Distribution, Abundance and Conservation Status of Dugong around Koh Talibong, Trang Province, Thailand

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Abstract

The survey of the dugong population was conducted by using the paramotor between 14 January - 15 March 2008. Altogether 14 dugongs were sighted. The three main feeding grounds were the mouth of river which is the sea-route between Ban Chao Mai and Ban Lang Khao pier. One dugong was sighted in the Koh Talibong area. Another 4 was sighted around the Chu Hoey Cape. The largest number, 9 dugongs were sighted around the Haad Tha Tub and Thung Chin Bay. All the dugongs seemed to be swimming slowly and generally use the gully during the high tide. The dugong sighted in the Koh Talibong area fed mainly on *Halophila ovalis.* Altogether 25 traces of feeding were found averaging 0.19 meters in width (ranging between 0.15 – 0.25 meters), and 4.47 meters in length (ranging between 2.32. – 6.15 meters). The size of traces left behind averaged at 0.87 sq. meter/trace. The depth of the trace measured from the seabed averaged at 0.15 meter (ranging between 0.08 – 0.20 meter) Since the Koh Talibong is the largest seagrass bed in Thailand and is also the area where the largest number of dugongs were sighted on the Andaman Coast. To protect the resources in this area which is the main feeding ground for dugongs, it is necessary to create awareness of the ecological importance, to foster cooperation with Local Governments and the local fishing communities. It is also recommended that some form of agreements be made between the responsible public agencies and the various group of resource users over delineating of areas to be designated as dugongs and seagrass beds conservation zones that are clearly separate from areas where fishing activities are permitted which should be a modality to ensure adequate protection and sustainability of both seagrass beds and the dugong population.

Keywords: Dugongs, Feeding trails, *Halophila ovalis*, KohTalibong

1. Introduction

Dugongs (*Dugong dugon*, Müller) can be found in the tropical and subtropical sea areas of the Indo-Pacific Ocean (Nishiwaki and Marsh,1985). Dugongs are listed as Vulunerable to extinction (IUCN,1996) ,very little is known of its true status. Australia, the eastern Red Sea and the Arabian Gulf, have quatitative population estimates been derived (Bayliss and Freeland,1989; Preen,1989; Marsh and Saalfeld,1990; Marsh et al.,1996; Preen et al.,1997; Marsh and Lawler,2001). Dugong feed almost exclusively on seagrasses (Heinsohn and Birch, 1972; March et al.,1982; Preen,1995). From these and numerous less quantitative surveys conducted in many other parts of the dugongs' range it is apparent that Koh Talibong surrounding is the most important area for dugong and seagrass habitat in the western coastline of Thailand (Adulyanukosol,2000; Poovachiranon, 2000) from the survey of the herd of dugongs in the feeding area around Koh Talibong and Koh Muk in Trang Province between February 20-27, 1996 sighted between 42-126 dugongs. Particularly on February 24th, 1996, the highest number of dugongs (126) among these 7-17 were young dugongs.(Adulyanukosol et al.,1997)

Direct observations of dugongs and their feeding habits is difficult because they are secretive. Hence, less direct approaches are required, serveral reports on analysis of stomach contents, fecal samples ,and mouth samples (Heinsohn and Birch,1972; Lipkin,1975; Johnstone and Hudson,1981; Marsh et al.,1982; Erftemeijer et al.,1993; Preen,1995. Adulyanukosol,2001; André et al.,2005), as well as field observation of dugong feeding trails (Argones,1994; Nakanishi et al.,2005), which clarified that they feed on seagrasses. This study was undertaken to identify critical habitats for dugong conservation. The criteria adopted was observed feeding areas and areas supporting known preferred food sources. The study of dugong feeding trails and the species of seagrass was conducted in the area around Koh Talibong, Trang province, Thailand. The data used for the analysis is primarily based on the results of aerial surveys using the paramotors to observe the feeding trails. Sampling plots were set up to collect information on seagrass species.

