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Determination The Status of Utilization and Level of *Sepat (Trichogaster sp)* in freshwaters of *Banjar* Regency

Novita Sari, Iriansyah, Irhamsyah*

Department of Fisheries Resources Utilization, Faculty of Fisheries and Marine Sciences, Lambung Mangkurat University, Banjarbaru, Indonesia, 70714.

* Correspondence: irhamsyah.asmuni@rocketmail.com

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ABSTRACT

The fishing of *Sepat (Trichogaster sp*) in freshwaters of Banjar Regency with a solid intensity that has lasted long enough. This study aims: (1) Knowing the model of surplus production that can be used (2) Knowing the optimum effort *Sepat* (3) Knowing the maximum sustainable yield (4) Knowing the utilization level of *Sepat* (5) Knowing the effort level of *Sepat*. The method that used in this research was survey method and collecting data. Data was analyzed by the Schaefer's model and Fox's model. The result of this research: (1) The best model is the Schaefer model with R2 and validation value (2) The catch rate of *Sepat* was 45630 trip per year (3) Maximum sustainable yield of *Sepat* was 45,466 ton per year. (4) The utilization rate of *Sepat (Trichogaster sp)* was 33% which shows there no more catch *under fishing* (5) Effort level of *Sepat* was 16 %.

Keywords: fox model, maximum sustainable yield, *schaefer* model, *sepat* (*trichogaster sp*), surplus production model.

1. Introduction

Fishing in the freshwaters in South Kalimantan are generally carried out in rivers, swamps, lakes and reservoirs. Fish that are usually caught are local fish. In 2012 the production of *Sepat* fish resources. Data on the level of fish utilization in water is very important because it determines the utilization of these resources is less than optimal, optimal, or even overfishing. Excessive use of fish will threaten the sustainability of the fish. Knowing the level of utilization of *Sepat* resources is expected to be carried out in a planned management.

The Surplus Production Model is one of the simplest fish stock valuation models and is easily explained and accepted by fish resource managers. The basic assumption of this model is the entity's fish resources, without taking into account the actual processes that are not simple that causes the formation of the entity. Experts claim this model simplifies the process. This model only requires data capture and effort, these two types of data are usually known as fisheries characteristics. So, it is necessary to know the characteristics of fish resources, behavior and limits of the resilience of fish resources to fishing pressure (Badrudin, 2004).

Formulation of the Problem:

1. What is the best surplus production model that can be used for catching *Sepat* (*Trichogaster sp*)?
2. What is the level of catching *Sepat (Trichogaster sp)*?
3. What is the maximum result catching of *Sepat* (*Trichogaster sp*)?
4. What is the utilization rate of *Sepat (Trichogaster sp)*?
5. What is the level effort of *Sepat (Trichogaster sp)*?

Research purposes:

1. Find out the best surplus production model that can be used for catching *Sepat* (*Trichogaster sp*)
2. Find out the level of catching *Sepat (Trichogaster sp)*
3. Find the maximum result catching of *Sepat* (Trichogaster sp*)*
4. Find out the utilization rate of *Sepat(Trichogaster sp)*
5. Find out the level effort of *Sepat (Trichogaster sp)*

2. Materials and Methods

Time and Place

This research was carried out for 4 months from the preparation until the report, from June to September 2017. It is located in *Banjar* Regency, South Kalimantan Province.

Research Methods

This research was conducted using survey methods. The data collected is primary data and secondary data. This research uses data with field observations.

Primary data collection is done through direct observation of fishing units as well as interviews with fishermen using questions that fit the research objectives. Data obtained from the *Banjar* Regency Fisheries Statistics data, the Banjar Regency Maritime Affairs and Fisheries Agency, the relevant agencies and through searching various libraries.

Analysis Data

1. Schaefer's Model

The Surplus Production Model developed by Schaefer, whose initial form same as the logistical growth model.

2. Fox's Model

The Fox model (1970) in Kekenusa, Rondonuwu, Paendong, and Weku, 2014 has several different characteristics from the Schaefer model, namely biomass growth following the Gompertz growth model. The decrease in CPUE to capture attempts follows a negative exponential pattern.

