International Council for the Exploration of the Sea. C.M.1955
Scombriform Fish Committee
No.21.

K

I. German Tuna Fisheries and its Importance for the German Deep Sea Cutter Fisheries.

II. German Tuna Investigations.

By
P.F.Meyer - Waarden,Hamburg.

I.

A. Economic Situation of the German Tuna Fisheries.

The German interest in tuna fisheries began only few years ago. The fist tuna landings were mentioned by German statistics in 1928.Since that time the landings developed as follows (Table 1):

Table 1

German tuna landings from the North Sea during 1928/1936 and 1949/1954 in 1000 kg and 1000 DM.

Year:	1928	1929	1930	1931	1932	1933	1934	1935	1936
Quantity:	30	108	47	33	54	26	27	20	19
Value:	not mentioned								

Year:	1949	1950	1951	1952	1953	1954
Quantity:	175	230	236	307	325	655
Value:	-	234	284	363	390	842

As compared with the tuna catches taken by the other North European fishing countries the German output of that fishery is even to-day fairly small (Table 2 and Table 3):

Table 2

Tuna landings of Norway, Denmark, Sweden and Germany in 1952/53 in 1000 kg and 1000 Krona (for Germany in 1000 DM).

	1952+)	1953++)	
	Quantity	Quantity	Value
Norway	13 776	7 951	9 707
Denmark	2 059	779	1 288
Sweden	316	52	85
Germany	307	325	390

+) Source: Bulletin Statistique
++) " : National Statistics.

Table 3

Participation of the North European Countries in tuna fisheries 1952 in % according to Bulletin Statistique (total landings: 66447 t).

Denmark	3,1
France	22,5
Germany	0,5
Norway	20,7
Portugal	9,4
Spain	43,3
Sweden	0,5
Netherland	0,0

In Germany it is supposed that the increasing tuna landings made by the North Sea countries, in particular Germany and Denmark, are influenced by the cutter herring fisheries which undergoes a continuous development since 1949, connected with the development of new fishing grounds, but that the generally suggested increasing temperature of the sea is only of secondary importance for the occurance of tuna in the North Sea.

In contrast to Danish and Norwegian cutters, many of which are exclusively fishing for tuna during the North Sea season (July to November), the German cutters are carrying out tuna fishing usually as secondary subject. However, since 1952 there ist the tendency that German fishermen, too, are interested in tuna fishing as main occupation, as the recent years proved that tuna fishing can also be profitable for us. In 1954, 10 units of the 39 cutters participating in tuna fishing dealt exclusively with that fishery; this year even more cutters are doing so.

B. Fishing Gear.

The fishing gear used by German tuna fishermen is the same as in Denmark and Sweden, i.e. the tuna line. Purse seines, which are preferred in Norway, are not used by our fishermen. The hooks mainly used by them are Mustad-hooks.No.10,11 and 12.Until 1953 German hooks were also used. Electric tuna lines developed by Dr.Kreutzer in cooperation with my Institute of Coastal and Freshwater Fisheries of the Federal Research Institute at Hamburg and commercially manufactured by the Swedish firm of Atlas Marin, Göteborg, are not yet adopted by our fishermen. The working method of these electric tuna lines is described by the diagram in Picture No.1. Some years ago it was tried to introduce in German fisheries electric tuna lines made by Messrs. Siemens-Schuckert, but without success. In the recent time some very important improvements have been made with the electric tuna line, which will probably facilitate in future the introduction of the electric gear in tuna fisheries. According to an information from Atlas-Marin approximately 30 electric tuna lines are presently in operation, i.e. 5 in Danmark, 18 in Sweden, 2 in USA and one each in France, Italy, Norway and Peru. Two electric gears are tried at present in Germany.

C. Fishing Ground (Picture No.2).

Owing to the fact that German fishermen carried out tuna fishing generally as secondary subject, the fishing grounds of German tuna fisheries were usually the same as the herring fishing

grounds. Thus tuna were caught until 1950 on "Fladen Ground", in the "Gat" and on "Doggerbank", where our cutters took fresh fish. In 1951, 1952 and 1953, most of the tuna were caught in August in the area of "White Bank" and "Southern Schlickbank", since the then beginning "Oil herring fishery"(herring for reduction factories) took place there; in September and October of the same years tuna fishing was mainly practized on the Western Dogger during the fresh herring season. 1954 the tuna fishing centered already in August on the Western Dogger, i.e. near "East Bank", "Bayman's Loch", later on "Middle Reef", "Bolders Bank", "Bruceys-Garden" and "Southern Reef". A great number of cutters was there already exclusively fishing for tuna. On these fishing grounds tuna shoals were particularly abundant. The output of these tuna voyages consisted up to 70-80 %, partly 100 %, of tuna.

