Feeding Habits of Marsela Fish (*Parachromis managuensis*) In Penjalin Reservoir Brebes, Central Java

Dewi Kresnasari[1], Anggun Dwita Darajati[2]

[1] Faculty of Science and Technology, Nahdlatul Ulama University Purwokerto,

Jl. Sultan Agung No. 42 Karang Klesem, Purwokerto 53142, Central Java, Indonesia.

e-mail: dewiks2903@gmail.com

[2]Faculty of Fisheries and Marine Science, Jenderal Soedirman University, Purwokerto, Central Java, Indonesia.

Abstract. The presence of introduced fish populations in the Penjalin Reservoir is increasing, one of the dominant ones being caught is Marsela (*Parachromis managuensis*). It is feared that this fish population will continue to increase and will have a negative impact on other organisms, especially native fish communities. This study aims to determine the eating habits of Marsela fish, the composition of the type of food and its relationship to the abundance of plankton in the waters. This research was conducted in September-October 2018. The method used was CPUE with a sampling technique that is Simple Random Sampling. Sampling of fish in one day is done 6 times, namely at 05:00, 11:00, 17:30, 21:00, 00:00, and 03:00. Fish samples obtained are then grouped according to length and then an analysis of the contents of the stomach. The results showed that in the Penjalin Reservoir the percentage of phytoplankton presence was 96% with the highest abundance found in the Bacillariophyta group. Marsela is an omnivorous fish with popular foods are Chlorophyta and Charophyta. However, in adulthood Marsela fish also eat animals.

Keywords: Marsela Fish (*Parachromis managuensis*), Feeding Habit, Penjalin Reservoir

1. Introduction

The fish community in Penjalin Reservoir is currently dominated by predatory fish, especially by Manila Fish or Marsela Fish (*Parachromis managuensis*). In 2013, there were 6 species of fish caught in the

Penjalin Reservoir, namely Betutu Fish (*Oxyeleotris marmorata*), Nila (*Oreochromis niloticus*), Nilem (*Osteochilus vittatus*), Tawes (*Barbonymus gonionotus*), and Beunteur (*Puntius binotatus*), each of which is 45 fish, 19 fish, 1 fish, 1 fish, 5 fish, 5 fish and dominated by 129 Marsela fish (*P. managuensis*) (Hedianto *et al*., 2013). Then in 2016 in the same place found as many as 217 Marsela Fish (*P. managuensis*) (Hamiyati, 2016). This fish is the result of unintentional introductions and has high tolerance characteristics in a waters.

In general, the shape of the Marsela (*P. managuensis*) body is elongated and slender, the mouth is oblique, the back edge has a line extending down to the bottom of the anterior edge of the eye, has a reddish-red (purple-red) and black spot on the eye body and fins, there is a black line right along the body, has a green color on the back (dorsal) and yellow on the abdomen (ventral), and the lining on the edges of his eyes are red (Figure 1).

The classification of Marsella Fish (*P. managuensis*) according to Gunther (1867) in Agasen *et al*, (2006) namely:

Phylum: Chordata

Subfilum: Vertebrates

Class: Actinopterygii

Order: Perciformes

Family: Cichlidae

Genus: Parachomis (Agassiz, 1859)

Species: Parachomis managuensis (Gunther, 1867)

Figure 1. Marsela Fish (*P. managuensis*)

According to Conkel (1993), Marsela Fish (*P. managuensis*) can develop both in warm and murky waters with bottom waters in the form of mud or litter and high levels of eutrophication. If the trophic status of the waters of the Penjalin Reservoir changes to eutrophic, it is feared that the population of Marsela Fish (*P. managuensis*) will become very dominant (invasive alien species). If this happens, then ecologically, it has a negative impact on other organisms, especially native fish communities (Umar and Sulaiman, 2013). While from an economic standpoint, this incident will reduce the income of fishermen. Marsela fish are classified as economically low fish for the surrounding community, even though the abundance is high in nature.

