Dolphins Encountered in Kepulauan Seribu

Yusli Wardiatno*[1)], Chikarista Irfangi[1)] and Totok Hestirianoto[2)]

[1]Department of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Bogor Agricultural University (IPB), Kampus IPB Darmaga, Bogor 16680, Indonesia, Telp/Fax: 0251-8622932. Email: ywardiatno@hotmail.com
[2]Department of Marine Sciences and Technology, Faculty of Fisheries and Marine Sciences, Bogor Agricultural University (IPB), Kampus IPB Darmaga, Bogor 16680, Indonesia.

Abstrak

Kepulauan Seribu diduga sebagai salah satu rute migrasi berbagai jenis lumba-lumba. Hal ini didasarkan pada jumlah laporan dari nelayan dan masyarakat di Kepulauan Seribu pada keberadaan lumba-lumba. Tujuan dari penelitian ini adalah untuk menilai jenis, perilaku, lokasi penyebaran, dan estimasi jumlah dan jenis Cetacean yang ditemukan di Kepulauan Seribu. Penelitian ini dilakukan pada 10-27Mei dan 22 Juni-3 Juli 2010. Pengamatan dilakukan setiap hari, kecuali hari Jumat, mulai jam 7:00-18:00. Penelitian ini menggunakan metode eksplorasi dengan menggunakan perahu motor. Pengamatan jenis, jumlah, dan perilaku lumba-lumba telah dilakukan secara visual. Berdasarkan hasil penelitian,dapat disimpulkan bahwa spesies lumba-lumba yang ditemukan di Kepulauan Seribu adalah Delphinus delphis, Pseudorca crassidens, Stenella longirostris, dan Tursiops truncatus, dengan jumlah total 145 individu. Spesies lumba-lumba yang paling sering ditemukan adalah T. truncatus, sedangkan tipe paling umum adalah Delphinus delphis. Selain itu ditemukan juga bayi lumba-lumba dan spesies yang tidak teridentifikasi. Lokasi perjumpaan dengan lumba-lumba paling sering terjadi di sekitar Pulau Gosong Congkak (Karang Congkak) dan Karang Lebar. Dilihat dari perilaku yang diamati, dapat dikatakan bahwa Kepulauan Seribu merupakan daerah mencari makan dan rute migrasi Cetacean. Selain itu, Kepulauan Seribu juga diduga sebagai daerah asuhan bagi bayi lumba-lumba.

Kata kunci : *Cetacean, lumba-lumba, Kepulauan Seribu*

Abstract

Kepulauan Seribu has been considered as one of the dolphin migration routes. This is based on the number of reports from fishermen and communities in Kepulauan Seribu on the existence of cetacean. The purpose of this study was to assess the type, behavior, deployment location, and estimate the number of dolphins found in Kepulauan Seribu. Research was conducted on May 10th to May 27th, 2010 and 22nd June to 3th July 2010. Observations were made every day, except Friday, and started at 7:00 a.m. to 6:00 pm. Observation by boat was used in the research. Observation of the amount, type, and behavior of cetacean had been done visually. Based on research results, it can be concluded that the species of dolphins found in Kepulauan Seribu are Delphinus delphis, Pseudorca crassidens, Stenella longirostris, and Tursiops truncatus, with a total number of 145 individuals. Species of dolphins are most often found is T. truncatus, whereas the least common type is Delphinus delphis. In addition there are also calf and unidentified species. The location of the encounter with the dolphins most often occurs around Pulau Gosong Congkak (Karang Congkak) and Karang Lebar. Judging from the observed behavior, it can be said that Kepulauan Seribu is a foraging area and migration routes for cetacean. In addition, Kepulauan Seribu was also considered as nursery ground for calf.

Key words : *Cetacean, dolphin, Kepulauan Seribu*

*) Corresponding author

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Introduction

Cetaceans are mammals fully adapted to aquatic life. This includes Whales, Dolphins and Porpoises. The sea in Indonesia has a high diversity of cetacean. There are about 31 species of whales and dolphins in Indonesia of a total of 86 species in the world (Tomascik *et al*., 1997). Indonesian waters provide an imperative migratory area for over 30 species of marine mammals, particularly in the eastern parts of Indonesia. More than one third of all known *cetaceans* can be found in the Indonesian seas, including the rare and endangered Blue Whale (*Balaenoptera musculus*). In Makassar Straits which is considered as one pathway of cetacean migration route, Kreb & Budiono (2005) found more than 9 cetacean species. According to the list issued by APEX Environmental (2011) in Northen Sulawesi waters 17 cetacean species was reported, while in Komodo Island and its surrounding area, 20 species of cetaceans occurred ().

Increasingly, bottlenose and other dolphins have become the target of dolphin watching and wild dolphin interaction programs. Currently there are 295 communities in 65 countries that now have commercial whale and dolphin based tourist operations, generating in excess of US$ 500 million in yearly revenues (Orams, 1997). There is increased concern that the pressure generated by these activities may result in altered behavioral patterns, especially where people enter the water with dolphins and where the dolphins are provisioned.

