Preliminary estimation of seabird bycatch of Taiwanese longline fisheries in the Indian Ocean

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SUMMARY

Noting the increasing global attentions on the conservation of the ecosystem, the issue of incidental catches of ecological related species in fishing operations has been of great concerns. This is the first attempt to estimate seabird incidental catch of Taiwan longline fisheries in the Indian Ocean.

To collect scientific information for target species as well as incidental catch species, Taiwan has launched observer programs since 2002. There were 23 observer trips from 2002 to 2006 in the Indian Ocean large scale tuna longline fleets. The coverage rate by trips was 1.48% in average. The observed days were 1904. According to the data collected, the seabird incidental catch rate (BPUE) in each 5*5 degree grid square varied from 0 to 0.22 per 1000 hooks with the average BPUE of 0.048 per 1000 hooks. As for the seabird incidental catch distribution, the BPUE was the highest in the areas between 30-45 S and 25 W to 35 E and between 25-35 S and 65-95E. By using the total efforts data estimated from logbooks and the seabird BPUE from observers, the preliminary estimated average number of seabird incidental catch was around 1512 per year.

Keywords: seabird bycatch, longline, Indian Ocean, Taiwan, observer

1. INTRODUCTION

There has been increasing global awareness of environmental protection in recent years. The impact of worldwide fishing practices on living marine resources is an issue of major concern of most Regional Fisheries Management Organizations. Among those species, seabird, especially those distributing in high latitude, has drawn much attention from different groups. However, few fishery observer programs are designed to record interactions with seabirds. As a result, quantitative information on seabird incidental catch in longline fisheries is scarce and is available from only a small number of fisheries.

Taiwanese tuna fishery has operating in Indian Ocean since 1950s. Yellowfin tuna was the target in the beginning. Albacore and bigeye tuna are followed as main target till recent years. Currently, Taiwan's large scale longline (LTLL) fleet can be divided into two groups in accordance with the target species: those operate mainly in tropical area (between) targeting on bigeye tuna and yellowfin tunas, and those operate in subtropical and temperate waters targeting on albacore.

As for the seabird conservation measures in Indian Ocean, IOTC adopted Recommendation 05/09 on incidental mortality of seabirds requesting CPCs to report their

implementation of the IPOA-seabirds and be encouraged to provide all available information on interactions with seabirds. In 2006, the Resolution 06/04 on Reducing Incidental Bycatch of Seabirds in longline fisheries was adopted for specific mitigation measures includes bird-scaring lines. All vessesls fishing south of 30S shall carry and use bird-scaring lines.

2. METHODS

Data collected

Two sources of information have been used in this study. The key data came from the scientific observers on board longline vessels between 2002 and 2006. During the deployment, scientific observers took note of the fishing activities. In addition, they recorded the information of incidental catch, including seabird, sea turtles and sharks. The information included fishing method (e.g. position, number of hooks, time of set and position, catch number and weight), as well as seabird incidental catch information (species, number, and status). The identification cards and training were developed for the observers to record the situation of seabird. During the five years, data were collected by observers from 23 trips.

Another source was the fishing efforts data estimated from logbooks between 2002 and 2006. The efforts data were derived from logbooks collected by Fisheries Agency which were submitted by captains of those vessels. For estimating the incidental catch number of seabird, the efforts data were aggregated by 5*5 degree grid square by month. However, the Task II for 2006 is still preliminary.

Estimation of seabird bycatch

The incidental catch rate was computed by the numbers of birds caught per 1000 hooks.

BPUE= # of bycatch /thousand hooks.

Considering the spatial-time distribution of seabird, seasonal variation and fishing activities, the following formulae were used to estimated the annual seabird bycatch,

$$C = \sum_{j=1}^{4} \sum_{i=1}^{n} c_{ij} * A_{ij}$$

C: estimated the annual seabird bycatch,

c_{ij}: observed BPUE within 5*5 degree grid i in season j,

A: Number of 1000 hooks deployed in region i, season j,

i: area, which were defined as the 5*5 degree grid square,

j: season, which were defined as Season 1(January - March), Season 2(April - June), Season 3(July-September)and Season 4(October-December) .

c was the observed BPUE within region *i* in season *j*. Because the coverage rate was low in early years, it should be noted that some areas were without observation. We summarized the five years data into a databank to substitute some zero data. If there were many observation data in one 5*5 degree grid square in one season, then the average value were

used as c_{ij}.