Spreading fish or restocking is an effort to improve the ecological balance in the Penjalin Reservoir, especially from native fish species. However, it should be noted that the high number of Marsela fish (*P. managuensis*) as predators is feared that the types of fish that will be stocked actually become prey. The best first step towards restoring ecology in the Penjalin Reservoir is to control the Marsela Fish (*P. managuensis*) population. According to Hedianto *et al*., (2013), one of the causes of the low population of Tawes as native fish in the Penjalin Reservoir is the presence of high predation pressure and territorial competition by Marsela Fish (*P. managuensis*).

Food is one of the important factors in an organism in determining the extent of spread of a species and controlling the size of a population (Astuti *et al*., 2013). To control an introduced fish population some information is needed, for example the availability of natural food resources. The lack of information about Marsela Fish (*P. managuensis*), prompts the author to conduct a study of the eating habits of Marsela Fish (*P. managuensis*) in Penjalin Reservoir.

2. Methods

The method used is CPUE with the technique in sampling which is Simple Random Sampling. Sampling of fish is done in 1 day as many as 6 times namely at 05:00, 11:00, 17:30, 21:00, 00:00, and 3:00 in September - October 2018.

The fish caught were measured by total length using calipers, while the weights of fish were weighed using digital scales. In observing fish food habits is done by observing the contents of the stomach of the fish which is split and removed its contents then separated according to the type of food. Furthermore, each water sample and fish's stomach contents were identified and then the number of plankton per milliliter was calculated using the formula from Lackey Drop Microtansec Counting (APHA, 1989 in Nurruhwati *et al*., 2017), namely:

$$N = \frac{Q1}{Q2} x \frac{V1}{V2} x \frac{1}{p} x \frac{1}{w}$$

Information:

N: average number of plankers in the preparation

Q1: Extensive glass cover

Q2: wide field of view

V1: volume of water in a container

V2: volume of water under the glass cover

P: number of fields observed

W: marsela fish hull volume

Calculation of natural feed for gastric contents uses a selectivity index (E) to compare natural food between gastric contents and food in waters. This index calculation uses the method developed by Krebs (1989) in Kurnia *et al*., (2017) with the formula:

$$E = \frac{ri - pi}{ri + pi}$$

Information:

ri: the relative number of different types of organisms that are eaten

pi: the relative number of kinds of organisms in waters

The selectivity index (E) is used to compare the natural food of Marsella Fish (*P. managuensis*) in each group of lengths between the contents of the fish's hull and the feed in the waters, where:

+1: fish tend to have the habit of eating these types.

0: fish tend not to choose natural food in the environment.

-1: fish tend not to have the habit of eating these types.

3. Results and Discussion

1. Distribution of Fish Frequency Length

Marsela fish (*P. managuensis*) caught from Penjalin Reservoir totaled 47 tails. This number was captured from all observation points. Fish that have been measured length and weight are then grouped manually into three long groups. The long range of Marsella Fish (*P. managuensis*) is presented in Table 1.

Table 1. Long-Range Groups of Marsella Fish (*P. managuensis*) in The Penjalin Reservoir

Group	Length range (cm)	Amount	Kategori
1	9,7 – 11	14	Small
2	11,1 – 12,9	17	Medium
3	13 – 20	16	Big

Next Marsela Fish (*P. managuensis*) were dissected for sampling the eating habits in the digestive tract and analyzing the selectivity index. The results of the analysis were compared and explained descriptively how different each group of Marsela Fish (*P. managuensis*) lengths was.

2. Plankton Abundance in the Weirs Reservoir Waters

Natural feed in Penjalin Reservoirs is found in phytoplankton more than zooplankton and others. The presence of phytoplankton in a waters can indicate its fertility. Changes to a water quality can be viewed from the abundance of phytoplankton and can provide information about the condition of these waters (Hidayah, *et al.*, 2014). The number of natural feed genera found in the waters of the Penjalin Reservoir is 32 plankton genera. The abundance of natural feed waters of the Penjalin Reservoir is presented in Figure 2

