Fish composition of gillnet catches in Wadaslintang reservoir, Central Java

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Abstract. Wadaslintang reservoir is a reservoir with medium fertility rate. Fishing gear which usually used are gill nets. Gill net is a selective fishing gear. Different mesh sizes of gill nets will capture different type and size of fish. The purpose of this study is to determine the species composition of fish caught using gill nets. Research conducted at Wadaslintang Reservoir in April, June and September 2016. The samples consisted of 6 points that are Paras village, Depok Village, Gading village, Pesanggrahan Village, Village and Medono Village and Keramat Village. Fishing is done with the use of gill nets with mesh sizes 0.75; 1.5; 2; 2.5; and 3 inches. Species composition were analyzed using Odum equation. The results showed that fish caught using gill net consists of 15 species and 6 families. Cyprinidae is dominant family. The highest composition was recorded from the mesh size 0.75” well in April, June, and September. The lowest composition in April, June, and September was recorded from the mesh size 3.5”. The smaller mesh size will catch fish with small length frequency.

1. Introduction
The Wadaslintang Reservoir is located in the southern part of Wadaslintang District bordering the Padureso sub-district in Kebumen Regency. This reservoir uses Kali Gede as its main water source with several other small tributaries that supply water to the Wadaslintang Reservoir. This reservoir has several important functions that support the lives of the surrounding residents. Some of the main functions of the Wadaslintang Reservoir are: irrigation, hydroelectric power plants (PLTA), fisheries, tourism, preventing flooding, storing water.

The waters of the Wadaslintang Reservoir are 1,400 ha with potential fish resources. Purnomo et al. (1995) stated that the Wadaslintang Reservoir fertility rate was moderate fertility (mesotrophic) and in it lived 12 types of fish [1]. While Adjie et al. (2013) stated that there were 14 species of fish found [2].

Fishing gear as the main means in capture fisheries business is arranged in such a way that it does not have a negative impact on fisheries resource users and the aquatic environment as well as other users of water services. The use of fishing gear must pay attention to the balance and minimize negative impacts on other biota [3]. Radarwati et. al., (2010) explained that errors in anticipating the dynamics of fishing gear have also caused the extinction of fish resources [4].

According to Balik & Cubuk (2001) that gill net is usually widely used in coastal and inland public waters because the price is cheap and easy to operate [5]. Most of the fish are caught by traditional fishermen in public waters by using net gill [6]. The gill nets are usually used to catch fish that move
and migrate through the catchment area [7]. The operation is used in the type of rather calm waters or rivers with relatively slow currents.

The net gill is a selective fishing device, in operation the different mesh sizes will capture different types and sizes of fish. This tool is classified as passive and caught fish depends on its movements. This tool is usually installed in open waters or on the edge of a river with a slow flow.

With the use of fishing gear that is less effective, the opportunity to increase fish catches in these waters is still quite high. However, the increase in the utilization of fisheries in the waters of the Wadaslintang Reservoir needs to be based on rational utilization so that the sustainability of fisheries is guaranteed. The purpose of this study was to determine the composition of species of fish caught using gill nets.

2. Materials and methods
This research was carried out in the Wadaslintang Reservoir (Figure 1) in April, June and September 2016. The sampling locations consisted of 6 points, namely Paras Village, Depok Village, Gading Village, Pesanggrahan Village, Medono Village and Keramat Village. Fishing is carried out using gill net (gill net) made of nylon yarn with a length of 10 m and a width of 1 m. The net is installed transversely, with the size of the mesh installed, which is 0.75; 1.5; 2; 2.5; and 3 inches. The net is fastened to the wood and each net is continuously connected. These nets are installed for ± 12 hours and after 12 hours the net is lifted by taking it against the current. The type of fish caught is recorded, the size of the net and its location. Furthermore, these fish are preserved with 10% formalin to be identified at the Laboratory of Public Aquatic Research Institute. As a guideline for identification of fish used the book Kottelat (1993) and Webber and Beauford (1916) [8].

Figure 1. Research sites in Wadaslintang Reservoir, Cetral Java

The data collected includes the type of fish, the length and weight of the fish, the number of fish, the location, the time of installation of fishing and lifting equipment, the depth of the water, and the size of the net. Data on types of fish caught using nets are then tabulated for analysis:

2.1. Type composition
Data on types of fish caught in gill nets with different meshes are arranged to determine the number and composition of species. This data is intended to find out the type of fish caught and the number in each mesh size.
2.2. Variations in the size of fish caught
The caught fish is measured in total length based on the size of the net. The length of the fish in each mesh is compared to one another to find out the comparison of the variation in the size of the fish caught.

2.3. Catch
To find out the fish catch per fishing gear, the caught fish are separated and recorded based on the size of the net / location. The total catch is calculated from the total catch / catch / location data.

2.4. Analysis
2.4.1. Data analysis
1. Type composition

The composition of fish species was analyzed using the equation of Odum (1996),

\[ P = \frac{\sum x_i}{N} \times 100\% \]

\( P \) = Percentage of type i fish (i = 1,2,3, ... n);
\( \sum x_i \) = The number of individual species of fish (i = 1,2,3, ... n);
\( N \) = Number of individuals of all types of fish (total number of individuals for each sampling).

2. Size composition
To determine the size composition of each type of fish, first the length and weight class are determined. The determination of the number of classes is calculated using the Sturgess equation (1982),

\[ K = 1 + 3.3 \times \log N \]

\( K \) = Number of classes;
\( N \) = Number of samples.

Then the class interval is determined using the equation:

\[ P = \frac{R}{K} \]

\( P \) = class interval;
\( R \) = range (highest fish length - lowest fish length);
\( K \) = Number of classes.

