

Diversity and Distribution of Fish in Lake Burung Petuk Katimpun Village, Palangka Raya City

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ABSTRACT

This study aimed to determine fish diversity and distribution as well as water quality conditions in Burung Lake, Petuk Katimpun Village, Palangka Raya City. The study was conducted from September to November 2025 using purposive sampling at five stations representing different conditions of the lake. Fish samples were collected using fishing gears commonly used by local fishermen, while water quality parameters measured included temperature, transparency, depth, Total Suspended Solids (TSS), Electrical Conductivity (EC), dissolved oxygen (DO), pH, phosphate, nitrate, and ammonia. Fish diversity was analyzed using the Shannon-Wiener diversity index, relative abundance, occurrence frequency, and Simpson dominance index. The results showed that 12 fish species belonging to 8 families were recorded, with a total of 24 individuals. The most abundant species was *Belontia hasselti* (Kakapar), with 5 individuals (20.83%), followed by *Cyclocheilichthys heteronema* (Puhing) with 4 individuals (16.67%), while *Pristolepis grootii* (Patung) and *Bagroides melapterus* (Bapuntin) each accounted for 3 individuals (12.50%). Fish diversity was categorized as moderate, while the dominance index indicated that no fish species dominated the community. Water quality measurements showed temperature ranging from 27.6–28.2 °C, transparency from 11.7–14.25 cm, depth from 2.03–2.70 m, TSS from 35.67–79.1 mg/L, DO from 2.57–2.80 mg/L, pH from 4.53–5.55, phosphate from 0.046–0.061 mg/L, nitrate from 0.046–0.067 mg/L, ammonia from <0.050–0.072 mg/L, and EC from 1.043–1.522 µS/cm.

INTRODUCTION

Biodiversity plays a role in stabilizing aquatic ecosystems (Wahyuni et al., 2014). Indonesia boasts a vast fish diversity, with an estimated 4,000–6,000 species across its waters, 800 of which live in freshwater and brackish water, such as lakes, mountain rivers, and brackish swamps (Nurudin et al., 2013). High species diversity necessitates high-quality habitats. However, in certain cases, the characteristics of a habitat can force its inhabitants to adapt to survive (Latief et al., 2020).

Central Kalimantan also has the potential for public water fisheries with an area of $\pm$ 2.29 million consisting of 11 large rivers with 33 small rivers that originate from the north and flow into the Java Sea, Central Kalimantan also has 26 swamps and 555 lakes which are one of the freshwater fishing areas as well as fish farming areas spread across almost all districts/cities in Central Kalimantan (Central Kalimantan Province Fisheries and Maritime Affairs Office, 2020)

Burung Lake is a floodplain lake located in Petuk Katimpun Village. The lake plays a vital role for the community of Petuk Katimpun Village, particularly in fishing activities. It is one of the primary fishing grounds alongside Hanjalutung Lake and several other lakes. Although the lake serves as a fishing ground for fishermen, information on the diversity and distribution of fish within it is not yet available. This information is crucial for the conservation of fish resources within the lake. This research will provide crucial information for various parties involved in managing the lake and its fish resources. Continuous fishing efforts, using non-selective fishing gear, and changes in environmental conditions can impact the condition of fish resources. Therefore, the availability of preliminary information on the fish in the lake is crucial for both preserving and sustaining the fish resources in Bird Lake. Research on fish species diversity is crucial for maximizing the fisheries potential of each region. This study aims to determine the diversity and distribution of fish in Bird Lake, Petuk Katimpun Village, Palangka Raya City and to determine the condition of water quality.

LITERATURE REVIEW

Freshwater ecosystems such as lakes, floodplain lakes, rivers, and swamps provide important habitats for various fish species and support the livelihoods of communities through capture fisheries and aquaculture activities. Lakes and floodplain ecosystems are dynamic aquatic environments because changes in water levels, hydrological connectivity, habitat characteristics, and seasonal conditions can influence the distribution and abundance of aquatic organisms. In floodplain ecosystems, seasonal changes may cause fish to move between the main water body and surrounding flooded areas for feeding, reproduction, and shelter.