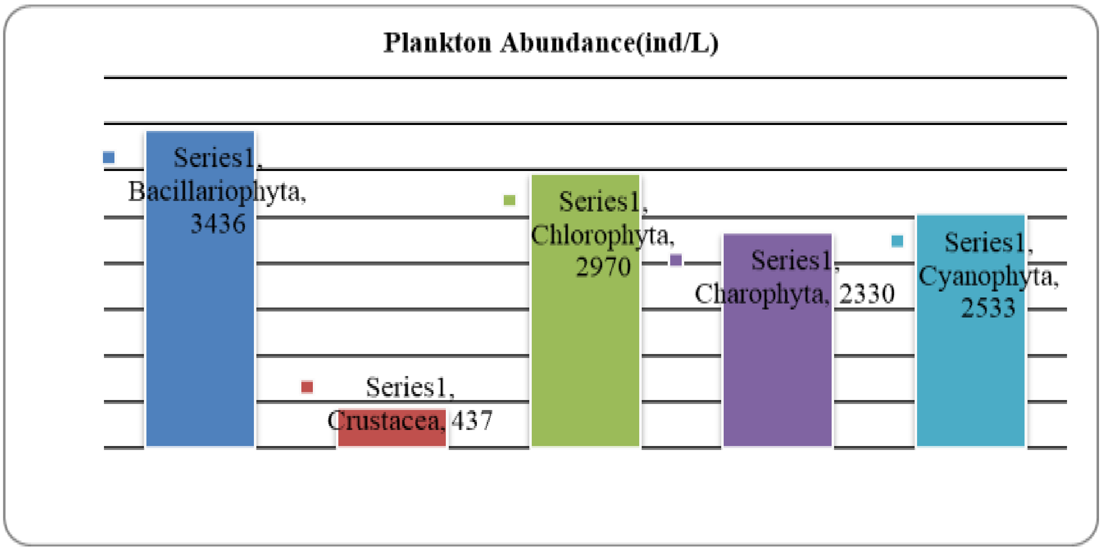

Figure 2. Planktonic Abundance (ind / L) of Natural Feed In The Penjalin Reservoir

The abundance of planktonic natural feed in the waters of the Penjalin Reservoir was 11706 ind / L, with a percentage of the presence of phytoplankton of 96%. In the same place, a 2014 study by Wijaya (2015) showed an abundance of phytoplankton ranging from 2,380-3,355 ind / L. Based on this abundance, the Penjalin Reservoir is included in the category of Mesotrophic waters which is a category with a moderate fertility rate. According to Landner (1978) in Hardiyanto *et al.*, (2012), water fertility based on plankton abundance is divided into three, namely oligotrophic with plankton abundance level 0-2000 ind / L, mesotrophic with plankton abundance ranging from 2000-15000 ind / L and eutrophic with an abundance level of plankton more than 15000 ind / L. Water fertility in the reservoir is thought to originate from household waste, livestock and agricultural waste in the form of residual fertilizers that contain a lot of N and P elements. resulting in eutrophication in water (Simanjuntak, 2009). According to Suryanto (2011) excessive content of N and P elements can stimulate plankton growth quickly and abundantly, so that it can affect plankton abundance in water.

Based on the results of the study note that the highest abundance in Bacillariophyta. This is thought to be related to the temperature condition of the waters in the cold Penjalin Reservoir, so that the Bacillariophycea class is fertile. According to Hadiyanto *et al.*, (2012), Bacillariophyceae is an algal group that is most easily found in various types of aquatic habitats, especially in relatively cold waters, because of this ability the Bacillariophyceae class can be used as a biological indicator of clean waters.

The second highest abundance is occupied by the Chlorophyta division. Cyanophyta's division ranks third. The number of species of Cyanophyta obtained in the Weir Reservoir is still relatively small compared to Bacillariophyceae and Chlorophyta. This indicates that the waters of the Penjalin Reservoir are still classified as good. According to Arum *et al*., (2017), if a waters are dominated by the Cyanophyta division, the waters are polluted waters.

3. Natural Feed Abundance in the Stomach of Marsela Fish

The number of plankton natural food genera found in the stomach of Marsela Fish (*P. managuensis*) is 24 genera. The diversity of genera found in the stomach of Marsela fish is presented in Table 2. Based on Table 2 it can be seen the diversity of planktonic natural food in the stomach of Marsela Fish (*P. managuensis*), age group 1 has 11 different genera which are entirely from the plant group. Age group 2 has 10 different genera, all of which are from the plant group. Whereas the age group 3 has 19 variants of genera consisting of 17 varieties of plant groups and 2 groups of animals.

