

COMPARISON OF 1994 YEARLY ALBACORE MEAN WEIGHT DERIVED FROM RECOVERED LOGBOOKS VERSUS SAMPLED LENGTH FREQUENCY

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SUMMARY

A scheme to compile catch data for the tuna longline fishery of Taiwan has been conducted by the OFDC since July, 1996. An alternative procedure for the compilation of logbook records was adopted in 1994. The catch data, in weight, adjusted by commercial landing information and boat-trip category, appeared to be more accurate than the previous procedure. Catches in number of the two methods can then be obtained by (1) dividing the adjusted catches in weight by mean weight derived from length frequency data (assuming the length frequency has been properly sampled); and (2) adopting the number of fish caught recorded in the original logbooks (assuming the number of fish caught is correct). As a result, the albacore yearly mean weights derived from the two algorithms appeared quite different between them. This may have a significant impact on its follow-up stock assessment. It is therefore recommended that further studies be undertaken to clarify this discrepancy.

RÉSUMÉ

Le système de compilation des données de capture des pêcheries thonières à la palangre de Taïwan est exécuté par l'OFDC depuis juillet 1996. Un processus alternatif de compilation des registres des carnets de pêche a été adopté en 1994. Les données de capture en poids, ajustées en fonction des informations issues des débarquements commerciaux et de la catégorie de sorties de bateaux se sont révélées plus exactes que le processus précédent. Les prises en nombre issues des deux méthodes peuvent alors être obtenues (1) en divisant les prises en poids ajustées par le poids moyen issu des données de fréquence de longueur (en supposant que la fréquence de longueur a été correctement échantillonnée) et (2) en retenant le nombre de poissons pris enregistré dans les carnets de pêche originaux (en supposant que le nombre de poisson pris est exact). Il en résulte que les poids moyens annuels de germon issus des deux algorithmes présentent une différence assez notable. Ceci peut avoir un impact significatif sur l'évaluation à venir de son stock. Il est par conséquent recommandé d'entreprendre d'autres études afin de clarifier cette différence.

RESUMEN

A partir de julio de 1996, Overseas Fisheries Development Council (OFDC), lleva a cabo un sistema de compilación de datos de captura de la pesquería de palangre de Taiwan. En 1994 se adoptó un procedimiento alternativo para la recopilación de registros de cuadernos de pesca. Los datos de captura en peso, ajustados con información comercial sobre desembarques y categoría de embarcación, parecían ser más precisos que con el procedimiento anterior. Se pueden obtener capturas en número de los dos métodos mediante (1) la división de las capturas ajustadas en peso por el peso medio derivado de los datos de frecuencia de tallas (asumiendo que la frecuencia de tallas haya sido adecuadamente muestreada), y (2) la adopción del número de peces capturados registrado en los cuadernos de pesca originales (asumiendo que el número de peces capturados sea correcto). En consecuencia, los promedios de pesos anuales de atún blanco deducidos de los dos algoritmos parecía presentar bastantes diferencias entre ellos. Esto podría tener un impacto significativo en las consiguientes evaluaciones de stock. Por tanto, se recomienda efectuar estudios ulteriores para aclarar esta discrepancia.

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INTRODUCTION

Collection, compilation and analysis of fishery statistics are fundamental to the effective conservation and management of fishery resources. To enhance the functions of the related work, the catch statistics collection and compilation group as well as the research group was reorganized in Taiwan during 1995. The data collecting system is similar to that explained in SCRS/94/43. Starting from July of 1996, the responsibility of checking and compiling the fishery statistics was shifted to the Overseas Fisheries Development Council of the Republic of China (OFDC), a nonprofit organization with funds endowed by both the Government and the fishery sector.

For 1994 logbook data, an alternative procedure was adopted by OFDC due to additional information which could be treated as check-points to the logbook records available. The procedure was mainly based on the comparison and further adjustment with commercial landing records by boat-trip basis. Basically it is the same as that described in Chap. 4 of ICCAT Field Manual for Statistics and Sampling Atlantic Tunas and Tuna-Like Fishes (3rd ed.). All the logbooks have been compared and adjusted by boat-trip basis according to the following four information: (1) the verification on fishing vessels' sales settlement, (2) the certified weight reports of the New Japan Surveyors and Sworn Measures Association, (3) the traders' sales records, and (4) the radio reports from Kaohsiung Fishery Radio Station (SCRS/96/78 (Rev.)). Then the logbook data were raised to finalized TASK I data (Appendix 1).

