

# Assessment of incidental catch of sea turtles in relation to the fishing practice in Indonesia

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## ABSTRACT

This review provides information on the incidental catch of sea turtles in fishing activities in Indonesian waters. There are a few works related to the interaction between sea turtles and fisheries that were done in 2005 to 2006. The data and information available concerns the status of catching of sea turtles as by-catch in tuna longline and shrimp trawl fisheries. Based on the data gathered through an interview approach and observation on board of commercial fishing fleets, it is shown that a number of sea turtles are caught by these fisheries activities. Finally, almost all turtles caught are finally released back directly to the sea by the fishermen for some reasons such as protection by law, non target fishing, prohibition, and pity. Due to some weaknesses and limitations of previous work, it is necessary to determine a comprehensive program related to the conservation of sea turtles and diminution of the incidental catch of sea turtles by fishing activities.

**KEYWORDS: incidental catch, sea turtles, tuna longline fisheries, Indonesian waters.**

## INTRODUCTION

Several kinds of fishing gear are operated to exploit marine fisheries resources in Indonesian waters. Different fishing gears such as gillnet, purse seine, fish net, shrimp trawl, and tuna longline, are used to catch fish in appropriate areas of Indonesian waters that are divided into nine Fisheries Management Zones. For instant, fish net and shrimp trawl are widely operated in the Arafura Sea, while tuna longliners are operated in the Indian Ocean and Pacific Ocean.

As an archipelago country, Indonesia consisting of 17,500 islands and 81,000 km of total coastlines offers an excellent habitat for sea turtles. Among seven species of sea turtles in the world, six species have been identified to occur in Indonesian waters. The species are green turtle, leatherback, hawksbill, olive ridley, loggerhead, and flatback. The latter species nests exclusively in Australia but has been observed feeding in Indonesian waters (Kitchener 1996).

Since the fishing ground of tuna fisheries and swimming ground of sea turtles are often overlapped, this condition may give an indication of the great potential for the interaction between sea turtles and fisheries activities. Since little quantitative data and information are available on this phenomenon, this paper tries to review recent works on relevant issues. The works, initiated in 2005 – 2006 by the Research Center for Capture Fisheries – Agency for Marine and Fisheries Research and World Wildlife Fund (WWF) – Indonesia, reported that sea turtles were captured incidentally by some fishing gears in certain areas in Indonesian waters (Anonymous, 2005,

(Anonymous, 2005, Wiadnyana *et al.*, in preparation, Zainudin, 2005).

## FISHING GEARS AND FISHERIES MANAGEMENT ZONE

A number of fishing gears are used to exploit marine fisheries resources in Indonesian waters that are divided into nine Fisheries Management Zones as illustrated in Figure 1. The dominant fishing gears used by fishermen throughout those zones depend on the kind of fish resources available in each zone. The fishing activities by the commercial fishing fleets can be very intense to catch fish during all seasons, resulting in a high possibility of incidental capture of sea turtles since the latter migrate across Indonesian waters to find an appropriate habitat to nest (Dermawan, 2005).

## PRILIMINARY INFORMATION OF SEA TURTLE MORTALITY DUE TO FISHING GEAR OPERATION

The awareness of people in the world has increased toward the conservation of sea turtles of which the populations are more and more vulnerable. The decrease of sea turtle populations may be due to many factors, including fisheries activities. Several investigations, much related to the strong presumption of the existence of an interaction in the sea between fisheries activities and sea turtle, have been made in overseas countries. These investigations which were not much conducted in Indonesia focused more on the sea turtle mitigation. Based on this condition, the investigations conducted by WWF – Indonesia and the Research Center for

Capture Fisheries are to anticipate against the global issues toward the environmental conservation, especially the sea

turtles conservation. The investigations focused on three aspects: (i) to gather data and information on the status of sea turtle by-catch in tuna longline fisheries using the actual fishing technique; (ii) to understand the advantage of the “circle hook” to be used in tuna longline fisheries; and (iii) to disseminate information on the “circle hook” to fishermen and fisheries practice in several tuna longline bases.