Table 2. Number of Plankton And Other Natural Food Genera In The Stomach of Marsela Fish (*P. managuensis*) In Each Age Group

No	Divisi/Filum	Age Group 1	Age Group 2	Age Group 3
A	Plant group			
1	Chlorophyta	1	3	5
2	Charophyta	4	3	5
3	Bacillariophyta	3	3	4
4	Cyanophyta	3	1	3
	Jumlah	11	10	17
B	Animal Group			
1	Miozoa	0	0	1
2	Crustacea	0	0	1
	Jumlah	0	0	2
	Total	11	10	19

The abundance of natural food in the stomach of Marsela Fish (*P. managuensis*) based on Table 3, age group 1 has an abundance of 1251 ind / ml which consists entirely of plant groups. In the age group 2 has an abundance of 1281 ind / ml which consists entirely of groups of plants. Whereas the age group 3 had an abundance of 2064 ind / ml consisting of plant groups of 1948 ind / ml and animal groups 116 ind / ml.

The abundance of plankton natural food in the stomach of Marsela Fish (*P. managuensis*) based on Table 3 age group 1 is dominated by the divisions of Cyanophyta and Charophyta. In the age group 2 is dominated by the divisio Chlorophyta and Charophyta. Whereas the age group 3 is dominated by the divisions of Chlorophyta and Bacillariophyta. In the analysis of the gastric contents of the Marsela Fish (*P. managuensis*) age group 3 it was found to have eaten animal species, namely from the phyla group of miozoa and crustaceans.

Table 3. Abundance (ind / L) And Relative Abundance (%) of Natural Food In The Stomach of Marsela Fish (*P. managuensis*) In Each Age Group

No	Divisi/Filum	Age Group 1		Age Group 2		Age Group 3	
		A	RA (%)	A	RA (%)	A	RA (%)
A	Plant Goup						
1	Chlorophyta	29	2.32	466	36.38	640	31.01
2	Charophyta	465	37.17	408	31.85	435	21.08
3	Bacillariophyta	145	11.59	145	11.32	495	23.98
4	Cyanophyta	612	48.92	262	20.45	378	18.31
	Jumlah	1251	100	1281	100	1948	94.38
B	Animal Goup						
1	Miozoa	0	0	0	0	58	2.81
2	Crustacea	0	0	0	0	58	2.81
	Jumlah	0	0	0	0	116	5.62
	Total	1251	100	1281	100	2064	100

Note: A = Abundance, RA = Relative Abundance

According to Agasen *et al* (2006), states that Marsela Fish (*P. managuensis*) are known as predators that eat small fish and are very aggressive. For example, when Marsela Fish (*P. managuensis*) are introduced into Mexican waters it causes havoc among native fish populations and is considered a potential pest. However, based on data obtained in Table 3, it shows that Marsella Fish (*P. managuensis*) tend to be included in predators of phytoplankton. However, in Marsela Fish (*P. managuensis*) age group 3 there is natural food from animal species, thus Marsela Fish (*P. managuensis*) are included in the omnivorous group. The composition of fish eating changes with increasing size and age. Small fish tend to eat phytoplankton that are adjusted to the mouth opening. After growing bigger, the type of food consumed will change. According Effendie (2002), said that the larger the size of the fish, the more varied the types of food so that the area of the niche will be even greater.

4. Choice Index and Largest Portion in the Gastric of Marsela Fish (*P. managuensis*)

The selectivity index calculation (E) was analyzed by comparing the percentage plankton abundance found in the hull of Marsela Fish (*P. managuensis*) with the percentage plankton abundance in the waters of the Penjalin Reservoir. Based on the calculation of this selectivity index, it will be known that the food found in the hull of the fish is selected and favored or not. The results of the selectivity index and the percentage of planktonic natural feed in the age group 1 are presented in Table 4. Marsela Fish (*P. managuensis*) in the age group 1 made a positive or fond selection for Charophyta and Cyanophyta divisions. Marsela fish age group 1 tend to make negative or dislike selection of the divisions / phyla of Chlorophyta, Bacillariophyta, Miozoa and Crustacea.