The data adjusted and raised by the above procedure are catches in weight. However, some analyses need catches in number to calculate the catches in number per unit effort (CPUE) or the catch-at-size. To this end, there were two methods to obtain catch in number data: (1) to divide the adjusted catches in weight by mean weight derived from length frequency data, assuming that the length frequency has been properly sampled; and (2) to directly adopt the number data recorded in the original logbooks, assuming that most fishermen may only biased report the weight but not the catch in number. However, take albacore as an example, there was a big difference between the yearly mean weights derived from the obtained two data sets. This paper provides a note showing the difference which may have impacts on its follow-up stock assessment. Further studies and discussions should be made before these catch in number data can be appropriately applied in stock assessment.

MATERIALS AND METHODS

The adjusted and raised logbook data (the catches in weight)

Logbook data were collected by the Fishery Department of Reconstruction Bureau, Kaohsiung Municipal Government (FDKMG) and compiled by OFDC. The data have been adjusted and raised to TASK I before using in this study by the alternative procedure described in the previous section and Appendix 1. The adjusted and raised logbook data obtained were catches in weight.

1st data set: Catches in number from the catches in weight and the size frequency data

Size frequency data of 1994 were also obtained from FDKMG; they were aggregated measurements of the first 30 fish caught in a set by Taiwan's longliners. Those albacore size frequencies were aggregated by the four ICCAT Albacore statistical areas (hereinafter referred to 'subarea') and by quarters. Then, these size frequencies were converted to weight frequencies using new length-weight equations recommended by ICCAT (SCRS/96/70) for north and south Atlantic albacore. Mean weights by areas and by quarters (mean weights of blocks) were obtained by dividing the total weight of each block by the total number of fish sampled in the same block. The blocks without size sample but with catches were substituted according to Chap. 5 of ICCAT Field Manual.

The catches in number were then back-calculated by dividing the raised catches in weight (on month and 5-degree fishing area basis) by the corresponding mean weights obtained above.

In the final report of the Data Preparatory Meeting for Atlantic Pelagic Tuna Longline Fisheries (SCRS/94/36) has recommended a procedure to obtain catches in weight from the catches in number data and the size frequency data. The procedure used here to obtain the 1st data set was actually the same as theirs but in reverse direction; and with exception of that the mean weight obtained here was by converting the size frequencies to the weight frequencies rather than directly converted from the mean size in the report.

2nd data set: Catches in number from the raised (but not adjusted) logbook records

The catches in weight have been adjusted and then raised to TASK I. If the daily number of albacore caught in the original logbooks are correct and needed no adjustment, then the number data could be adopted directly and raised to the 2nd data set.

RESULTS AND DISCUSSION

Yearly mean weights

Yearly mean weights of Atlantic albacore can be obtained by dividing the catches in weight with catches in number in the 1st and 2nd data sets. The estimated mean weight for the entire Atlantic Ocean was 21.3 kg from the 1st data set and 16.4 kg from the 2nd data set, about 5 kg of discrepancy between the two. Additionally, the mean weight calculated directly from the original logbook records was 13.8 kg, which is lower than those from the two data sets. The range of these discrepancies represent up to about 25% difference in the number of fish in Taiwan's catches.

The low mean sighted weight from original logbook records might be resulted from under-estimation of the fish weight caught by eyes of skippers. After adjusted the weight information in each logbook using commercial landing record for each trip, the mean weight has increased to 16.4 kg.

When examining the scattering pattern of detailed mean weights calculated from each record of the 2nd data set, it is found that only about 6% of the estimated total number of fish have abnormal mean weight higher than 35 kg per fish; while the others ranging mainly from 15-23 kg. Detailed examining the logbook records, these abnormal high values were concentrated in few poorly reported vessels.

Comments on the 1994 size frequency data

The 1st data set which has high yearly mean weight was heavily influenced by three vessels' length measurements: all samples consisted huge number of small fish (Fig. 1).