D. Proceedings from and processing of tuna.

Those fishermen who carried out tuna fishing as main subject had better proceedings than all those working at that time in other fields of cutterfisheries. The average proceedings from a voyage of the above mentioned 10 cutters amounted to DM 12.900.Each of these ten cutters had average proceedings of DM 52.600 during the season of about three months(August to October 1954).As compared with the 20 most successful cutters fishing for oil herring during the said period, whose proceedings were already considerably greater than those of the cutters fishing for flat fish, the tuna fishermen gained DM 10.000 per cutter more than the oil herring fishermen.

From the experience made during the recent years it may be supposed that, like in Norway and Danmark the German tuna fishing industry will also be more intensified in the coming years, provided that the German home market ist able to adsorb the supply and that the cheap imports, which might now be expected from Japan, would not adversely affect the market situation.

Hitherto the German market accepted all tuna taken by German fishermen. They could also be sold at relatively favourable prices (Table 4):

Table 4.

Average prices per kg of tuna in 1950 - 1954, in DM.

Year	1950	1951	1952	1953	1954
DM	1.02	1.20	1.18	1.20	1.18

The trouble of the German market is, that there are no facilities to deep-freeze the tuna for storing and transport. Most of the tuna is used for fresh consumption. Only a small quantity is canned. No German tuna products are exported.

II.

Corresponding to the relatively unimportant rôle the tuna fishing industry is playing in German fisheries and as red tuna stay only few month (August til October) in the North Sea, our present tuna investigations are mainly confined to

A. Investigations on the quantities caught, on length and weight of the Red Tuna (Thunnus thynnus L.), registration of the fishing grounds.

B. Origin of the Red Tuna (Thunnus thynnus L.)

C. Economic investigations.

To A: In all cases adult Red Tuna (Thunnus thynnus L.) were caught, which had finished spawning. At the beginning of the season they were in a relatively lean condition. The number of the investigated tuna can be seen from the following table:

Table 5

Survey on all tunas measured since 1951.

Year	Number of measured tunas+)	Number of caught tunas	Number of measured tunas in % of the caught tunas
1951	480	1 120	43
1952	589	1 420	41
1953	513	1 560	33
1954	2 405	3 100	78

+) The measurements were made at Cuxhaven. In 1954 a great number of tuna were measured for the first time also at Kiel and Bremerhaven.

In 1951 the following method was used for measuring the tuna: Between the tip of the lower jaw and the connecting line of the two caudal tips (L.T.). In 1952/1954 it was thought more suitable to measure between the tip of the lower jaw and the deepest point of the notch of the caudal fin (L.c.). In order to find a formula for converting the two different measuring methods, the tuna were measured in 1952 by the two methods which resulted in the following correlation: L.c. = L.T. . 1,0754. The measured lengths can be seen from Drawing Nr.3. All values refer to L.c. The exact results will be published in a special work by Dr. Tiews at the end of the year.

Picture No.3 shows that mainly tuna of 170-280 in length had been caught. The maxima of the measurements were in 1951 at 245 cm; 1952 at 240 cm and a smaller one at 200 cm; 1952 at 210 and 215 cm and a small one at 240 cm; and 1954 at 220 cm. The investigations made in that year showed a continued trend of minima of the length-curve towards 230 cm (preliminary results). That development cannot be considered accidental, but might be due to the existence of particularly abundant year-classes and their growth. Our observations will continue. Maybe, that the results of our investigations will contribute at a later date to the explanation of the problem of origin and growth of the Tuna occuring in the North Sea during the autumn-months.

The records on the weight of tunas were collected at the fish markets of Hamburg, Bremerhaven, Cuxhaven and Kiel. They refer to gutted tuna with head. It proved, that there may exist differences in the weight of more than 100 kg between lean and well-fed tunas when they occur in the North Sea. Dr. Bahr was able to calculate in his work (Investigations on the Red Tuna of the North Sea. Ber. DWK XIII, 1, pp. 64-78, 1952), that the tuna added in the average 1/20 to 1/5 of its weight during its three months' feeding-time in the North Sea; a proof, that the Red Tuna visits the North Sea merely as hunting and feeding ground. As it proved in the years of 1952 to 1954, these changes in weight are varying in the individual years. They depend greatly on the feeding condition of the tuna by the time of its entering the North Sea. Thus we were able to ascertain that in August 1951 the weights of tunas of 200 to 240 cm in length were in the average 5 kg above those of animals of the same size in August 1952 and the weights of tunas of 245 to 289 cm in lenghth differed even by 25 kg. Tunas caught in August 1954 were also in the average by 3 kg heavier than those caught in August 1953. These differences in weight within the same sizes depend probably on the varying spawning time.

