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Preliminary estimation of seabird bycatch of Taiwanese longline fisheries in the Pacific 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 Pacific 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 Pacific Ocean large scale tuna longline fleets. The coverage rate by trips was 3.5% in average. The observed days were 1590. According to the data collected, the seabird incidental catch rate (BPUE) in each 5*5 degree grid square varied from 0 to 0.76 per 1000 hooks with the average BPUE of 0.054 per 1000 hooks. As for the seabird incidental catch distribution, the BPUE was the highest in the areas between25-40 N and 165 W to 165 E and between 25-35 S and 165-180W. On the contrary, the BPUE was low in tropical area. 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 1500 per year. The observer data showed the set up of bird scaring lines could reduce the incidental catch of seabird effectively.

Keywords: seabird bycatch, longline, Pacific 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. Among those researches, the United States has long historical data of seabird bycatch collection in Alaska and Hawaii areas as well as the research on seabird bycatch mitigation measures (IATTC SAR-8-12c).

Taiwan Fisheries Description

The Pacific Ocean is one of the earliest fishing grounds exploited by Taiwanese tuna fishery. 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 15°N and 15°S) targeting on bigeye tuna, and those operate in subtropical and temperate waters targeting on albacore. Vessels targeting on bigeye tuna usually conduct a year round operation, and transship their catches to transport vessels and receive fuel and supplies during

transshipment. Those fishing for albacore usually have to enter into port twice a year for landing, fuel and supply.

Historically, most of the LTLL fleets targeted on albacore for canning. Before 1995, the catch of albacore in the South region was higher then north region. For the opportunities of access agreements to the South Pacific were constrained, the Taiwanese fishing efforts and catch in the North region increased thereafter. These vessels fish for northern albacore seasonally from September to next March, and shift to the South Pacific fishing for southern albacore from April to August.

In recent years, higher proportion targeted on tropical species for Japanese frozen sashimi market. The major fishing grounds of LTLL fleet were located in the central regions. During 2002-2004, the most dominant species was bigeye, accounting for about 36% of the total catch, while the albacore for another 35%. Owing to the bigeye quota restriction, Fisheries Agency has perceived the current situations and decided to carry out fleet reduction program to decrease the fishing vessels, for special considerations. The total number of vessels operating in the Pacific Ocean in 2002 was 133, the number increasing to 142 in 2003, then continue decreasing to 117 in 2006. The catch of bigeye were around 13,000 ton, accounting for about 34% of the total catch, while the albacore tunas were around 11800 t, for another 30% during 2005-2006.

IATTC adopted 05-01Resolution On Incidental Mortality Of Seabirds encourage CPCs to collect and voluntarily provide the Commission with all available information on interactions with seabirds, including incidental catches in all fisheries under the purview of IATTC. Fisheries Agency of Taiwan has launched an observer programs to collect bycatch data since 2002. In this study, it provided the information of seabird bycatch from the observer programs, and attempted to estimate the seabird bycatch of Taiwan large scale longline fleet in the Pacific Ocean from 2002 to 2006.

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

3.1 Longline Fisheries Activities

The annual fishing efforts varied from 82978 to 145,106 thousand hooks between 2002 and 2006. The average hooks were 118,206 thousand hooks. The geographical distributions of fishing efforts are shown in Figure 1.

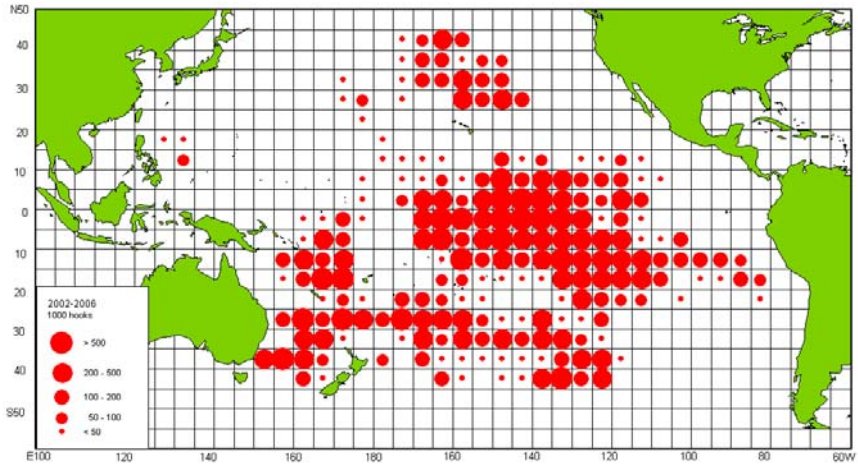

Figure 1 Distribution of efforts of Taiwanese longline fisheries in the Pacific Ocean between 2002 and 2006

The efforts ratio by area/fleets were showed in Figure 2. The efforts of bigeye fleet in tropical areas were more stable during the year. However, the efforts of albacore fleets was not uniform. Hooks set in south areas were concentrated in Season 2 and Season 3. The hooks set in north were major in Season 1 and Season 4.