3. Results and Discussion

Result

The catch rate of *Sepat (Trichogaster sp)*

Table 1. Number of production of sepat (*Trichogaster sp*) in Banjar District by Type of Fishing Gear in 2012-2016.

Type of fishing gear	Production / year (ton)				
	2012	**2013**	**2014**	**2015**	**2016**
Anco	1,5	0,2	5,1	1,4	3,6
Jaring Insang	1,2	0,8	9,1	3,5	6,2
Lukah	3,9	0,4	2,1	1,5	1,4
Pancing	3,0	2,3	8,0	3,4	0,4
Tempirai	0,4	0,6	9,7	6,9	3,4
Total	**10,0**	**4,3**	**34,0**	**16,7**	**15,0**

Source : Data from the Banjar Regency Fisheries and Maritime Agency

Fishing efforts *(Trichogaster sp)*

The number of trips of each fishing gear in *Banjar* Regency within a period of 5 years (2012-2016)
Table. 2

Type of fishing gear	Trip / year				
	2012	**2013**	**2014**	**2015**	**2016**
Anco	1236	476	3519	5618	2835
Jaring Insang	789	1303	5721	3729	3330
Lukah	1778	1825	6871	7200	5649
Pancing	2124	2247	7729	2408	395
Tempirai	1144	360	6065	5256	6240

Source : Data from the Banjar Regency Fisheries and Maritime Agency

Schaefer's Model

From the analysis results obtained by the regression equation as follows $\frac{C_t}{E_t}$ = 0,001992838 – 2,18368E - 08 E_t with the coefficient of determination R^2 = 0,246613491 and level of significance (p < 0,05).

Fox's Model

From the analysis results obtained by the regression equation as follows: Ln $\frac{C_t}{E_t}$ = -6,22628274 – 1,21186E-05 with R^2 = 0,243724618 and level of significance (p < 0,05). Combined Results and Discussion section is recommended. Results should be clear and concise. Discussion should explore the significance of the results of the work, not repeat the results. Avoid extensive citations and discussion of published literature.

Discussion

1. Surplus Production Model

These two model used in this research after calculation, the Schaefer model is considered the best model with the support of R2 and validation values, while the Fox's model has a lower R2 value and a large validation value. If the value of R2 approaches the number one, it shows that the model is good and for the validation value, the smaller the value, the more it states that the model is good.

Table. 3 Calculation of data validation for both surplus production models.

	Schaefer Model	Fox Model
R^2 value	**0.246613491**	0.243724618
Validation value	**54,47**	7448,30
Significance of Individual Regression Coefficients	**Not Significant**	Not Significant

Source: Primary data processed

From the calculation results of Table 3 it appears that the most appropriate is the Schaefer model with a large of R^2 value (R^2 = **0.246613491**) and a small validation value (Validation = **54,47**), while the significance of the individual regression coefficient of the Schaefer model is not significant.

2. Level of Catching Efforts

From the Schaefer model obtained a= 0.001992838 and b = 2.18368E-08, with equations (1) and (2) the optimum effort value can be calculated (E_{opt}) 45.630 trip/year. It means that to maintain the sustainability of *sepat* fishery resources (*Trichogaster sp*) in Banjar District in a year the number of fishing units must not exceed 45,630 trips/year.

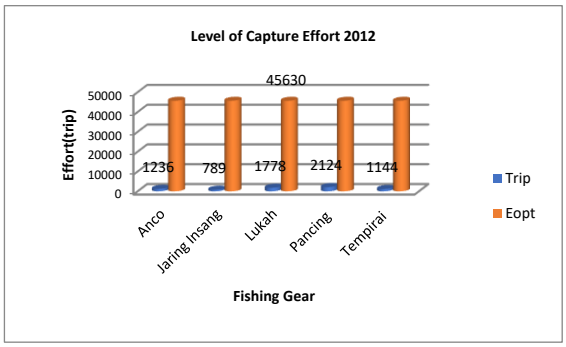

Figure 1. The catch rate of *Sepat* in *2012.*

Based on the chart above, the 2012 fishing effort level of *Anco* has 1236 trips, 789 trip gills, *Lukah* 1778 trips, Fishing lines 2124 trips and *Tempirai* 1144 trips can be stated not to exceed the optimum value.