Dolphin is included into the protected fauna. The effort to protect cetaceans in Indonesia is not optimal yet, because it is still a lack of knowledge about the existence of cetaceans. IUCN stated that the status of cetacean, especially dolphin populations, in Indonesia is in a state of danger (threat) (Ali, 2006). In other countries, there are many researches done about the cetaceans, i.e. Silber & Fertl (1995), Karczmarski *et al*. (1997), Lammers (2004), Alava *et al*. (2005), and Torda *et al*. (2010)

Kepulauan Seribu has been considered as one of the marine mammal migration routes in Indonesia. This is based on the number of reports from fishermen and local communities about the emergence of a dolphin. Kepulauan Seribu is one of a Marine National Park which has native ecosystems, managed by the zoning system is utilized for the purpose of research, science, education, support aquaculture, tourism, and recreation (UU No. 5/1990). The uniqueness of Kepulauan Seribu Marine National Park is a coastal ecosystem with coral reefs that have productivity and high species diversity of biota. Kepulauan Seribu is strongly influenced by the monsoon winds which generally can be divided into Wind West season (December-March) and the East wind season (June-September). Season transition occurs between the months of April-May and October-November.

Season influence the migration of all living things, including cetaceans. Long summer at high latitudes could make ice at the poles melt. This resulted in phytoplankton population is growing rapidly. These phytoplankton are eaten by krill, copepod, and other zooplankton. These organisms are then eaten by sea birds, seals, squid, fish, and whales. At this time, cetaceans are found in high latitude regions (Setiawan, 2004). In winter, the ocean in the polar re-frozen so that the productivity decreases. This resulted in cetaceans migrate to warmer tropical waters and have high productivity. For dolphins, seasonal migration to reproduce, leading to the shallow coastal areas and protected. In some cetaceans, migration is to avoid predators that will eat it (Carwardine, 1995).

One of the information needed for research on marine mammals, among others, is about the population. Based on the information on the population, then other information such as number, type, behavior, and its distribution can be known. Based on Priyono (2001), there were 10 species of dolphins are spread in Indonesia, among others, bottlenose dolphin (*Tursiops truncatus*), spotted dolphin (*Stenella attenuata*), long-snouted spinner dolphins (*S. longirostris*), striped dolphin (*S. coeruleoalba*), short-beaked common dolphin (*Delphinus delphis*), Fraser's dolphin (*Lagenodelphis hosei*), Indo-Pacific humpback dolphin (*Sousa chinensis*), rough-toothed dolphins (*Steno bredanensis*), Risso's dolphin (*Grampus griseus*), and Irrawaddy Dolphin (*Orcaella brevirostris*).

Materials and Methods

This research was conducted in the area of Kepulauan Seribu, Province of Jakarta. Data were collected twice, first was held on May 10th, 2010 until May 27th, 2010. The second data was taken on June 22nd, 2010 to July 3th, 2010. Figure 1 shows the location of the study.

Survey was done by exploration method using motor boats. The survey was conducted by a group of observers (single platform) (Figure 2). In observation of cetaceans with a single platform, the position of the observer is illustrated in Figure 2. Observations were carried out by three observers who observed the emergence of cetacean on one deck (platform). The position of the first observer was in the bow of the boat, a second observer in the middle of the boat, and the third observer was in the stern of the boat.

Data was taken at the time of observation in the study area is the date and time when the dolphins seen, the position of latitude and longitude using GPS (Global Positioning System), species of cetacean, the number of observed cetacean, the weather at the time of observation, the state of surface water during the observation, associated species, and some behavior of cetacean. Observed cetacean behavior is behavior of cetacean at the surface that visually observed by observers from the boat. Observation of the behavior was conducted following Table 1. All data is recorded in the observation sheet. Weekly observation routes are presented in Figure 3.

Observations on the species and number of encountered cetacean in Kepulauan Seribu was done visually in the field from the boat with the visual census method, is perform a direct enumeration of observed cetacean, as is done by Ali (2006) in Lovina Beach, Bali. When the cetaceans comes to the surface, the identification of species of dolphins done by looking at specific characteristics described by APEX Environmental (Ali, 2006); i.e. habitat, geographical location, size, dorsal fin, flipper, body shape, color and special sign, flukes, type of water spray, order dive, behavior, group size, and snout. Identification was also performed using the identification books cetaceans namely FAO Species identification guide: Marine Mammals of the World (Jefferson *et al.,* 1993)

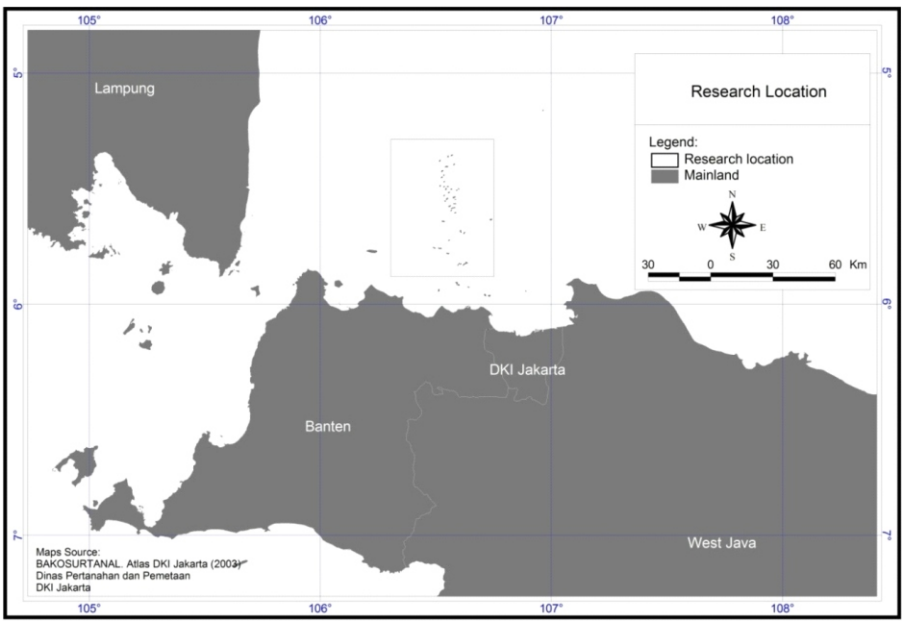

Figure 1. Research location. Black square indicates location where research were conducted.

