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## **The Fishery Resources and the Fishery Industries of The Netherlands Antilles**

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### **Abstract**

After the survey of the fishery resources and the food fishes of the Netherlands Antilles in 1905 by Dr. J. Boeke no intensive study of the sea fisheries was made.

The present paper contains detailed information on the said subjects which were mainly collected by the author during 1958. Thus data about the fishery resources, climate and oceanography, character of the coasts, harbors, fishing grounds and the occurrence and ecology of the fishes are treated in detail. The food fishes belong to 50 different families.

The second part of the paper gives information about the fishery industries. The total number of full-time and part-time fisherman in early 1959 was about 1,150. This means that the proportion of fishermen to the total population is 1:166. The types of fishing craft and the numbers of each are discussed. Sailboats still outnumber the motorboats and boats with an auxiliary outboard motor.

As to the types of fishing gear handlines and fish pots ("kanaster") are mostly used. Only a limited number of beach seines ("reda") are present.

The approximate landings per full-time fishermen per year is 1.08 tons. According to this the amounts of fresh fish available from the local fishermen per head per-year was 5.02 kg in 1958, whereas the amount in 1908 was 35.6 kg. As the statistics show, the amount of fresh and frozen fish imported from foreign countries into Curacao was 10.2 kg in 1951. Together with otherwise imported fresh fish the average amount of fresh and frozen fish available per head per year amounts to 15.49 kg.

From an extensive inquiry into the consumption of fresh and frozen fish in Curacao it became evident that the consumption of fish in that island is per capita per year 15.6 kg.

### **INTRODUCTION**

FROM TIME IMMEMORIAL THE inhabitants of the Netherlands Antillean islands, the former Dutch West Indies, have been great fish eaters. Their main food consists of a kind of corn-pudding (made from *Andropogon sorghum*), called "funchi". This is eaten with either fried fish or with a peppery fish soup made from small fish or fish heads. This dish is called in the native language "sopi di playa," as it was eaten originally at the beach (playa means beach).

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As a matter of fact visitors to the islands in their narratives often add a chapter on fish or fisheries. Most of the earlier publications like those by G. G. Paddenburg (1818), G. J. Simons (1868), D. H. Havelaar (1903) and H. van Kol (1904) are of historical value only as they do not give exact data about the number of fishermen, fishing craft, the fishing gear and the quantities of fish landed. The most extensive information about the fishery resources and the food fishes of the Netherlands Antillean islands in the beginning of the 19th century is to be found in the book by M.D. Teenstra, published in 1837. As a surveyor, Teenstra visited the islands in 1828-'29 and 1834-'35, and he gives an accurate description of the fisheries in general and the customs in fishing used in these days.

However, the first and hitherto the only extensive survey of the fisheries of the Netherlands Antilles was carried out by Dr. J. Boeke in 1905, and published in 1907 and 1919. The follow up to this work was done by Dr. P.J. van Breemen, who was Fishery Advisor to the Government from 1908 to 1913. His highly important survey of the fisheries of 1908 has never been published and consequently, did not receive the attention it deserved. Therefore, several of his data are used in the present paper. In recent years some other partial surveys of the fisheries of the islands have been published. First of all, a questionnaire prepared by J. d'Alarco, F.A.O. Fisheries Headquarters, was sent to Curaçao in 1954 and answered by the Technical and Economical Council for the Netherlands Antilles in March, 1955. Then a preliminary survey of the fisheries of the Netherlands Antillean Leeward Islands was made by T.W. Burdon, Fishery Officer in the Department of Agriculture, Jamaica, in July, 1955. And finally the F.A.O. Expert, Dr. G.C. Salmon, studied the fishery industries in the Netherlands Antilles, early in 1957. His conclusions are to be found in the F.A.O. Report No. 781, published in 1958. The paper by F. Steenmeijer (1957), formerly a pharmacist at Aruba, is of much importance with regard to the diet of the inhabitants; however, this subject is not treated in the present survey.