Fish diversity is an important indicator of the condition of aquatic ecosystems. The diversity of fish communities is influenced by habitat characteristics, food availability, water quality, and hydrological conditions. Research by Nurudin et al. (2013) showed that freshwater ecosystems in Central Kalimantan support diverse fish communities. Similarly, Wahyuni et al. (2014) reported that fish distribution can vary spatially and temporally in response to

environmental conditions. These findings indicate that fish diversity and distribution should be examined together with the characteristics of their aquatic habitats.

Fish distribution within a lake is not uniform. Differences in depth, water movement, vegetation, substrate, dissolved oxygen, and food availability can create different habitats for fish species. Taradhipa et al. (2018) emphasized the importance of examining species diversity and distribution in lake ecosystems, while Wujdi et al. (2012) demonstrated that environmental conditions can influence fish population characteristics. Fish may also show seasonal movements in response to changes in water level. Sulistyarto et al. (2007) reported that seasonal changes affect fish abundance in floodplain waters in Central Kalimantan. During periods of high water, fish may move into flooded areas, while during lower water levels they may return to rivers or the main lake body.

METHODOLOGY

Time and Place of Research

This research is planned to take place during September-November 2025 at Burung Lake, Petuk Katimpun Village, Palangka Raya City. A map of the research location and station points can be seen in Figure 1.

1. Station 1 is at the coordinates -2.120636, 113.890162 and is the inlet (water inlet) of the lake.
2. Station 2 is at the coordinate point -2.123359, 113.891597 which is the right edge of Bird Lake.
3. Station 3 is at the coordinates -2.123823, 113.889356 and is the outlet (water outlet) of the lake.
4. Station 4 is at coordinates -2.122645, 113.887615
5. the left side of Bird Lake.
6. Station 5 is at coordinates -2.121085, 113.
7. The upper part of Bird Lake is an area where there are former small-scale mining sites.

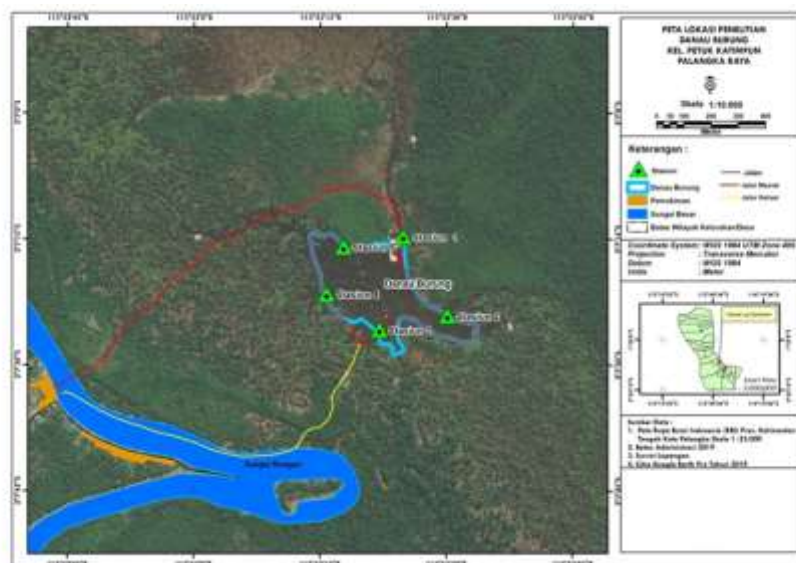


Figure 1. Location Map and Sampling Points

Tools and Materials

The tools and materials used in this research are presented in Table 1 below:

Table 1. Tools and Materials Used in the Research

No.	Tools and materials	Utility
1	Water Quality Checker	As a temperature and pH measuring tool
2	Secchi disk	To measure brightness
3	Depth sounder	To measure depth
4	Fishing Gear	To catch fish
5	Cool Box	To cool fish samples and water samples
6	Ziploc Plastic	As a place to store each type of fish
7	Sample Bottle	To store water samples
8	Measuring Board	To measure the length of the fish
9	Scales	To measure the weight of fish
10	Water Sample	Samples used for analysis
11	Fish Sample	Fish samples for identification

Research Methods

The method used in this study was the Purposive Sampling method, which involves taking samples at each station at locations that represent the water conditions of Burung Lake and the observation method (direct observation). This sampling technique aims to take samples at a research location that represents the waters and the samples taken have the same characteristics (Nasoetion & Barizi, 1998).