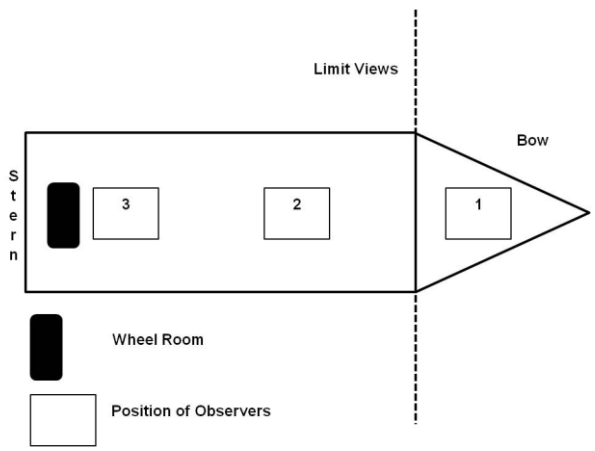

Figure 2. Position of observers on single platform method.

Results and Discussion

During 26 days of observation, dolphins were found 13 times. Species that are successfully identified as many as 4 species, i.e. Spinner dolphin (*Stenella longirostris*), Bottlenose dolphin (*Tursiop truncatus*), short-beaked common dolphin (*Delphinus delphis*), and False Killer Whale (*Pseudorca crassidens*). In addition, there are also baby dolphin (calf) and unidentified dolphins. Date, time, location, species, and number of encountered dolphins can be seen in Table 3. Results from cetacean position points in GPS that plotted to the map of study area have shown in Figure 4. Cetacean were found in Gosong Congkak Island (Karang Congkak), Karang Lebar, Opak Island, Coconut Island, Kaliage Besar Island, Gosong Mungu, Karang Baronang, Payung Island, Pari Island, Pramuka Island, and Panggang Island.

Figure 5 shows the map of dolphin distribution based on identified species and dolphin composition in study area. Composition of dolphins by day is shown in Figure 6. Composition of dolphins based on encountered time intervals shown in Figure 7. During the observation, the behavior of dolphins that had been observed in study area are aerial, feeding, traveling, lobtailing, and breaching. During the period of study dolphins mostly were distributed in the waters near the coral reef.

This might be due to the occurrence of so many small fish, like anchovies, squid, and other small fish in waters around Opak Island, Kelapa Island, Kaliage Besar Island, Gosong Congkak Island, and Karang Lebar, which is food for the dolphins. Weber & Thurman (1991) said that the dolphins mostly fish eaters, although they also eat squid. In the North Sea, the bottlenose dolphin feed mainly on herring (*Clupea harengus*), spur-dog (a small shark species, *Squalus acanthias*), haddock, dory (*Zeus faber*) and sole (*Solea solea*) (Verwey & Wolff, 1981). In the Indian ocean population off Natal, South Africa, the most important food species for the same species of dolphin are *Pomadasys olivaceum* (a grunt species), cuttlefish (*Sepia officinalis*),*Scomber japonicus* (a mackerel species) and *Pagellus bellotti* (Cockcroft & Ross, 1990). Barros & Odell (1990) found that in the Southeastern US, the most important prey species were sciaenids (drums, croakers and sea trouts) and haemulids (grunts).

According to Würsig (1986), delphinidae has a strategy in search of food, either by making an attack on an individual and attack in groups. The dolphins were not always looking for meals around the reef. At the time of observation, there are several pods of dolphin did foraging activity in areas far away from coral reefs. In areas that far from coral reefs, schooling tuna found a few times, so it could be presumed that the tuna is also a meal for the dolphins. One of the feeding behavior seen in the false killer whale pod. False Killer Whale (*Pseudorca crassidens*) clustered then swam up and around schooling tuna. At that time, some dolphins tossed tuna into the air using its tail. It is called fish kicking or kicking the fish, which is the most unique way of eating. The dolphins use the rod tip or tail to kick the fish near the surface of the water into the air. Fish kicking is usually done by a dolphin that swam towards schooling fish.

In other species of dolphin, Bottlenose dolphin (*Tursiops truncatus*), Short-beaked common dolphin (*Delphinus delphis*), and Spinner dolphin (*Stenella longirostris*), they are often found in the area around the reef. They occasionally came to the surface, then dive back at the edge of the reefs. This behavior can be presumed that the dolphins had been on a rush feeding

Table 1. Types and descriptions of cetacean behavior (Carwardine, 1995; Karczmarski *et al*., 2000).