3. Results and Discussion

The annual fishing efforts varied from 197,793 to 281,473 thousand hooks between 2002 and 2006.   The average hooks were 253,412 thousand hooks. The geographical distributions of fishing efforts are shown in Figure 1.

The total observer's trips were 23 between 2002 and 2006 The average observer's coverage rate by trip was 1.48%. The observer coverage increased from 0.32% in 2002 to 2.86% in 2006. The total observation days were 1,904 and the total hooks were 6,407 thousands from 2002 to 2006. (Figure 2).

The seabird incidental catch BPUE varied from 0 to 0.22 per 1000 hooks, with the average BPUE of 0.048 per 1000 hooks. The distribution of incidental catch is shown in Figure 3. It shows that 13 5*5 degree grid square have the records of seabird incidental catch. The seabird incidental catch was the highest in area south of 25 S, especially in areas between 25-35E, 30-45 S.

The BPUE and the preliminary efforts data were used to estimate the seabird incidental catch. The preliminary estimated seabird incidental catch were 332 to 3,763 per year, with the average of 1,512 per year. The average seabird incidental catch, fishing efforts and estimated seabird bycatch mortality by 5 degree latitude are shown in Figure 4. It shows the seabird incidental catch occurs more in higher latitudes in the north, especially in area north of 30 degree south. As for the fishing effort distribution, tropical areas where the seabird incidental catches were relatively low.

Seabird abundance and species composition is not uniform throughout the region. In addition,   the observer coverage was low in early years, we combined five years observers data, trying to cover more fishing ground of Taiwanese fishing vessels.. In this study, there were significant differences in BPUE between areas. The BPUE was higher in temperate areas than in tropical areas. Data in 5*5 degree grid square could clearly show the variation.
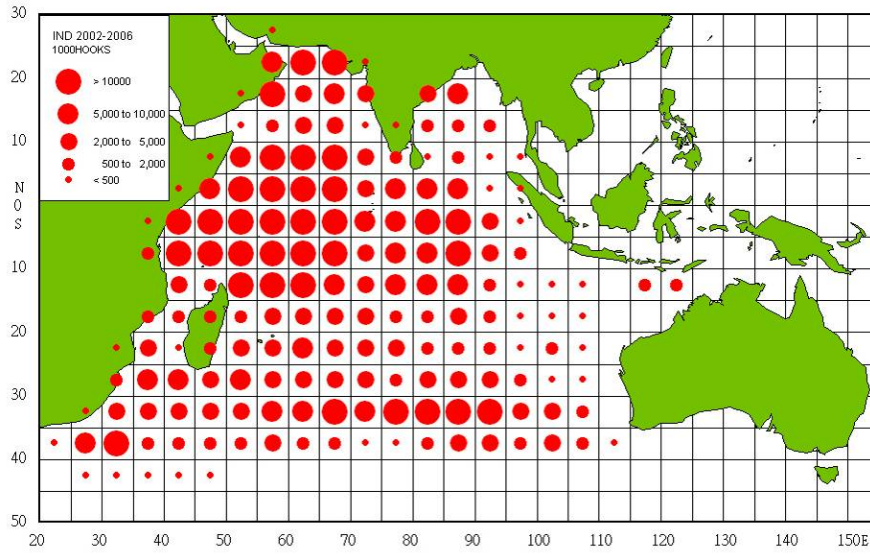
Figure 1 Distribution of efforts of Taiwanese longline fisheries in the Indian Ocean between 2002 and 2006
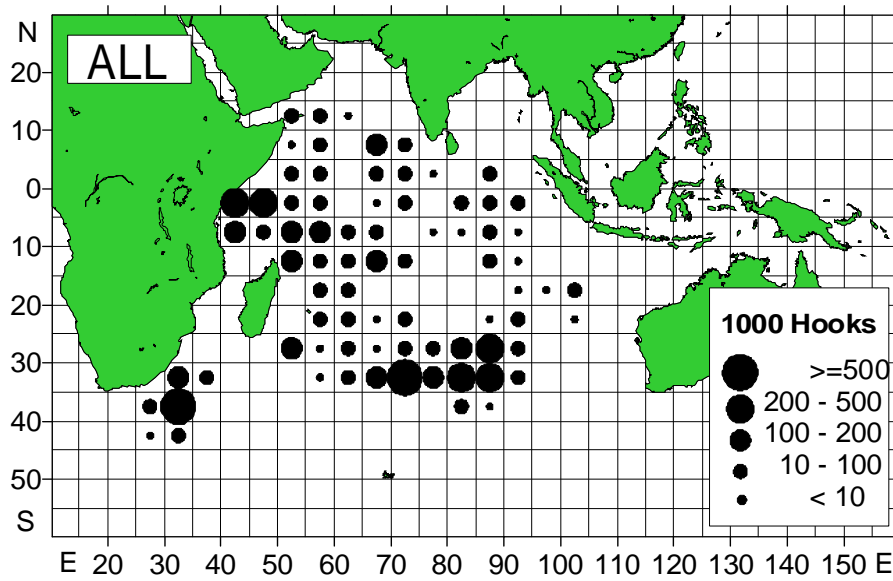

