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NOTES ON THE DATA BASE FOR THE HIGHLY MIGRATORY SPECIES IN THE MEDITERRANEAN

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1. Background on the ICCAT data base for tunas and tuna-like species

Since the International Commission for the Conservation of Atlantic Tunas (ICCAT) was established in 1969, one of its primary interests has been to set up and maintain a good data base for all tunas. The Commission's Standing Committee on Research and Statistics (SCRS) established the following criteria for the collection of data:

i) Annual nominal total catches by species, gear, nationality of the fishing vessels, and by large geographical area (contained in the Commission's "Statistical Bulletin" series).

ii) Catch and effort statistics by 1-degree latitude and 1-degree longitude rectangle (or 5 x 5 rectangle for longline fisheries only), by month, species, gear and flag (contained in the Commission's "Data Record" series).

iii) Length frequencies by species, area (smallest by 1° x 1° rectangles and largest by ICCAT sampling areas), by month (or quarter for longline fisheries), by gear and by flag. The sampling areas for bluefin tuna are shown in Figure 1. The length measurement of bluefin tuna should be expressed in fork length; the length intervals should be 1 cm for small fish and they could be 2 cm for large fish (Summary of data is contained in the Commission's "Data Records" series).

iv) Catch at length for selected species, including bluefin and albacore tunas and swordfish, by specific area (for bluefin: east Atlantic, west Atlantic and Mediterranean), and by month or quarter (see Section 2.2, below).

v) Tagging release and recovery data, with detailed information on releases and recoveries (see Section 2.3, below).

The national offices are responsible for submitting data to the Commission and ICCAT's Sub-Committee on Statistics is responsible for monitoring the collection of data. The Secretariat is in charge of managing all the data received, including verification of the data and checking for adequacy of data. When there is a lack of data or only insufficient data are available for a specific fishery, the Secretariat staff often visits the area concerned to help solving problems in the sampling system.

This paper was prepared for the Joint GFCM/ICCAT Expert Consultation on Evaluation of Stocks of Large Pelagic Fishes in the Mediterranean Area (Bari, Italy, June 21-27, 1990).

2. Current data bases

2.1. Actual basic data

The nominal catch data are updated (up to and including 1988); the preliminary 1989 data will be compiled by September, 1990.

Detailed catch and effort data are behind by a few months to one year to the nominal catch data, particularly for Japanese longline data, since the logbook records cannot be assembled until the end of the fishing trips which may last as long as 14 months.

Actual size data are not available for all the fisheries, even for those for which we have catch-at-length data. For example, France (Mediterranean) submits catch-at-length data, but does not submit actual size frequencies. The data are about one-half year behind the nominal catch data.

2.2 Catch-at-length files

a) Bluefin tuna

In the late 1970's, there were indications of a reduction in the bluefin stocks, particularly for the west Atlantic. The Commission decided to conduct an intensive research program on Atlantic bluefin tuna in order to gather all the data available. The following meetings have been held by the Commission for this purpose:

a) A workshop in Santander (Spain) in September, 1979 (Collective Volume of Scientific Papers, XI, ICCAT, 1980).

b) A data preparatory meeting in Trapani (Sicily) in May, 1983 (Coll. Vol. Sci. Pap. XIX, ICCAT, 1984).

c) A workshop in Tsukuba and Shimizu (Japan) in September, 1983 (Coll. Vol. Sci. Pap. XIX, ICCAT, 1984).

During all these sessions, the scientists agreed to carry out stock assessments of bluefin tuna by applying Virtual Population Analysis (VPA) and the creation of the data base required for such analysis was initiated. Also, it was agreed to conduct stock assessments based on a two-stock hypothesis; i.e. an east Atlantic stock which includes Mediterranean bluefin and a west Atlantic stock (see Figure 1). With this in mind, the scientists and the Secretariat gathered all the basic data available and created a catch-at-length file for the east and west Atlantic and Mediterranean.

Since then, the catch-at-length base has been up-dated each year for the latest year and whenever historical catch data are changed or new size data become available. The base is maintained as a working file in the computer separately from the basic data, such as actual size frequencies.

In principle, each national office is responsible for updating these data. However, the Secretariat has to update the catch-at-length base for all the fisheries, with the

exception of a few countries which create these files by themselves. The updating procedures applied by the Secretariat for catch at length have been reported in the following papers:

SCRS/84/26	Coll. Vol. Sci. Pap. XXII, ICCAT, 1985
SCRS/85/20	Coll. Vol. Sci. Pap. XXIV, ICCAT, 1986
SCRS/86/10	Coll. Vol. Sci. Pap. XXVI, ICCAT, 1987
SCRS/87/19	Coll. Vol. Sci. Pap. XXVIII, ICCAT, 1988
SCRS/88/64	Coll. Vol. Sci. Pap. XXX(2), ICCAT, 1989
SCRS/89/8	Coll. Vol. Sci. Pap. XXXII(2), ICCAT, 1990

The latest catch-at-length base was prepared in November, 1989, for the scientific meeting of the Commission (up to and including the base for 1988). However, much of the data used for 1988 were preliminary and hence have been modified and updated at this time. The data substitutions and raising procedures adopted at this time are listed in Table 1.

For the catch-at-length data, only three areas have been adopted as shown in Figure 2. In the data base, all the frequencies are kept by 1 cm intervals. If the data are received in intervals larger than 1 cm, they are equally distributed into centimeters. The records are kept by gear and by month for the west Atlantic, and by month or quarter for the rest. However, they are merged and summed up for the application of analytical programs.

b) Swordfish

ICCAT held two workshops on swordfish (Oct. 6-13, 1987 and Sep. 6-13, 1988). At the first workshop, application of VPA to the catch at age was agreed upon and a data base was created up to 1986 for the North Atlantic. Due to time constraints, no VPA application was made in this year. The scientists agreed to consider the North Atlantic (north of 5 degrees North) as one stock. There was no data base created for the Mediterranean. This was due to the lack of data and not because the Mediterranean stock was considered to be separate from the one in the North Atlantic. At the same time, length-weight conversion, growth and natural mortality were discussed and agreed upon, at least for the North Atlantic.