No.	Type of behavior	Descriptions
1	*Bowriding*	Swimming movements follows the waves that created by boat.
2	*Aerials*	Jumping movement onto the water surface, salto, turning, or spinning in the air.
3	*Spyhopping*	When spyhopping, the whale rises and holds position partially out of the water, often exposing its entire rostrum and head, and is visually akin to human treading water. Spyhopping is controlled and slow, and can last for minutes at a time if the whale is sufficiently inquisitive about whatever (or whomever) it is viewing.
4	*Breaching*	A leap out of the water also known as cresting and dropping back towards the body
5	*Feeding*	Activities undertaken while looking for food, usually marked by a schooling fish near the cetacean.
6	*Lobtailing*	The act of a whale or dolphin lifting its flux out of the water and then bringing them down onto the surface of the water hard and fast in order to make a loud slap. Similarly, species with large flippers may also slap them against the water.
7	*Avoidance*	Avoiding movement away from the boats
8	*Travelling*	Swim together with one direction, then the dive together, and then go back to the surface water, and catch fish in groups.

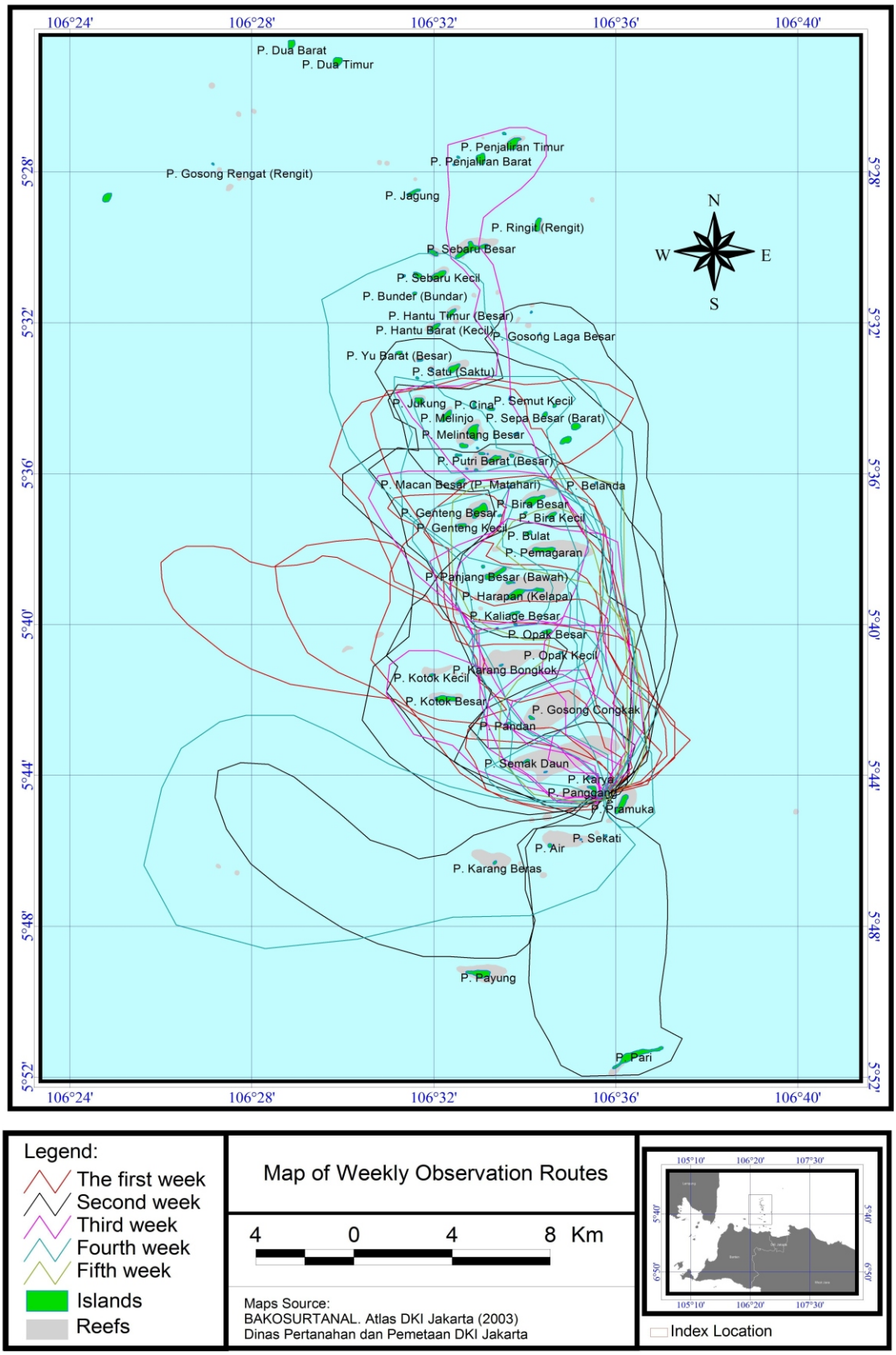

Figure 3. Weekly observation routes.