This research method uses a quantitative method because it uses numbers, data collection, data interpretation, and the presentation of the results (Arikunto, 2013). This study consisted of 5 stations and 3 sampling measurements at each station. The study was conducted over a period of 3 weeks, with one sampling each week. Water samples were repeated 3 times at each station, with each station receiving one water sample. The water sampling method was carried out using the reference (SNI 8995:2021 National Standardization Agency).

Research Procedures

Water Quality Measurement

Water quality parameters such as temperature, Total Suspended Solids (TSS), depth, clarity, pH, and Dissolved Oxygen (DO) were measured directly at each sampling point, while ammonia, phosphate, and nitrate were analyzed at the Palangka Raya City Health and Calibration Laboratory. For the analysis of these three parameters, 600 ml of water samples were taken from each sampling point and delivered to the laboratory for further analysis.

Water measurements and sampling were carried out at five sampling points. Water samples for analysis were taken every nine days at three-day intervals.

Fish Sampling

Fishing was conducted at five predetermined sampling points using fishing gear commonly used by local fishermen. The gear was set up in the afternoon and retrieved the following morning. The fish were stored in ziplock bags for identification and length and weight measurements for each species.

Data Analysis

Research calculation of the relative abundance of each type of fish was carried out by calculating the percentage of the number (numerically). The equation used by Nizar et al., (2014) is:

$$Kr = (ni/N) \times 100\%$$

Information:

Kr = Relative Abundance;

ni = Number of individuals of species i;

N = Total number of individuals of all species.

Meanwhile, the calculation of frequency of occurrence refers to Nurfiarin, et al (2015) as follows:

$$Fi = (ti/T) \times 100\%$$

Information:

Fi = frequency of species i fish caught (%)

ti = number of stations where species i was caught

T = number of all stations

To determine the diversity of fish species, the Shannon-Wiener index is used (Yunita, 2010).

$$H' = -\sum p_i \ln p_i$$

Information:

H' = Shannon-Wiener diversity index; ni = Number of individuals of type i;

N = Number of individuals of all species; Pi = Proportion of individuals of the i-th species.

Pi = ni/N

The index obtained is then entered into the diversity criteria according to (Kumalararas, 2018) as follows:

H' value > 3 = high diversity;

H' 1-3 value = moderate diversity;

H' value < 1 = low diversity.

Meanwhile, to determine whether there is dominance or not, the Simpson Dominance Index is used (Hedja et al., 2009).

$$C = \sum (ni/N)^2$$

Information:

C = Simpson's dominance index; ni = Number of individuals of the 1st species;

N = Number of individuals of all species.

The dominance index value ranges from 0-1 with the following categories:

Index 1 = very high species dominance.

Index 0 = no one dominates

RESEARCH RESULTS AND DISCUSSION

Diversity and Distribution of Fish Species in Bird Lake

Types of Fish in Burung Lake

The types of fish found in Burung Lake consist of 12 types from 8 (eight) families with a total number of fish caught of 24 individuals (Table 2) and Figure 2. The fish were caught using 1 (one) fishing net, longline (*long lines*) as many as 5 (five) pieces, tampirai as many as 2 (two) pieces and rambat as many as 2 (two) pieces with a total number of fishing gear used is 10 pieces. Sweking et al (2018) reported that in 2018 there were 14 types of species caught by fishermen, but of the 14 types there were only 7 species that were the same as the results of the current study. This difference is likely caused by several factors, namely the fishing gear used and also the sampling season (dry season or rainy season).

During the rainy season, overflowing lakes affect fish distribution, resulting in varying catches. This is evident in the very low catches during the rainy season, despite the use of several different types of fishing gear.