At the 1988 Workshop, the north Atlantic base was updated and VPA was applied for the first time. Mediterranean swordfish data continued to be very inadequate to warrant creating any data base of catch at size.

At the 1989 swordfish stock assessment session, the data base for the North Atlantic was again updated. The base now includes catch at size up to 1988. Data matching, data substitutions, and raising carried out by the Secretariat on north Atlantic swordfish are documented in the following papers:

SCRS/87/17	Coll. Vol. Sci. Pap. XXVII, ICCAT, 1988
Workshop Rpt	Coll. Vol. Sci. Pap. XXIX, ICCAT, 1989
SCRS/89/9	Coll. Vol. Sci. Pap. XXXII(2), ICCAT, 1989

The ICCAT Secretariat has updated this North Atlantic data base as of June 10, 1990, including all the changes in catch and additional size data. At the same time, a trial was made to create a catch-at-size base for the Mediterranean swordfish. The data matching, substitutions and raising carried out for this purpose are listed in Table 2.

c) Albacore and other tuna-like species

The ICCAT scientists have worked on albacore data and created a catch-at-size base for the North Atlantic, for 1978 through 1988. The work is described in the Albacore Workshop Report (Coll. Vol. Sci. Pap. XXXI). Although there have been considerable catches of albacore by the Mediterranean coastal fisheries, no data base has been created for the Mediterranean albacore, not because the stock is considered as separate but because of the lack of size data. No attempt was made to match the Mediterranean albacore catches with size data, at this time, since the catch data are not quite complete or size data are inadequate.

2.3 Data coverage

The confidence in the bluefin catch-at-size data base thus created has been challenged many times by ICCAT scientists, particularly in the case of the Mediterranean data. The base contains many data substitutions, and high raising factors have been applied for some catches (i.e. a very small sample is extrapolated to a large catch). Table 3 lists the levels of sampling and the data substitutions applied for each bluefin fishery in the Mediterranean. This type of table was not created for swordfish since Table 2 gives data substitution as well as other information to evaluate the sampling level for each fishery.

The sampling level is summarized in Tables 4 and 5. These Tables could be somewhat misleading, since the importance of sampling is not the total number of fish measured but by how well the sampling has been stratified. Therefore, these Tables should be studied together with Tables 2 and 3. Nevertheless, it is very clear that many catches have no matching size data. Hence, size data from other fisheries or other years have been used as substitution. The conclusion is that the level of sampling is far from satisfactory to carry out any meaningful VPA type of analysis.

3. Tagging files

The tagging data files are fragmental. It was the Commission's intention to put all the tagging records into one format and one file. However, this has never been realized, for the following reasons;

i) The release information for fish which have never been recovered is not very well documented and is not always submitted to the Commission by the agencies actually carrying out the tagging. Particularly, information on old releases is often lost or difficult to find.

ii) There are many errors in the existing tag recovery files due to misreporting, double

reporting, mis-entries, lack of verification of data.

iii) The Secretariat has not been able to work on the historical data, due to time constraints.

At present, release and recovery information for those tags already recovered has been kept in computer files since 1979. This has been possible only because ICCAT has been holding annual tagging lotteries for recovered tags. The files are, however, in various formats and in two distinct coding systems, since the system was changed in the course of time. The outline of the tagging files and a summary of the results are reported by Miyake (History of the ICCAT tagging program, 1971-1986, In Proceedings of the International Symposium and Educational Workshop on Fish Marking Techniques, Seattle, in press).

Table 1. Updating made on ICCAT catch at size data prepared in November, 1989 (East Atlantic and Mediterranean bluefin)

NEW DATA						OLD DATA				
AREA	COUNTRY	GEAR	YR	CATCH KG	R.F.	AREA	COUNTRY	GEAR	YR	REMARKS
EAST	SPAIN	GILL	88	4000	0.00192	EAST	SPAIN	BB	88	SUB TASKI = 208200
EAST	JAPAN	LL	88	1169000	1.46125	EAST	JAPAN	LL	88	OLD TASKI = 80000
EAST	DENMARK	UNCL	85	2000	0.06452	EAST	NORWAY	PS	86	SUB TASKI = 3100
MED	SPAIN	TRAP	88	228000	1.13433	MED	SPAIN	TRAP	88	OLD TASKI = 20100
MED	JAPAN	LL	88	236000	0.94400	MED	JAPAN	LL	88	OLD TASKI = 25000
MED	TUNISIE	TRAP	88	100000	1.20482	MED	TUNISIE	TRAP	88	OLD TASKI = 8300

TABLE 2. Mediterranean swordfish data matching and substitutions.

