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Observing Dolphins Behaviour in the Kiluan Bay Waters Lampung

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Abstract. Dolphins belong to the order Cetacean which can be found in the eco-waters of Kiluan Bay, Lampung. The behavior and appearance of dolphins is strongly influenced by water quality parameters. This study aims to determine the behavior and estimate the number of dolphins found in Kiluan Bay, Lampung, using the observation method. Data analysis in this study was carried out by descriptive analysis method. The behavior of 729 dolphins (Bottlenose dolphin and Spinner Dolphin) observed during 3 days of observation in the waters of Kiluan Bay was traveling (55%), bow riding (17%), feeding (10%), avoidance (10%) and aerial (8%).

Keywords. Lampung, Dolphins, Kiluan Bay, Behavior

INTRODUCTION

Dolphins are a type of cetacean that are often found throughout coastal waters to the deep sea. Dolphins have unique behaviors in foraging, migrating, and reproducing. However, the number of dolphin hunting is getting higher until this species is in a threatened state according to the International Union for Conservation of Nature and Natural Resources (IUCN) (Faizah et al. 2006). Apart from hunting, the dolphin population is also threatened by changes in habitat conditions due to environmental damage (Ali 2006, Hammond et al. 2012). So it is necessary to hold efforts to preserve the dolphins.

Achievement in efforts to conserve dolphins requires supporting data such as number, species, behavior, and distribution. However, there are few data related to this matter (Baxter 2016) so an in-depth study is needed. Combining data from various aspects of water quality such as water temperature can be one of the keys to determine the seasonal movement behavior or migration of dolphins (Taylor et al. 2016, Moreno 2005). While the appearance of dolphins can be associated with changes in salinity (Gawarkiewicz et al. 1988 in Ali 2006, Taylor et al. 2016).

One of the migration routes of dolphins in Indonesian waters is Kiluan Bay, Lampung. Kiluan Bay holds a lot of potential, as the original habitat of several protected species, such as dolphins and turtles and various other wildlife (Siahainenia 2008), making it an ecotourism destination. Therefore, this study was conducted to determine the behavior and estimate the number of dolphins found in the waters of Kiluan Bay, Lampung.

METHOD

This research was conducted in the waters of Kiluan Bay, Tanggamus Regency, Lampung Province (105º0'0"E - 105º9'0"E and 5º51'0"S - 5º46'30"S), in May 2018. Dolphin data collection in the waters of Kiluan Bay, Lampung, carried out by the observation method. Parameters observed were water quality, appearance, and behavior of dolphins.

Research procedure

Water Quality Parameters

The physical parameters of the waters measured consisted of four parameters, namely pH, Dissolved Oxygen (DO), water surface temperature, and salinity. Measurements were made at the location where the dolphins appeared.

Dolphin Observation

Observations of dolphin appearances included identification of the type and number of dolphins passing by directly from the ship using the visual census of dolphin method with one group of observers (single platform) consisting of 4 people (Figure 1).

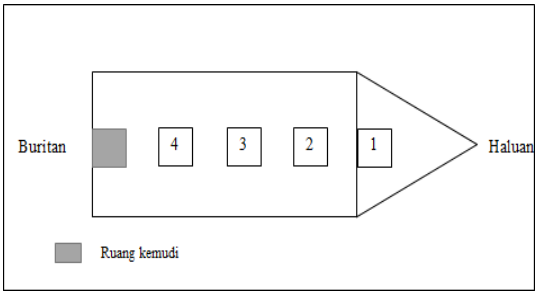

Figure 1. Observer position from the ship (Siahaninenia 2008)

Dolphin Behavior Observation

The behavior of the dolphins observed is the behavior on the surface of the water that is observed visually from the ship (Carwadine 1995).

Data analysis

Data analysis in this study was carried out by descriptive analysis method.

RESULTS AND DISCUSSION

Water quality

Environmental factors have a direct impact on changes that occur in the biological and ecological processes of an individual (Nybakken 1992, Lubis et al. 2016).

