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PROCEDURES ADOPTED FOR PROCESSING LONGLINE CATCH-BY-SIZE DATA FOR WORKING GROUP ON JUVENILE TROPICAL TUNAS

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1. Abstract

a. All Task 1 catches of yellowfin and bigeye were sized.

b. Task 1 catches were broken down into time-area strata using corresponding Task 2 data. If Task 2 data were lacking, data substitutions were made. In order to expedite this procedure, three Standard Series were created for Task 2 catch data (Sections 3 and 4).

c. All available size data were combined by time-area strata and by country. As in the case of Task 2 catch data, three standard size series were created (Sect. 5).

d. Catches broken down into time-area strata were matched to corresponding size data. If there were no size data to match, the standard size series was used (Sect. 6).

e. Size frequencies were then raised to the matched catches for each strata (Sect. 7).

f. The basic file consists of catch-by-size data (2 cm intervals) by time-area strata, by fleets and by year. The summary table consists of combined catch-by-size, for all fisheries, by time-area strata and by year (Sect. 8).

2. Basic data base

The ICCAT Task 1 catches, Task 2 catch and effort data and Task 2 biological data bases as of December 31, 1983, were used. The Task 1 catches are the same as those which appear in Stat. Bull. Vol. 13 (Final).

All the size frequencies were converted into 2 cm intervals. Some frequencies recorded in 5 cm intervals were assigned to the mid-points of the intervals. This resulted in jagged output tables for some frequencies. A few samples which showed suspicious mean weights were eliminated. For yellowfin, size data were eliminated from the time-area strata for which the accumulated sample size was 50 fish or less.

All the codes used in this work were the standard ICCAT codes, except for the following special country codes:

EXPLANATION OF THE CODES	COUNTRY CODES USED
Standard Series for Korea	91
Standard Series for China (Taiwan)	92
Standard Series for Japan	93

3. Time-area strata

The time strata used were quarter-year periods. The years 1975 through 1982 were covered in this work. The areas used in this work are attached as Figs. 1 and 2. These are the areas approved at the Data Preparatory Meeting (Dakar, February, 1984).

4. Catch by strata

Task 2 catches are generally recorded by 5^{o} x 5^{o} areas and by month for the longline fisheries. In this work, they were arithmatically added to the time-area strata discussed above. All the Task 1 catches were broken down into these time-area strata using the Task 2 catches, assuming that they were proportionally distributed to the Task 2 catches. If Task 2 catch data were in number of fish, the average weight of fish for each stratum was calculated based on the size frequency matched to that stratum (see Sect. 7) and was used to convert number of fish into weight.

When Task 2 catch data were partially lacking for some fisheries, they were substituted by the data from the following year or preceding year, in that order of preference. However, for some fisheries, the Task 2 catch data are totally lacking. To facilitate the data substitution in such cases, three Standard Series of Task 2 data were created for Korea, China (Taiwan), and Japan. The reasons for creating these three series are rather obvious. They have relatively complete data sets, while the fleets' operating patterns are distinct in terms of their target species and fishing grounds.

Since there are two series of data in the ICCAT data base for Korea and China, (i.e. national series and those which originated from ICCAT port sampling), the following sets were chosen based on the adequacy of sample coverage.

SERIES	YEARS COVERED	DATA BASES USED
CHINA(TAIWAN)	1975	CHI.TAIW (national data)
	1976 - 1978	CHI.COMB (This file was created by a combination of national and port sampling files to eliminate biases in 1981 (see SCRS/81/11))
	1979 - 1982	CHI.TAIW (national)
JAPAN	1975 - 1981	JAPAN (national)
	1982	JAPAN 1981 substituted
KOREA	1975 - 1979	KOR+PAN (ICCAT port sampling data)
	1980 - 1982	KOREA (national)

If one fishery was totally lacking Task 2 data, the Task 1 catch of that fishery was merely added to the Task 1 catch of one of the above Standard Series (e.g. Panama to Korea series), or to the catch of one area of the above series (e.g. Argentina to Korea standard yellowfin area 3 etc.). This procedure simplified the work while having the same effect as data substitution. However, the identity of these fisheries was lost due to being included in the standard series.