According to the three vessels' logbook information, Vessel A has been fishing in subareas 33 and 34 and the other two vessels were all fishing in subarea 34. The mean weights calculated from their unadjusted and unraised logbook records were shown in Fig. 2. In Fig. 2 the mean weight of Vessel A in subarea 34 was 11.0 kg; that is 80.6 cm using length-weight equation for south Atlantic albacore (SCRS/96/70, Penny's equation); and 23.2 kg (102.5 cm) in subarea 33. Similarly the other two vessels' mean weights were 10.4 kg (79 cm). All these mean values were comparatively larger than the size frequencies of the three vessels in Fig. 1.

On inquiry with masters of the vessels, two explanations were obtained: (1) The sample ratio was low comparing to their annual total catches of albacore (Table 1) and there were more larger fish not being measured; (2) only the first 30 fish caught in a set were measured, those fish might not be at random sampled. Therefore, the samples were excluded from the size frequency data set. This made the mean weight as calculated from the actual size frequency data of South Atlantic albacore to be 19.2 kg (Fig. 3). If adding samples from the three vessels into the actual size data set, the mean weight of South Atlantic albacore will reduce to a relatively small level of 12.2 kg.

Fig. 4 plots Taiwan's catch-at-size distributions of the South Atlantic albacore (the "File2" data from ICCAT, July 9, 1996). It could be found from Fig. 4 that with or without the small and large fish, the samples will make large differences in the mean weights (Fig. 5). Therefore, using the mean weight derived from size frequency data should be carefully checked whether the size frequency data have been properly sampled or adjusted.

ACKNOWLEDGEMENT

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REFERENCES

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- SCRS/96/70 (Revised) Procedures adopted for updating catch at size for North and South Atlantic albacore (as of July 24, 1996) - ICCAT Secretariat
- SCRS/94/36 Final Report of the Data Preparatory Meeting for Atlantic Pelagic Tuna Longline Fisheries (Taipei, Taiwan, May 11-15, 1994)

Table 1. Atlantic albacore length sample ratios of the three Taiwan longliners.

	Length sample size	Catches in number in the original logbooks	Sample ratio
Vessel A	4,372	22,976	19%
Vessel B	6,495	26,577	24%
Vessel C	6,205	18,508	34%

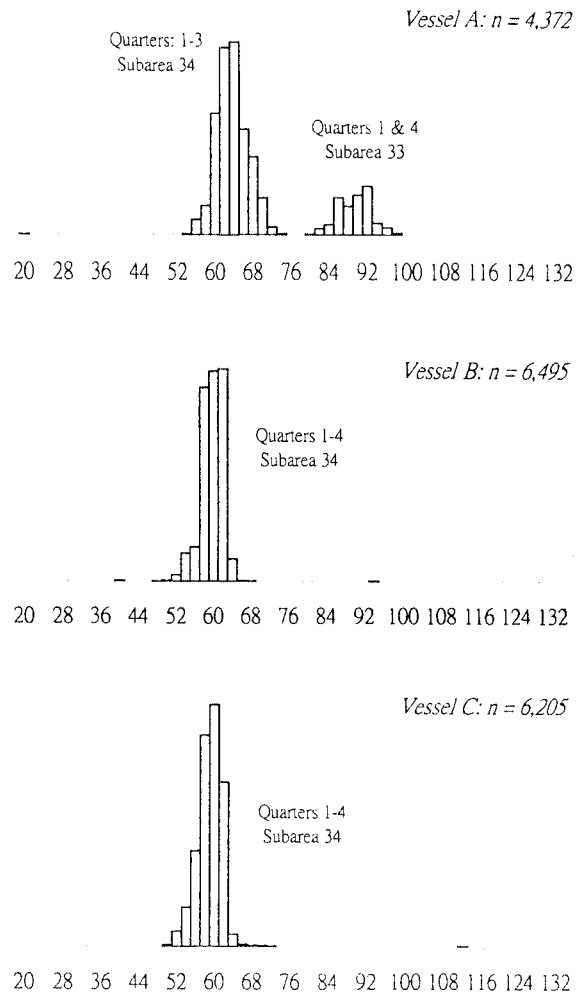


Fig. 1. Size frequency of Atlantic albacore measured by the three Taiwan longliners in 1994.