As, moreover, the fisheries of the Netherlands Antilles were not treated in "The Fisheries and Fishery Resources of the Caribbean Area" (Fiedler, Lobell, and Lucas, 1947, F.A.O. Leaflet 259), it seemed worthwhile to compose an up-to-date review. This review was made by the present author in 1958 and the results entitled "The Sea Fisheries of The Netherlands Antilles" were presented in mimeographed form at the third Caribbean Fisheries Seminar, held on the island of St. Maarten, Netherlands Antilles, from July 3-9, 1959. This is a revised edition of that paper.

In this review turtles, lobsters, shrimps, oysters, crabs, etc., are not taken into consideration. A detailed account of the Netherlands Antillean lobsters was published by Holthuis and Zaneveld in 1958.

A list of vernacular and scientific names of Netherlands Antillean Marine fishes, by the present author, has been published in mimeographed form in 1959.

On account of the scarcity of fresh water there is no fresh water fishing of any significance.

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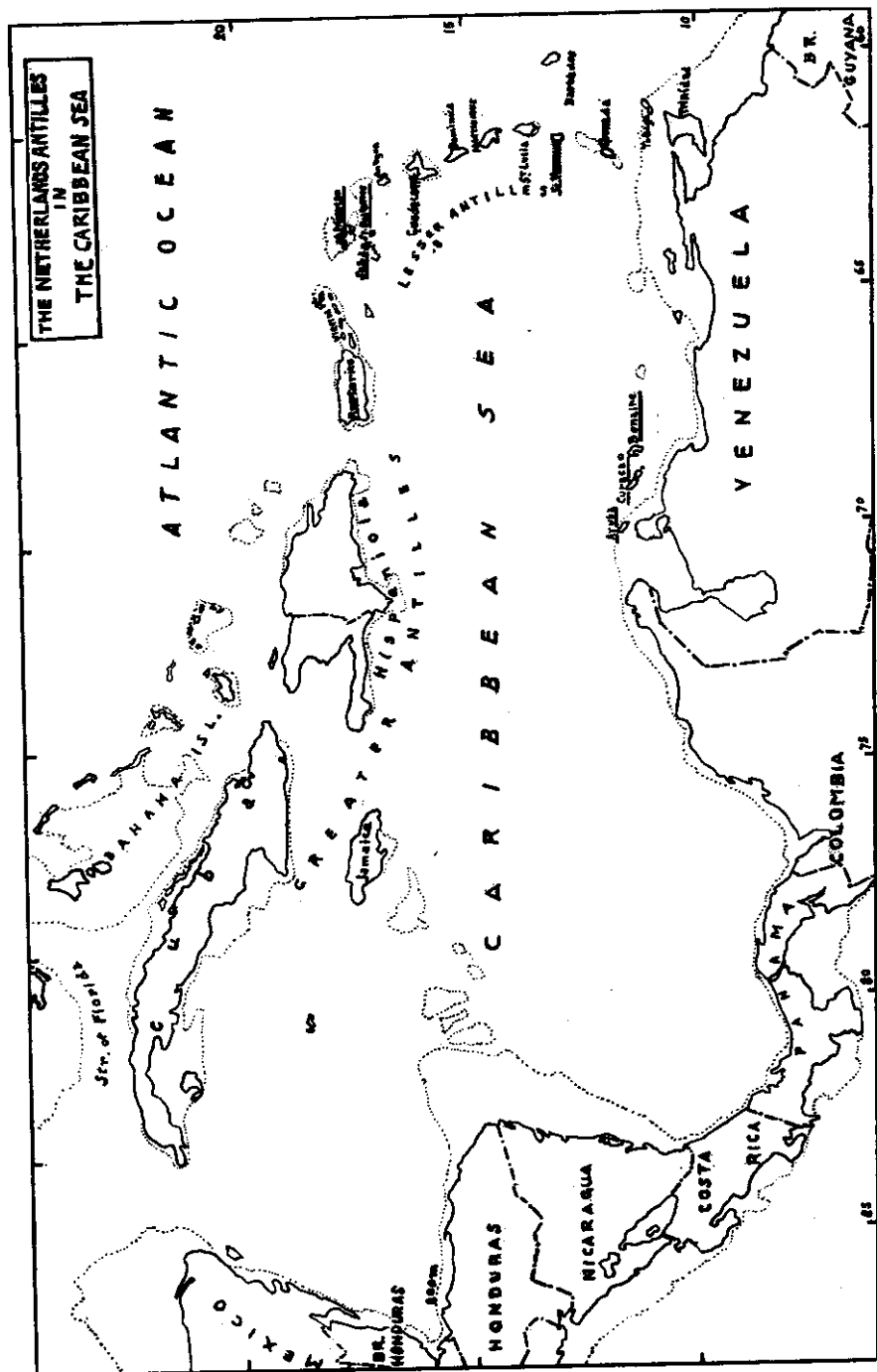