Standard Series and substitutions actually made are summarized in Tables 1 and 2.

5. Standard Size Data Series

Since many of the catches by time-area strata lack corresponding Task 2 biological data, rather than substituting each stratum for each fishery, three standard data sets of size were created as was the case with Task 2 catch data. Those standards are for the Taiwanese, Japanese and Korean fleets.

For the Taiwanese and Korean fleets there are two different size series available in the ICCAT data base, i.e. those which originated from sampling by national scientists, and those which originated from the ICCAT port sampling program. Considering the quality of sampling and sample sizes, the following data were used for each series:

STANDARD SERIES	YEARS	SIZE DATA USED
CHINA	75 - 78	Size data obtained through the ICCAT port sampling program were used since those are the only data available.
	79 - 82	Size data sent by Taiwan University (fishermen aboard vessel sampling) and size samples obtained through the ICCAT port sampling program were combined and used.
JAPAN	75 - 81	Japanese Government Task 2 biological data. For 1982, data for 1981 were used.
KOREA	75 - 79	Size data obtained through the ICCAT port sampling program were used since Korean Task 2 data for those years are duplications of part of the ICCAT port sampling data.
	80 - 82	Size data obtained through the ICCAT port sampling program and Task 2 data presented by the Korean Government were added and used.

In creating these standard series, it was necessary to fill in, by data substitution, all the time-area strata lacking biological data. The size frequencies were compared between areas, years, fleets and quarters. It was noted that the variance is less in the frequencies between years than between quarters. Also, between-fleet variance is smaller than between-area variance. Based on these observations, strata which lack size data were substituted using those from the same quarter, area and fishery, but from the following year, the preceding year, two years later or two years before.

When the fishery was not active in a certain area during the 8 year period covered in this work, many of the time strata in that particular area were naturally lacking data. If more than half of the strata were missing data in one area, they were substituted by data of another fleet rather than trying substitutions within the same fleet. These types of data substitutions made in this work between fleets are as follows:

When missing:			Substituted by:		
Series	Species	Area	Series	Species	Area
Japan	YFT	3	Korea	YFT	3
China	YFT	1	Japan	YFT	1
China	YFT	2	Japan	YFT	2
China	YFT	3	Korea	YFT	3
China	YFT	4	Korea	YFT	4
Japan	BET	3	Korea	BET	3
Korea	BET	1	Japan	BET	1
Korea	BET	2	Japan	BET	2
China	BET	1	Japan	BET	1
China	BET	2	Japan	BET	2

It should be noted, however, that even though the substitutions between three Standard Series were made, the catches which would match the strata thus substituted are very minor.

Table 1 summarizes the Standard Series created.

6. Data matching

The catches broken down into time-area strata, as described in Section 4, were then matched to the biological data. Only when the catch lacked corresponding size data, was one of the Standard Series used for data substitution. Table 2 summarizes the substitutions made.

7. Raising size frequencies to the catches

For each time-area strata, the size frequencies thus matched were raised to the corresponding catches, using the standard ICCAT method (details are described in the Explanatory Note of the ICCAT Stat. Series). The following length-weight relationships were used to convert number of fish into weight.

YELLOWFIN: $W = 2.1441 \times 10^{-5} \times FL^{2.97362}$

BIGEYE: $W = 2.396 \times 10^{-5} \times FL^{2.9774}$

These equations were agreed upon at the Dakar Preparatory Meeting.

8. Output table

The working basic file which has been created by this work consists of catch-by-size, by fleet and by time-area strata. This file exists only in data file form. The file has been copied on magnetic tape and is being sent to the scientists who so requested it.

As explained in the previous sections, when Task 2 catch or biological data were missing in their entirety, the catch of one fleet was added to the catch of the Standard Series before the size data were matched. As a result, each Standard Series includes several fleets. The following list shows which Standard Series included what fleets.