CATCH DATA AVAILABLE					MATCHED SIZE DATA (OR SUBSTITUTED DATA)							
COUNTRY	YR	TIME	GEAR	CATCH MT	COUNTRY	GEAR	YR	TIME	SAMPLE KG	SAMPLE #	R.F.	REMARKS
ALGERIE	78	0	UNCL	320	SPAIN	LLHB	78	0			44.81730	SP EST'D WGT= 7140.1
ALGERIE	79	0	UNCL	521	SPAIN	LLHB	79	0			53.39154	SP EST'D WGT= 9758.1
ALGERIE	80	0	UNCL	650	SPAIN	LLHB	80	0			32.77383	SP EST'D WGT= 19832.9
ALGERIE	81	17	UNCL	760	SPAIN	LLHB	81	17			0.67857	SPAN. TASKI = 1120000
ALGERIE	82	17	UNCL	870	SPAIN	LLHB	82	17			0.96667	SPAN. TASKI = 900000
ALGERIE	83	0	UNCL	877	SPAIN	LLHB	84	0			0.70555	SPAN. TASKI = 1243000
ALGERIE	84	0	UNCL	884	SPAIN	LLHB	84	0			0.71118	SPAN. TASKI = 1243000
ALGERIE	85	0	UNCL	890	SPAIN	LLHB	85	0			0.73011	SPAN. TASKI = 1219000
ALGERIE	86	0	UNCL	847	SPAIN	LLHB	86	0			0.63351	SPAN. TASKI = 1337000
ALGERIE	87	0	UNCL	1820	SPAIN	LLHB	88	0			1.03409	SPAN. TASKI = 1760000
ALGERIE	88	0	UNCL	2621	SPAIN	LLHB	88	0			1.48920	SPAN. TASKI = 1760000
CYPRUS	78	0	LL	82	SPAIN	LLHB	78	0			11.48443	SP EST'D WGT= 7140.1
CYPRUS	79	0	LL	98	SPAIN	LLHB	79	0			10.04294	SP EST'D WGT= 9758.1
CYPRUS	80	0	LL	72	SPAIN	LLHB	80	0			3.63033	SP EST'D WGT= 19832.9
CYPRUS	81	17	LL	78	SPAIN	LLHB	81	17			0.06964	SPAN. TASKI = 1120000
CYPRUS	82	17	LL	103	SPAIN	LLHB	82	17			0.11444	SPAN. TASKI = 900000
CYPRUS	83	0	LL	28	SPAIN	LLHB	84	0			0.02253	SPAN. TASKI = 1243000
CYPRUS	84	0	LL	63	SPAIN	LLHB	84	0			0.05068	SPAN. TASKI = 1243000
CYPRUS	85	0	LL	71	SPAIN	LLHB	85	0			0.05824	SPAN. TASKI = 1219000
CYPRUS	86	0	LL	154	GREECE	LL	86	0			0.06720	GRC EST CATCH 2291724
CYPRUS	87	0	LL	84	GREECE	LL	87	0			0.05728	GRC EST CATCH 1466372
CYPRUS	88	0	LL	121	GREECE	LL	87	0			0.08252	GRC EST CATCH 1466372
GREECE	81	17	LL	91	SPAIN	LLHB	81	17			0.08125	SPAN. TASKI = 1120000
GREECE	82	17	LL	690	SPAIN	LLHB	82	17			0.76667	SPAN. TASKI = 900000
GREECE	83	0	LL	689	SPAIN	LLHB	84	0			0.55430	SPAN. TASKI = 1243000
GREECE	84	0	LL	965	SPAIN	LLHB	84	0			0.77635	SPAN. TASKI = 1243000
GREECE	85	0	LL	925	SPAIN	LLHB	85	0			0.75882	SPAN. TASKI = 1219000
GREECE	86	0	LL	1535						1091	1.00000	RAISED BY GREEK SCI *
GREECE	87	0	LL	1110						1100	1.00000	RAISED BY GREEK SCI**
GREECE	88	0	LL	1251	GREECE	LL	87	0			0.85313	GRC EST CATCH= 1466372
ITALY	78	0	LLHB	3348	SPAIN	LLHB	78	0			468.90100	SP EST'D WGT= 7140.1
ITALY	78	0	HARP	675	SPAIN	LLHB	78	0			94.53649	SP EST'D WGT= 7140.1
ITALY	79	0	LLHB	3085	SPAIN	LLHB	79	0			316.14761	SP EST'D WGT= 9758.1
ITALY	79	0	HARP	426	SPAIN	LLHB	79	0			43.45108	SP EST'D WGT= 9758.1
ITALY	80	0	LLHB	3252	SPAIN	LLHB	80	0			163.96997	SP EST'D WGT= 19832.9
ITALY	80	0	HARP	447	SPAIN	LLHB	80	0			22.53831	SP EST'D WGT= 19832.9
ITALY	81	17	LLHB	3002	SPAIN	LLHB	81	17			2.68036	SPAN. TASKI= 1120000
ITALY	81	17	HARP	412	SPAIN	LLHB	81	17			0.36786	SPAN. TASKI= 1120000
ITALY	82	17	LLHB	2306	SPAIN	LLHB	82	17			2.56222	SPAN. TASKI= 900000
ITALY	82	17	HARP	318	SPAIN	LLHB	82	17			0.35333	SPAN. TASKI= 900000
ITALY	83	0	LLHB	2375	SPAIN	LLHB	84	0			1.91070	SPAN. TASKI= 1243000
ITALY	83	0	HARP	327	SPAIN	LLHB	84	0			0.26307	SPAN. TASKI= 1243000
ITALY	84	0	LLHB	2463	SPAIN	LLHB	84	0			1.98150	SPAN. TASKI= 1243000
ITALY	84	0	TRAP	3	SPAIN	LLHB	84	0			0.00241	SPAN. TASKI= 1243000
ITALY	84	0	UNCL	4588	SPAIN	LLHB	84	0			3.69107	SPAN. TASKI= 1243000
ITALY	84	0	GILL	1303	SPAIN	LLHB	84	0			1.04827	SPAN. TASKI= 1243000
ITALY	85	0	LLHB	2226	SPAIN	LLHB	85	0			1.82609	SPAN. TASKI= 1219000
ITALY	85	0	UNCL	6098	SPAIN	LLHB	85	0			5.00246	SPAN. TASKI= 1219000
ITALY	85	0	GILL	1375	SPAIN	LLHB	85	0			1.12797	SPAN. TASKI= 1219000
ITALY	86	0	LLHB	2341	SPAIN	LLHB	86	0			1.75093	SPAN. TASKI= 1337000
ITALY	86	0	UNCL	6403	SPAIN	LLHB	86	0			4.78908	SPAN. TASKI= 1337000
ITALY	86	0	GILL	1446	SPAIN	LLHB	86	0			1.08153	SPAN. TASKI= 1337000
ITALY	87	0	LLHB	2528	SPAIN	LLHB	88	0			1.43636	SPAN. TASKI= 1760000
ITALY	87	0	UNCL	6915	SPAIN	LLHB	88	0			3.92898	SPAN. TASKI= 1760000
ITALY	87	0	GILL	1562	SPAIN	LLHB	88	0			0.88750	SPAN. TASKI= 1760000
ITALY	88	0	LLHB	2669	SPAIN	LLHB	88	0			1.51648	SPAN. TASKI= 1760000
ITALY	88	0	UNCL	7299	SPAIN	LLHB	88	0			4.14716	SPAN. TASKI= 1760000
ITALY	88	0	GILL	1648	SPAIN	LLHB	88	0			0.93636	SPAN. TASKI= 1760000
JAPAN	78	0	LL	2				0	2077	19	1.00000	
JAPAN	79	0	LL	3				0	928	12	3.23171	
JAPAN	80	0	LL	1				0	15090	107	1.00000	
JAPAN	81	0	LL	1				0	12011	106	1.00000	
JAPAN	82	0	LL	5				0	332	2	15.06932	