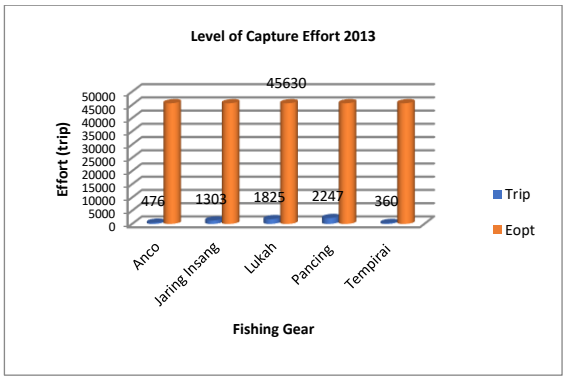

Figure 2. The catch rate of *Sepat* in *2013.*

Based on the graph above that in 2013 the level of capture effort did not exceed the optimum value limit. *Anco* 476 trip, Gill net 1303 trip, *Lukah* 1825 trip Fishing line 2247 trip and *Tempirai* 360 trip.

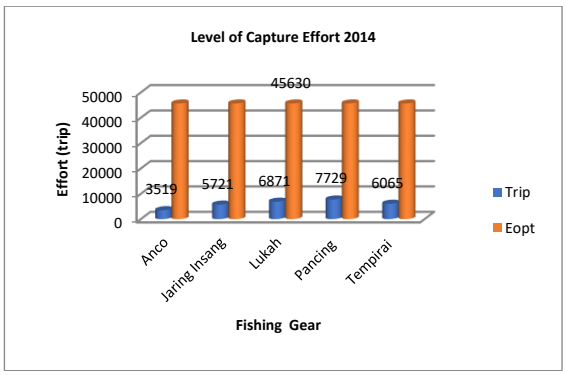

Figure 3. The catch rate of *Sepat* in *2014.*

In 2014 the level of catching effort did not exceed the optimum value limit. *Anco* 3519 trip, Gill net 5721 trip, *Lukah* 6871 trip, Fishing line 7729 trip and *Tempirai* 6065 trip.

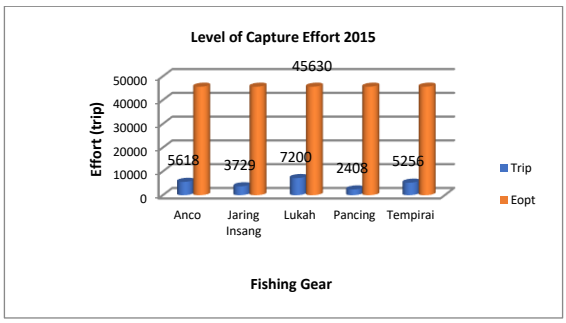

Figure 4. The catch rate of *Sepat* in *2015.*

In 2015 the same as in 2014 the level of capture effort does not exceed the optimum value.

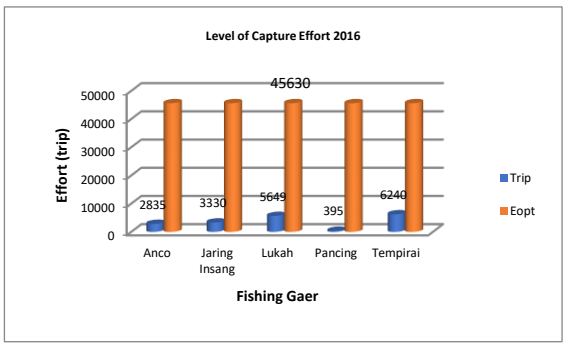

Figure 5. The catch rate of *Sepat* in *2016.*

Based on the level of capture effort from 2012-2016 does not exceed the optimum value so that the number of trips or the fleet can be increased.

The distance of the fishing area is 1.5 km on the gill net by using a boat or diesel generator-powered genset. The arrest time was from 6:00 a.m. - 4:00 p.m. with a total of two fishermen. For *Anco*, the location of the fishing area with 100 m length of fishing time from 17.00-07.00 WITA, does not use a boat or *jukung*. In the fishing area, the location of the fishing area is 100 m without using a boat, the fishing time for the morning is 10.00-12.00 pm and for the afternoon at 14.00-18.00 pm. *Tempirai* and *Lukah* fishing areas are also almost the same as a 100 m fishing line, do not use a boat or *jukung*, when the catch is from 07.00-10.00 WITA and 12.00-15.00 WITA.

