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Observation on Weight-Length Relationship of *Priacanthus tayenus* (Richardson, 1846) Species in Darvel Bay, Sabah, Malaysia

Hamid Awong, Sakri Ibrahim, Khalid Somo and Mohd Azmi Ambak

Faculty of Agro Technology and Food Science,
University Malaysia Terangganu, 21030 Kuala Terangganu, Malaysia

Abstract: This study was conducted to determine weight-length of *Priacanthus tayenus* (Richardson, 1846) species or Threadfin big eyes in Darvel Bay, Sabah, Malaysia in the Sulu-Sulawesi Marine Ecology (SSME) region. *Priacanthus tayenus* (Richardson, 1846) or Threadfin big eyes were caught in a covered area of 5 to 40 fathom depth. A total of 24,653 fish was caught started January to December 2008 by using a trawler boat with an cod end diamond mesh size at 38 mm. The distribution of the length frequency of the samples with maximum of 2 heads and manimum of 2 heads were 25 and 5 cm length with average 15.5 cm. Single Sample Method or Petersen Method were used to plot distribution of the length frequency. Three categories modes were obtained with length 13, 18 and 21 cm. von Bertalanffy growth parameter curve to calculate Weight-Length relationship for *Priacanthus tayenus* (Richardson, 1846) as: $W = 0.0068*L^{\wedge 3.3525}$ Thus, the theoretical maximum for asymptotic weight (W^{∞}) was 350.5 gram.

Key words: Fish samples · Length frequency · Demersal fish · Trawler · Cod end

INTRODUCTION

Marine fisheries in Darvel Bay, Sabah, East Malaysia is typically dominated by artisanal fisheries it's predominantly in nature. Coastal fisheries are defined as to all fishing activities confined within 30 nautical miles of the coast, where fishing boat that operate within this area are not greater than 70 Gross Tonnes (GRT) in size.

Marine fisheries can be categorized into demersal and pelagic fisheries. Demersal refer to fish that spend most of their adult life on or near the bottom sea, while pelagic fisheries are mainly concentrated on the migratory species [1].

The *Priacanthus tayenus* (Richardson, 1846) is one of the most important species in Darvel Bay, as well Sabah in the Malaysia water coastal area [2]. It plays a significant role in the economic development and also providing cheap protein to the coastal community. There is limited information on the growth parameter of marine fisheries resources in Sabah.

Single Sample method or Petersen method [3] was used for prepared the length frequency distributions of *Priacanthus tayenus* (Richardson, 1846) and fixed to the von Bertalffy growth curve for create the growth parameter [4]. Estimation of the growth parameters of commercial fish on trawl surveys has become a management necessity [5]. This study had conducted a valuable guidance to formulate the direction for both long and short term for evaluation future management [6]. The objective of this research was to determine the Length-Weight relationships of *Priacanthus tayenus* (Richardson, 1846) by used the *von* Bertalffy growth parameter.

MATERIALS AND METHODS

Length frequency data were collected by commercial trawler boat. Exploratory surveys were conducted on the coast of Darvel Bay, Sabah (Figure 3). within the Sulu-Sulawesi Marine Ecology (SSME). Trawler boat 20 GRT with trawler was used in this survey. Tow duration was 4 hours from settling the gear to commencement of haul back. A covered cod end with a diamond mesh size of 38 mm was used. The engine with 1100 rpm at 3 knots speed, depth ranging 5-40 fathoms depth. This trial programmed was conducted for one year started from January to December 2008. The *Priacanthus tayenus* (Richardson, 1846) were caught twice a month and the first shot was made within 1 Kilometer East of Sakar Island.

Corresponding Author: Hamid Awong, Faculty of Agro Technology and Food Science, University Malaysia Terangganu, 21030 Kuala Terangganu, Malaysia. E-mail: hamidawong@hotmail.com.

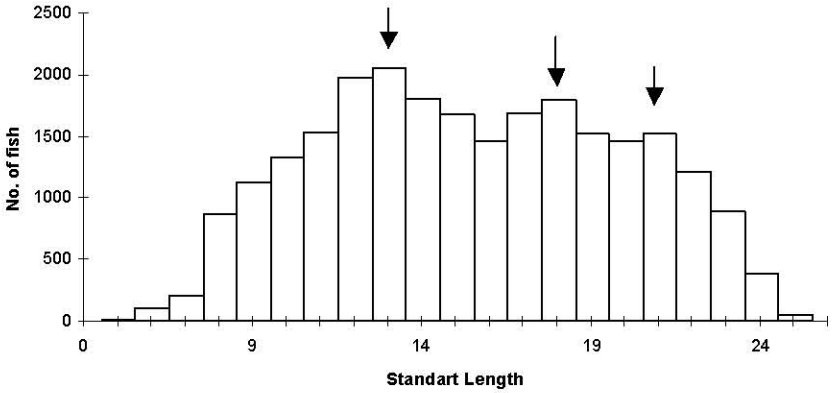

Fig. 1: Size distribution samples *Priacanthus tayenus* (Richardson, 1846)