Table 2. Types and Total Number of Fish Caught in Burung Lake

No.	Family	Species Name	Local Name	Number of individuals
1	Cyprinidae	<i>Cyclocheilichthys heteronema</i>	Puhing	4
		<i>Osteochilus melanopleura</i>	Kalabau	1
		<i>Systomus rubripinnis</i>	Brakas	1
		<i>Pristolepis grootii</i>	Statue	3
		<i>Belontia hasselti</i>	Snapper	5
4	Bagridae	<i>Trichopodus leerii</i>	As soon as possible	1
		<i>Mystus bocourti</i>	Darap (Darap Kajang)	1
		<i>Bagroides melapterus</i>	Bapuntin (Banana Snapper)	3
		<i>Oxyeleotris marmorata</i>	Betutu	1
5	Eleotridae	<i>Pangasius conchophilus</i>	Lawang (lau wang)	1
6	Pangisidae	<i>Macrognathus circumcinctus</i>	Jajili	1
7	Mastacembelidae	<i>Clarias alluaudi</i>	Catfish/Pentet	2
8	Clariidae			
Total Individuals				24

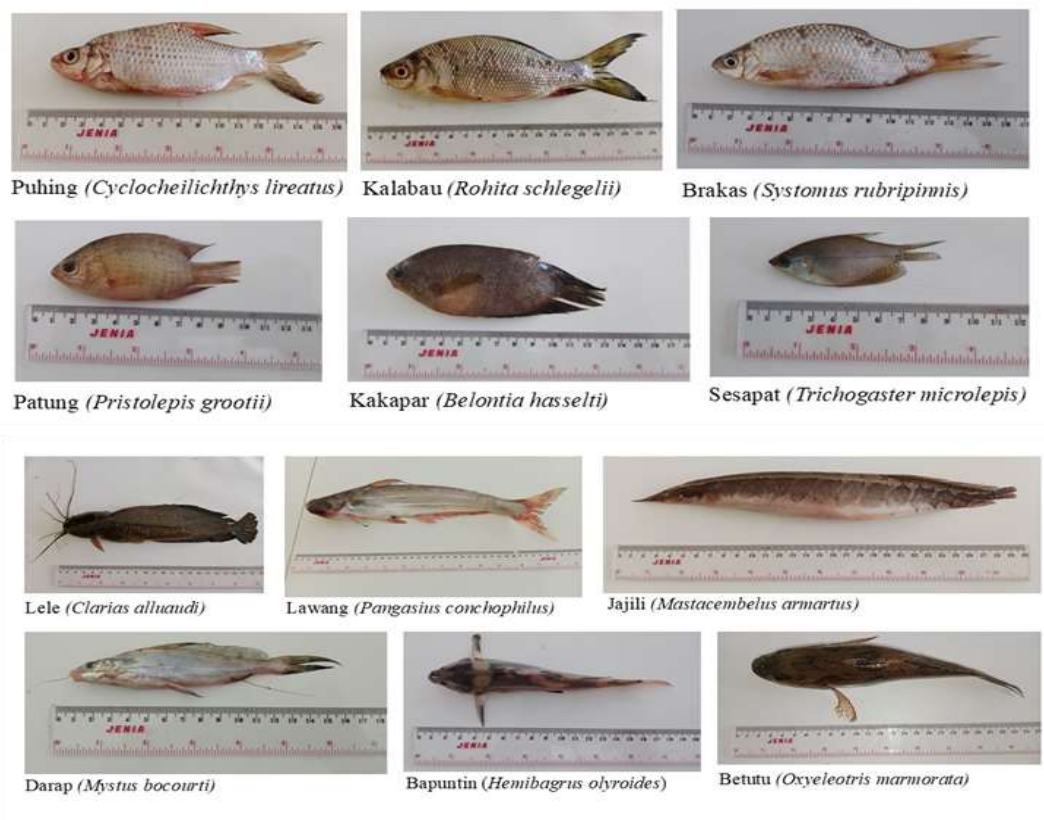


Figure 2. Types of fish caught in Burung Lake

The low number of fish caught is thought to be due to environmental factors, such as oligotrophic water conditions, varying lake depths, and water level fluctuations that affect fish distribution (Sugianti et al., 2020). Furthermore, the rainy season also contributes to the lake's increased water volume, allowing fish to roam more freely. Furthermore, during the rainy season, fish tend to migrate toward flooded swamps around Burung Lake. This phenomenon is a natural strategy for fish to find more suitable areas for spawning and feeding. According to Sulastris (2012), fish in lake waters generally migrate to swamps or floodplains during the rainy season when water levels rise, and return to the main body of water, such as rivers or lakes, during the dry season. This results in relatively fewer fish caught in Burung Lake.