Then the percentage of each class of length and weight is determined by the equation:

\[ P = \frac{K_i}{K} \times 100\% \]

\( P \) = Percentage of fish size class i (i = 1,2,3, ..... n);
\( \sum K_i \) = The number of individual fish in the i-size class (i = 1,2,3, ..... n);
\( K \) = The total number of individual fish in all size classes.
3. Results
The types of fish caught using gill nets consist of 15 species and 6 families (Table 1). Species that are caught a lot are from the Cyprinidae family.

| Type of Fish | Scientific name       | Family    |
|--------------|-----------------------|-----------|
| Palung       | Hampala macrolepidota | Cyprinidae|
| Melem        | Osteochillus vittatus  | Cyprinidae|
| Brek         | Puntius orphoides     | Cyprinidae|
| Kalkul       | Rasbora sp.           | Cyprinidae|
| Andong       | Rasbora sp.           | Cyprinidae|
| Nila         | Oreochromis niloticus | Cichlidae |
| Betutu       | Oxyeleotris marmorata | Eleotridae|
| Patin        | Pangasianodon hypophthalmus |  |
| Lele         | Clarias gariepinus    | Clariidae |
| Bader        | Cyclocheilichthys enoplos | Cyprinidae|
| Grasscarp    | Ctenopharyngodon idella | Cyprinidae|
| Tawes        | Barbodes gonionotus   | Cyprinidae|
| Betik        | Barbodes gonionotus   | Cyprinidae|
| Gabus        | Channa striata        | Channidae |
| Brongsong    | Barbodes gonionotus   | Cyprinidae|

Based on the number of species caught (Figure 2), the size of the net 2" caught the most species with the highest variation of species, 11-12 species. Mesh size 3" catches fish with the lowest number of species, namely 4 species. The smaller the size of the mesh, the higher the number of species caught.

![Figure 2. The number of fish species caught by each net mesh size](image)

3.1. Catch composition
From Figure 3 it is known that based on the percentage of individuals the size of net mesh is 0.75" has the highest catch composition at each time of observation.
Figure 3. The catch composition based on percentage of number (individual) and weight (gram)

The composition of the catch based on the percentage of fish species caught each mesh size (0.75; 1.5; 2; 2.5; 3; 3.5 inches) and every time of observation (April, June, September) are listed in Figure 4. The size of mesh 3.5" caught 4 types of fish, 3" caught 6 types of fish, size 2.5" caught 8 types of fish, size 2.5" caught 8 types of fish, size 2" caught 11 species of fish, size 1.5" catching 9 types of fish and a size of 0.75" caught 9 species of fish. Net mesh size 3.5; 3; 2.5; and 2 are dominated by Tilapia (Oreochromis niloticus). size 1.5" dominated by Brek fish (Puntius orphoides) and size 0.75" dominated by Andong fish (Rasbora sp.).
Figure 4. Percentage of fish species (%) caught for every mesh net size ((3.5; 3; 2.5; 2; 1.5; 0.75 inch)

From Figure 4 it is known that fish caught in nets with a size of 0.75 inches at most with a length of 8.7-9.3 cm, for a size of 1.5 "at most with a length of 12.2-13.5 cm, size 2" most catch fish with a length of 11.4-13.7 cm, size 2.5 "most catch fish with a length of 15.7-18 cm, size 3" most catch fish with a length of 17.9-20 cm, and size 3.5 "most catch fish with a length of 19.1-24 cm.
Figure 5. Length frequency distribution of fish for every mesh net size in Wadaslintang Reservoir
4. Discussion

4.1. Catch

Based on the percentage of weight, there is no specific mesh size that dominates the catch composition. However, based on the percentage of individuals the smallest mesh size (0.75") dominates the number of species.

Most of the fish caught are included in the Cyprinidae family. This indicates the widespread spread of the Cyprinidae family. This is supported by Kottelat et. al., (1993) which explains that the Cyprinidae family is the most abundant freshwater fish family in the Sunda Shelf [8]. According to Lowe-Mc. Connell (1987), tropical freshwater fish in Asia are nominated by Cyprinidae and Siluridae families [9]. The same results were also stated by Marini & Fatah (2012) who conducted research in Teluk Rasau, South Sumatra [10]. The number of species from the Cyprinidae family caught in the Rasau Bay is 13 species.

4.2. Composition of catches

The composition of the catch in September in each mesh size except for the 1.5 "inch mesh is higher than April and June. This is estimated due to the influence of the season in September, where in September is the beginning of the rainy season. The increase in water volume due to rain can cause changes in water depth and quality. Changes in the depth of water are stimulants for fish to migrate, reproduce, or find food.

The high composition of catches on the mesh size of 0.75 "based on the number of individuals in each month of observation (April, June and September) allegedly associated with the size of the fish contained in the reservoir Wadaslintang nearly uniform. The low diversity of species of fish in the reservoir Wadaslintang as many as 15 species are thought to be caused habitat structure Wadaslintang homogeneous reservoir and reservoir levels kessuburan belonging to the moderate fertility [1].

5. Conclusion

1. In the Wadaslintang Reservoir there are about 15 species and 6 families with the most fish species from the Cyprinidae family. The low diversity is thought to be caused by the habitat structure homogeneity and the fertility level of the Wadaslintang Reservoir which is classified as medium.

2. The composition of the largest catches is gill nets of 0.75 in both April, June and September. The smallest catch composition in April, June, and September was obtained in 3.5-inch gill nets. The smaller the size of the mesh will catch fish with a long range of small fish.

3. The composition of catches in the Wadaslintang Reservoir is seasonal, with the most catches in September which is the beginning of the rainy season.

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