Jurnal Biolokus: Jurnal Penelitian Pendidikan Biologi dan Biologi
Vol. 5, Issue 2, December 2022
Pages : 107 – 113

p-ISSN: 2621-3702
e-ISSN: 2621-7538

Length-weight relationship and condition factors of *Channa striata* in Tanjung Haloban village, Labuhanbatu

Asri Asyhari[1], Rusdi Machrizal[1*]
[1] Department of Biology Education, Faculty of Teacher Training and Education, Universitas Labuhanbatu, Jl. SM. Raja No. 126 A, Rantauprapat 21418, Indonesia.
*corresponding author: rusdimachrizal@gmail.com

ABSTRACT

This study aims to determine about length-weight relationship and condition factors of Channa striata in Tanjung Haloban village, Bilah Hilir District, Labuhanbatu Regency. The study was conducted from October to December 2021. Sampling of snakehead fish (C. striata) had done in Tanjung Haloban village. Measurement of the length and weight of snakehead fish (C. striata) was carried out in the ecology laboratory of the Faculty of Teacher Training and Education, Universitas Labuhanbatu. The tools used in this study among others rods, ruler, scales, calipers, buckets. Sampling is carried out for three months with fishing gear. The length-weight relationship can be analyzed using the linear allometric model (LAM) equation. Based on the results of the analysis of the relationship in the length of the snakehead fish weight (C. striata) shows that the results of measuring the length of the snakehead fish weight can be known that male and female snakehead fish have a negative alomatric pattern with a value of b<3, while the condition factor calculated with relative weight (WR) 100.58 and the fulton condition factor (K) 0.85 is close to 1 which means the condition of the swamp waters of the snakehead fish habitat is in a balance state.

Keywords: *Channa striata,* condition factor, length-weight relationship, linear allometric model

INTRODUCTION

Indonesia has extensive freshwater waters with various types of freshwater fish. Lakes, reservoirs, and rivers in Indonesia recorded 14.6 million hectares, while swamp waters covered an area of 33.4 million hectares. With great freshwater potential, it becomes the capital for fisheries development in Indonesia (Swarto *et al.*, 2018). Snakehead fish (*Channa striata*) (Bloch, 1793) is one of the local species fish of Indonesian waters whose habitat is in swamps, rice fields, puddles, and calm current watersheds that carry mud emulsions, and can also be in brackish waters. *C. striata* are spread throughout Indonesia, especially in Sumatra, Java, and Kalimantan. *C. striata* is known by various regional names, including curse fish (Java), snakehead fish (Betawi and Sunda), haruan (South Kalimantan), behau (Central Kalimantan), deleg (Sumatra), bale salo (Sulawesi), and gastor (Papua). In the world the distribution of *C. striata* includes India, Myanmar, Banglades, Laos, Vietnam, Thailand, Cambodia, and Malaysia. Post-introduction *C. striata* are found in Madagascar, the Philippines, eastern Indonesia, new Caledonia and Fuji. (BPBAT Mandiangin, 2014).

The length-weight relationship and condition factors are two important measures in the field of fisheries biology. The benefits of length-weight measurement itself are commonly used to estimate weight based on length measures in fish stock estimation, to estimate biomass from long frequency distributions, to calculate condition factors, and to compare the life history of a particular species from different areas. Studies of the length of weight and factors of snakehead fish conditions have been widely studied, namely, snakehead fish (*C. striata*) raised in Rawa Lebak, South Sumatra Province (Muthmainnah, 2013), snakehead fish (*C. striata*) in Lake Teluk Petai, Riau Province (Shasia et al., 2021), snakehead fish (*C. striata*) in Parung waters, West Java (Kusmini et al., 2018).

Snakehead fish (*C. striata*) is a fish with high economic value, this is because snakehead fish contains protein with a value

of 25.2 grams in every 100 grams of snakehead fish and also contains very high albumin with a value of 63-107 mg/ g which is useful for curing various diseases, one of which helps accelerate wound healing (Chasanah et al., 2015). High economic value leads to a high level of exploitation of snakehead fish (*C. striata*). This can lead to a decrease in the population of snakehead fish (*C. striata*) in nature. According to Yulisman et al., (2012) Constant exploitation activities in nature,- will lead to a decrease in the population of snakehead fish. To overcome the decline in population, domestication, and cultivation of snakehead fish can be carried out.