Table 3. Observation results

Date	Time	Location	Species	Number (individual)
5th May	11.20	Gosong Mungu	*Delphinus delphis*	6
			Tursiops truncatus	5
			Calf	1
11th May	12.45	Karang Baronang	*Stenella longirostris*	5
			Tursiops truncatus	10
			Unidentified species	3
16th May	08.36	North of Payung Island	*Stenella longirostris*	10
			Tursiops truncatus	3
18th May	08.50	Strait of Pari Island	*Stenella longirostris*	13
			Calf	1
19th May	14.04	South of Payung Island	*Pseudorca crassidens*	12
26th May	10.05	Barat Pulau Kelapa	*Tursiops truncatus*	7
			Calf	3
	12.00	East of Opak Island and South of Kaliage Besar Island	*Delphinus delpnis*	2
			Tursiops truncatus	12
			Calf	1
26th May	15.45	Strait between Karang Congkak and Karang Lebar	*Tursiops truncatus*	8
27th May	11.11	Esat of Karang Congkak	*Tursiops truncatus*	16
23th June	16.17	Strait between Panggang Island and Pramuka Island	Unidentified species	4
24th June	09.45	East of Karang Lebar	*Tursiops truncatus*	10
28th June	10.17	East of Karang Lebar	*Tursiops truncatus*	8
3th July	09.47	East of Karang Congkak	*Tursiops truncatus*	5

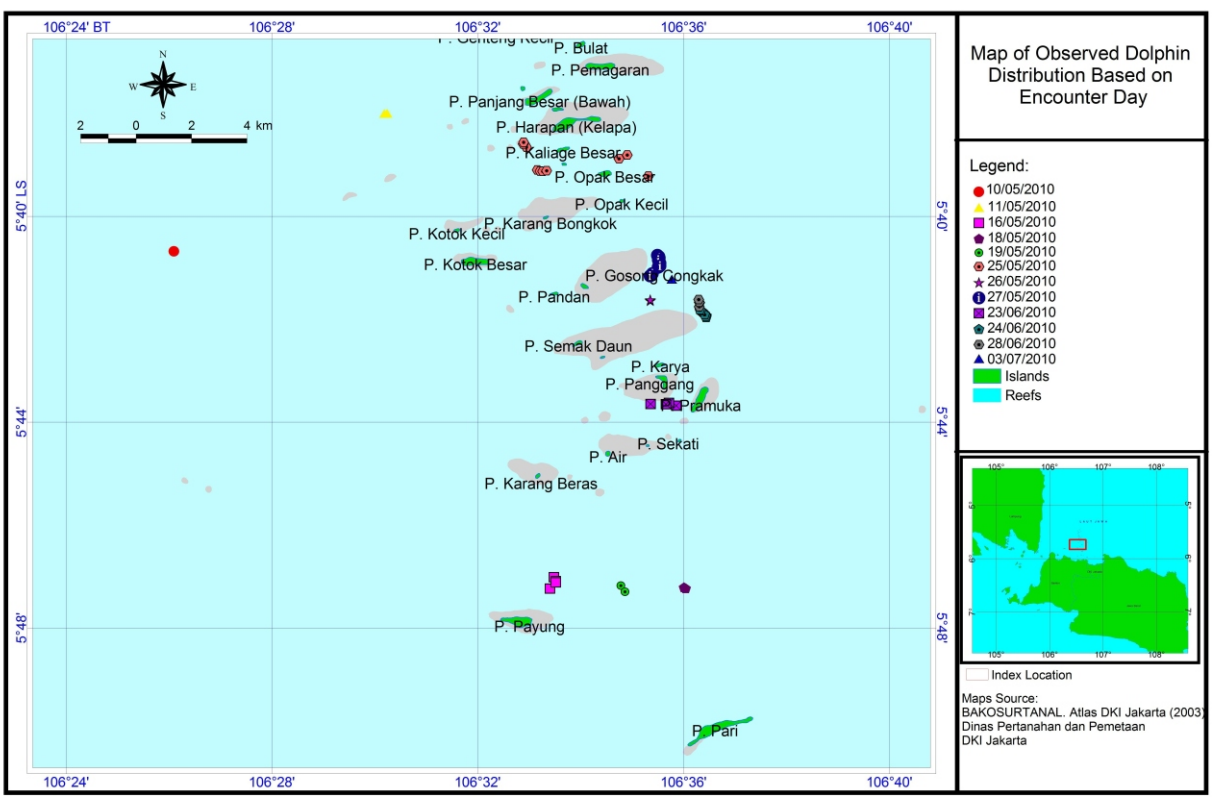

Figure 4. Map of observed dolphin distribution based on encountered date.