FIGURE 1. Map showing the location of the six islands of the Netherlands Antilles, Aruba, Curaçao, Bonaire, St. Maarten, St. Eustatius and Saba.

Mr. E. Jørg of the Department of Economic Affairs and Welfare, and Mr. C. C. Peterson, Head, Island Government Fish Markets, all of Curaçao. My thanks are also due to Mrs. Margaret MacCabe, Curaçao, for correcting the English text, and to Dr. Jean Pugh, Norfolk, Virginia, U.S.A., for the lettering of the figures. Finally, I am glad to refer to the kind help of Miss Hertha Capriles, for typing the manuscript, to Mr. H. Verbrugge, Amanuensis, for making inquiries, and to Mr. A. J. Maduro, for the spelling of the Papiamentu names, all at Curaçao.

### **Background Information**

*Geographical situation:* The Netherlands Antilles consist of two groups of islands which are known as the "leeward" and "windward" islands (Fig. 1).

To the Leeward Group belong (from west to east) Aruba, Curaçao, Klein Curaçao, Bonaire and Klein Bonaire situated in the southern Caribbean Sea. Aruba lies at a distance of less than 20 statute miles from Venezuela and 42 statute miles W.N.W. of Curaçao, the largest island, whereas the distance from Curaçao to Venezuela is about 38 statute miles. Bonaire is 30 statute miles east of Curaçao.

To the Windward Group of islands located at a distance of 565 statute miles to the N.E. of Curaçao, belong (from west to east) Saba, St. Eustatius and the southern part of St. Maarten, situated at about latitude  $18^{\circ}$  North between longitude  $63^{\circ}$  and  $64^{\circ}$  W. Both the Leeward and the Lesser Windward group form part of the Lesser Antilles chain.

It may be noted here that the usage of the terms Leeward and Windward Islands is somewhat confusing.

In general with the Windward Group is meant the islands extending from the Virgin Islands to Grenada. These islands are also known as *Islas de Barlovento* (Spanish), *Iles sur le Vent* (French), and *Bovenwindse Eilanden* (Netherlands), whereas with the Leeward Group in general is meant the islands extending from Los Testigos to Aruba. These islands are also known as *Islas de Sotavento* (Spanish), *Iles sous le Vent* (French) and *Benedenwindse Eilanden* (Netherlands).

In British usage however, the Windward Group is divided into the Leeward Islands, extending from the Virgin Islands to Dominica, and the Windward Islands, extending from Martinique to Grenada.

*Area and population:* The area and population of the two groups of islands are given in Table 1. For comparison the population in 1900 and in 1930 is also given. After the establishment of the oil refineries in Curaçao (1916) and Aruba (1927) the population of these islands increased rapidly.

The official language is Netherlands (Dutch). The native population in the Leeward Islands speaks a dialect known as Papiamentu, derived from Spanish, Portuguese, Dutch and English, and in the Windward Islands English.

*Administration:* The six islands forming the Netherlands Antilles are an autonomous part of the Kingdom of the Netherlands. The Queen is represented by a Governor, residing in the Federal Capital, Willemstad at Curaçao. He shares his executive power with the Executive Council consisting of seven members.

The legislative branch of the Government is called the "Staten".

Both fresh water and salt water fisheries come under the Ministry of Economic Affairs and Welfare, however, no special department there is in charge of the fisheries.