This study is intended to analyze the relationship between the length of weight and factors of snakehead fish (*C. striata*) conditions in the swamp ecosystem of Tanjung Haloban village, Bilah Hilir District, Labuhanbatu Regency, which until now has never been published. Data of length-weight relationship and condition factors of snakehead fish (*C. striata*) can be used as basic information in efforts to cultivate snakehead fish (*C. striata*) in the future.

METHOD

Tools and materials

Fish samples were caught using fishing rods. The weight (g) of fish caught in the measured using digital scales (g) with a degree of accuracy (0.1 g), length (mm) of fish measured using a ruler. All the fish caught are collected in a cooler box.

Sampling method

This research uses an exploration method. The exploration method is a method that is carried out by observing objects that will be researched directly. The location of snakehead fish sampling is carried out in the area of rice field irrigation flows. The research stations are divided into 3 with each distance of ± 250 m at each station. The determination of the research station was carried out based on information from the surrounding community who used to catch snakehead fish.

Population and sample

The study was conducted from October to December 2021. Sampling of *C. striata* was carried out in the swampy waters of Tajung Haloban Village, Labuhanbatu Regency. The sampling location was at 2o27'28.72" N: 100o4'51.27" BT (station 1), 2o27'50.79" N: 100o4'49.78" BT (station 2), 2o28'7.39" N: 100o4'54.92" BT (station 3). The sampling location can be seen in Figure 1.

Figure 1. Snakehead fish research site map.

Sampling was carried out 3 times in 3 months. Sampling starts from 6:00 a.m. to 8:00 a.m. and 7:00 p.m. to 9:00 p.m. During the study, 60 samples were obtained. Measurement of the length of the weight of snakehead fish (C. *striata*) was carried out at the ecology laboratory of the Faculty of Teacher Training and Education, Universitas Labuhanbatu.

Research procedure

The research begins with determining the sampling location. Sampling location information was obtained through information from the community around Tanjung Haloban village. Then the fish are caught using fishing gear, fishing rods are installed 2 times a day, namely at 06:00-08:00 in the morning and at 19:00-21:00 at night. All caught fish are put in a cooler box and taken to the laboratorium for length and weight measurements.

Data analysis

For the length weight relationship can be analyzed using equations *linear allometric model* (LAM).

$$W = aL^b$$

Note:
W = the total weight (g);
L = the total length of the fish (cm);
a & b = linearization constants through the transformation of logarithms by equations:

$$\text{Log } W = \text{Log } a + b \text{ Log } L$$

The significance of the value of b is tested with a t test to find out if the value of b = 3. If b = 3, then the length-weight relationship is isometric which means that length and weight are equal. However, if b ≠ 3, then the length-weight relationship is allometric. If b < 3, the length-weight allometric relationship is negative where the growth of length is more dominant than weight, then if b > 3 means a positive allometric length-weight relationship where weight growth is more dominant than length (Simon et al., 2014; Seiyaboh et al., 2016).

Conditions factor

To measure the relative weight condition factor Wr, this study used the formula of Rypel & Richter (2008).

$$WR = (W/WS) \text{ X } 100$$

Note:
WR = the relative weight,
W = the sample fish weight
WS = the predicted weight of the fish based on the lam calculation results

In this study, the relative weight coefficient (Wr) was calculated to predict the condition factor of each sample of the relative weight calculation formula (WR).

$$K = WL^{-3} \text{ X } 100$$

Note:
K = a condition factor
W = weight in grams
L = the length in cm 3 i.e. the coefficient of length to test whether the value of K tends to approach 1.

RESULTS AND DISCUSSION

Table 1. Length-weight of snakehead fish (*C. striata*) by sex.

Time	Length (cm)	Weight (g)	Male	Female
October	21-31	81-180	2	19
November	21-29.5	81-177	10	10
December	20-30	81-180	10	9

From Table 1, it is found that in October the fish obtained consisted of 2 male fish and 19 female fish weighing 81-180 and a length of 21-30. In November researchers got 10 male fish and 10 female fish weighing 81-177 and 21-29.5 in length, while in December researchers got 10 male fish and 9 females weighing 81-180 and 20-30 long.

The results of the data analysis obtained the weight of the snakehead fish (*C. striata*) is in the range of 81-180 grams and the total length is in the range of 21-31 cm. The results of the analysis of the weight length relationship can be seen in table 2 where the value of b is 2.248.

Table 2. Parameters observed in snakehead fish (*C. striata*).