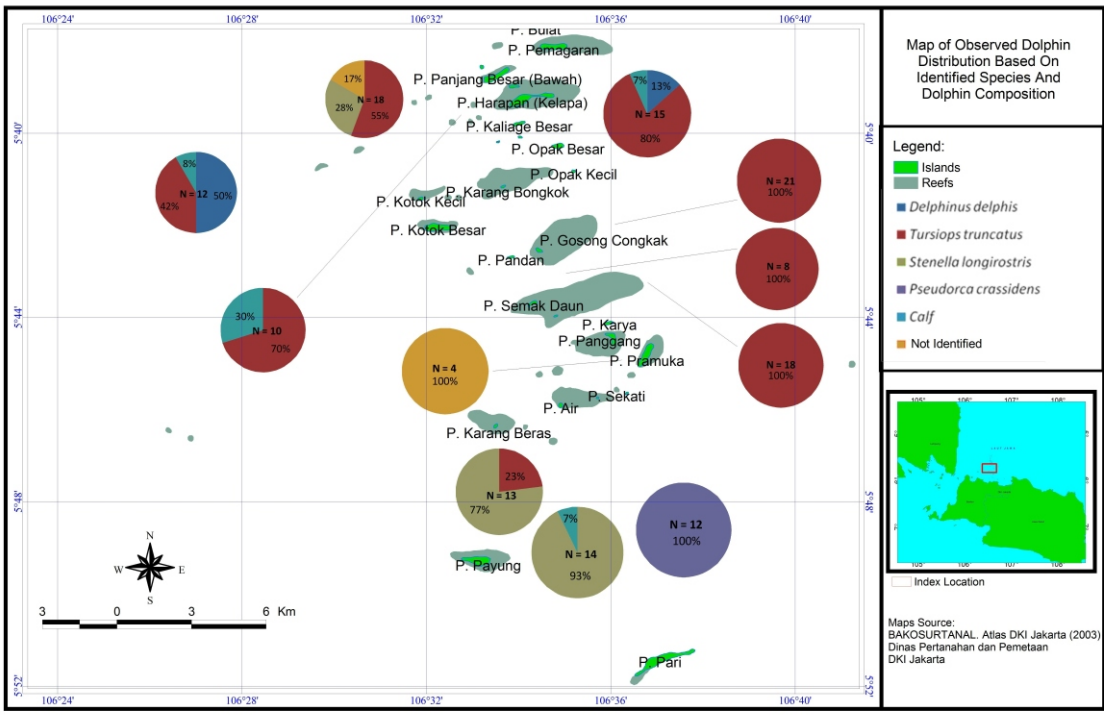

Figure 5. Map of observed dolphin distribution based on identified species and dolphin composition.