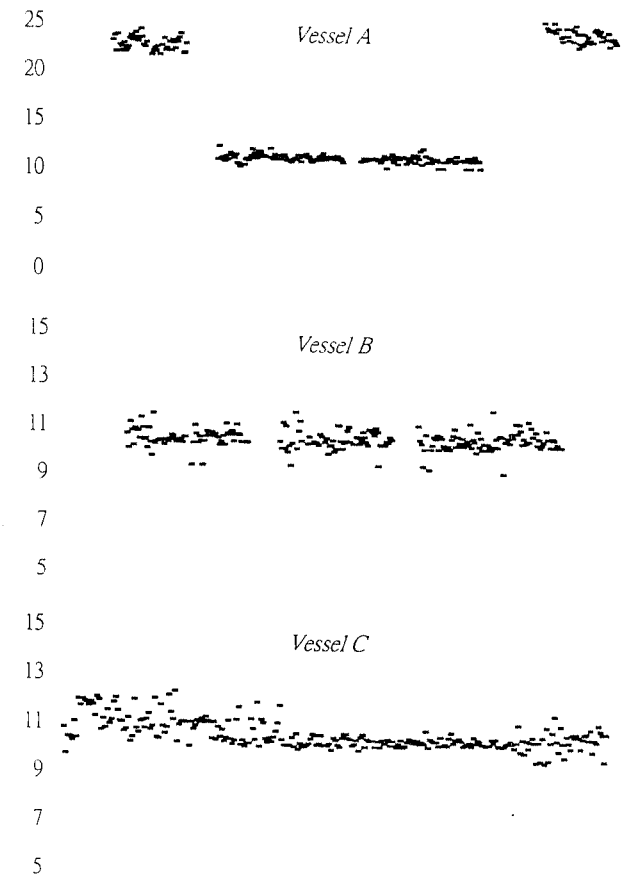


Fig. 2. Atlantic albacore mean weights calculated from original logbook records of the three Taiwan's longliners in 1994.

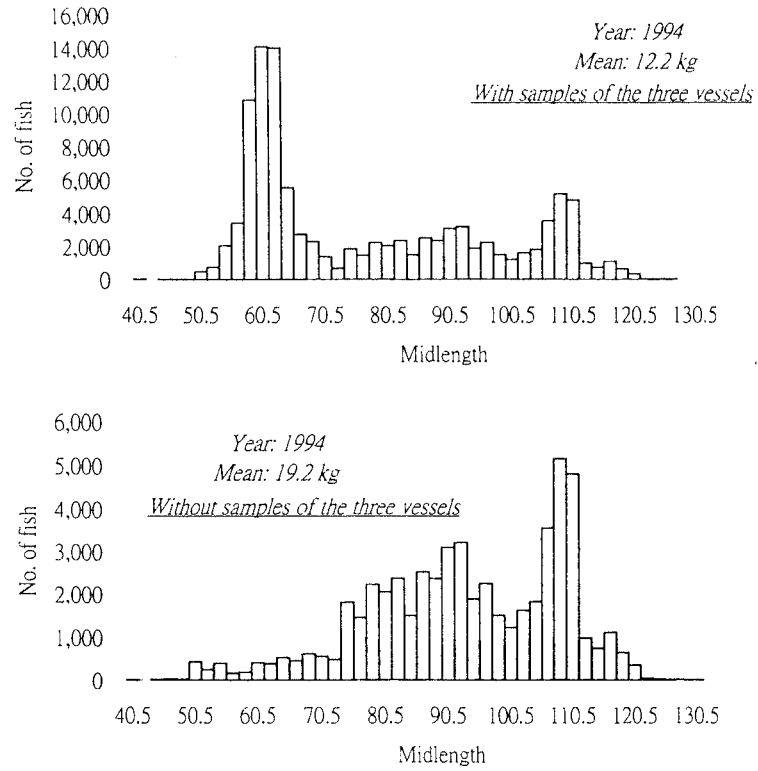


Fig. 3. Actual size frequency of South Atlantic albacore with or without samples of the three Taiwan's longliners in 1994.