In the preliminary works of Anonymous (2005) and Wiadnyana *et al.* (2007) it was reported that sea

turtles were captured as a by-catch in certain places of Indonesian waters, especially in the Indian Ocean. These works were based on an interview approach to gathering information on the status of sea turtles captured as by-catch in tuna longline fisheries. Figure 2 shows that almost 70% (69.43 %) of sampled fishing fleets frequently captured 1 turtle per trip (1 trip equal on average to 1 month of fishing days) and only 15.29 % of the fishing fleet did not capture any turtles, whereas the remainder captured in a range of 2 – 29 individuals (15.28 %).



Fig.1 Map of fisheries management zone and dominant fishing gears operated in each zone.

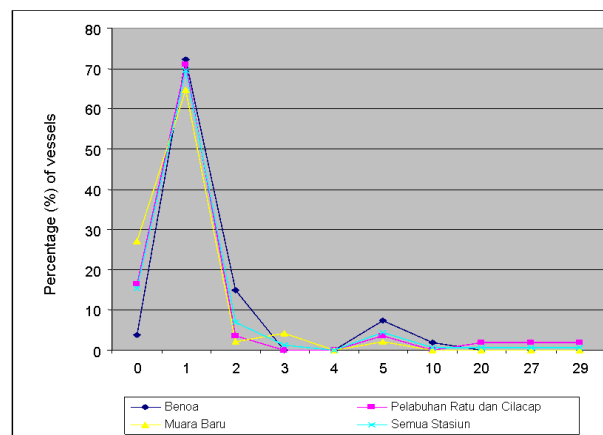


Fig.2 Distribution pattern of incidental sea turtle catching by tuna longliner: result basis from interview of four tuna longline fleets.

The species of sea turtles recognized by the fishermen were loggerhead, leatherback, and green turtles. The dominant sizes of sea turtle by-catch were 25 – 50 cm and 50 – 75 cm.

The results of these type of investigations are: (i) sea turtles were caught incidentally by tuna longliner mostly 1 individual per trip (4 to 8 fishing days); (ii) the tuna longline fishermen seem to obey acts on the prohibiting of sea turtle use, however almost of them did not well understand how to release the sea turtles back to the sea, this fact may cause the injury or mortality of sea turtles; and (iii) almost of tuna longliners use “J” hooks for their longlines and operate their fishing gears in the surface depth (<100 m) which is inhabited by sea turtle, both of these factors set a high probability that the tuna longline fisheries will catch sea turtles as by-catch. The results of fishing experiments with the “circle hook” reported in overseas countries showed that longliners used the “circle hook” compared to the “J” hook in catching target species (tunas) and reduced sea turtles by catch. In addition the “circle hook” did not enter easily to the esophagus of the predators including sea turtles. In addition, there were some other reasons why the fishermen released all caught sea turtles back to the sea, such as: non target fishing, prohibition, misfortune, and pity.

### CIRCLE HOOK TRIAL IN TUNA LONGLINE FISHERIES

As a follow up to previous activities on the assessment of the status of sea turtle by-catch in tuna longline fisheries, WWF – Indonesia carried out a program on circle hook trials in tuna longline fisheries in 2006. The investigation was limited only to certain experiments in cooperation with fishermen. The results showed some advantages of using the circle hook compared to the “J” hook shape (normal

tuna’s hooks) that is actually used dominantly by the fishermen in Indonesia (Table 1). By using the circle hook, tuna as the target species were caught higher that by using the “J” hook, even though a turtle was caught by normal tuna hook.

### OBSERVER PROGRAM

The observer program was initiated by WWF-Indonesia in 2005. This program was made to access sea turtles by-catch related to fishing activities in the Arafura Sea. During the activities, observers were sent to follow fishing operations on board commercial shrimp trawl fleets. This work was successful in gathering data and information confirming that sea turtles were often captured by the shrimp trawl fisheries in some locations (Figure 3). Results from on board observation show that there were about 2 – 33 sea turtle individuals caught by 12 shrimp trawl fleets or about 11 sea turtle individuals caught in 1 fishing trip where 1 trip is equal on average to 40 fishing days (Zainuddin, 2005). The species composition was green, loggerhead and olive ridley. One possible reason why many sea turtles were caught together with target fish is because the crews tend not to use the Turtle Excluder Device (TED) on their fishing gear. In fact, this device is one of the requirements in the application of fishing license.

