdominal cavity.

Table 2. Water Quality Data Swamp flood Rungan River city of Palangkaraya Kingdom During research of the month October 2013 - April 2014

No	Sampling	pH	Depth (m)	DO (ppm)	Temperature	Brightness
1	October	3.65 ± 0.50	1.90 ± 0.87	3.28 ± 0.05	28.75 ± 0.50	32.50 ± 2.89
2	November	3.90 ± 0.58	5.28 ± 1.84	3.35 ± 0.10	27.00 ± 0.00	27.50 ± 2.89
3	December	3.90 ± 0.58	6.48 ± 2.33	3.40 ± 0.12	26.75 ± 0.50	26.25 ± 2.50
4	January	5.00 ± 0.00	4.03 ± 1.06	3.45 ± 0.06	26.00 ± 0.00	25.00 ± 0.00
5	February	4.50 ± 0.00	1.70 ± 0.71	3.38 ± 0.36	27.25 ± 0.50	30.00 ± 4.08
6	March	5.00 ± 0.71	3.78 ± 0.92	3.20 ± 0.00	26.00 ± 0.00	27.50 ± 2.89
7	April	6.00 ± 0.00	5.18 ± 0.78	3.73 ± 0.10	26.00 ± 0.00	25.00 ± 0.00

main river, which in the rainy season flood swamps will blend with the river forming a sea of fresh water. In the dry season there is a swamp flood drought, but the area lebung or part there is still water in the swamp. Exchange of water in the main river flood swamps occur through the canals that connect to the main river flood swamps. Kana also used the fish to migrate from the main river to flood the marsh when entering the dry season and vice versa in the rainy season.

Water Quality Swamp Flood

This flood of swamp water parameters such as water depth, pH, DO, temperature, brightness and Hg content, can be seen in Table 2.

Table 2 Water Quality Data Swamp flood Rungan River city of Palangkaraya Kingdom During research of the month October 2013 - April 2014 From the table shows that the average depth of the swamp water is 4 m with the highest depth in December, which is 6.5 meters with a standard deviation of ± 2:33, and the lowest in February, with a depth of 1.7 meters ± standard deviation of 0.71. Bardasarkan rainfall data in the region of Central

Figure 2: Swamp flood conditions: a. The waters began to recede; b. waters in

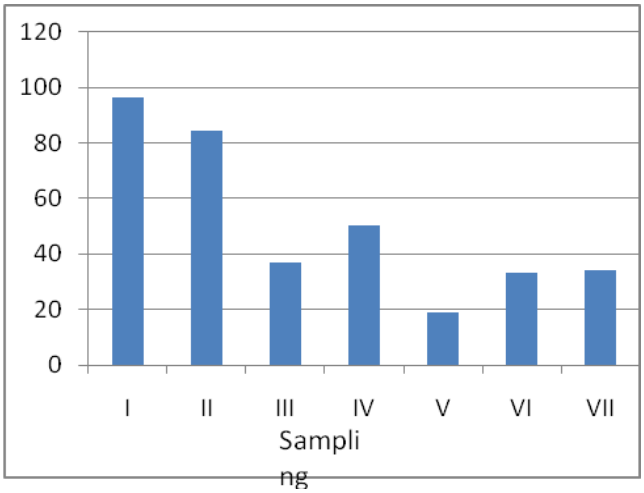

Figure 3: Distribution of the Lais Fish Caught During Research

Based on the research results Sulistyarto et al (2007), on the river Rungan that theRungan, water in the season occurs from November to May and shallow water season occurs in June to October. Marsh swamp water depth is influenced by rainfall in the upstream location and Rungan.

The content of the highest pH in April ie 6 pH scale, and the lowest in October is 3.7 which is acidic waters because the pH value below 7. Effect of high acidity Rungan river flood waters swamp because the base substrate is composed of peat swamp flood (contain humic acid) and the number of vegetation along rivers and swamps that led to a flood of water becomes acidic conditions. In general pH suitable for fish life ranged from 6.7 to 8.6, but some types of fish because of its original environment is in swamps have endurance to live at low pH (Susanto, 1991). Fish Crytopterus limpok able to live on the water with a slightly acidic pH ranging from 5.5 to 6.0 (Elvyra, 2004).

Dissolved oxygen in the water also affects the pH of the water content. The results of the analysis of dissolved oxygen content results in the highest in the river flood swamps Rungan shows that in April 2014 ie 3.7 mg / l and the lowest in October 2013 of 3.3 mg / l.The difference in dissolved oxygen content results are influenced by water temperature, which in October of high water temperature is 29oC and the water temperature is 26°C in April. Temperature fluctuations in river flood waters swamp Rungan, influenced by the depth of water and precipitation levels. The higher rainfall semikin then in cold water and the water temperature.