2. Methods

2.1 Area surveyed

To collect data on the size of the population and feeding behavior, surveys of dugongs were conducted from November 2007 to July 2008 covering both the wet and dry seasons covering the area around the Koh Talibong in Trang province. (7° 12´-23´N, 99° 14´-31´E). Long tail boats were used to transport scuba divers to the area to collect data on the directions of movement of the dugongs for feeding as well as traces left behind in the patches of seagrass beds. In Thailand, the large group of dugong inhabitats around Koh Talibong (Adulyanukosol et al.,1997; Adulyanukosol and Chantrapornsyl,1999; Adulyanukosol,2000; Hines et al.,2005), where the largest seagrass meadows in Thai waters are also located (Changsang and Poovachiranon,1994; Poovachiranon,2000). The area of Koh Talibong is of particular importance as it is near the Trang river outlet. Of the 12 seagrass specie found in Thailand, 11 species can be found in this area. These are *Enhalus acoroides*, *Halophila ovalis*, *Halophila minor*, *Halophila baccarii*, *Halophila pinifolia*, *Halophila decipiens Thalassia hemprichii*, *Halodule uninervis*, *Cymodocea rotundata*, *Cymodocea serrulata* and *Syringodium isoetifolium* (Poovachiranon and Chansang.1994). As such, it has been reported by previous studies that this was the one of the main feeding grounds.

2.2 Strip-transect survey methodology

As dugongs are very secretive, in order to observe their feeding habitats, air survey was selected as the method to collect data. To conduct air survey of dugongs, there is a need for systematic organization and coordination between the research team and the pilot. The former has to provide a flying route to collect data on directions of movement of the dugong herds in search of food as well as making sure that all survey equipments such as paramotors, etc., are available and functioning. The pilot on the other hand has to make sure that he fully understands the flying route he has to follow as well as ensure that all communication codes are clear. In addition, there is also the sea rescue team who will be using boats or long tail boats and the 2 scuba divers to standby in case there are accidents that require emergency landing. Each flight has to be timed taking into consideration the period of the high and low tides, the weather condition and most importantly, the wind direction and speed.(preen,2003; March and Sinclair,1989; Bayliss and Freeland,1989; Preen,1989; Marsh and Saalfeid,1990; Marsh et. al.,1996; Preen et. al.,1997; Marsh and Lawler,2001)

Since dugongs are generally distributed around the sea grass beds which are the main feeding grounds nearer to the coastal area (Preen,1995). This study therefore concentrates on collecting information of the direction of the movement in search of food around the Koh Talibong between 14 January -15 March 2008. Data was collected by using air survey using paramotor. The flying route follows the transect line route from east to west from between 400-700 feet above. The flights were scheduled during the high tide period. (Table 1)

2.3 Dugong feeding trails

To identify the critical feeding habitat of dugongs around Koh Talibong, the sampling plots has been set up to observe their feeding routines. Dugongs feed mainly on seagrass. They usually need between 28-40 kilograms wet weight per day (Preen,1993 and Aregones,1996) fully grown dugongs need approximately 30 kilograms per day which is equivalent to between 8-10% of their body weight (Kataoka et al.,1995). Heinsohn and Birch (1972) found that seagrass species particularly favoured by dugongs were *Cymodocea spp.* and *Halodule spp.* As the seagrass specie that dugongs like generally grow nearer to the coastline, (Murray et. al.,1977), sampling plots of 100*100 meters were laid both in locations where seagrass beds are submerged under the sea and where shallow areas where seagrass beds can be seen and data is collected during Mean Low Water Springs : MLWS where sea depth is deeper than 1 meter. Divers collect data when seawater starts to recede. Each diving session to collect data can take no less than 4-5 hours both during the spring and neap tide, five times a day for a period of 10 days. Every time traces of dugong feeding can be found for instance the average feeding trails in Mukai et al.,1999 is 5.1 m^2 , divers would mark the spots with a 30 centimeter tag. One each of the tag is tide to a hook by a small rope. The other side is dug into the seabed. This method was used attempt to collect data and identify dugong's feeding trail. To avoid double counting, each trace is measured for width, length and depth.