The observer activities were also conducted for tuna longline fisheries. The program was carried out in 2006 by sending observers on board commercial tuna longline fleets. On this occasion, the observers reported that several sea turtles were in fact caught incidentally by tuna longline fisheries. From observations on 10 tuna longliners, a total of 79 sea turtle individuals were caught after 519 line settings. This total composed of green turtle, leatherback, hawksbill, olive ridley, and loggerhead.

Table 1 Comparison of circle hook trial in tuna longline fisheries. Source: Zainudin et al. (2007).

| Species                                    | Circle Hooks | Normal tuna's hooks |
|--|--------------|---------------------|
| Albacora                                   | 13           | 9                   |
| Big Eye Tuna                               | 77           | 68                  |
| Big Eye Tuna (baby)                        | 1            | 1                   |
| Blue Fin Tuna                              | 7            | 2                   |
| Yellow Fin Tuna                            | 29           | 16                  |
| Skipjack                                   | 3            | 6                   |
| Sw ord Fish                                | 10           | 5                   |
| Marlin                                     | 1            | 0                   |
| Shark                                      | 14           | 14                  |
| Mahi-mahi                                  | 6            | 5                   |
| Opah ( <i>lampris spp.</i> )               | 1            | 3                   |
| The others fishes that utilized            | 31           | 22                  |
| The others fishes that discarded (ray etc) | 35           | 46                  |
| Olive Ridley Turtle                        | 0            | 1                   |
| <b>Total</b>                               | <b>228</b>   | <b>198</b>          |



Fig.3  
Map showing the locations of sea turtles caught incidentally by shrimp trawl fisheries in Arafura Sea.

### CONCLUSION

This short review provides information on recent activities related to the interaction between sea turtles and fisheries in Indonesia. The recent work initiated by the Research Center for Capture Fisheries and WWF – Indonesia may show the importance of sea turtles caught as by-catch due to fishing practices. It is shown that in tuna longline fisheries especially in fishing grounds of the Indian Ocean, a number of sea turtles were incidentally caught during the fishing. The species composition is namely loggerhead, leatherback, and green turtles. Similar to the investigation in the Arafura Sea, certain shrimp trawl fisheries captured sea turtles. The reality is clear that sea turtles were often captured as by-catch in tuna longline fisheries after reports by observers on board of commercial fishing fleets. For some reason, the fishermen seem to release the captured sea turtles directly back into the sea without knowing exactly if the sea turtles are in good condition or alive.

### RECOMMENDATION

Recognizing some weaknesses and the limitation of observation, as well as the quantity of experiments of circle hook trials in tuna longline fisheries, it might be recommended to determine the next program related to mitigation of sea turtle mortality and decreasing of the interaction between sea turtles and fisheries activities, such as:

1. Investigation on the migration pattern of sea turtles in Indonesia waters. The migration patterns are often requested by fishermen to avoid incidental catch of sea turtles during their fishing activities.
2. Continuation of the works on:
  - Identification and monitoring of incidental catch of fishing activities on sea turtles

- Determination of the impact of coastal fisheries on the sea turtle populations.
3. Transformation of fishing gear utilization for fishermen in the tuna longline fisheries in Indonesia. The scope of work would include:
    - Strengthening the capacity of monitoring by-catch of tuna longline fisheries by conducting trials on the utilization of circle hooks in larger areas and with higher intensity.
    - Setting up monitoring guidelines to be used on board for the mitigation of sea turtles.
    - Dissemination of information on the transformation of fishing gear by introducing circle hooks to the fishermen who showed an interest to use the circle hook in tuna longline fisheries.

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