The results of selectivity index and percentage of planktonic natural food of Marsela Fish (*P. managuensis*) age group 2 are presented in Table 5. Based on the table shows that Marsela Fish (*P. managuensis*) made a positive or fond selection of the Chlorophyta and Charophyta divisions. Marsela Fish (*P. managuensis*) in the age group 2 tend to make negative or dislike selection of the divisions of the phyla Bacillariophyta, Cyanophyta, Miozoa and Crustacea.

Table 4. Results of The Marsela Fish (*P. managuensis*) Choice Index Age Group 1

No	Types of Feed	r	Ri	P	Pi	E
A	Plant Group					
1	Chlorophyta	29	2.32	2970	25.37	-0.83
2	Charophyta	465	37.17	2330	19.9	0.3
3	Bacillariophyta	145	11.59	3436	29.35	-0.43
4	Cyanophyta	612	48.92	2533	21.64	0.39
B	Animal Group					
1	Miozoa	0	0	0	0	0
2	Crustacea	0	0	437	3.73	-1

r = number of types of feed contained in the stomach, p = number of types of feed contained in waters, ri = percent of a type of feed contained in the stomach, pi = percent of a type of feed contained in waters, E = choice index

Table 5. Results of The Marsela Fish (*P. managuensis*) Choice Index Age Group 2

No	Types of Feed	r	Ri	P	Pi	E
A	Plant Group					
1	Chlorophyta	466	36.38	2970	25.37	0.18
2	Charophyta	408	31.85	2330	19.9	0.23
3	Bacillariophyta	145	11.32	3436	29.35	-0.44

4	Cyanophyta	262	20.45	2533	21.64	-0.03
B	Animal Group					
1	Miozoa	0	0	0	0	0
2	Crustacea	0	0	437	3.73	-1

r = number of types of feed contained in the stomach, p = number of types of feed contained in waters, ri = percent of a type of feed contained in the stomach, pi = percent of a type of feed contained in waters, E = choice index

Results of the selectivity index and percentage of planktonic natural food of Marsela Fish (*P. managuensis*) age group 3 are presented in Table 6. Marsela Fish (*P. managuensis*) age group 3 makes a positive or fond selection of the Chlorophyta, Charophyta, and Miozoa divisions. Marsela Fish (*P. managuensis*) age group 3 tends to make negative or dislike selection of Bacillariophyta, Cyanophyta, and Crustacean divisions.

Based on the results of the selectivity index, Marsela Fish (*P. managuensis*) made a positive or fond selection of plankton from the Charophyta division. This is because the abundance of plankton in the waters of the Penjalin Reservoir is quite high. Although the presence of Bacillariophyta is abundant in waters, it is not certain that food is an important part of the composition of the fish diet. According to Effendie (2002), the types of food eaten by a fish species usually depend on their preference for certain types of food, the size and age of the fish, the season, and their habitat. In addition Syahputra *et al*., (2016), stated that the preference of fish in one type of food is influenced by the availability of food in the waters.

Table 6. Results of The Marsela Fish (*P. managuensis*) Choice Index Age Group 3

No	Types of Feed	r	ri	P	Pi	E
A	Plant Group					
1	Chlorophyta	640	31.01	2970	25.37	0.10
2	Charophyta	435	21.08	2330	19.9	0.03
3	Bacillariophyta	495	23.98	3436	29.35	-0.10
4	Cyanophyta	378	18.31	2533	21.64	-0.08
B	Animal Goup					
1	Miozoa	58	2.81	0	0	1
2	Crustacea	58	2.81	437	3.73	-0.14

r = number of types of feed contained in the stomach, p = number of types of feed contained in waters, ri = percent of a type of feed contained in the stomach, pi = percent of a type of feed contained in waters, E = choice index

4. CONCLUSION

Based on the results of research in Reservoir Reservoir, it can be concluded that:

1. The highest percentage of natural food found in phytoplankton is 96% with the highest abundance found in the Bacillariophyta group
2. Marsela Fish (*P. managuensis*) is an omnivorous fish with popular foods are Chlorophyta and Charophyta. However, in adulthood Marsela Fish (*P. managuensis*) also eat animals.

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