TIME 0=MONTHLY OR QUARTERLY DATA DATA
17=YEARLY DATA

TABLE 2. Continued...

CATCH DATA AVAILABLE					MATCHED SIZE DATA (OR SUBSTITUTED DATA)							
COUNTRY	YR	TIME	GEAR	CATCH MT	COUNTRY	GEAR	YR	TIME	SAMPLE KG	SAMPLE #	R.F.	REMARKS
JAPAN	83	0	LL	6				0	6827	70	1.00000	
JAPAN	84	0	LL	19				0	24698	257	1.00000	
JAPAN	85	0	LL	14				0	14694	156	1.00000	
JAPAN	86	0	LL	7				0	10794	127	1.00000	
JAPAN	87	0	LL	3				0	422	6	7.11575	
JAPAN	88	0	LL	4	JAPAN	LLHB	87	0			9.34579	SAMPLE WEIGHT 428
MALTA	78	0	UNCL	121	SPAIN	LLHB	78	0			16.96454	SP EST'D WGT= 7140.1
MALTA	79	0	UNCL	135	SPAIN	LLHB	79	0			13.83466	SP EST'D WGT= 9758.1
MALTA	80	0	UNCL	198	SPAIN	LLHB	80	0			9.98341	SP EST'D WGT= 19832.9
MALTA	81	17	UNCL	171	SPAIN	LLHB	81	17			0.15268	SPAN. TASKI = 1120000
MALTA	82	17	UNCL	158	SPAIN	LLHB	82	17			0.17556	SPAN. TASKI = 900000
MALTA	83	0	UNCL	53	SPAIN	LLHB	84	0			0.04264	SPAN. TASKI = 1243000
MALTA	84	0	UNCL	84	SPAIN	LLHB	84	0			0.06758	SPAN. TASKI = 1243000
MALTA	85	0	UNCL	96	SPAIN	LLHB	85	0			0.07875	SPAN. TASKI = 1219000
MALTA	86	0	UNCL	87	SPAIN	LLHB	86	0			0.06507	SPAN. TASKI = 1337000
MALTA	87	0	UNCL	117	SPAIN	LLHB	88	0			0.06648	SPAN. TASKI = 1760000
MALTA	88	0	UNCL	185	SPAIN	LLHB	88	0			0.10511	SPAN. TASKI = 1760000
MOROCCO	78	0	LL	172	SPAIN	LLHB	78	0			24.08930	SP EST'D WGT= 7140.1
MOROCCO	83	0	LL	43	SPAIN	LLHB	84	0			0.03459	SPAN. TASKI = 1243000
MOROCCO	84	0	LL	39	SPAIN	LLHB	84	0			0.03138	SPAN. TASKI = 1243000
MOROCCO	85	0	LL	37	SPAIN	LLHB	85	0			0.03035	SPAN. TASKI = 1219000
MOROCCO	86	0	LL	99	SPAIN	LLHB	86	0			0.07405	SPAN. TASKI = 1337000
MOROCCO	87	0	LL	39	SPAIN	LLHB	88	0			0.02216	SPAN. TASKI = 1760000
MOROCCO	88	0	LL	62	SPAIN	LLHB	88	0			0.03523	SPAN. TASKI = 1760000
SPAIN	78	0	LLHB	720				0	7140	179	133.00000	R.F. BY SPAN SCI.***
SPAIN	79	0	LLHB	800				0	9758	223	111.00000	R.F. BY SPAN SCI.***
SPAIN	80	0	LLHB	750				0	19833	471	50.00000	R.F. BY SPAN SCI.***
SPAIN	81	17	LLHB	1120				17		457	1.00000	RAISED BY SPANISH SCI.
SPAIN	82	17	LLHB	900				17		1461	1.00000	RAISED BY SPANISH SCI.
SPAIN	83	0	LLHB	1321	SPAIN	LLHB	84	0			1.06275	SPAN. TASKI = 1243000
SPAIN	83	0	TRAP	1	SPAIN	LLHB	84	0			0.00080	SPAN. TASKI = 1243000