Brightness flood waters swamp Rungan river is highest in October is 32.52 cm, and the lowest in January and April, with the value of 25.00 cm water transparency. The low brightness Rungan river flood waters swamp in January and April due to lack of sunlight into the water, and this will certainly affect the activity fotositesa phytoplankton, which of course also affects the natural food ketesediaan aquatic biota (including fish). The penetration of light can be measured by the fertility of the waters, the deeper the water, the light intensity on the wane, this condition will reduce the growth of plankton as natural forage fish, because the sun is the energy source of plankton to perform photosynthesis.

The Structure of Fish Populations Lais

To determine the structure of fish populations in the swamp Lais Rungan river flood, then performed an analysis of fish length and weight and sex ratio. Based on the sampling results of the sampling fish I - VII, the total fish caught is 353 tail with the details as follows:
I = 96 tail sampling, sampling II = 84 tails, III = 37 tail sampling, sampling IV = 50, sampling V = 19 tail, VI = 33 tail sampling and sampling VII = 34 tail. Distribution Lais caught fish can be seen in the bar chart (Figure 3).

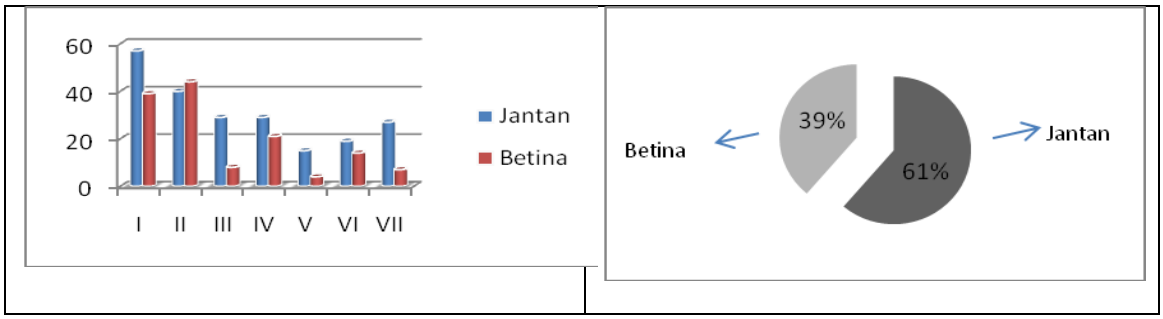

Figure 4: Distribution of the number of fish Lais males and females as well as males percentage fish Lais and females caught during the study

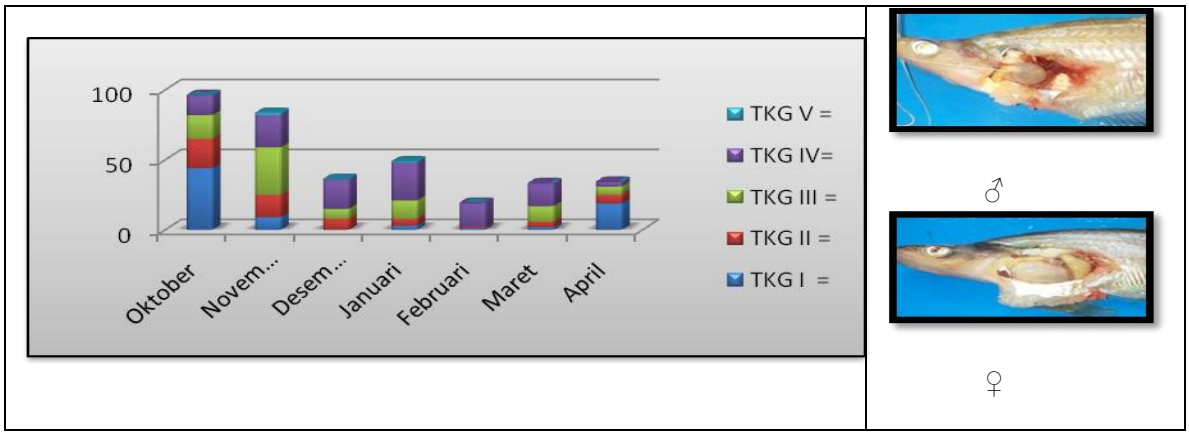

Figure 5. Distribution of fish gonad development Lais Each Sampling and gonads male and female fish are ripe (IV)

Based on the picture above, it appears that the number of fish caught is highest Laish at the first sampling at 96 tail and the number of fish caught V lowest for the sampling of only 19 individuals. When connected to the water conditions on the sampling of I that in October 2013 the average water depth of 1.9 m, where normal rainfall is 200-300 mm, shallow water conditions, making it easier for the fishing Lais. While the sampling to V (month February 2014) although the shallow water fish number Lais were caught a bit, due to the previous month December-January in the water, so the fish that were in the swamp LaisJanuary flood has spread and migrate to the waters of the river. Water conditions change influenced by the seasons will affect also the presence and distribution of fish in the waters of Laish. Thedistribution change of the physical condition of the water environment (height and extent of surface water) will affect the changes in behavior and adaptability of fish.