To B: The most certain method to investigate the hitherto unexplored origin of the tuna appearing in the North Sea is to mark them. Such an experiment, however, is considerably difficult for us. On the one side it is very expensive, for it concerns large and valuable animals (see Table No. 4). On the other side the number of tuna caught during a voyage is relatively small and might scarcely suffice for a marking. German tuna fishermen take in the average only 10-80 tunas during a voyage in the North Sea (10-14 days). Moreover, such an experiment would have to be made in deep sea waters from a cutter. The handling of a hooked red tuna, if it is not electrically stunned, is already extremely difficult aboard a cutter. As is well-known, all hooked tunas are struggling furiously at first. In the Mediterranean and also off the Atlantic coast of France, Spain and Portugal the pre-requisites for such an experiment are far more favourable: There are sufficient large red tunas available in the Tonnares and Almadrabas. Moreover, there exist sufficient small red tunas, which are easily taken by seine nets or lines, the marking of which, however, is particularly important for exploring the origin of the adult red tunas of the North Sea. Last but not least, such marking-experiments can be carried out off the shore with a calm sea, which facilitates essentially the success of the experiment.

However, it would be advisable to use in such a case the electro-narcosis, as otherwise there would scarcely be any guaranty that the tuna keeps quiet during marking or that it can be marked immediately after the bite (i.e. before the struggling begins which takes place usually when it is caught). The practical value of the electro-narcosis for the marking of tunas is beyond any doubt. From the German side this method was already applied successfully in the North Sea for marking a great number of adult red tunas, and in cooperation with French authorities for red tunas and white tunas (Germon allalonga) off the French coast near St. Jean-de-Luz.

The question, which marking method would be most suitable for tunas, was frequently discussed. According to our experience,

Nylon or Perlon cords provided with a tag and put around the caudal peduncle of the tuna, appear to be particularly suitable. That marking is durable and cannot be overlooked. Our experiments with the stud-method had no remarkable success, as these tags got lost very quickly. One could even think of a marking with hooks, as for instance the self-marking of Baltic salmons by means of fishing hooks. With that method, too, we made already experiments. However, it would be necessary, that possibly all tuna fishermen work with specially marked fishing hooks. With the great number of tunas breaking off the lines, usually 50 %, an adequate number of tunas would then mark themselves in that way. But I think it difficult to organize and control that experiment. Moreover, the expenses would be fairly considerable.

Beside the above-mentioned investigations which had to be confinded mainly to investigating the amount of catches, length, weight, origin, registration of fishing grounds and economic records, there exists the intention in Germany also to examine the gill rakers of tuna, as that has been done by Frade in Portugal and by Ginsberg in Amerika. Recently, we are also interested in parasites attacking the tunas.