No	Parameter	Value	Average
1.	Total Length (cm)	21-31	26
2.	Total Weight, W (g)	81-180	147.5
3.	Weight Prediction, Ws (g)	80.2949035-215.057027	147.03567
4.	Relative Weight (Wr)	81.18974-124.566	100.58
5.	Fultons Factor Conditions (K)	12.82386-16.3454	14,445
6.	Cooficient of determination (r2)	0.8365	-
7.	*B* Value	2.248	-

Based on the graph in Figure 2, it can be seen that the results of the length-weight analysis using the linear allometric model obtained the value of b from the length

equation of the weight of *C. striata* male which is 2.1069, the female is 2.2914 and the combination of male and female is 2.248, meaning the value of b<3. This means that the growth pattern of snakehead fish is negatively allometric, where long growth is more dominant when compared to weight growth. This research is also supported by research (Kusmini et al., 2018) which found that snakehead fish (*C. striata*) is negatively allometric where the value of b=2,875. Unlike the case with those found Cia et al., (2018) where the growth pattern of male snakehead fish in the waters of the Aopa Swamp is isometric (b=3) meaning that the increase in length is balanced with the increase in body weight and the positive allometric female fish (b>3) means that the weight gain is faster than the growth in length. The results of this study are also almost the same as those obtained Shasia et al., (2021) where the value of b in male snakehead fish (*C. striata*) is greater than the value of b in female snakehead fish. The difference in the growth pattern of snakehead fish (*C. striata*) in the study is thought to be due to intrinsic factors, where the female snakehead fish caught consists mainly of fish that are maturing gonads so that it affects body weight. This is in line with the opinion Siagian et al., (2017) states that, the growth of fish is influenced by two factors, namely: intrinsic factors (inside) and extrinsic factors (outside). Intrinsic factors are factors arising from within the fish itself, namely: hereditary traits, age, heredity, resistance to diseases, and the ability to make use of food. While extrinsic factors include: physical and chemical properties of waters as well as biological components such as food availability and competition. Moreover, Marasabessy (2020) revealed that, the emergence of differences in b values in fish can be influenced from 2 factors, namely: environmental factors and factors of food conditions in the waters. According to Sinaga et al., (2018) in general, the value of b depends on physiological and environmental conditions such as temperature, pH, geographical location and sampling technique.

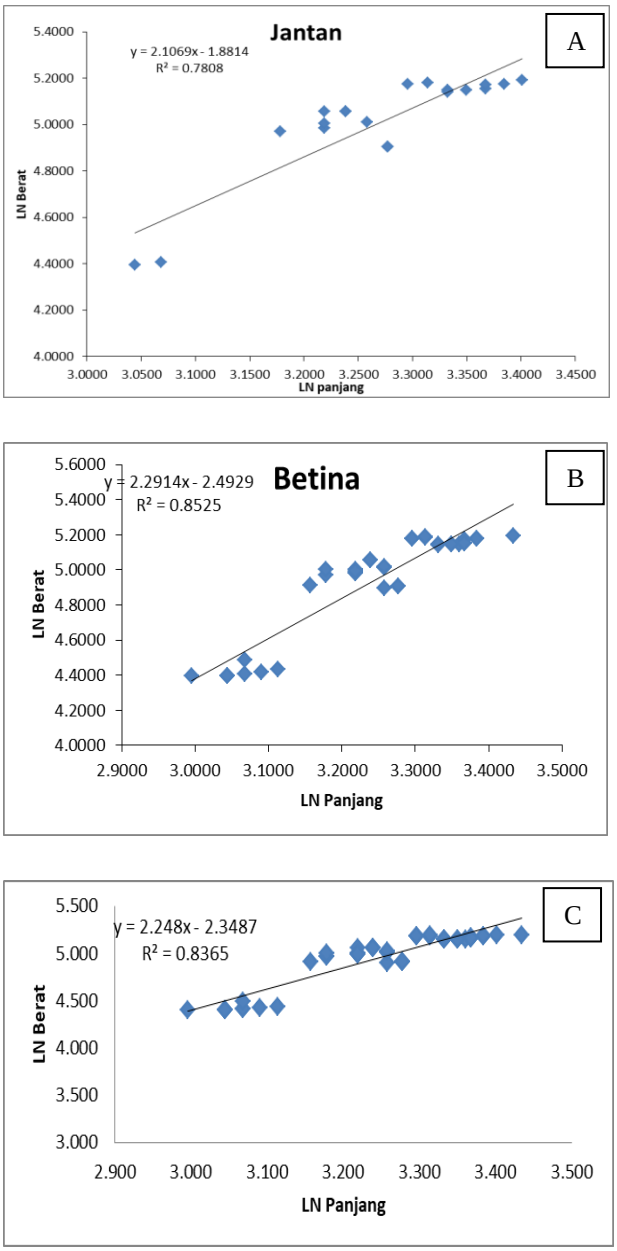
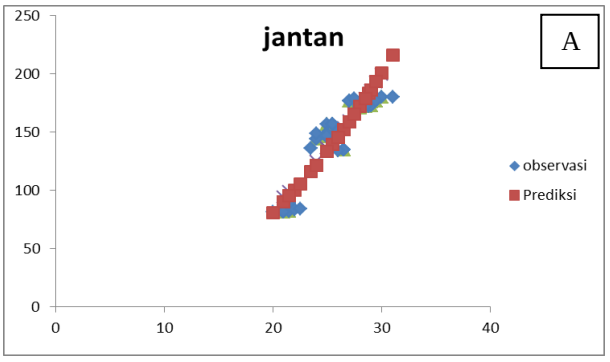