The results of the analysis of the total length and weight measurements Lais fish caught during the study, obtained results Lais fish length ranges from 12-29 cm and weight of fish Lais between 10-250 grams. Lais fish growth pattern was allometric positive for Laisgrams fish. caught in November 2013 - March 2014, in which heavy growth is faster than the growth in length. Month of October 2013 and April (2014) growth pattern Lais fish is negative allometric, ie the length growth faster than the growth of the weight.

Based on the results of the correlation R = 0.918, where the fish length and weight0.918, relationship Lais for research is very strong / tight. With the value of b> 3, which means that the pattern of positive allometric growth Lais fish, namely growth more towards weight of fish.

Total fish Lais male and female fish snare during the study found that the amount offemale fish Lais more manly when it is compared with fish caught female Lais. Nisbih value or proportion of female and male fish Lais is 137: 216. Percentage of male and female Lais fish caught (Figure 4).

Based on the above picture where the percentage of male fish Lais higher = 61% when compared to females only = 39%. This is in contrast with the results Handayani (2009); Elvyra (2009) and Simanjuntak (2009), in which the ratio of fish caught Lais that more females than males. However, research results Nurullah et al (2012), in Riau Kampar RiverRiver, the number of male fish Lais more when compared with female Lais fish.

Level of Maturity Gonads Fish Lais (*Ompok hypopthalmus*)

To see the fish gonad development Lais, both males and females during the study was to see and observe the development of fish gonad and fish testes through surgery Lais fish surgery. hormonal development done by looking at the fish gonad maturity level morphologically linked to the time when the sampling of fish every time sampling.

Observations development Lais fish gonad maturity by observing some of the processes involved in reproduction

is TKG I (undeveloped), II (early development), III (moderate berkemgang), IV (mature) and V (post-spawning) in both the male fish and fish females. Stages in fish gonad development is needed to determine the ratio of fish that will be reproduced and which are not. In addition, information can also be obtained when the fish will spawn, spawn new or already finished spawning fish gonads Distribution Maturity Level.

From Figure 5 above, the distribution of fish gonads Maturity Level Lais for above October, dominated by fish Lais at Maturity Level I or underdeveloped gonads, in November, dominated Maturity Level III developing gonads. December to March is dominated by Lais fish with gonads Maturity Level IV where fish spawn Lais ready, and in April was dominated by fish with gonads Maturity Level I. Peak spawning (mature gonad) in this study took place in December 2013 and January 2014, with the ratio of female and male Lais fish caught is 1:2014 2 and 1: 3, the pattern of growth more towards heavy Lais fish.

The availability of food in waters is also a factor that plays a role in supporting the process of gonad maturity Lais fish ready to spawn. Analysis of the composition of the foodAnalysis in the stomach of fish Lais in December 2013 and January 2014, there were between 5454-60% type of food consists of insects and fish child. Minggawati (2010), that fish Lais including carnivorous fish with the main food of adult insects that fall from the trees around the lake. In 2007 and 2010 research Elvyra R and Simanjuntak, swamp waters flooding in Riau indicates swamp that Lais fish gonad mature and ready to spawn occurred in October.

Environmental conditions also affect the waters of gonad maturation process fish especially during the rainy season fish spawning Lais will do. Water quality at the peakseason, spawning is the average depth of the waters of the swamp flood of 6.48 meters to 4.03 meters in December and in January, the water temperature is between 20 - 27oC, pH 3.9 to 5, DO 3.4 to 3, 5 mg / l, brightness between 26-27 cm. The rise in the water level so that water be in because of high rainfall intensity in December and January are ranged between 300-400 mm as compared to previous months. Thus it can be said that the spawning Lais keep pace swamp flood inundation during the rainy season.

CONCLUSION

Based on the research results it can be concluded that, the peak spawning Lais was in December 2013 and January 2014 with gonad maturity level IV and Lais comparison of female and male fish are ready to spawn is 1: 2 and 1: 3 Total Lais fish caught during research is 353 tail, with a percentage of 61% males and 39% females, with a total length of fish Lais ranged between 12-29 cm and weigh between 10-250 grams. Lais fish growth29 patterns is a positive alomatrik ie heavy growth is faster than the growth in length. Prsentase type of food, there are about 54-60% consists of insects and fish child Lais fish,child.

Morphologically, mature female gonad ovaries yellow, fill 2/3 of the abdominal cavity, eggs gonad, compact, easy in separate eggs and for males the testes are white, thick and wide serrated.

Lais fish spawning season to keep pace with bog flood inundation during the rainy season or when the water inside. The depth of the river flood waters swamp Rungan Lais fish when matured gonad reaches 4.03 to 6.5 meters, with high-intensity rainfall between 300-400mm in December and January, the average water temperature 26,9oC, pH 4, 6, DO of 3.4 mg / l and the brightness of 27.6 cm.

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