COUNTRY CODES	STANDARD SERIES	FISHERIES INCLUDED	REMARKS
92	CHINA (TAIWAN)	CHINA (TAIWAN)	
93	JAPAN	JAPAN	
		SOUTH AFRICA	
		SPAIN	BET area 4
		URUGUAY	YFT area 3, BET area 4
91	KOREA	ARGENTINA	YFT area 3, BET area 4
		CAPE VERDE	YFT area 2, BET area 4
		KOREA	
		PANAMA	
		POLAND	
		U.S.A.	
		VENEZUELA	YFT area 4, BET area 3

The Summary Table consists of total catches-by-size, by time-area strata. No fleet break-down is maintained. This Summary Table has been prepared in hard copy form and is being distributed to all the scientists concerned.

TABLE 1. DATA STANDARD SERIES MADE

STANDARD SERIES	TASK 1 YEARS	TASK 2 CATCH AND EFFORT YEARS	TASK 2 CATCH AND EFFORT DATA SOURCES	TASK 2 SIZE DATA YEARS	TASK 2 SIZE DATA DATA SOURCES
China (Taiwan)	75 - 82	75	CHI.TAIW (national)	75 - 78	CHI ICAT (Port samp.)
		76 - 78	CHI.COMB (nat. + Port)	79 - 82	CHI ICAT + CHI.TAIW
		79 - 82	CHI.TAIW (national)		
Japan	75 - 82	75 - 81	JAPAN (national)	75 - 81	JAPAN (national)
			82 by 81		82 by 81
Korea	75 - 82	75 - 79	KOR+PAN (Port samp.)	75 - 79	KOR+PAN
		80 - 82	KOREA (national)	80 - 82	KOR+PAN + KOREA
Brazil*				75	Brazil 75
				76	Brazil 76
				77	Brazil 76
				78	Br.Jpn 80
				79	Br.Jpn 80
				80	Br.Jpn 80
				81	Br.Jpn 81
				82	Br.Jpn 81

* Standard was created for size data and was used for Brazilian fisheries only.

Table 2. LONGLINE DATA AVAILABILITY AND SUBSTITUTIONS MADE

COUNTRY	TASK 1 YEARS	TASK 2 CATCH AND EFFORT YEARS DATA AV.	SUBSTITUTIONS	TASK 2 SIZE DATA YEARS DATA AV.	SUBSTITUTIONS
Argentina	75-78, 81	no data	Task 1 catch added to Korea Standard YFT Area 3, BET Area 4	no data	(Korea Standard)
Brazil	75 - 82	75 - 81	82 by 81	Brazil Standard	
Brazil Jpn	77 - 82	77 - 81	82 by 81	Brazil Standard	
Brazil Kor	76, 77	76, 77		Brazil Standard	
Cape Verde	82	no data	Task 1 catch added to Korea Standard YFT Area 2, BET Area 4	no data	(Korea Standard)
China (Taiwan)	75 - 82	75 - 82	China Standard	75 - 82	China Standard
Cuba	75 - 82	75 - 81	82 by 81	75, 76	For any missing strata and years, Korean Standard was used.
Japan	75 - 82	75 - 82	Japan Standard	75 - 82	Japan Standard
Korea	75 - 82	75 - 82	Korea Standard	75 - 82	Korea Standard
Panama	75 - 82		Task 1 catch added to Korea Standard		(Korea Standard)
Poland	82	no data	Task 1 catch added to Korea Standard		(Korea Standard)
S. Africa	79 - 82	79 - 82	When raised using S. African data, catch was added to Japan stnd.	no data	(Japan Standard)

COUNTRY	TASK 1 YEARS	TASK 2 CATCH AND EFFORT YEARS DATA AV.	SUBSTITUTIONS	TASK 2 SIZE DATA YEARS DATA AV.	SUBSTITUTIONS
Spain	75-77,81,82	no data	Task 1 catch added to Japan Standard BET Area 4	no data	(Japan Standard)
U.S.A.	80, 81	no data	Task 1 catch added to Korea Standard	no data	(Korea Standard)
Uruguay	81, 82	81, 82	After raised by Uruguay Task 2 catches, they were added to Japan Standard	no data	(Japan Standard)
USSR	75 - 82	78,79,81,82	75-77 by 78, 80 by 81	75 - 81	82 substituted by 81. For any missing strata, for any year, Japan Standard was used.
Venezuela	75 - 82	no data	Task 1 catch added to Korea Standard YFT Area 4, BET Area 3		(Korea Standard)