Based on the data collected, it is possible to identifying the distribution of feeding grounds and relationship with the abundance of seagrass. Such findings on dugong's feeding trails are of crucial importance and can be used as the basis for establishing conservation zones for purpose of protecting feeding areas of dugongs.

3. Results

3.1 Dugongs

Results of the air survey between January 14-15, 2008 altogether 9 air surveys were conducted. Two airplanes scanned the site during the day time starting from the beginning of the high tide period. Altogether 14 dugongs were sighted. There was only one flight where not one dugong was sighted. (Table 2)

There are three main seagrass beds around the Koh Talibong (Figure 1) Location A is around the mouth of river which is the sea route between Ban Chao Mai and Ban Lang Khao. One dugong was sighted feeding in this area. In location B, around the Chu Hoey Cape, the air survey was conducted on January 15 and between 12-14 February. Altogether 4 dugongs were sighted. One dugong was sighted per day for a period of 4 days. Location C is around the Had Tub and Thung Chin Bay area. In this area, the air survey was conducted on 12, 14 and 15 March 2008. Altogether 9 dugongs were sighted; 4 on March 12, another 2 dugongs were sighted on March 14 and 3 dugongs were sighted on March 15.

Since the air survey was conducted during the hot season of the Andaman Coast, the skies around Koh Talibong was clear. Visibility was more than 3-5 kilometers. Turbidity ranged between 0.8 ± 0.2 meters, Salinity ranged between 29.1 ± 0.7 ppt, Depth ranged between 4.2 ± 0.6 meters. The morning hours were the most suitable period for flying as wind is not so strong. Dugongs sighted were found to be swimming rather slowly and most were moving around the gully heading towards the east in the direction of the seagrass. Also the fishing gears, such as drifting nets and the use of the bamboo fish-trap were found around both the gully and seagrass beds meadow.

3.2 Dugong feeding trails

Between January 14-July 4, 2008, altogether 25 traces of feeding trails were found during the period (Figure2). Average width of the traces was 0.19 meters (ranging between 0.15 – 0.25 meters). Average length of the traces was 4.47 meters (ranging between 2.32. – 6.15 meters). Average size of the traces was 0.87 square meters and average depth of the trace as 0.15 meter (ranging between 0.08 – 0.20 meter). On the distributional structure of seagrasses, altogether 8 species were found. These were *Halophila ovalis*, *Halodule pinifolia*, *Halodule uninervis, Cymodocea serrulata*, *Cymodocea rotundata, Syringodium isoetifolium, Thalassia hemprichii*, *Enhalus acoroides*. In the Koh Talibong area, Dugongs appeared to favour *Halophila ovalis* the most. This is consistent with the findings of Heinsohn and Birch (1972) that dugongs generally need *Cymodocea* and *Halodule spp* more than other seagrass species. Murray et al (1977) also concluded that dugongs tend to feed on soft seagrass found that are sparsely grown such as *Halophila ovalis* and *Halodule uninervis* before other types of seagrass. Mukai et al (1999) who studied dugong feeding trails around Hat Chao Mai in Trang Province also concluded that dugongs fed on *Halophila ovalis* more than other seagrass species.

4. Discussion

4.1 Usages of seagrass meadows by dugongs

Since seagrass is most abundant in the Koh Libong area (Poovachiranon and Chansang. 1994) and since this is the area where there is the largest number of dugongs found in Thailand (Adulyanukosol et al., 1997). The findings of this study confirm these earlier observations. That is 14 dugongs were sighted in this area because of the availability of *Halophila ovalis* which is an indicator of the quality of ecosystem that can still provide adequate food for dugongs for their daily consumption. There is need for concern however, as quantity and distribution of the *Halophila ovalis* has been notably decline and the major cause is due to increasing exploitation of the area where seagrass beds can be found.

Grazing habit of dugongs usually followed an 'S' shape pattern and none of the trails left behind were linear. This may be because dugongs have to support themselves by using the front fins to prevent the lower part of the body from touching the sand which may cause injuries to the skin and body. Some traces in the shape of small potholes have been intermittently found near the feeding trails. These were possibly marks left by the front pair of fins used to support the body while feeding. The length of the traces generally vary according to the size of the dugong's mouth. The older and larger dugongs consumes larger amount of seagrass than the younger ones and tended to leave more traces of feeding which are also generally longer in length.