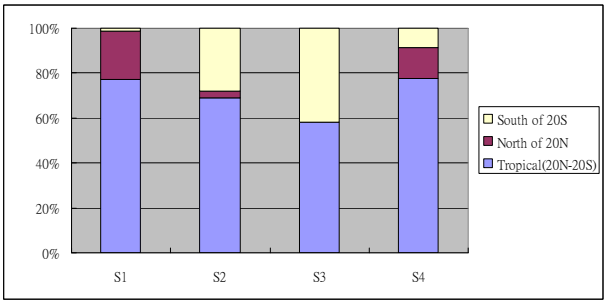

Figure 2 Effort deployed by season by area from 2002 to 2006

3.2 Observation data

The total observer's trips were 23 between 2002 and 2006, 15trips for bigeye fishing vessels and 8 trips for albacore vessels. Over 60% of the observers were deployed on bigeye vessels since it's the major fisheries. The average observer's coverage rate by trip was 3.5%. The observer coverage increased from 0.75% in 2002 to 8.55% in 2006.

The total observation days were 1,590 and the total hooks were 5,387 thousands from 2002 to 2006. Over 60% of the observation area was in the tropical areas, with only 33% in north area and the others in south area (Figure 3).

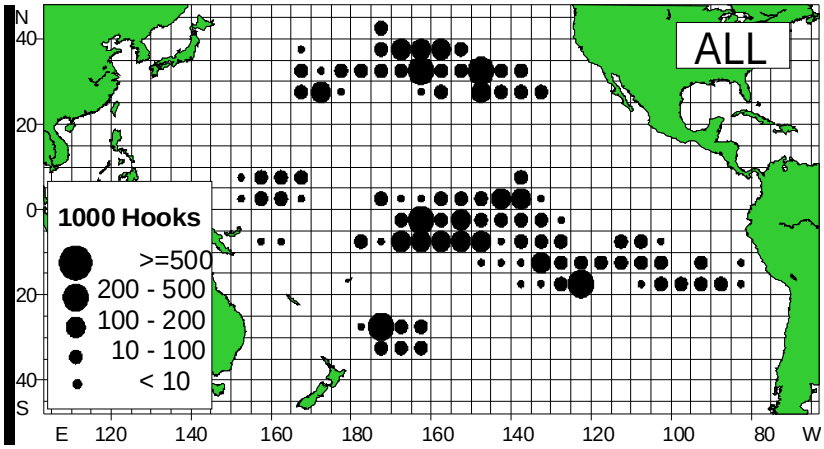

Figure 3 Distribution of observed fishing efforts from 2002 to 2006

3.3 Seabird Incidental Catch

The seabird incidental catch BPUE varied from 0 to 0.76 per 1000 hooks, with the average BPUE of 0.054 per 1000 hooks. The distribution of incidental catch is shown in Figure 4. It shows that 28 5*5 degree grid square have the records of seabird incidental catch. The seabird incidental catch was the highest in area north of 30 N, especially in areas between165W-165E, 25-40N. Most were caught in Season 1 and Season 4.

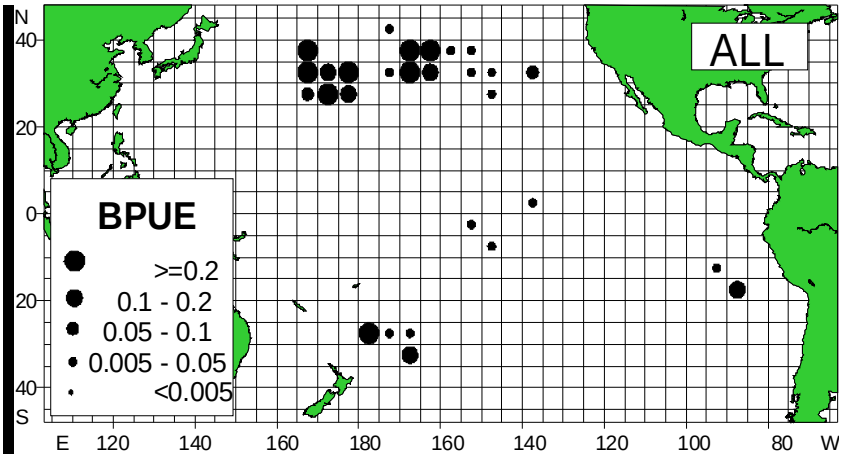

Figure 4 Distribution of seabird BPUE from 2002 to 2006

3.4 Estimated total Seabird Bycatch

The BPUE and the preliminary efforts data were used to estimate the seabird incidental catch. The preliminary estimated seabird incidental catch were 467 to 2030 per year, with the average of 1361 per year. The average seabird incidental catch, fishing efforts and estimated seabird bycatch mortality by 5 degree latitude are

shown in Figure 5. It shows the seabird incidental catch occurs more in higher latitudes in the north, especially in area north of 30 degree north. As for the fishing effort distribution, tropical areas where the seabird incidental catches were relatively low. And most of the seabird incidental catch occurred in areas north of 30 degree north.