SPAIN	84	0	LLHB	1243				0	278965	12532	1.00000	RAISED BY SPANISH SCI.
SPAIN	84	0	TRAP	2	SPAIN	LLHB	84	0			0.00161	SPAN. TASKI = 1243000
SPAIN	85	0	LLHB	1219				0			1.00000	RAISED BY SPANISH SCI.
SPAIN	85	0	TRAP	3	SPAIN	LLHB	85	0			0.00246	SPAN. TASKI = 1219000
SPAIN	85	0	SURF	2	SPAIN	LLHB	85	0			0.00164	SPAN. TASKI = 1219000
SPAIN	85	0	UNCL	1	SPAIN	LLHB	85	0			0.00082	SPAN. TASKI = 1219000
SPAIN	85	0	TRAW	1	SPAIN	LLHB	85	0			0.00082	SPAN. TASKI = 1219000
SPAIN	85	0	HAND	1	SPAIN	LLHB	85	0			0.00082	SPAN. TASKI = 1219000
SPAIN	86	0	LLHB	1337				0			1.00000	RAISED BY SPANISH SCI.
SPAIN	87	0	LLHB	1134	SPAIN	LLHB	88	0			0.64432	SPAN. TASKI = 1760000
SPAIN	88	0	LLHB	1760				0			1.00000	RAISED BY SPANISH SCI.
SPAIN	88	0	TRAP	2	SPAIN	LLHB	88	0			0.00114	SPAN. TASKI = 1760000
TUNISIE	81	17	UNCL	7	SPAIN	LLHB	81	17			0.00625	SPAN. TASKI = 1120000
TUNISIE	82	17	UNCL	19	SPAIN	LLHB	82	17			0.02111	SPAN. TASKI = 900000
TUNISIE	83	0	UNCL	15	SPAIN	LLHB	84	0			0.01207	SPAN. TASKI = 1243000
TUNISIE	84	0	UNCL	15	SPAIN	LLHB	84	0			0.01207	SPAN. TASKI = 1243000
TUNISIE	85	0	UNCL	61	SPAIN	LLHB	85	0			0.05004	SPAN. TASKI = 1219000
TUNISIE	86	0	UNCL	64	SPAIN	LLHB	86	0			0.04787	SPAN. TASKI = 1337000
TUNISIE	87	0	UNCL	63	SPAIN	LLHB	88	0			0.03580	SPAN. TASKI = 1760000
TUNISIE	88	0	UNCL	80	SPAIN	LLHB	88	0			0.04545	SPAN. TASKI = 1760000
TURKEY	78	0	UNCL	20	SPAIN	LLHB	78	0			2.80108	SP EST'D WGT= 7140.1
TURKEY	79	0	UNCL	44	SPAIN	LLHB	79	0			4.50907	SP EST'D WGT= 9758.1
TURKEY	80	0	UNCL	13	SPAIN	LLHB	80	0			0.65548	SP EST'D WGT= 19832.9
TURKEY	81	17	UNCL	70	SPAIN	LLHB	81	17			0.06250	SPAN. TASKI = 1120000
TURKEY	82	17	UNCL	40	SPAIN	LLHB	82	17			0.04444	SPAN. TASKI = 900000
TURKEY	83	0	UNCL	216	SPAIN	LLHB	84	0			0.17377	SPAN. TASKI = 1243000
TURKEY	84	0	UNCL	95	SPAIN	LLHB	84	0			0.07643	SPAN. TASKI = 1243000
TURKEY	85	0	GILL	190	SPAIN	LLHB	85	0			0.15587	SPAN. TASKI = 1219000
TURKEY	86	0	GILL	226	GREECE	LL	86	0			0.09862	GRC EST CATCH 2291724
TURKEY	87	0	GILL	557	GREECE	LL	87	0			0.37985	GRC EST CATCH 1466372
TURKEY	88	0	GILL	557	GREECE	LL	87	0			0.37985	GRC EST CATCH 1466372

TIME 0=MONTHLY OR QUARTERLY DATA DATA
17=YEARLY DATA

Table 3. Level of the substitutions made on the bluefin catch-at-size base 1984 - 1988