4.2 Conservation of Dugong in Koh Talibong

Due to the fact that seagrass beds are areas where there are abundance of fishery resources, the biggest threat therefore comes from coastal fisheries, from the use of fishing gears, such as drifting nets to catch fish and the use of the bamboo fish-trap with the narrow neck to catch horse crab (*Portunus trituberculatus*)

The use of these equipments along the coastline as well as around the seagrass beds tend to block the routes which dugongs use to access the feeding grounds. The effect is to limit the route that dugongs can use and they can no longer follow the gully as they normally do. Many dugongs also die because they get trapped in drifting nets and cannot surface to breath.

Access to feeding areas is further restricted because there are also gully around the seagrass beds in the Koh Talibong area which is used for large seafaring vessels. The increasing number of large and small fishing vessels as well as cargo ship constitute one of the main reasons for the disrupting access of dugongs to the feeding grounds. The dugong population is also disturbed by the engine noises and their mortality increased because of accidents and being hit by passing vessels.

From these findings, it is highly recommended that to protect the dugong population in the Koh Talibong, it is necessary to provide knowledge and understanding of the coastal resources ecosystem as well as cooperation of the local authorities and communities in zoning and controlling the level of intensity of activities as well as how resources are exploited will be necessary measures to ensure sustainable food supplies for the dugongs in this ecosystem.

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Table 1. Summary of strip-transect aerial surveys of dugongs in Koh Talibong, Thailand

Time of surveys	14 January -15 March 2008
Aircraft	paramotor
Area covered	168 km^2
Transect orientation	east - west
Number of times air survey was conducted	9 times
Transect covered water to depth of	0 – 12 m
Nominal survey altitude	400 – 700 feet
Other transportation in addition to air survey	long tail boat and 2 divers

Table 2. Information from air survey of feeding behavior around the Koh Talibong Area between January 14-15, 2008

Date	Number of dugong sighted	Direction of movement	Tide	Depth (m)
14 January 2008	1	East - west	high tide	6
15 January 2008	1	North -South	high tide	4
16 January 2008	(none)	(none)	(none)	(none)
12 February 2008	1	North - South	high tide	3
13 February 2008	1	North - South	high tide	4
14 February 2008	1	North - South	high tide	3.5
12 March 2008	4	East - west	high tide	5
14 March 2008	2	East - west	high tide	5.5
15 March 2008	3	East - west	high tide	4