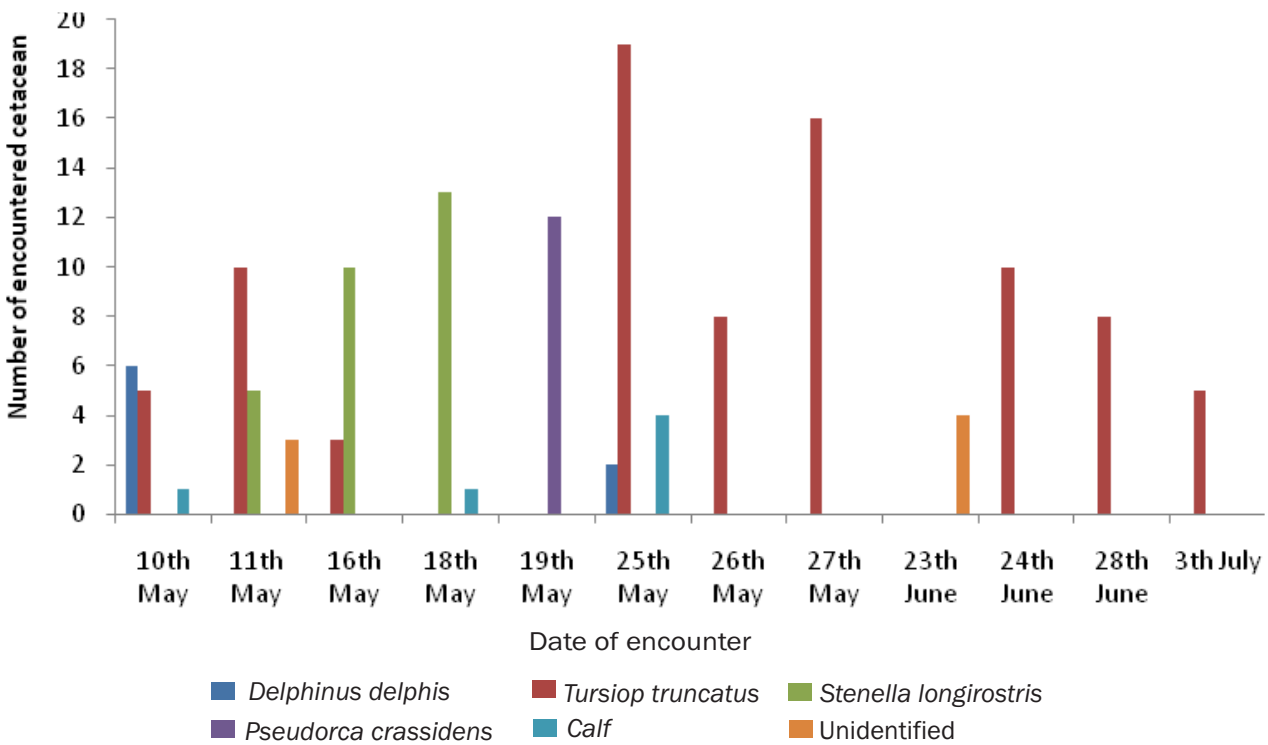

Figure 6. Composition of dolphins based on encountered day

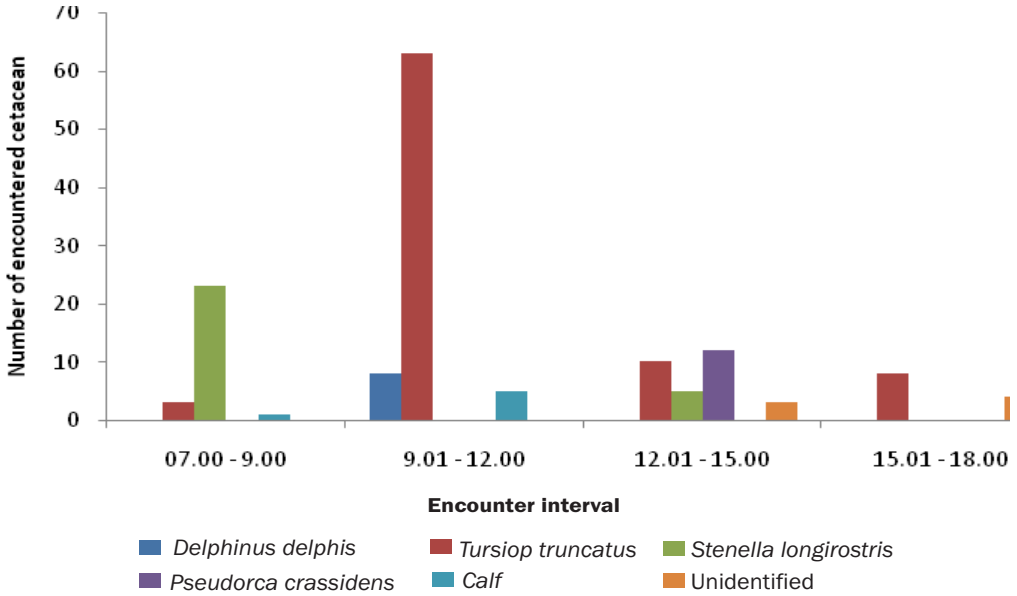

Figure 7. Composition of dolphins based on encountered time intervals.

activity, because in that area had been encountered fishes such as anchovies, squid, and other small fish. Feeding rush is one form of foraging invaded by a set of fish in waters around reefs, such as those observed in waters around Karang Baronang, Karang Lebar, and Karang Congkak.

Dolphins that found far away from coral reefs, such as those found in waters around Pari Island and Payung Island allegedly was doing traveling activities, where they were swim in one direction and dive together to water surface, and catch fish in groups. According to Cañadas *et al*. (2002), depth greatly affect the distribution of cetaceans in the waters. *Delphinus delphis* and *Tursiops truncatus* often found in shallow water. Other types of dolphins are also commonly found in shallow water but the frequency slightly. This is in accordance with the circumstances at the study site, where the depth of the waters of the Kepulauan Seribu ranges from 50-90 m (Mihardja & Pranowo, 2001).

Among the observed dolphins, *Tursiops truncatus* had the most widely distributed among other species of dolphin. The number of individuals ever encountered was 19 individuals around of Kelapa Island, Opak Island, and Kaliage Besar Island. This shows that the waters of Kepulauan Seribu is a suitable habitat for the species. This is apparently due to a wide spread area, as stated by Rice (1998) that the bottlenose dolphin (*Tursiops truncatus*) has a very wide dispersion area. According to Klinowska (1991), bottlenose dolphins are found worldwide in tropical and sub-tropical waters, inshore and offshore. Corkeron (1990) states that bottlenose dolphins were usually found between nearshore and offshore, as well as spending 92% of his time at depths less than 32 m and located at 1 km from the shore. Bearzi (2005) states that the distribution of bottlenose dolphins in the Bay of Santa Monica, California are mostly located 500 m from the beach. This is caused by differences in bathymetry and oceanography of coastal and offshore. In contrast to conditions in Northern California where bottlenose dolphins are often found at 1 km from shore at a depth of 10 and 30 m, but has a striking difference between the shore and offshore. Bottlenose dolphins in the waters can adapt to different habitats and can associate with other cetaceans community.

Dolphins which has narrow distribution was false killer whale (*Pseudorca crassidens*). This species found only in waters around Pari Island and Payung Island. The depth of the waters around Pari Island and Payung Island is 60-80 m. According to Carwardine (1995), false killer whales live in the warm waters with water depths ranging from 38-3000 m.

The highest number of dolphins encountered on May 25 th 2010. On that day, the observed weather was sunny, no wave, and the water was clear too. This is a condition suitable for dolphins. On May 26-27th 2010, June 24th 2010, June 28th 2010, and July 3th 2010, just *Tursiop truncatus* was found. On these period, the water condition was not so good. It is characterized by cloudy weather and waves are quite large. On May 19th 2010, only *Pseudorca crassidens* found. On June 23th 2010, 4 individuals unidentified dolphins were found. On that date, quite large waves and wind hardly blowing

occurs, so that identification of species was difficult to be done. On May 10 to 27th 2010, the species of dolphins are found more diverse than June 23th 2010 until July 3th 2010. This is caused by the influence of the season. Noor (2003) stated that wind conditions in Kepulauan Seribu is strongly influenced by the monsoon winds which generally can be divided into Western Wind season (December-March) and Eastern Wind season (June-September). Transition season occurs between the months of April-May and October-November. In the transition season, a wave that is formed is not too big and the wind blowing not too strong. In Eastern season, which formed large waves and the wind was blowing pretty fresh. This condition cause the diversity of species of dolphins and the numbers are declining in the Eastern season. Bottlenose dolphins usually occur in small groups. In Tampa Bay, the average school size is 5 (Weigle, 1990). In the Sado estuary, Portugal, the mean group size is 13.7 (dos Santos & Lacerda, 1987). Group sizes can vary from 1 to 100 or more, but in general a group consists of 2-15 animals. Two types of groups can be distinguished: pods (small units of dolphins that associate closely and engage in similar activities) and herds (which are temporary aggregations of pods) (Shane *et al*., 1986). In South Africa, groups size were larger (average 140, range 3-1000).