Degree of Acidity (pH)

Based on the results of in situ measurements of the pH variable of the waters of Kiluan Bay, the result is 7.3. This is in accordance with the rules of the Ministry of the Environment regarding the pH value suitable for marine biota, namely 7–8.5. According to Effendi (2003), a very low pH will cause the mobility of various toxic heavy metal compounds to be higher which of course will threaten the survival of aquatic organisms, including dolphins. Meanwhile, a high pH will cause the balance between ammonium and ammonia in the water to be disturbed, where an increase in pH above neutral will increase the concentration of ammonia which is very toxic to aquatic organisms.

Dissolved Oxygen (DO)

The oxygen content in waters is closely related to the amount of organic matter into the waters, because it is used by microorganisms to decompose these organic substances. Nybakken (1992) stated that the high content of organic matter and the high population of bacteria in the sediment caused an increase in oxygen demand in the waters. The results of in situ measurements of dissolved oxygen in the waters of Kiluan Bay showed the results obtained were 7.5 mg/L. Dissolved oxygen content at 7.5 mg/L is a good content for dolphin life, because it is in accordance with the regulations of the Ministry of Environment Number 51 of 2004 (>5 mg/L).

Temperature

The temperature in the waters of Kiluan Bay during observations ranged from 29oC - 30oC. The range of monthly average temperatures in the surface waters of Lampung Bay is estimated to be larger due to the geographical conditions of the waters of the bay. This is based on the condition of the Lampung Bay waters which have direct access to the waters off the Indian Ocean through the Sunda Strait. Seawater temperature is the main abiotic variable that significantly affects the body temperature of dolphins in their activities and when they eat food (Carwardine 1995). Dolphins have a layer of fat under their skin which accounts for about 50% of their body weight. The fat layer is useful for maintaining the condition of the body to remain stable at a temperature of 36oC - 37oC. According to Phillips et al. (2011), Spinner dolphins are commonly found at sea surface temperatures ranging from 24-30ºC. This is in accordance with the research by Scoot and Chiver (1990) which states that dolphins are able to settle in tropical waters with temperatures of more than 25oC when compared to the results obtained during observations, the waters of Kiluan Bay and its surroundings are areas suitable for dolphin habitats. Dolphin.

Salinity

The results of in situ measurements of salinity in the waters of Kiluan Bay show that the results obtained are in the range of 32-35o/oo. The salinity obtained during this observation was in accordance with Pariwono's (1999) statement which said that the surface salinity in the waters of West Sumatra ranged from 32.5 to 33.6o/oo where the minimum salinity was found in January and the maximum salinity value occurred in August. Salinity can have an influence on the distribution and behavior of dolphins (Ali 2006, Lubis et al. 2016) The observed behavior of dolphins in the salinity obtained is that dolphins move actively doing Bow riding, Breaching and Traveling. This is in accordance with the results of research conducted on dolphin behavior by Lubiset al. (2016) at salinity 30 o/oo.

Dolphins Appear in Kiluan Bay Waters

Observations of the appearance of dolphins were carried out on a moving boat. Observations were made in the morning at 06.00 - 09.00 WIB, sothe signs of the appearance of dolphins can be easily identified. During the observation, general information was recorded, namely the date, time, number of individuals that appeared, the name of the species and the behavior of the dolphins.

Figure 2. Dolphins Appear in Kiluan Bay Waters

The results of observations of dolphins are shown in Table 2. Based on the results of observations for 3 days where in a day it takes ±3 hours of observation. The total number of dolphin appearances during observations in Kiluan Bay waters was 729 individuals.