YEAR	COUNTRY	GEAR	CATCH	# FISH	SOURCE
EAST ATLANTIC					
1984	CAP VERT	BBF	1		1
1984	ESPANA	BB	2		1
1984	ESPANA	PS	41		1
1984	ESPANA	LLHB	7	66	2
1984	ESPANA	GILL	2		1
1984	ESPANA	BB	2364		2
1984	ESPANA	SURF	117		1
1984	ESPANA	TRAP	2271	1398	2
1984	FRANCE	TROL	36		1
1984	FRANCE	BB	566		1
1984	JAPAN	LLHB	1514	899	2
1984	MAROC	PS	127		1
1984	MAROC	SURF	44		1
1984	NORWAY	PS	243		3
1984	PANAMA	LLFB	17		1
1984	PORTUGAL	SURF	16		1
1984	PORTUGAL	BB	1		1
1984	PORTUGAL	BB	14		1
1984	PORTUGAL	PS	3	7	3
RAISE FROM SAMPLE			6402	2370	
SUBSTITUTED			984		
TOTAL			7386		
1985	ESPANA	BB	133	47	2
1985	ESPANA	BB	1850		2
1985	ESPANA	TRAP	1630		2
1985	ESPANA	TROL	1		1
1985	ESPANA	LLHB	16		1
1985	FRANCE	BB	380		1
1985	FRANCE	TROL	110		1
1985	JAPAN	LLHB	420	691	2
1985	KOREA	LLFB	77		1
1985	MAROC	PS	86		1
1985	PANAMA	LLFB	22		1
1985	PORTUGAL	SURF	25		2
1985	PORTUGAL	HAND	1	3	2
1985	PORTUGAL	BB	3	27	2
RAISED BY SAMPLE			4062	768	
SUBSTITUTED			692		
TOTAL			4754		
1986	DENMARK	UNCL	1		1
1986	ESPANA	BB	78	12	2
1986	ESPANA	BB	1875		2
1986	ESPANA	TRAP	891	1006	2
1986	ESPANA	PS	12	856	2
1986	ESPANA	LLHB	20		1
1986	FRANCE	BB	272		1
1986	FRANCE	TROL	76		1
1986	JAPAN	LLHB	710	939	2
1986	MAROC	PS	122		1
1986	NORWAY	PS	31	70	3
1986	PANAMA	LLFB	11		1
1986	PORTUGAL	SURF	41		2
1986	PORTUGAL	HAND	1	12	2
1986	PORTUGAL	BB	28	221	2
1986	PORTUGAL	PS	123	37	2
RAISED BY SAMPLE			3790	3153	
SUBSTITUTED			502		
TOTAL			4292		
1987	ESPANA	BB	25	12	2
1987	ESPANA	BB	1512	2412	2
1987	ESPANA	TRAP	939		2
1987	FRANCE	BB	533		1
1987	JAPAN	LLHB	900	1741	2
1987	MAROC	TRAP	460		1
1987	PANAMA	LLFB	4		1
1987	PORTUGAL	SURF	102		1
1987	PORTUGAL	HAND	3	10	2
1987	PORTUGAL	BB	58		2
RAISED BY SAMPLE			3437	4175	
SUBSTITUTED			1099		
TOTAL			4536		
1988	ESPANA	BB	92	12	2
1988	ESPANA	BB	2082	5609	2
1988	ESPANA	TRAP	2389	275	2
1988	MAROC	SURF	202		1
1988	MAROC	TRAP	131		1
1988	POLAND	UNCL	2		1
1988	PORTUGAL	SURF	16		2
1988	PORTUGAL	HAND	1	30	2
1988	PORTUGAL	BB	29	6	2
RAISED BY SAMPLE			4609	5932	
SUBSTITUTED			335		
TOTAL			4944		
MEDITERRANEAN					
1984	ALGERIE	UNCL	254		1
1984	ESPANA	GILL	3		1
1984	ESPANA	HAND	145	495	2
1984	ESPANA	BB	1699	834	2
1984	ESPANA	UNCL	101	592	2
1984	ESPANA	SURF	26	1173	2
1984	ESPANA	TRAP	621		2
1984	ESPANA	PS	79		1
1984	ESPANA	LLHB	69		2
1984	FRANCE	PSM	3570		2
1984	FRANCE	SPOR	30		1
1984	GREECE	UNCL	500		1
1984	ITALY	PSFS	993		1
1984	ITALY	PSFB	2476	3550	2
1984	ITALY	GILL	100		1
1984	ITALY	HAND	10		1
1984	ITALY	UNCL	1250		1
1984	ITALY	SPOR	10		1
1984	ITALY	TRAP	327		1
1984	ITALY	PS	1913		1
1984	ITALY	LLHB	41		1
1984	JAPAN	LLHB	1036	763	2
1984	LIBYA	UNCL	300		1
1984	MALTA	UNCL	21		1
1984	MAROC	SURF	4		1
1984	TUNISIE	TRAP	80		1
1984	TURKEY	UNCL	869		1
1984	YUGOSLAV	PS	825		1
RAISED FROM SAMPLE			9743	7407	
SUBSTITUTED			7609		
TOTAL			17352		

DATA SOURCE:
1 = SIZE DATA WERE SUBSTITUTED
2 = DATA ARE RAISED USING SAMPLES FROM THE SAME FISHERY
3 = 100% SAMPLE

Table 3. Continued...