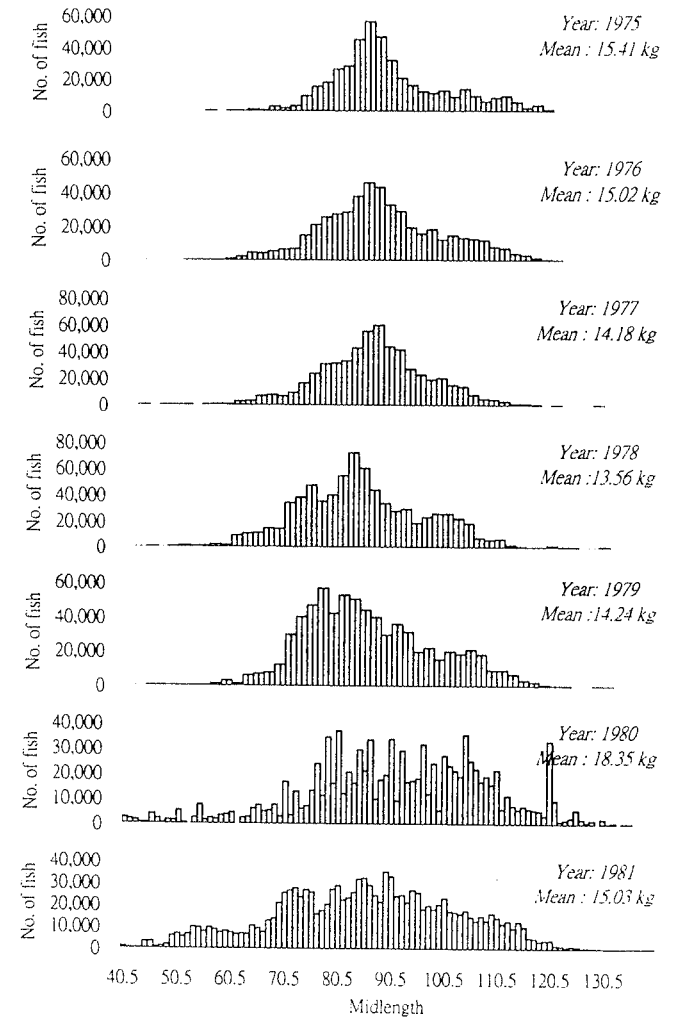


Fig. 4. Taiwan's catch-at-size of the South Atlantic albacore, 1975-1993.

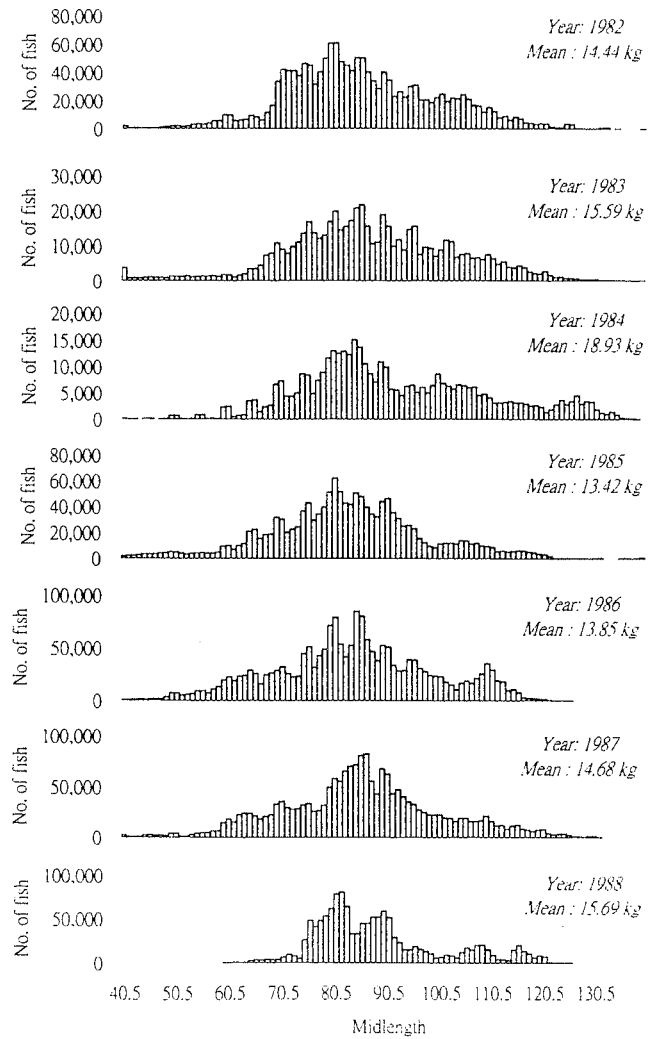


Fig. 4. (Continued)