Fish from the Family Cyprinidae are the fish most commonly found in Burung Lake, numbering six. Fish from the Cyprinidae family have good adaptability to changes in water quality and food availability. Nelson (2006) explains that members of the Cyprinidae family are eurythrotolerant, meaning they have a wide range of environmental tolerance and are able to utilize various types of food sources.

On the other hand, fish from the familyPangasidae, Eleotrididae, Bagridae, Belonidae, Mastacembelidae, Pristolepididae, Clariidae, Osphronemidae were only found in 1 - 5 individuals.This may be due to the influence of habitat preferences, feeding strategies, and migration patterns. According to Lagler et al. (1977), the spatial distribution of fish depends on a combination of internal

factors (foraging, reproduction, defense mechanisms) and external factors (depth, oxygen availability, habitat structure, and hydrological fluctuations).

Abundance, Diversity and Dominance Index of Fish in Bird Lake

Fish abundance in Burung Lake varies widely. Snapper is the most abundant, followed by puhing, patung, and bapuntin, which are categorized as abundant, while the rest are categorized as less abundant (Table 3). Fish abundance in the lake is influenced by several water quality factors, such as temperature, dissolved oxygen, and pH. Besides water quality, fish abundance is also influenced by other factors, such as overfishing.

Table 3. Abundance of Fish Species in Burung Lake

No.	Species Name	Number of individuals of species i (ni)	Relative Abundance (%)	Abundance Criteria
1	Cyclocheilichthys lireatus	4	16.67	Abundant
2	Rohita schlegelii	1	4.17	Less abundant
3	Systomus rubripinnis	1	4.17	Less abundant
4	Pristolepis grootii	3	12.50	Abundant
5	Belontia hasselti	5	20.83	Very abundant
6	Trichogaster microlepis	1	4.17	Less abundant
7	Mystus bocourti	1	4.17	Less abundant
8	Hemibagrus olyroides	3	12.50	Abundant
9	Oxyeleotris marmorata	1	4.17	Less abundant
10	Pangasius conchophilus	1	4.17	Less abundant
11	Mastacembelus armatus	1	4.17	Less abundant
12	Clarias alluaudi	2	8.33	Less abundant
Total Number of Individuals		24		

The fish dominance index in Burung Lake ranges from 0.0002 to 0.0280. The fish dominance index value in Burung Lake is lower than 1 (one), indicating that there is no dominant fish species in Burung Lake. According to Odum (1971) in Zamdial et al. (2020), the estimated dominance index is 0-1, meaning that the closer the value is to 1, the higher the dominance index. Zamdial et al. (2020) also stated that the higher the dominance index value, the more clearly the abundance of a species encountered compared to other species.

Table 4. Fish Dominance Index in Burung Lake

No.	Species Name	Local Name	Number of individuals of the i-th species (ni)	Dominance Index (C)
1	Cyclocheilichthys lireatus	Puhing	4	0.0280
2	Rohita schlegelii	Kalabau	1	0.0002
3	Systemus rubripinnis	Brakas	1	0.0002
4	Pristolepis grootii	Statue	3	0.0016
5	Belontia hasselti	Snapper	5	0.0044
6	Trichogaster microlepis	As soon as possible	1	0.0002
7	Mystus bocourti	Darap (Darap Kajang)	1	0.0002
8	Hemibagrus olynoides	Bapuntin (Banana Snapper)	3	0.0016
9	Oxyeleotris marmorata	Betutu	1	0.0002
10	Pangasius conchophilus	Lawang (lawang)	1	0.0002
11	Mastacembelus armatus	Jajili	1	0.0002
12	Clarias alluaudi	Catfish/Pentet	2	0.0070

Burung Lake Water Quality

Physical Parameters

The data from the measurement results of the physical and chemical parameters of water quality are presented in Table 1. The measurement of the physical and chemical parameters was carried out once in the field with 3 (three) sampling times and a total of 5 (five) stations.

1. Temperature

The results of measuring the water temperature of Burung Lake during sampling can be seen in (Figure 1.) below.