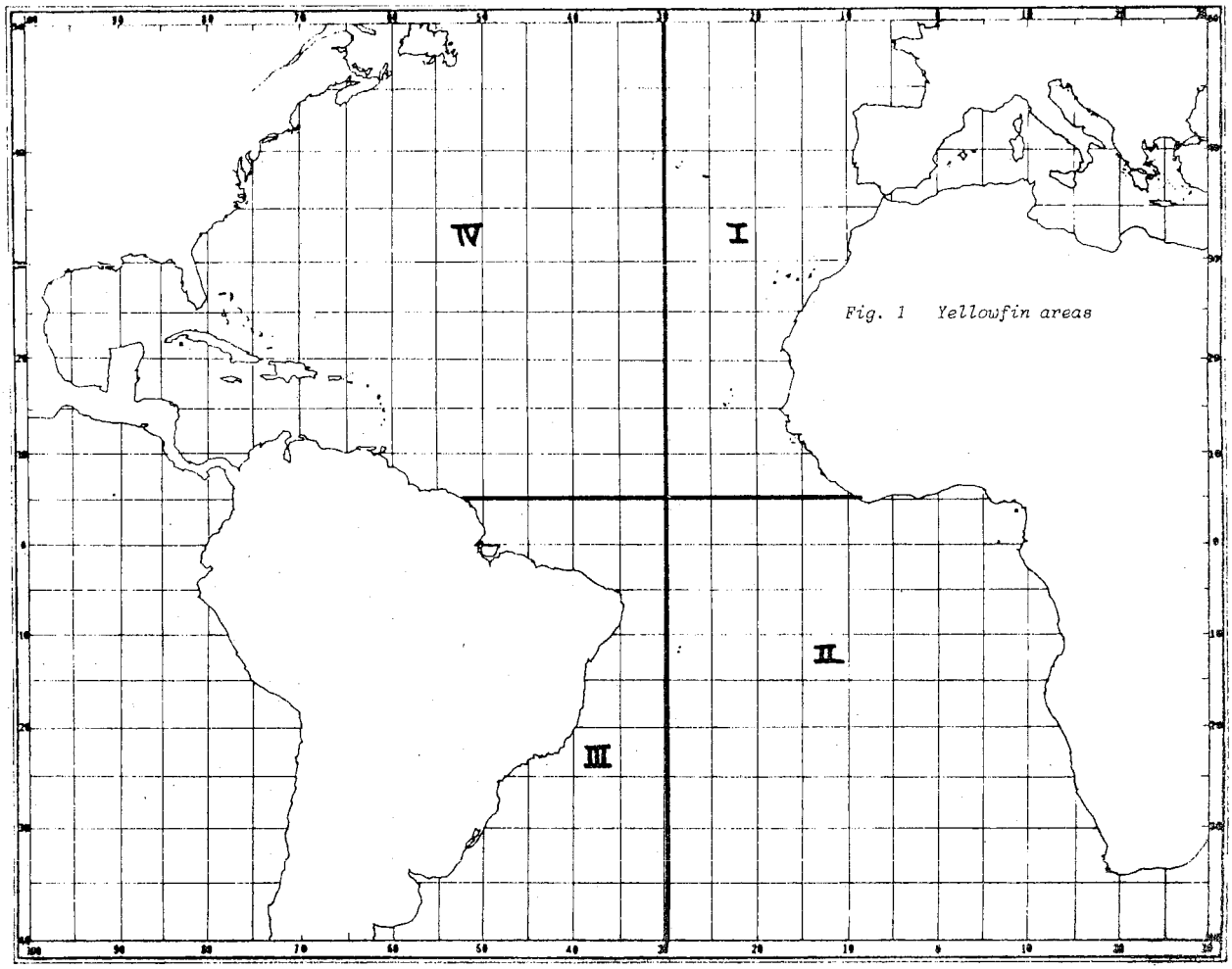

Fig. 1 Yellowfin areas