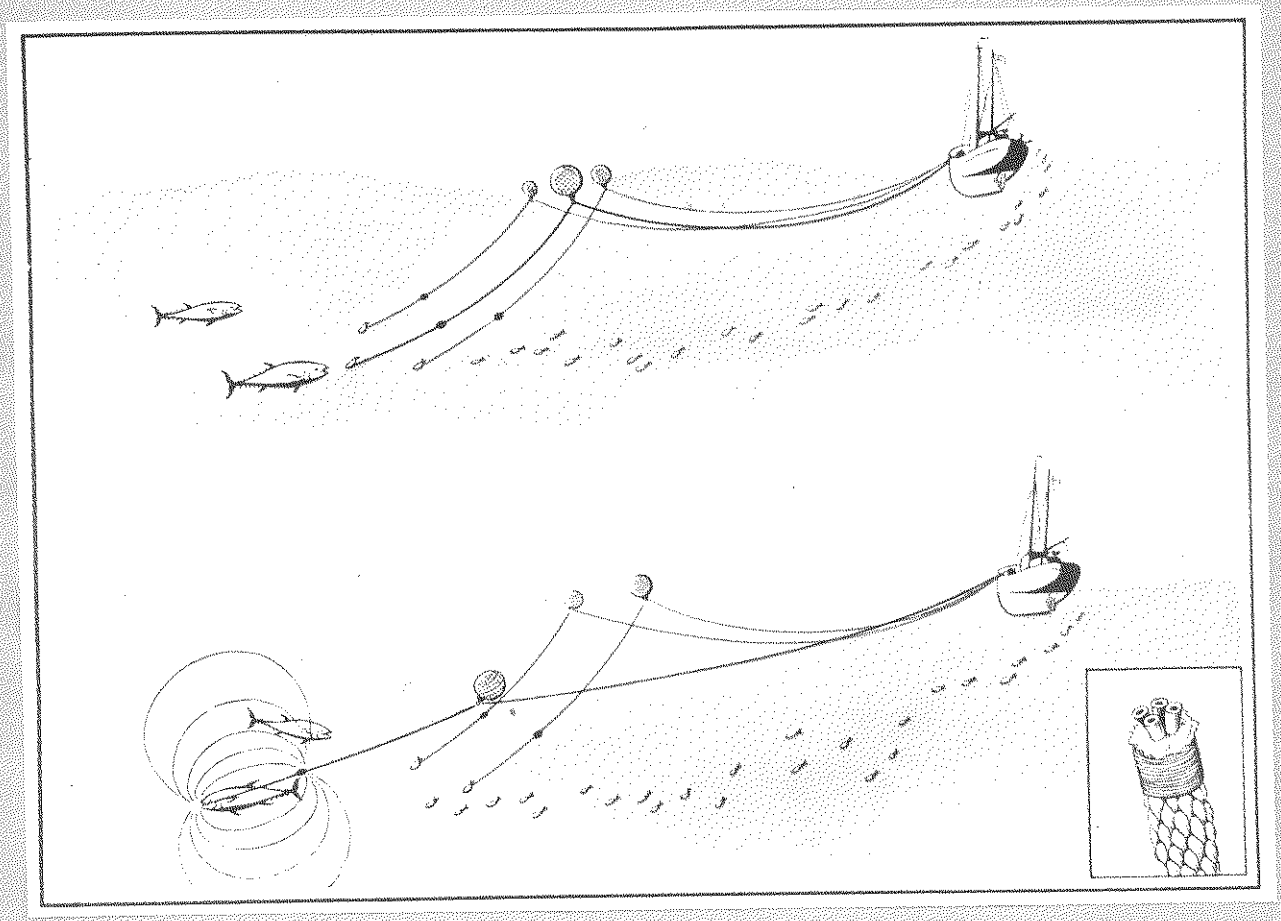

Abb. 1

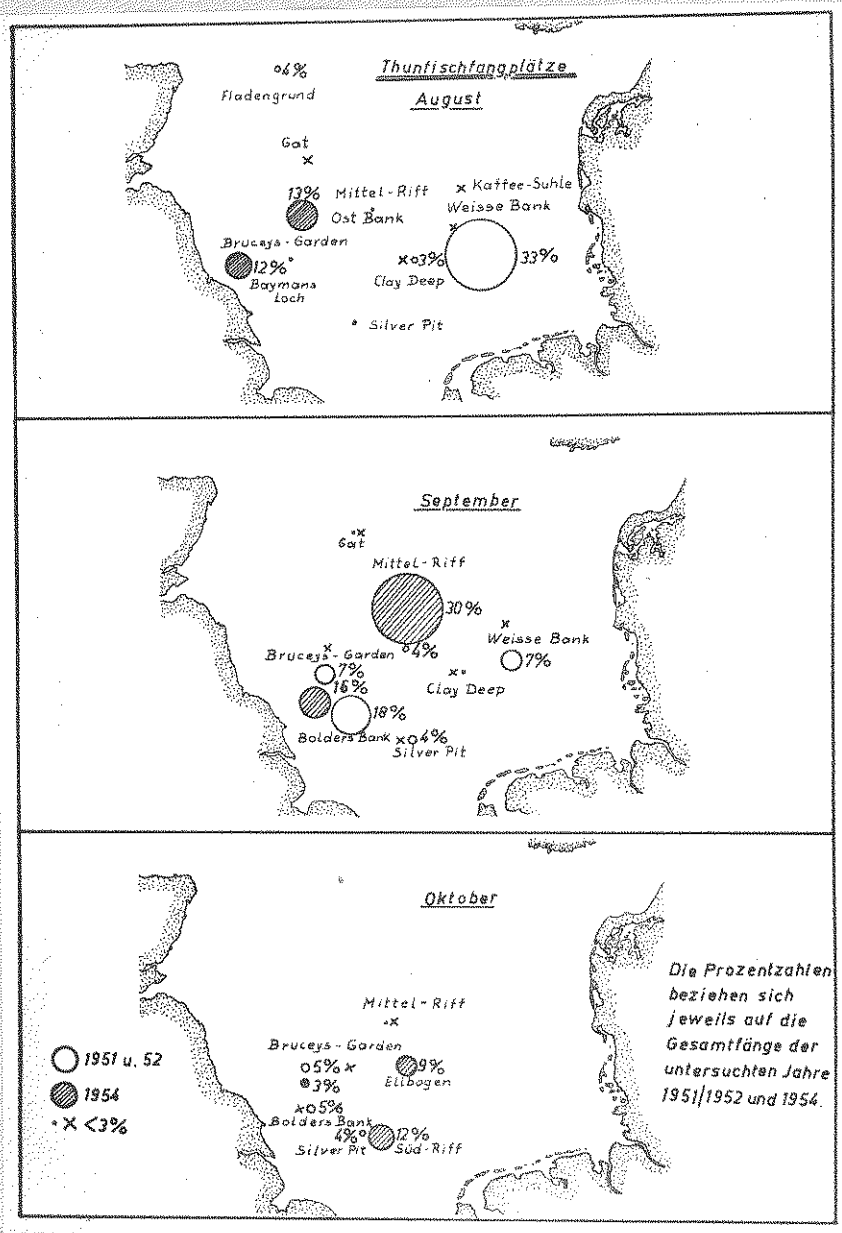
Thunfischfangplätze
August
0,6%
Fladengrund
Gat
13%
Mittel-Riff
Ost Bank
Kaffee-Suhle
Weisse Bank
Bruceys-Garden
12%
Baymans Loch
0,3%
Clay Deep
33%
Silver Pit
September
Gat
Mittel-Riff
30%
64%
Weisse Bank
7%
Bruceys-Garden
7%
16%
Clay Deep
18%
Bolders Bank
0,4%
Silver Pit
Oktober
Mittel-Riff
Bruceys-Garden
0,5%
9%
Ellbogen
3%
0,5%
Bolders Bank
4%
12%
Süd-Riff
Silver Pit
1951 u. 52
1954
< 3%
Die Prozentzahlen beziehen sich jeweils auf die Gesamtfänge der untersuchten Jahre 1951/1952 und 1954.