3. Maximum Sustainable Yield (MSY)

Maximum Sustainable Yield (MSY) is the maximum value of fishing in waters in maximum sustainable capacity or often called maximum sustainable catch. Through linear regression using Microsoft Excel contained in the attachment to get the value of intercept and slope (Nobunowe, 2007).

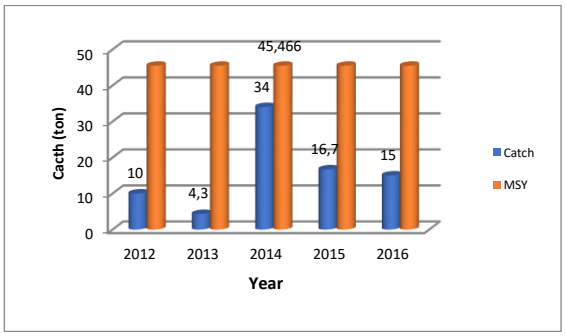

Figure 6. The catch of Sepat (Trichogaster sp) with MSY value.

The basic concept in the smallest scale fisheries management if the policy objective is maximum production, then the optimum exploitation rate is set to achieve Maximum Sustainable Yield, that is the maximum catch that can be obtained on sustainable basis. If the actual catch is less or smaller than MSY due to inadequate fishing efforts, then biologically fisheries as underfishing.

From the results of interviews with fishermen in Sungai Batang Village, Banjar Regency, the gill nets, the biggest catch is per 20 kg, the smallest is 10 kg. *Anco* catches per trip is the biggest of 3 kg and the

smallest is 0.5 kg. The biggest fishing rod per trip is 1-2 kg and the smallest is 0.5 kg. Capture the catch per trip the largest is 5-6 kg and the smallest is 2 kg. For *Lukah* the biggest catch per trip is 5 kg and the smallest is 1-2 kg.

4. Level of Fish Utilization

Table 4. Sepat Utilization Rate *(Trichogaster sp)*

Year	Catch (ton)	Utilization Rate (%)
2012	10	22
2013	4.3	9
2014	34	75
2015	16.7	37
2016	15	33

Source: Primary data processed

The level of fish utilization is usually seen from the last year's production of 2016 which was 33%.

Based on the level of utilization of fishery resources used by the national commission on estimating Marine Fish Stock (1997) consists of four levels:

1) Low level if the catch is still a fraction of the potential for sustainable yield (0-33.3%), where the capture effort still needs to be increased.
2) The level is moderate if the catch has become a real part of the sustainable potential (33.3-66.6%) but additional efforts are still possible to optimize yields.
3) The optimum level if the catch has reached a part of the sustainable potential (66.6-99.9%), the addition of efforts can't increase yields.
4) Overfishing if the catch exceeds the sustainable potential (> 100%) and the addition of efforts can be dangerous to the extinction of resources.

5. Fish Utilization Rate

The level of effort can be seen from the last year. If the fish cultivation level> 100% can be said to be unfit to catch, on the contrary, if the fish cultivation level <100% can still carry out fishing operations. The level of *Trichogastersp* in 2016 is 16%. This shows that the level of effort does not exceed the optimum limit so that operations can still be carried out.

4. Conclusions

1. The best Surplus Production Model used to study the catch of *sepat* fish (*Trichogaster sp*) in fresh waters of *Banjar* Regency is the Schaefer Model with the support of R2 and validation values.
2. The level of effort to catch *sepat* (*Trichogaster sp*) is 45,630 trips / year
3. The maximum sustainable yield of *sepat* (*Trichogaster sp*) is 45.466 tons / year.
4. The utilization rate of *sepat* (*Trichogaster sp*) in 2016 is 33% including the low level so that production results can still be increased
5. Year 2016 The fish catching rate (Trichogaster sp) is 16% so it can still carry out fishing operations. The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

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