Sampling I, sampling II, and sampling III measurements were carried out simultaneously in one field visit and recorded at the five measurement stations in the range of 27.6 °C – 28.2 °C (Figure 3). All temperature measurement results were still within the normal range and met water quality standards, both for class 2 and class 3 based on PP No. 22 of 2021. Weather conditions during field sampling were cloudy and drizzling, which also affected the temperature, which according to Boyd (1982) is one of the main controlling factors of aquatic ecosystems. Fluctuations in water temperature are very important because they affect chemical and biological processes, such as dissolved oxygen concentration, fish metabolic rate, and phytoplankton growth.

2. Brightness

The results of measuring the clarity of the water of Burung Lake during sampling can be seen in (Figure 1.) below.

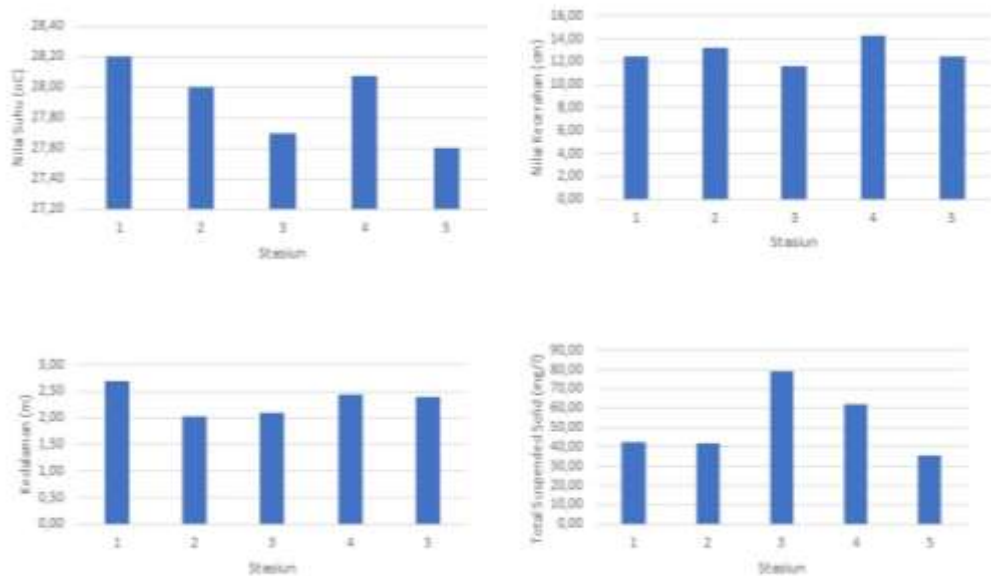


Figure 2. Temperature, Brightness, Depth, and Total Suspended Solids Values

Sampling I, sampling II, and sampling III measurements were carried out simultaneously in one field visit and the results of brightness measurements at the five stations ranged from 11.7 cm – 14.25 cm (Figure 4). The highest brightness value was at station 4 (four). Factors affecting water clarity include weather conditions, measurement time, water turbidity, and the level of accuracy of the researcher conducting the measurement, as explained by Ciptano (2010). Based on these measurement results, it can be concluded that the water clarity of Bird Lake is not up to standard, as the resulting clarity value is low. High clarity is defined as a value above 25 cm. (Elvince, 2021).

3. Depth

Sampling I, Sampling II, and Sampling III were conducted simultaneously in a single field visit, and the lake water depth measurements at the five stations ranged from 2.03 m to 2.7 m (Figure 5). The greatest depth was at Station 1, with a value of 2.7 m. At Station 1, there was fishing gear belonging to fishermen, which was deliberately installed because it was in a deep area (Figure 1).

4. Total Suspended Solid (TSS)

The TSS values at the five stations ranged from 35.67 to 79.1 mg/L (Figure 11). The TSS values at all stations still met the water quality standards for class 2 and class 3, Government Regulation No. 22 of 2021. Stations 3 and 4 did not meet the class 2 quality standards, while stations 1, 2, 3, 4, and 5 met the class 3 quality standards. Verma and Singh (2013) explained that TSS consists of organic and inorganic solid materials suspended in water, including various components

such as live or dead plankton, biological waste, decaying plant debris, and industrial effluents.