YEAR	COUNTRY	GEAR	CATCH	# FISH	SOURCE
1985	ALGERIE	UNCL	260		1
1985	ESPANA	GILL	2		1
1985	ESPANA	HAND	267		2
1985	ESPANA	BB	278		2
1985	ESPANA	UNCL	22		1
1985	ESPANA	SURF	415		2
1985	ESPANA	TRAP	302		2
1985	ESPANA	PS	56		2
1985	ESPANA	LLHB	129		2
1985	FRANCE	PSM	5400		2
1985	FRANCE	SPOR	30		1
1985	GREECE	UNCL	500		1
1985	ITALY	PSFS	2329		1
1985	ITALY	PSFB	1453	2458	2
1985	ITALY	GILL	100		1
1985	ITALY	HAND	10		1
1985	ITALY	UNCL	2100		1
1985	ITALY	SPOR	50		1
1985	ITALY	TRAP	295		1
1985	ITALY	PS	740		1
1985	ITALY	LLHB	62		1
1985	JAPAN	LLHB	873	2568	2
1985	LIBYA	UNCL	300		1
1985	MALTA	UNCL	21		1
1985	MAROC	SURF	12		1
1985	TUNISIE	TRAP	80		1
1985	TURKEY	PS	2230		1
1985	YUGOSLAV	PS	1010		1
RAISED BY SAMPLE			9173	5026	
SUBSTITUTED			10153		
TOTAL			19326		
1986	ALGERIE	UNCL	566		1
1986	ESPANA	HAND	29	126	2
1986	ESPANA	SURF	220		2
1986	ESPANA	TRAP	168		1
1986	ESPANA	PS	22		1
1986	ESPANA	LLHB	117	1453	2
1986	FRANCE	PSM	3460		2
1986	FRANCE	SPOR	30		1
1986	GREECE	UNCL	125		1
1986	ITALY	PSFS	2207		1
1986	ITALY	PSFB	1082	1513	2
1986	ITALY	GILL	45		1
1986	ITALY	UNCL	2338		1
1986	ITALY	SPOR	50		1
1986	ITALY	TRAP	293		1
1986	ITALY	PS	1500		1
1986	ITALY	LLHB	1		1
1986	JAPAN	LLHB	421	761	2
1986	LIBYA	UNCL	300		1
1986	MALTA	UNCL	41		1
1986	MAROC	SURF	18		1
1986	TUNISIE	TRAP	84		1
1986	TURKEY	PS	1524		1
1986	YUGOSLAV	PS	757		1
RAISED BY SAMPLE			5329	3853	
SUBSTITUTED			10069		
TOTAL			15398		
1987	ALGERIE	UNCL	420		1
1987	ESPANA	HAND	177	411	2
1987	ESPANA	SURF	404		2
1987	ESPANA	TRAP	219	332	2
1987	ESPANA	LLHB	116	398	2
1987	FRANCE	PSM	4300		2
1987	FRANCE	SPOR	30		1
1987	GREECE	UNCL	100		1
1987	ITALY	PSFS	522		1
1987	ITALY	PSFB	557	851	2
1987	ITALY	UNCL	1495		1
1987	ITALY	SPOR	53		1
1987	ITALY	TRAP	310		1
1987	ITALY	PS	1500		1
1987	ITALY	LLHB	65		1
1987	JAPAN	LLHB	280		2
1987	LIBYA	UNCL	300		1
1987	MALTA	UNCL	36		1
1987	TUNISIE	TRAP	83		1
1987	TURKEY	PS	910		1
1987	YUGOSLAV	PS	641		1
RAISED BY SAMPLE			6053	1992	
SUBSTITUTED			6465		
TOTAL			12518		
1988	ALGERIE	UNCL	677		1
1988	ESPANA	TRAP	201	333	2
1988	ESPANA	LLHB	136	761	2
1988	ESPANA	HAND	553	1458	2
1988	ESPANA	SURF	225		1
1988	FRANCE	PSM	5750		2
1988	FRANCE	SPORT	30		1
1988	GREECE	UNCL	100		1
1988	ITALY	PSFS	395		1
1988	ITALY	PSFB	334	395	2
1988	ITALY	UNCL	1452		1
1988	ITALY	SPOR	51		1
1988	ITALY	TRAP	301		1
1988	ITALY	PS	1500		1
1988	ITALY	LLHB	63		1
1988	JAPAN	LL	250		1
1988	LIBYA	UNCL	300		1
1988	MALTA	UNCL	25		1
1988	MAROC	SURF	44		1
1988	MAROC	TRAP	96		1
1988	TUNISIE	TRAP	83		1
1988	TURKEY	PS	910	86	2
1988	YUGOSLAV	PS	1512		1
RAISED BY SAMPLE			7884	3033	
SUBSTITUTED			7104		
TOTAL			14988		

DATA SOURCE:
1 = SIZE DATA WERE SUBSTITUTED
2 = DATA ARE RAISED USING SAMPLES FROM THE SAME FISHERY
3 = 100% SAMPLE

Table 4. Summary of bluefin sampling and substitution levels

YEAR	AREA	TOTAL CATCH MT	SIZE SAMPLES AVAILABLE MT	%	# FISH MEASURED*	SUBSTI-TUTED MT	# FISH PER CATCH(MT)
1984	EAST	7386	6402	86.7%	2370	984	0.32
	MED	17352	9743	56.1%	7407	7609	0.43
	WEST	2499	2282	91.3%	2171	217	0.87
1985	EAST	4754	4062	85.4%	768	692	0.16
	MED	19326	9173	47.5%	5026	10153	0.26
	WEST	5414	2658	49.1%	7356	2756	1.36
1986	EAST	4292	3790	88.3%	3153	502	0.73
	MED	15398	5329	34.6%	3853	10069	0.25
	WEST	1917	1799	93.8%	7747	118	4.04
1987	EAST	4536	3437	75.8%	4175	1099	0.92
	MED	12518	6053	48.4%	1992	6465	0.16
	WEST	2602	2395	92.0%	3105	207	1.19
1988	EAST	4944	4609	93.2%	5932	335	1.20
	MED	14988	7884	52.6%	3033	7104	0.20
	WEST	2986	2782	93.2%	3417	204	1.14

* The number of fish measured can be very underestimated, as information for some countries is not always available.

TABLE 5. Sampling level of swordfish in the Mediterranean Sea

YEAR	TOTAL CATCH MT	SAMPLED CATCH MT	SAMPLES WEIGHT KG	SAMPLES No	UNSAMPLED CATCH MT	SAMPLED CATCH %
78	5460	722	9346	198	4738	13.2
79	5110	803	10836	236	4307	15.7
80	5383	751	35413	578	4632	14.0
81	5712	1121	??	563	4591	19.6
82	5409	905	??	1463	4504	16.7
83	5951	6	6923	70	5945	0.1
84	11766	1262	307924	12785	10504	10.7
85	13210	1233	??	??	11977	9.3
86	15335	3668	??	1218+	11667	23.9
87	16309	1490	??	1106	14819	9.1
88	18259	1760	??	??	16499	9.6