Figure 2.Graph of the Relationship of Snakehead Fish Weight Length (*C. striata*): (A) Male; (b) female; (C) Combined Male and Female.



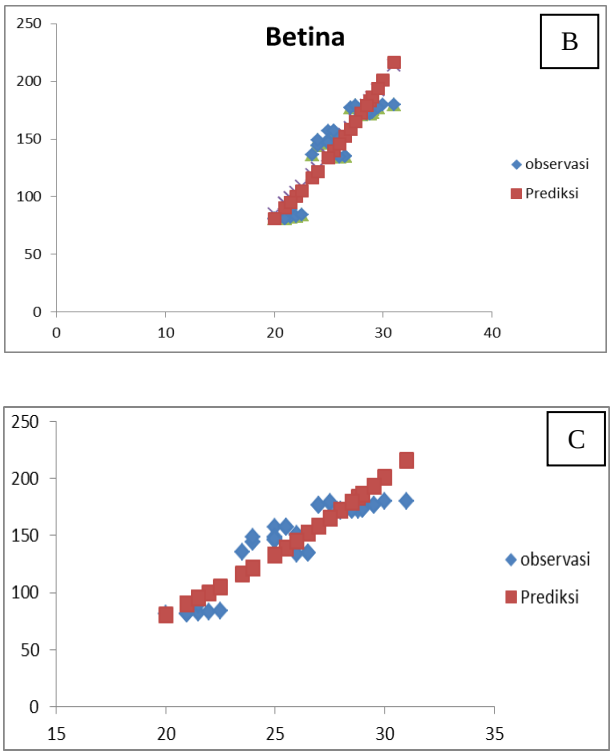


Figure 3. Comparison of the relationship in length of weight from observations and predictions of snakehead fish (*C. striata*); (a) male; (b) female; (C) Combined male and female.

Factor analysis of relative weight conditions (Wr) in the swampy waters of Tanjung Haloban village is close to 100, namely 81.18974-124.566 with an average value of 100.58 and fulton condition factor (K) 0.85 close to 1 which means that the condition of the swamp waters of snakehead fish habitat is in a balanced condition. Based on gender, the average value of condition factors in male fish calculated is smaller than that of female fish. In male fish, the average value of relative weight condition factor (WR) is about 85.57335-119.2392 with an average of 100.5018. And in female fish, the value of relative condition factor (WR) 82.73688-128.101 with an average of 101.9801 was obtained. The average value of the condition factors found in male fish is smaller than that of female fish, indicating that at the same size, female fish tend to weigh more than in male fish. Differences in the value of condition factors according to sex were also found by some researchers, Puspaningdiah et al., (2014) the result of the calculation of Kn obtained a value of 1,099, Muthmainnah (2013), condition factor of snakehead fish in the marsh of Mariana pond = 0.88 as well as research conducted by Shasia et al., (2021) the condition factor range of male snakehead fish during the study was 0.7033-1.6639 and female snakehead fish was 0.6203-1.3619. Research conducted by (Ibrahim et al., 2017) shows that the range of condition factors of the yellow selar fish with a total range between 1.0061 - 1.1926 indicates the condition of the yellow selar fish is good, as well as according to Munthe & Machrizal (2021) the average value of the relative weight condition factor (Wr) is 103.0791. This value tends to approach the value of 100 indicating that environmental conditions are in a balanced state.