Chemical Parameters

1. Dissolved Oxygen (DO)

Low dissolved oxygen (DO) can be detected by observing water conditions and directly by observing the water color. Oxygen is a crucial indicator of water quality. Oxygen plays a role in oxidizing organic and inorganic materials, which ultimately results in nutrients that contribute to water fertility (Elvince, 2021). High levels of dissolved oxygen are very good for water quality (Simanjuntak, 2007).

When measuring dissolved oxygen during sampling at sampling I, sampling II, and sampling III, the results of dissolved oxygen measurements at the five stations ranged from 2.57 mg/L to 2.8 mg/L (Figure 6). The dissolved oxygen value in Bird Lake can be said to meet class 2 and class 3 standards.

2. pH

The pH measurements of Bird Lake water at the five stations ranged from 4.53 to 5.55 (Figure 2). The pH values at all stations did not meet the water quality standards for class 2 and class 3, as stipulated in Government Regulation No. 22 of 2021. The optimal pH for freshwater biota is around 6.8 to 8.5. Tatangindatu et.al (2011) explain that water that is too acidic (low pH) is dangerous because it increases the solubility of toxic metals. Meanwhile, water that is too alkaline (high pH) is also dangerous because it increases toxic ammonia levels.

3. Phosphate

Phosphate measurement results at the five stations ranged from 0.046 – 0.061 mg/L (Figure 2). Phosphate values at all stations were still within the normal range and met the water quality standards for class 2 and class 3, PP. no. 22 of 2021. Phosphate is one of the nutrients needed for the growth and development of aquatic organisms that is very influential. The fertility level of waters can be measured using phosphate concentration as one of the main indicators (Boyd, 2012). The Phosphate trophic status of Bird Lake water is eutrophic waters, which according to Vollenweider in Effendi (2003), if the Phosphate level is 0.003 mg/L – 0.01 mg/L it is called oligotrophic waters, if the Phosphate level is 0.011 mg/L – 0.03 mg/L it is called mesotrophic waters and if the Phosphate level is 0.031 mg/L – 0.1 mg/L it is called eutrophic waters.

4. Nitrate

The results of Nitrate measurements at the five stations ranged from 0.046 - 0.061 mg/L (Figure 2). Nitrate values at all stations did not meet the water quality standards for class 2 and class 3, PP. no. 22 of 2021. Nitrate content of less than 0.23 mg/L indicates less fertile waters, Nitrate content between 0.23 mg/L - 1.13 mg/L indicates waters with moderate fertility and Nitrate content between 1.13 - 11.29 mg/L indicates waters with high fertility (Wetzel, RG (1975) in

Mustofa, A (2015)). So it can be said that Burung Lake water is less fertile based on the low Nitrate content.

5. Ammonia

The results of the ammonia measurements in Burung Lake water during sampling can be seen in (Figure 2) below. The ammonia measurement values at the five stations ranged from <0.050 - 0.072 mg/L (Figure 10). The ammonia values at all stations were still within the normal range and met the water quality standards for class 2 and class 3, PP. no. 22 of 2021. To comply with applicable water quality standards, ammonia levels in the water must be maintained below 1 mg/L (Yanti, 2017).

6. Electrical Conductivity (EC)

The results of EC measurements of Burung Lake waters during field sampling can be seen in Figure 12 below. The EC values at the five stations ranged from $1,043$ - $1,522$ $\mu\text{S}/\text{cm}$ (Figure 12). The EC values at all stations still meet the water quality standards for class 2 and class 3, PP. no. 22 of 2021, except for station 5 which is at $1,522$ $\mu\text{S}/\text{cm}$. EC values that are too high (above $1,500$ $\mu\text{S}/\text{cm}$) can cause osmotic stress in fish, disrupt growth, and even cause death in some sensitive species (Boyd, 2012).