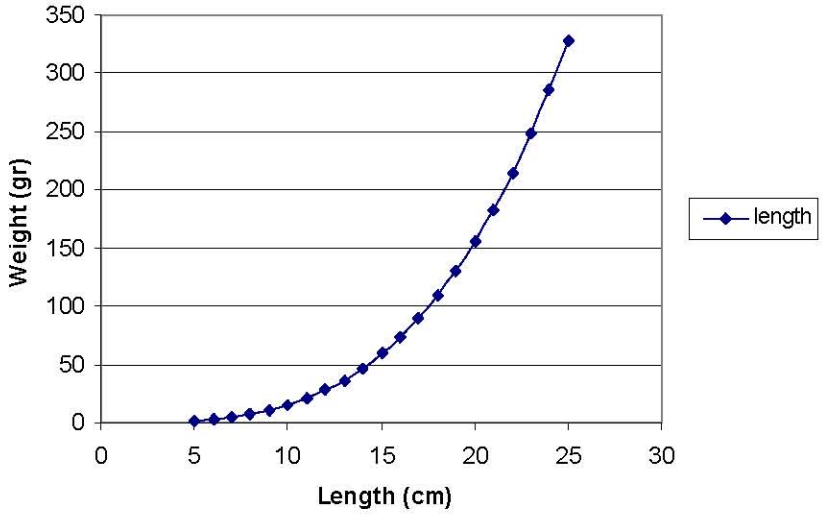

Fig. 2: The weight length relationship

Prior to the study, aerial survey work was set up to confirm fishing activity had not been carried out in the identified areas at that time [7].

The *Priacanthus tayenus* (Richardson, 1846) caught to be measured for length and weight [8]. The chief advantage of length based methods is that the basic data are quick and easy to obtain [9] the length frequency data may serve to illustrate modes (Figure 2).

Single Sample Method or Peterson Method: Application of length methods by Petersen in 1981 should always be the first step in analysis [9]. During the survey, the fish samples were measured and weighed by length class [8]. The distributions of length frequency of *Priacanthus tayenus* (Richardson, 1846) were recorded as in Table 1.

The length frequency distributions of *Priacanthus tayenus* (Richardson, 1846) as illustrated into graphical forms as in Figure 1.

Theoretical maximum for asymptotic weight (W^{∞}): Generally, it was assumed that the fish has the length weight relationship. It could be described by a formula of algometric growth where logarithmic transformation would give a linear relationship to form:

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

The relationship between length and weight was described as power function growing isometrically;

$W^{\infty} = aL^{b}$
Whereas,
Weight = W

Theoretical maximum for asymptotic

Weight = W^{∞}
Length = L

Fig. 3: Location of the study which is around Darvel Bay, Sabah, Malaysia (adapted from http://www.asianinfo.org/ asianinfo/ countries_map/map-picture/malaysia_pol98.jpg [11])

Table 1: The length frequency of 24,653 samples

Length (cm)	Total Numbers
0	0
5	12
6	99
7	212
8	863
9	1123
10	1325
11	1530
12	1970
13	**2050**
14	1808
15	1675
16	1456
17	1693
18	**1795**
19	1521
20	1459
21	**1523**
22	1211
23	895
24	386
25	47
26	0

Table 2: Length and Weight relationship of *Priacanthus tayenus* (Richardson, 1846)

SL (cm)	Wt/Fish (gr)	Ln L	Ln Wt
5	1.1	1.6094	0.0953
6	3.1	1.7917	1.1314
7	5.2	1.9459	1.6486
8	7.9	2.0794	2.0668
9	11.4	2.1972	2.4336
10	18.1	2.3025	2.8959
11	20.1	2.3978	3.0007
12	23.7	2.4849	3.1654
13	35.6	2.5649	3.5723
14	49.3	2.6390	3.8979
15	62.5	2.7080	4.1351
16	65.3	2.7725	4.1789
17	95.7	2.8332	4.5612
18	110.2	2.8903	4.7022
19	128.5	2.9444	4.8559
20	133.4	2.9957	4.8933
21	165.7	3.0445	5.1101
22	245.3	3.0910	5.5024
23	252.2	3.1354	5.5302
24	287.6	3.1780	5.6615
25	330.4	3.2188	5.8003
Mean		2.6107	3.7542
Variance		0.2268	2.5628

RESULTS

The length frequencier of the sampled of fish retained by the cod end are summarized in Table 1. This species had three modes that could be seen clearly (bolded) in the length frequency distribution and could be estimated with standard lengths of 13cm, 18cm and 21cm (arrowed) (Figure 1).

The Length- Weight relationship of *Priacanthus tayenus* (Richardson, 1846) could be represented as:

$$W = 0.0068 * L^{\wedge 3.3525}$$

Whereas,
Weight (W) in grams and length (L) in centimetres.

The random sample of fish caught in the 38 mm cod end were measured and weighed by length class as in

Table 2. Thus, we were able to show the length weight relationship as in Figure 2.

From the formula, the power curve described the relationship between weight and length. A cubic relationship between weight and standard length was found as shown in Table 2 and Figure 2.

DISCUSSION

Priacanthus tayenus (Richardson, 1846) were caught within 5 to 40 fathom depth near the coast. The species were found dominant in the coastal area. The length frequency distribution of *Priacanthus tayenus* (Richardson, 1846) were between 5 cm to 25 cm standard length with an average of 15 cm.

This procedure dates back to the earliest The length frequency distributions had three modes that could be seen clearly in the length distribution. A total of three categories of age could be estimated with standard length of 13, 18 and 21cm. This species had an extended spawning period and lower growth rate. Pseudo-cohorts in the length frequency distribution may overlap to such degree that it is not posible to identify separate modes, the weight would increase in relation to the increase in volume [5].

To our knowledge, this is the first study of Threadfin big eye (*Priacanthus tayenus*) age and growth in the Darvel Bay, Lahad Datu, Sabah. Our observed maximum was 25 cm is much lower than 29.5 cm research in Brunai Darul Salam reported by Fishbase [10].

In conclusion, von Bertalanffy equation in terms of weight had indicated theoretical maximum for asymptotic weight (W^{∞}) of 330.4 gram. The absence of larger, older fish in our samples suggests heavy fishing pressure on the species in the Darvel Bay.

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