According to Gustiarisanie et al., (2017) The difference in the value of condition factors is influenced by population density, the degree of maturity of the gonads, food, sex and age of the fish. According to (Kusmini et al., 2018) Condition factors of a type of fish can change / are not permanent, if there are changes in waters such as water quality and population density, then this can affect the factors of fish conditions. If the population density decreases while the availability of the amount of food remains then the value of the condition factor can increase and vice versa, if the population number is fixed but the availability of feed decreases then the value of the condition factor will decrease. Likewise according to (Syuhada et al., 2020) These differences in condition factors are related to biological interactions involving intra-specific competition for food, sex, distance between species, feeding intensity, gonadal development and food availability. Similarly, according to Makmur, (2004) The value of snakehead fish condition factors fluctuates every month, this is due to differences in age, TKG, environmental conditions, and food availability in these

waters. Where in this study the value of the condition factor is suspected to be influenced by TKG, this is because almost all snakehead fish (*C. striata*) caught on average females mature gonads.

CONCLUSION

The length-weight relationship of snakehead fish (*C. Striata*) shows that the results of measuring the length of the weight of snakehead fish can be seen that male and female snakehead fish have a negative allometric pattern with a value of b<3. As for the condition factor calculated with a relative weight (WR) of 100.58 and a fulton condition factor (K) of 0.85 close to 1 which means that the condition of the swamp waters of the snakehead fish habitat is in a balanced state. The average value of the condition factors found in male fish is smaller than that of female fish, suggesting that at the same size, female fish tend to be more beat than male fish.

REFERENCES

Balai Perikanan Budidaya Air Tawar (BPBAT) Mandiangin. (2014). Naskah akademik ikan gabus haruan (*Channa striata* Bloch 1793) hasil domestikasi. Retrieved from https://dokumen.tips/documents/naskah-akademik-ikan-gabus-haruan-channa-striata-iii-ringkasan-ikan-gabus-channa.html?page=1 (accessed on October, 11th 2022).

Chasanah, E., Nurilmala, M., Purnamasari, A. R., & Fithriani, D. (2015). Komposisi kimia, kadar albumin dan bioaktivitas ekstrak protein ikan gabus (*Channa striata*) alam dan hasil budidaya. *JPB Kelautan dan Perikanan*, *10*(2), 123–132. http://dx.doi.org/10.15578/jpbkp.v10i2.364.

Cia, C. W. O., Asriyana, & Halili. (2018). Mortalitas dan tingkat eksploitasi ikan gabus (*Channa striata*) di perairan rawa Aopa Watumohai Kecamatan Angata Kabupaten Konawe Selatan. *Jurnal Manajemen Sumber Daya Perairan, 3*(3), 223–231.

Gustiarisanie, A., Rahardjo, M. F., & Ernawati, Y. (2017). Biologi reproduksi ikan lidah, (*Cynoglossus cynoglossus*, Hamilton 1822) Pisces: cynoglossidae di teluk pabean, Jawa Barat. *Bawal Widya Riset Perikanan Tangkap*, *9*(2), 103-112. https://doi.org/10.15578/bawal.9.2.2017.103-112.

Ibrahim, P. S., Setyobudiandi, I., & Sulistiono. (2018). Length-weight relationship and condition factor of yellow stripe scads *Selaroides leptolepis* in Sunda Strait. *Jurnal Ilmu Teknologi kelautan Tropis*, *9*(2), 577–584. https://doi.org/10.29244/jitkt.v9i2.19292.

Kusmini, I. I., Admadi, V. Prakoso, Radona, D., & Putri, F. P. (2018). Hubungan Panjang-Bobot Dan Aspek Reproduksi Ikan Gabus Hubungan Panjang-Bobot Dan Aspek Reproduksi Di Perairan Parung , Jawa Barat. *Biotika*, *12*(1), 36–43. https://doi.org/10.24198/bjib.v13i1.10089.

Makmur, S. (2004). Pertumbuhan ikan gabus (*Channa striata* bloch) di daerah banjiran talang fatima DAS sumatera selatan. *JPPI Edisi Sumber Daya dan Penangkapan*, *10*(6), 1–18. http://dx.doi.org/10.15578/jppi.10.6.2004.1-18.