Table 2. Dolphin Observations in Kiluan Bay

No.	Observation Parameter	Observation result
1.	Total days of observation	3 days
2.	Total hours of observation	± 9 hours
3.	Total number of occurrences	729 people
4.	Identified species	*Tursiops truncatus*and Stanella longirostris
5.	Behavior	*Aerial, Avoidance, Bow Riding Feeding, Traveling*

During the observation, two types of dolphins were identified, namely the bottlenose dolphin (Tursiops truncatus) and the long-beaked dolphin (Stenella longirostris) (Table 3). Based on the results obtained during the observation, this is in accordance with the research conducted in Kiluan Bay by Himiteka IPB in 2005, Siahainenia in 2007 and (PSPL) Serang in 2017. including stingrays, sunfish, pilot whales, hawksbill turtles and leatherback turtles. However, the appearance of these biota is not too frequent when compared to the appearance of dolphins which can be found almost every day.

Table 3. Dolphin species found during the three days of observation

Dolphin type	Quantity (individual)
Spinner dolphin (Stenella longirostris)	607
Bottlenose dolphin (Tursiops truncatus)	122
Total	729

During three days of observation in the waters of Kiluan Bay, it was seen that Stenella longirostris had dominated 83.3% of the waters (Figure 3). The results of the type identification obtained
The results of this study are inversely proportional to the results of the May 2018 survey. It was found that the results of the appearance of dolphins in the waters of Kiluan Bay were dominated by Bottlenose Dolphins. This may be due to several factors, firstly, there was a mis-identification because the research at the Serang PSPL Workshop did not use an underwater cam so that identification was only carried out by looking at the dorsal or dorsal fin. The second is because the Serang PSPL Loka research lasted for 1 year while my research was only conducted in May 2018 it could be that the bottlenose dolphin dominates in 2017. Lammers et al. (2001) stated that during observations near Kalaeloa Barbers Point, Oahu, Hawaii every day about 40 to 100 Spinner dolphins were found.

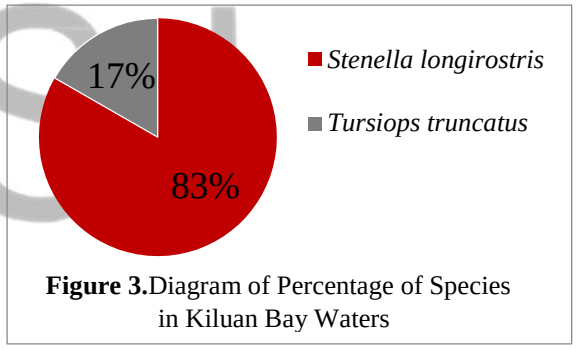

Figure 3. Diagram of Percentage of Species in Kiluan Bay Waters

Figure 4. Color Pattern on Spinner Dolphin

According to Priyono (2001) bottlenose dolphin (Tursiops truncantus), long-beaked dolphin (Stenella longirostris), and common dolphin (Delphinus delphis) have a distribution around the Java Sea and according to Rice (1998), dolphins bottlenose (Tursiops truncantus) has a very wide distribution area covering tropical waters. Identification of the Bottlenose dolphin in the waters is indicated by the dorsal fin that can be identified from the boat and underwater camera recordings. The characteristic feature of this dolphin is that it has a long nose, high dorsal fin and a slightly pointed tip bent like a sickle located in the middle of the back. During observations in the waters of Kiluan Bay, Bottlenose dolphins were found in groups of 4 to 12 individuals.

Spinner dolphin identified by its characteristics that often perform aerial movements, namely doing high jumps, somersaults, turning and spinning in the air. Another characteristic has a long and slender beak. According to Carwardine (1995), the spinner dolphin has 3 (three) color patterns, including light gray on the sides and white (grey and white) on the belly (Figure 4).

Dolphin Behavior in Kiluan Bay Waters

Dolphins can respond to a variety of ecological changes that may be unpredictable and vary in each location where dolphins are studied (Burgess 2006). Dolphins usually perform various kinds of behavior related to their lives, such as aerial, bowriding, breaching, lobtailing, feeding, traveling, logging, avoidance and others. The observed dolphin behavior in the waters of Kiluan Bay is summarized in Figure 5.