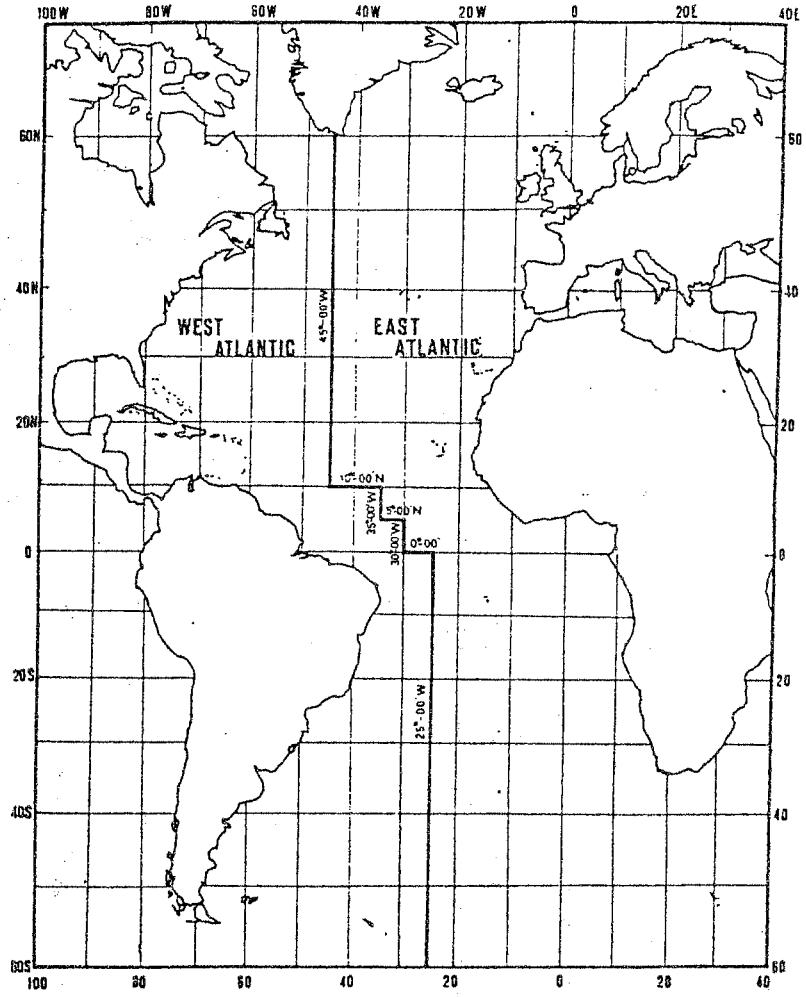

Fig. 1. Division line between East and West Atlantic stocks

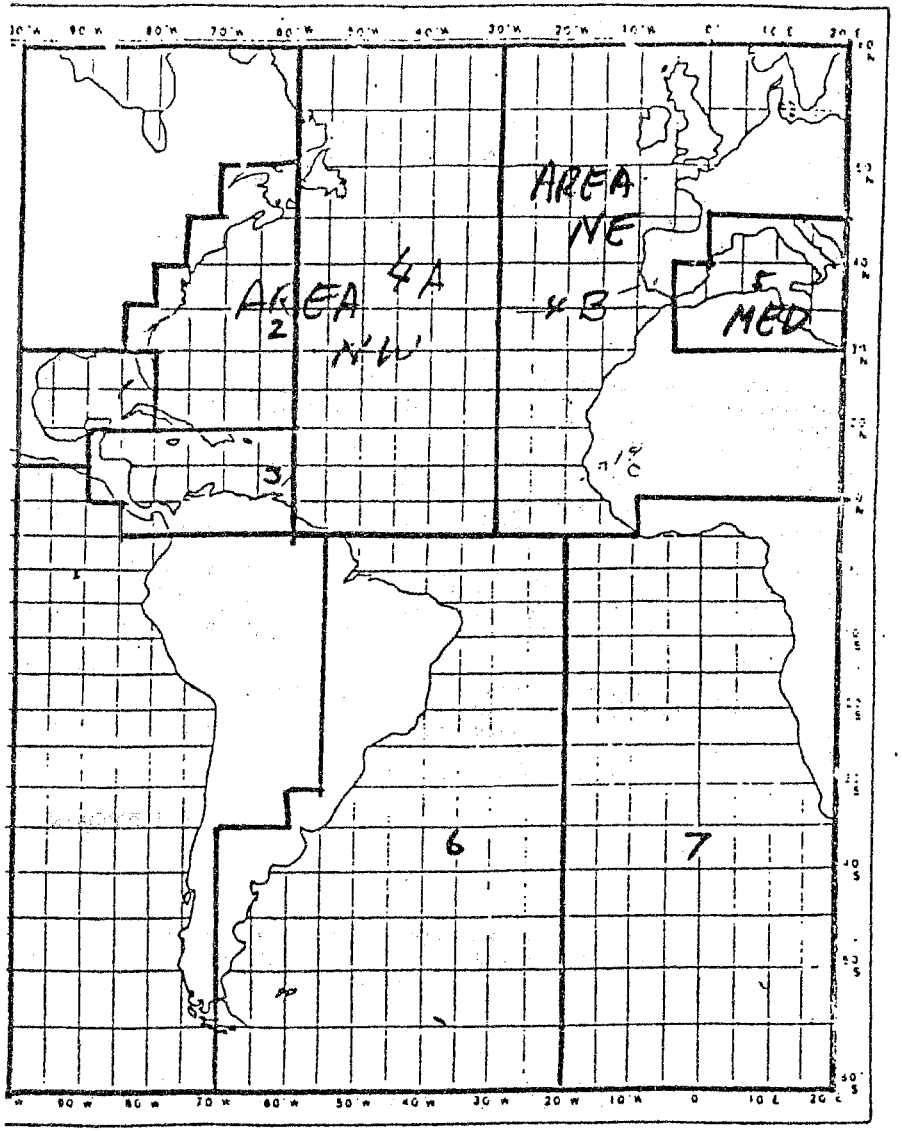

Fig. 2 Swordfish areas agreed upon by Workshop members for initial data preparations.