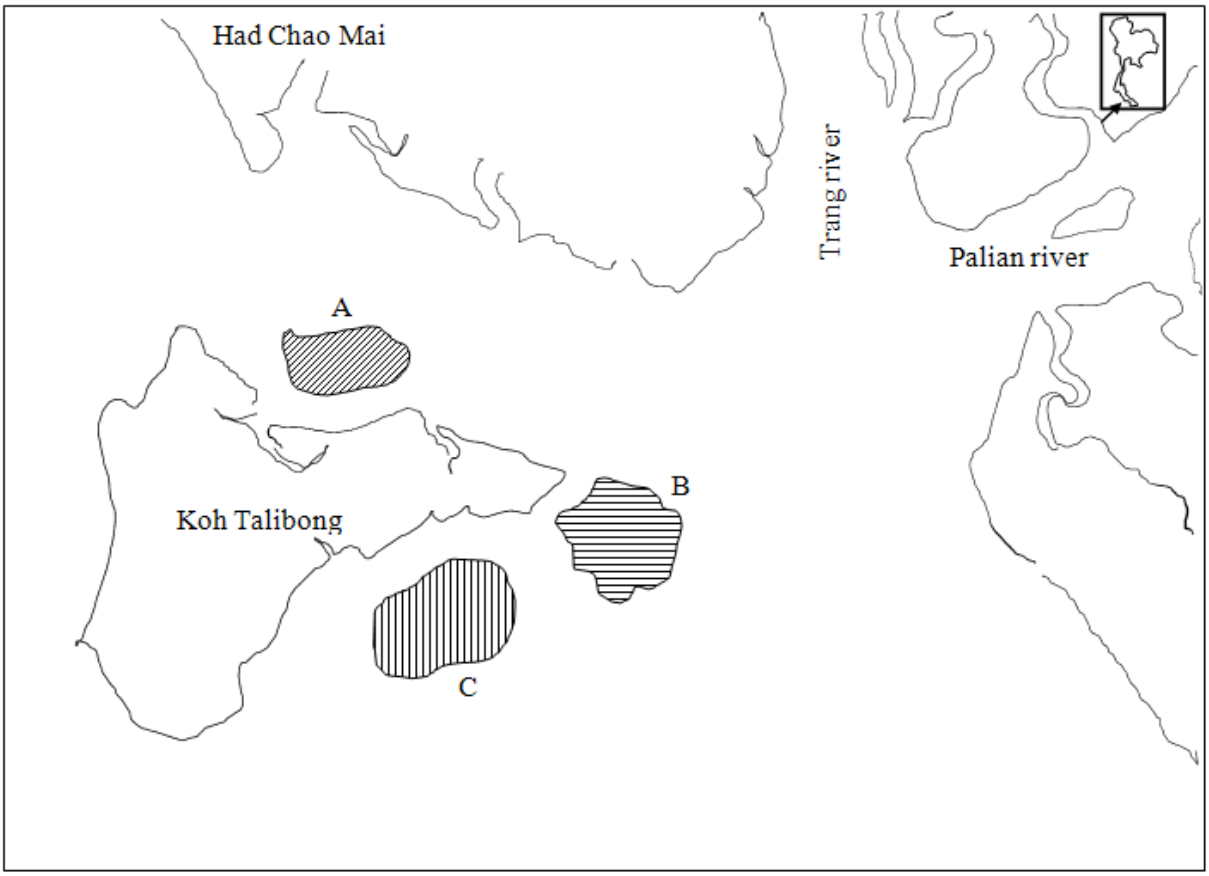

Figure 1. Area around the Koh Libong in Trang Province where 14 dugongs were sighted
(A: Ban Chao Mai area; B: Chuhoey Cape; and C: Haad Tub Lae and Thung Chin Bay)

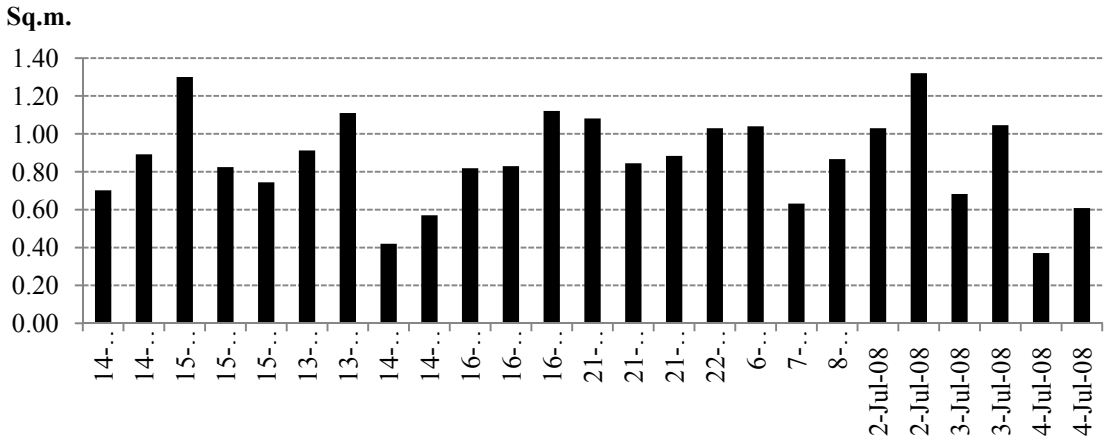

Figure 2. The length of markings indicating seagrass beds where dugongs have been feeding around Koh talibong