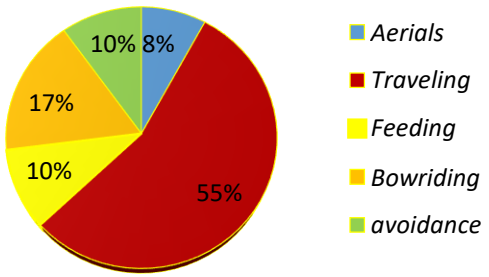

Figure 5. Percentage of Dolphin Behavior in Kiluan Bay

morning until 12.00 WIB.

Aerials Behavior

Feeding is an activity carried out while looking for food (Figure 7). Feeding activities are usually marked by fish schooling near the dolphins. Stenella longirostris and Tursiops truncatus were seen feeding in the morning. This is in accordance with research conducted by Shane (1990) on dolphins in parts of North Africa and Texas that forage in the morning and evening.

During the observation, there was a phenomenon of the appearance of dolphins accompanied by the discovery of schooling small fish. Based on the narratives of fishermen around the waters of Kiluan Bay, the small fish that jump on the sea surface are tuna.

Bowriding Behavior

Several times the dolphins showed swimming behavior on the fore and side of the boat. This activity is called bowriding (Figure 8). Bowriding is a swimming activity that tends to be quite slow/slow swim by dolphins following the wave movements that occur due to the movement of the ship and following the ship. Activities like this are carried out by a group of dolphins to play but this is what makes dolphins an object that is easy to catch when hunting.

Avoidance Behavior

According to Bejdar et al. (2006) in Wals and Zin (2019), avoidance is divided into two types, namely avoiding temporarily and avoiding permanently or leaving an area. During the observation, avoidance behavior was seen when the boat tried to approach a group of dolphins (Figure 9). Vertical avoidance is usually done to avoid temporarily while horizontal avoidance is done to move areas. Avoiding temporarily is done because of the noise that makes the dolphins tend to avoid the sound source (boat engines) for a while and then come back again (Lesage et al., 1999; Sun and Narins, 2005). Permanently avoiding an area is caused by several factors, including migration factors,

It is also possible that the dolphin was traumatized by hunting. According to the chairman of the Cikal Ecotourism Foundation, Pak Rico, hunting around the waters of Kiluan Bay is still often carried out by outside fishermen in the waters of Krakatau which is not far from the waters of Kiluan Bay. This is in accordance with research conducted by Shane (1990) which states that dolphin avoidance behavior towards boat activities in Florida waters is caused by hunting in the area.

Aerials Behavior

Aerials behavior is carried out by dolphins as a form of communication so as not to get lost. At the time of observation, the type of dolphin that made aerials movement was the long-beaked dolphin (Stenella longirostris) (Figure 6). Stenella longirostris was seen performing aerials movement at 09.00 WIB which is in accordance with research on aerials behavior conducted by Geise et al. (1999) stated that the behavior of aerials carried out by the family Delphinidae in Brazil's Cananeia Estuary happens every day with frequencymost occur in

Figure 7. *Feeding Behavior*

Figure 8. *Bowriding Behavior*

Figure 9. *Avoidance Behavior*

Figure 10. *Travelling Behavior*

Traveling Behavior

The behavior that is often carried out by the observed dolphins is traveling (Figure 10), where the dolphins swim in a certain direction and dive in groups, then emerge to the surface of the water. Traveling behavior is carried out by dolphins to find food in groups or to migrate from one place to another (Karczmarski & Cockroft 1999 in Karczmarski et al. 2000). Bearzi (2005) stated that the behavior that is often carried out by dolphins in Santa Monica Bay, California is traveling at an average speed of 4.3 km/day. This traveling behavior was carried out by all types of dolphins encountered during the observation. Traveling behavior can be seen directly above the water surface or under the ship with the help of an underwater camera. During observations from the ship, traveling behavior is carried out by 3-25 individuals, very rarely by one individual. Based on this, it can be assumed that the Kiluan Bay waters area is one of the places for foraging and playing for dolphins.

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