Marasabessy, F. (2020). Hubungan panjang berat dan faktor kondisi ikan kembung laki-laki (*Rastrelliger kanagurta*) di sekitar pesisir timur perairan Biak. *Barakuda 45: Jurnal Ilmu Perikanan dan Kelautan*, *2*(1), 28–34. https://doi.org/10.47685/barakuda45.v2i1.56.

Munthe, S. N., & Machrizal, R. (2021). Hubungan panjang-berat dan faktor kondisi julung-julung (*Hemirhamphodon pogonognathus*) di Aek Mailil Kabupaten Labuhanbatu Sumatera Utara Indonesia. *Bioma : Jurnal Ilmiah Biologi*, *10*(2), 171–180. https://doi.org/10.26877/bioma.v10i2.8193.

Muthmainnah, D. (2013). The length-weight relationship and condition factor of striped snakehead (*Channa striata* Bloch, 1793) grow out in swamp pond, South Sumatra Province. *Jurnal Ilmu Ilmu Perairan, Pesisir, dan Perikanan*, *2*(3), 184–190. https://doi.org/10.13170/depik.2.3.993

Puspaningdiah, M., Solichin, Gofar, A., (2014). Aspek Biologi Ikan Gabus (*Ophiocephalus striatus*) di Perairan Rawa Pening, Kabupaten Semarang. *Management of Aquatic Resources Journal (MAQUARES)*, *3*(4), 75-82. https://doi.org/10.14710/marj.v3i4.7034

Rypel, A. L., & Richter, T. J. (2008). Empirical percentile standard weight equation for the blacktail redhorse. *North American Journal of Fisheries Management*, *28*(6), 1843–1846. https://doi.org/10.1577/m07-193.1

Seiyaboh, E. I., Izah, S., & Gijo, H. A. (2016). Length-weight relationship and condition factor of some important fish species from Sangana River, Niger Delta. *International Journal of Innovative Agriculture & Biology Research, 4*(4), 37-44.

Shasia, M., Eddiwan, & Manda Putra, R. (2021). Hubungan panjang-berat dan faktor kondisi ikan gabus (*Channa striata*) di Danau Teluk Petai Provinsi Riau. *Jurnal Sumberdaya dan Lingkungan Akuatik*, *2*(1), 241–250.

Siagian, G., Wahyuningsih, H., & Barus, T. A. (2017). Struktur populasi ikan gulamah (*Johnius trachycephalus* P.) di Sungai Barumun Kabupaten Labuhan Batu Sumatera Utara. *Jurnal Biosains*, *3*(2), 59–65. https://doi.org/10.24114/jbio.v3i2.7433

Simon, K. D., De, M., & Gaffar, M. A. (2014). Length-weight relationship and trophic level of hard-tail scad *Megalaspis cordyla*. *ScienceAsia*, *40*(5), 317–322. https://doi.org/10.2306/scienceasia1513-1874.2014.40.317

Sinaga, S., Febri, S. P., Haser, T. F. & Azmi, F. (2018). Hubungan panjang dan berat serta faktor kondisi kerang bulu *Anadara antiquata* di Ujung Perling, Kota Langsa Aceh. *Jurnal Ilmiah Samudra Akuatika*, *2*(2), 30–34.

Swarto, M. D. H., Haeruddin, H., & Rudiyanti, S. (2018). Hubungan panjang dan berat ikan nila (*Oreochromis niloticus*) dalam media pembesaran dengan penambahan enzim ez-plus (skala laboratorium). *Management of Aquatic Resources Journal (MAQUARES)*, *7*(1), 150–156. https://doi.org/10.14710/marj.v7i1.22535.

Syuhada, Y. M., Hertati, R., & Kholis, M. N. (2020). Hubungan panjang berat dan faktor kondisi ikan limbat (*Clarias nieuhofii*) yang tertangkap pada bubu kawat di perairan rawa Rimbo Ulu Kabupaten Tebo Provinsi Jambi. *Semah Jurnal Pengelolaan Sumberdaya Perairan*, *4*(2), 90–102. https://doi.org/10.36355/semahjpsp.v4i2.457.

Yulisman, Y., Fitrani, M., & Jubaedah, D. (2012). Peningkatan pertumbuhan dan efisiensi pakan ikan gabus (*Channa sriata)* melalui optimasi kandungan protein dalam pakan. *Berkala Perikanan Terubuk*, *40*(2), 47–55. http://dx.doi.org/10.31258/terubuk.40.2.47-55.