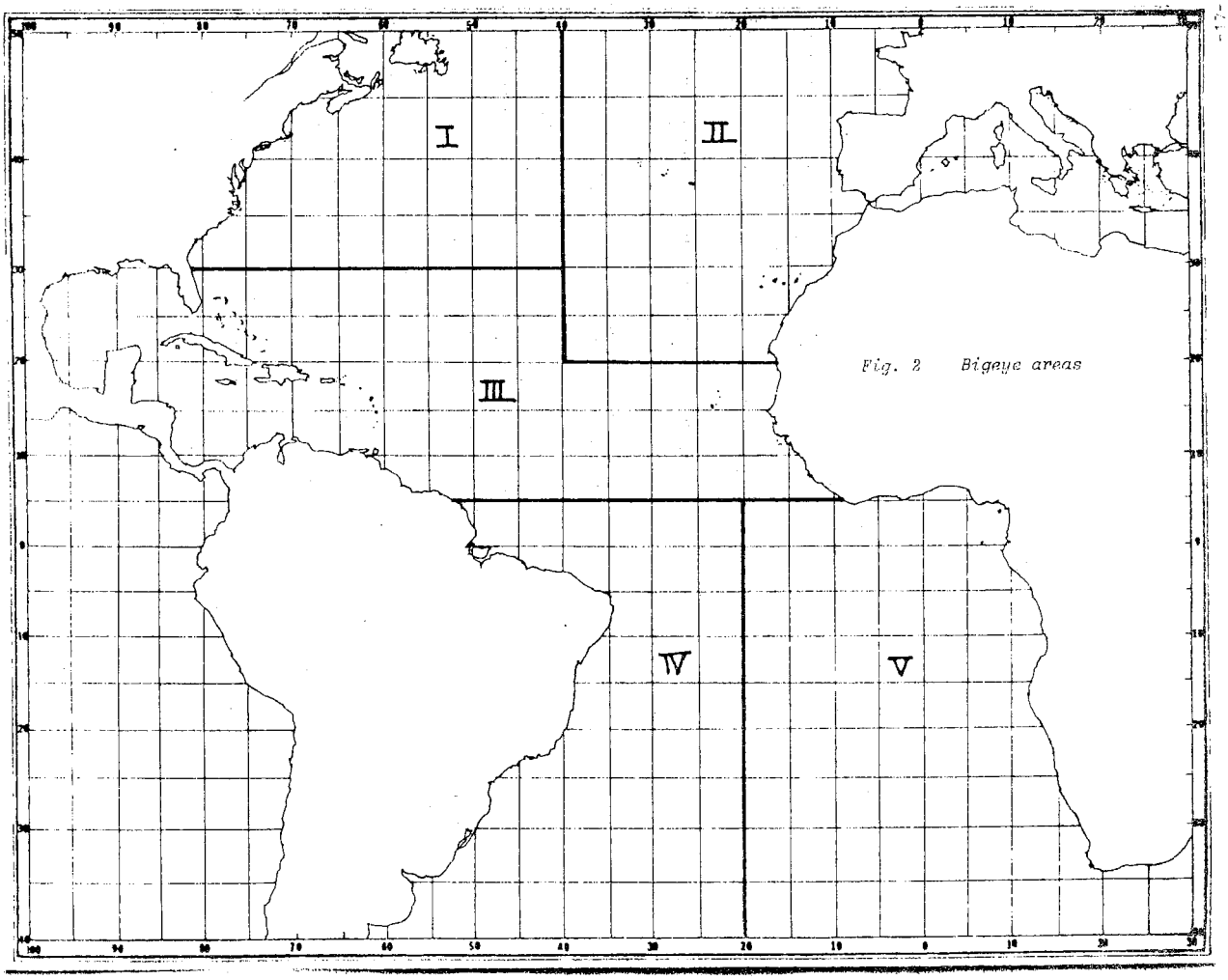

Fig. 2 Bigeye areas