In terms of time, dolphins mostly occurred in the morning at an interval of 09:01 to 12:00, while dolphins are found at least be in the class interval 15:01 to 18:00 pm. At the time interval 09:01 to 12:00 pm, the light needed by the dolphins to perform various activities, such as traveling and foraging were optimal. At the optimal light intensity, the dolphins could easily find and get preys. In his research, Lammers (2004) found that the spinner dolphin occurred more frequently in the morning than in the afternoon. This is consistent with the results of research done by Siahaninenia (2008) in Lovina Beach, Bali, which claimed that the emergence of the number of dolphins occurred in at 09:00 to 11:00. The light in the afternoon was not optimal, so the dolphins would be in few number between 15:01 to 18:00 pm. It is different with the finding by Setiawan (2004) in the territorial waters of Komodo National Park, where more dolphins distributed in the afternoon, at 15:30 to 18:00. This is apparently related to the foraging habits of dolphins in the morning, but in the afternoon they might go somewhere to take a rest.

The least common species was *Delphinus delphis*. In Mercury Bay, New Zealand, the movement of *Delphinus delphis* geographically influenced by the seasons. The dolphins are often found in inshore areas in spring, whereas in summer and autumn, the dolphins are more often found in offshore (Neumann & Orams, 2005).

The results shows a tendency that *Stenella longirostris* often found associated with *Tursiops truncatus.* The same result was also found by Kreb & Budiono (2005) in east Kalimantan waters. Long half-life of dolphins are often seen to form clustered in large numbers at a distance of hundreds miles of beach with shallow water condition, a sharp thermocline, and the variation of the low surface temperature (Perrin, 1998). While *Pseudorca crassidens* was found only once and not associated with other species. The existence of false killer whales in the inshore more influenced by the availability of food and follow the movement of warm sea water currents (Stacey *et al*., 2004).

Several observations showed that baby dolphin (calf) was encountered. The calf was found associated mostly with bottlenose dolphin group (see Table 3). Calf existence may indicate that Kepulauan Seribu is a local nursery ground for dolphins. According to Evans (1987) cetaceans are usually taken care of the mother in a place in the long term. Setiawan (2004) also said that the bottlenose dolphin (*Tursiops truncatus*) have a tendency to raise their children in the straits and the water around islands. Calves usually start weaning at 4-12 months (Verwey & Wolff, 1981). They are fully weaned at 18-20 months. The oldest calf still nursing was 38 months old. On the US Atlantic coast, the average size at birth is 117 cm and the average weight 20.4 kg. They are physically mature at 245 cm (age 13 years). Females become reproductively mature at about 10 years, which is when they are ovulating regularly. The first ovulation (sexual maturity) occurs at 5-7 years (Perrin & Reilly, 1984). Males become sexually mature at 10-15 years (Mead & Potter 1990). In Tampa Bay, dolphin schools consisted for 9.7% of calves (Weigle, 1990). In Sarasota Bay, the annual recruitment rate is 0.048. The crude birth rate is 0.055. There is a high variability in birth rate, resulting in varying numbers of calves in the population. The maximum calf ratio was 20% in 1986 (Wells & Scott, 1990). The mean annual immigration rate was 0.025. In Monkey Mia, a significant increase in calf mortality in provisioned dolphins has been noted (calf survival rate 0.36 for provisioned mothers, 0.67 for non-provisioned mothers) (Orams, 1997).

Behavior of dolphins is strongly influenced by ecological factors, such as season, water depth, tide, and human activity. The dolphins can respond to a variety of ecological changes that may be unpredictable and vary at each location where the dolphins studied (Burgess, 2006). Behavior of dolphins that had been observed during the study was the aerial, feeding, traveling, lobtailing, and breaching. However, not all of these behaviors can be recorded by documentation materials. Aerial performed by the dolphins to attract the attention of the group if they are separated. At the time of observation, species of

dolphins that perform aerial movement is the bottlenose dolphin (*Tursiops truncatus*). Lobtailing is lifting its tail to the surface movement of water, then pounded the tail into the water. This activity is suspected as a form of communication with other dolphins. According Herzing (2000), the dolphins do lobtailing movement to attract the attention of other individuals in one group. In addition, lobtailing behavior is also one of predation, where the dolphin perform that behavior to make their prey weak. This behavior could break down the school of prey which makes the prey weaker when they stay individually, not in the form of group (Lusseau, 2006). Breaching, a leap out of the water also known as cresting and dropping back towards the body, performed by the dolphins to undermine the schooling (Carwardine, 1995). Traveling behavior conducted by the dolphins to migrate from one place to another, or to find their meals (Karczmarski & Cockcroft, 1999). Traveling behavior was conducted by all of encountered dolphins species in Kepulauan Seribu.

Conclusions

In Kepulauan Seribu waters 4 species of dolphin were encountered, namely Spinner dolphin (*Stenella longirostris*), Bottlenose dolphin (*Tursiop truncatus*), short-beaked common dolphin (*Delphinus delphis*), and False Killer Whale (*Pseudorca crassidens*). Based on this, it can be presumed that the waters of Kepulauan Seribu is one of the dolphin migration routes. The waters can also be considered as nursery area due to the existence of baby dolphin (calf).

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