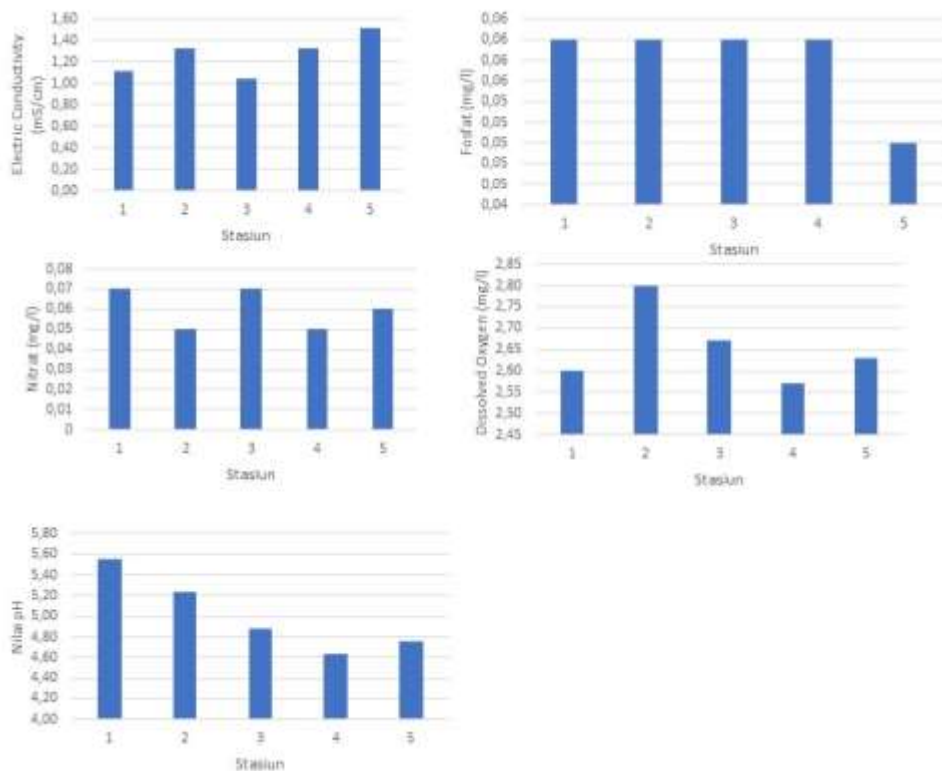


Figure 3. Electrical Conductivity (EC), Phosphate, Nitrate, Dissolved Oxygen and pH Values

CONCLUSION AND RECOMMENDATIONS

Based on the results of the research conducted, the types of fish found in Burung Lake consisted of 12 species from 8 (eight) families with a total of 24 individuals caught. These species are: *Cyclocheilichthys heteronema* (Puhing), *conchophilus* (Lawang), *Macrogathus circumcinctus* (Jajili), *Clarias alluaudi* (Pentet/Lele), *Belontia hasselti* (Kakapar) is a type of fish including a very abundant type of fish, while *Cyclocheilichthys heteronema* (Puhing) and *Pristolepis grootii* (Patung) are types of fish with abundance, namely abundant, and other types of fish are included in the types of fish that are less abundant. The types of fish in the lake are included in the medium diversity with a Diversity Index of $1 > H' < 3$, with a dominance index ranging from 0.0002-0.0280 (less than 1) which shows that there is no dominant type of fish in the lake.

The temperature value at Burung Lake ranges between 27.6 °C – 28.2 °C, the brightness between 11.7 cm – 14.25 cm, depth between 2.03 m – 2.7 m, TSS between 35.67 - 79.1 mg/L, dissolved oxygen between 2.57 mg/L – 2.8 mg/L, pH ranging between 4.53 – 5.55, phosphate ranging between 0.046 – 0.061 mg/L, nitrate ranging between 0.046 - 0.061 mg/L, ammonia reaching 0.072 mg/L, and EC ranging between 1.043 – 1.522 µS/cm. The water quality conditions in Burung Lake, as a parameter that supports fish life, are still in normal condition and comply with Government Regulation No. 22 of 2021.

ADVANCED RESEARCH

Further research on Burung Lake is needed to provide a more comprehensive understanding of the relationship between fish communities and environmental conditions. The present study provides baseline information on fish species composition, abundance, diversity, dominance, and several physical and chemical water parameters. However, the relatively small number of fish collected and the limited sampling period may not fully represent seasonal variations in fish communities. Future research should therefore investigate the seasonal dynamics of fish diversity and distribution by conducting sampling during both rainy and dry seasons. Because Burung Lake is a floodplain lake, changes in water level and connectivity with surrounding flooded areas may strongly influence fish movement, feeding, and reproduction. Comparing fish communities between different hydrological periods would provide a better understanding of seasonal migration and habitat use.

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