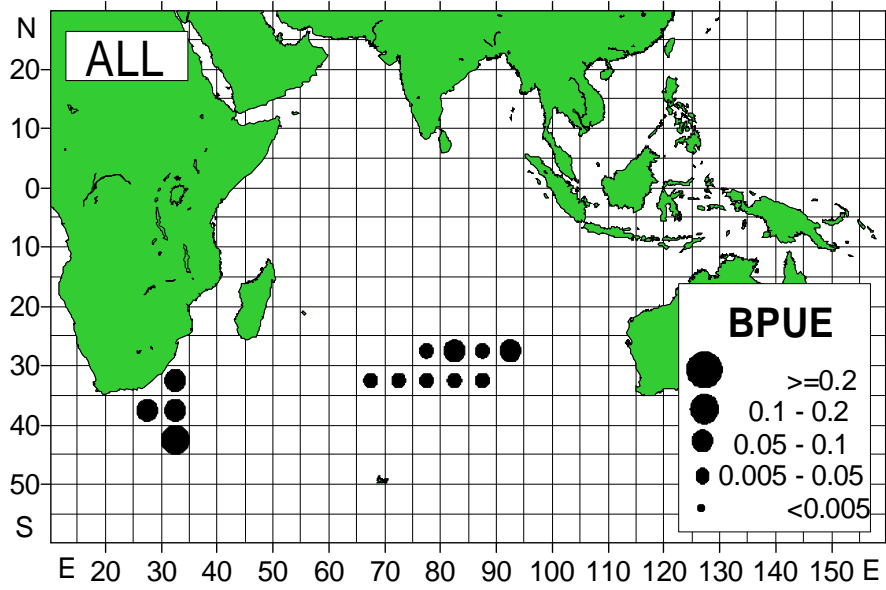Figure 2 Distribution of observed fishing efforts from 2002 to 2006

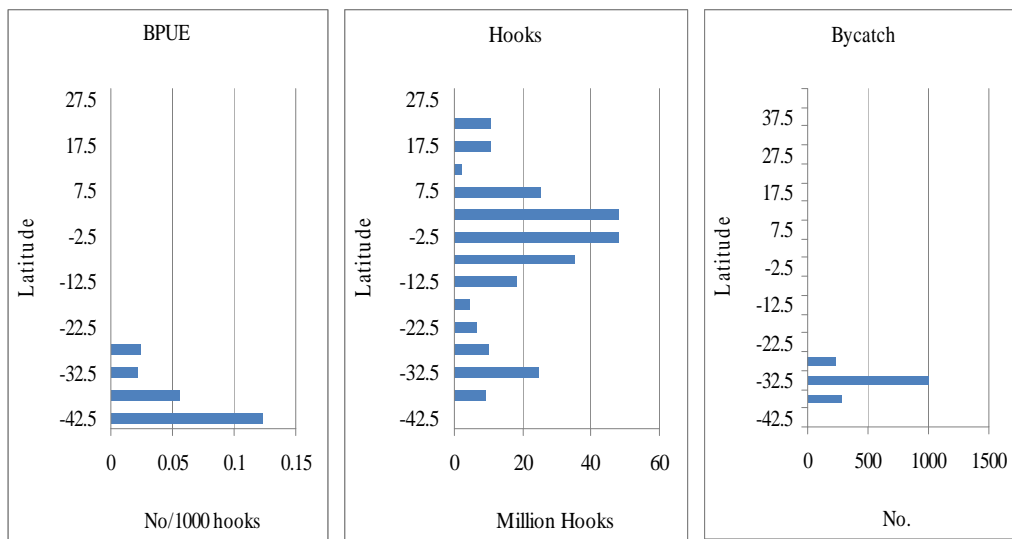Figure 3 Distribution of seabird BPUE from 2002 to 2006

Fig 5 Seabird BPUE, efforts and estimated seabird incidental catch number by Latitude from 2002 to 2006.