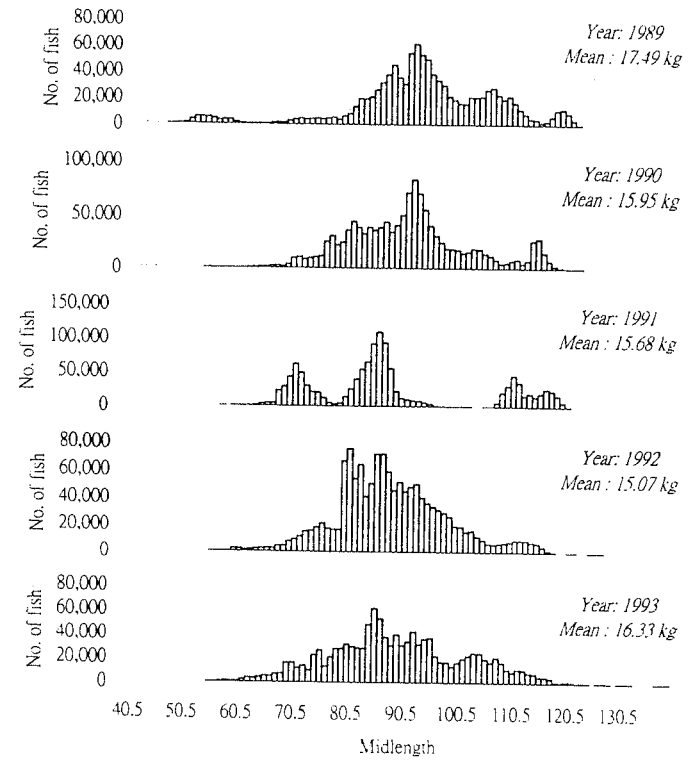


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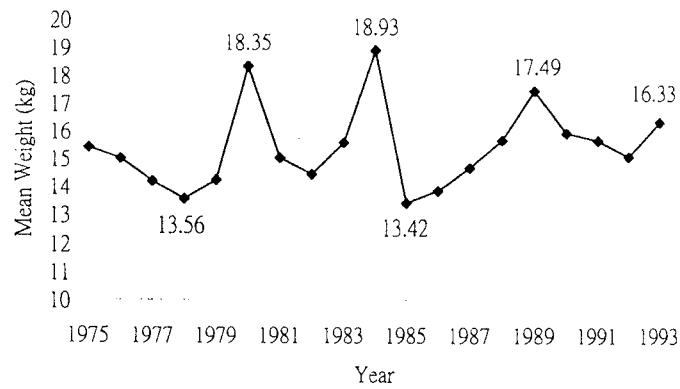


Fig. 5. Annual mean weights of South Atlantic albacore calculated from Taiwan's catch-at-size data. (from ICCAT "File2", July 9, 1996)

APPENDIX 1

Procedure to Check and Adjust Logbook Records for 1994

Check: Call and Correct

1. **Basic checks:** to check if the data getting on land, moving too far between days, too many hooks a day, ..., etc.
2. **Comparison checks:**
 - Fishing Area:** to check with daily radio reports of Kaohsiung Fishery Radio Station for the operation range and trips information
 - Catches in weight:** to sum up catches in weight by boat-trip, and then compare with
 - (1) the verification on fishing vessels' sales settlement
 - (2) the certified weight reports of Shin Nippon Kentai Kaisha, the New Japan Surveyors and Sworn Measures Association (NJSSMA)
 - (3) traders' sales records

Adjust: According to the comparison results of the boat-trip catch in weight

"Generally, the logbook gives daily catches, estimated by the captain. These catches are unloaded at the end of the trip and weighted on a commercial scale. ... All the logbook records of daily catches should be adjusted proportionally to the total landing weight so that the sum of catches matches the landing, if all the fish caught are unloaded."

– Field Manual for Statistics and Sampling Atlantic Tunas and Tuna-Like Fishes, 3rd ed., ICCAT

Raise: Raise to TASK I

Coverage rate = (Sum of catches of the major species recorded) / (Total catches of the species)