Abb. 2

Längenmessungen an Thunfischen 1951 - 1954.

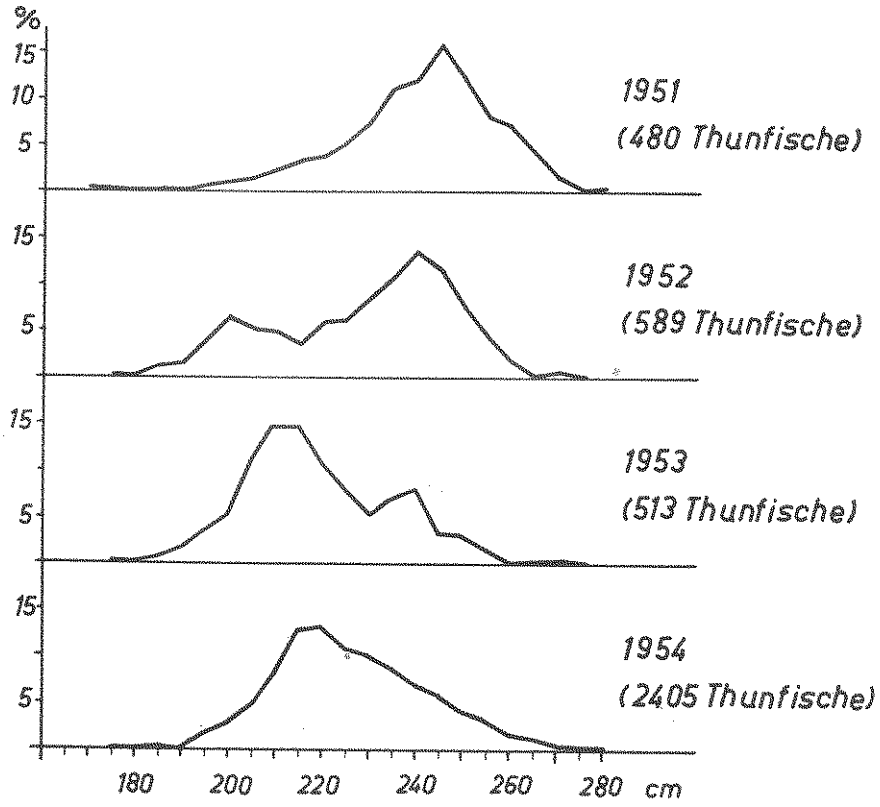

Abb. 3