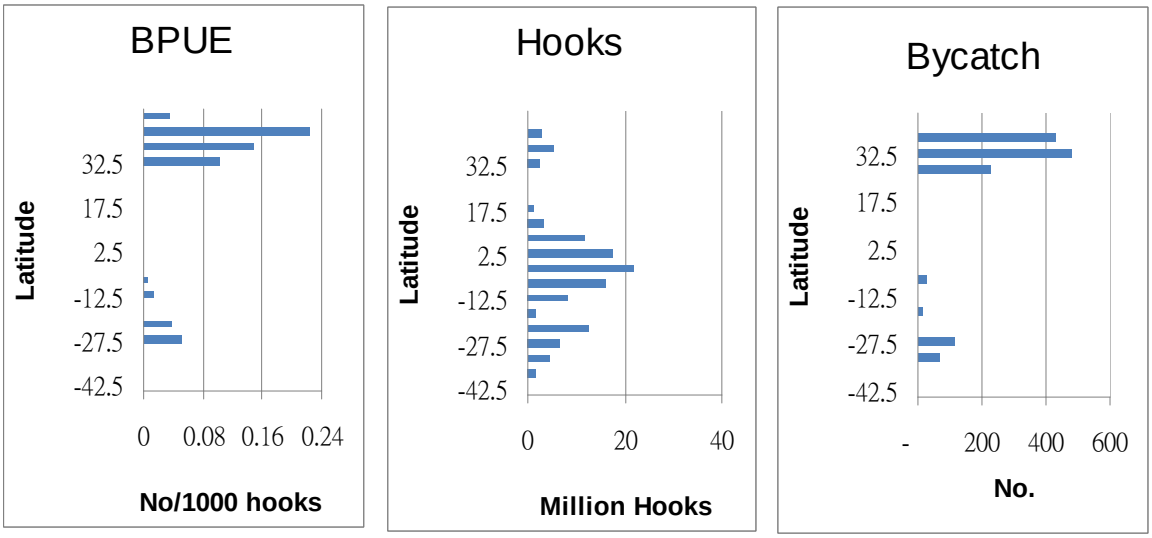

Fig 5 Seabird BPUE, efforts and estimated seabird incidental catch number by Latitude from 2002 to 2006.

3.5 Effect of bird-scaring lines

During those 23 trips, there were two trips operating in northern area in winter season (Season 1 and season 4). In the beginning of the trips, those two vessels were not set the bird scaring line which had higher seabird incidental catch rate(in an average of 0.82 and 0.70 No/thousand hooks). After those two vessels set up the bird-scaring lines, the seabird incidental catch rate was dropped to 0.29 and 0.32. It showed the effects of bird-scaring line of avoiding the bycatch of seabirds (Figure 6).

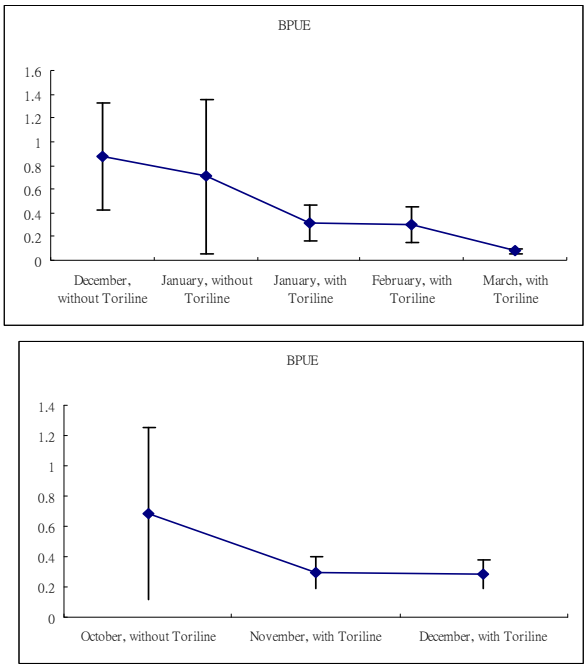

Figure 6 The incidental catch rate before and after the set of bird scaring line in two trips.

4. Discussion

Because the observer coverage was low in early years, we combined five years observers data, trying to cover more fishing ground of Taiwanese fishing vessels. Seabird abundance and species composition is not uniform throughout the region. 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.

The probability of catching seabirds may depend on fishing area, bait, fishing gears, the seabird behavior. It showed the bird scaring line will decrease the bycatch of seabird effectively. The further analysis on the characteristics of fishing activities and seabird ecology would be useful to obtain more information for seabird bycatch estimation, furthermore, reducing the seabird incidental catch.

Noting the importance of ecosystem approach conservation and management, the government has already adopted the National Plan of Action of Seabird. There is a need to increase the observer deployment on fishing vessels operating in the northern areas for collecting seabird incidental catch information and encouraging the vessels operating in high latitude to set the bird scaring line to avoiding the seabird bycatch.