TABLE 1  
AREA AND POPULATION OF THE NETHERLANDS ANTILLES

Island	Area in sq. miles	Population			Density of population 1.1.1958
		1.1.1900	1.1.1930	1.1.1958	
Curaçao	178.0	30,303	58,335	124,340	698.5
Klein Curaçao	0.5				
Aruba	70.9	9,591	15,500	57,213	807.0
Bonaire	108.1	4,926	5,299	5,663	52.4
Klein Bonaire	3.8				
Sub-total Leeward Islands	339.3	44,820	79,134	187,216	

Island	Area in sq. miles	Population			Density of population
		1.1.1900	1.1.1930	1.1.1958	
St. Maarten (Neth. part)	16.0	3,485	2,643	1,558	97.4
Saba	11.8	1,383	1,510	1,055	89.4
St. Eustatius	5.0	2,189	1,049	1,087	217.4
Sub-total Windward Islands	32.8	7,057	5,202	3,700	
Total Neth. Antilles	394.1	51,877	84,336	190,916	

There are four island territories with their own government headed by a Lt. Governor ("Gezaghebber") and assisted by two to five "deputies". The island fisheries come under one of the "deputies", however, none of the island governments has a special office concerned with fisheries matters.

#### **Fishery Resources**

*Climate and Oceanography:* The islands lying south of the range of hurricanes are exposed to the trade winds, which blow with great steadiness nearly the whole year from E.N.E. and E. The mean velocity being 5 m/sec (5-7 m/sec in the Leeward Groups, and 3.5-5 in the Windward Group.) A hurricane period can only be expected in the Windward Group of islands lasting from July until September. The Leeward Group falls within the area of low rainfall with an average precipitation in the rainy season, lasting from October to January, of 325 mm per year. In the Windward Group the mean rainfall amounts to 1,000 mm per year. Here as well as in the Leeward Group rainfall is very irregular with regard to quantity and distribution. The annual temperature in both groups of islands varies between 26° and 32° C. The annual salinity of the surface layers of the water surrounding the islands varies between 35.2 and 36.1 ppt and the temperatures between 25.7° and 28.6° C.

On account of the semi-arid climate no fresh water fishery industry exists on the Leeward Islands. The absence of fresh water ponds on the Windward Islands has prevented the development of fresh water fisheries. In the small basins where fresh water accumulates during the rainy season (November to March), the so-called "tankies," 3 species of fish, *Rivulus marmoratus*, *Eleotris pisonis*, and *Awaous banana*, together with some species of shrimps, i.e. *Macrobrachium carcinus* occur. *Cyprinodon dearborni* and *Mollienesia sphenops vandepolli* are also present, but they occur in brackish water too.

*Character of the Coasts:* All these islands are volcanic in origin, thus they have a steep type of coast. The maximum depth between Curaçao and the Venezuelan coast is 507 fathoms.

Aruba is separated from the Venezuelan peninsula of Paraguaná and the Colombian peninsula of La Guajira by water which is nowhere deeper than

60 fathoms. The island thus lies on a shoal connecting the main land of South America with the island. On the north and east sides, however, the depth falls suddenly to between 400 and 600 fathoms.

East of Aruba, between this island and Curaçao, there occurs a deep trench with a depth of 850 fathoms extending to the east, between the South American continent and the islands of Curaçao, Bonaire and Los Roques, as far as the plateau on which Tortuga and Blanquilla are situated. To the north of Aruba the bottom gradually drops to depths of 1,000 to 2,850 fathoms.

The islands of Curaçao and Bonaire together with the Islas Las Aves and Islas Los Roques are situated on a large shallow bank, less than 110 fathoms deep, which has steep slopes all around the plateau. This is the reason why the 100 and 1000 fathom lines are close together and close to the shores of the islands, except at the east sides.

St. Eustatius is situated at the North side of a sandy bank. The 10-fathom line surrounds the island at a distance of half a mile off the shore, whereas the 100-fathom line is to be found at a distance of 2 to 2.5 miles.

In contrast to this the 100-fathom line of Saba is quite close to the coast, surrounding the island at a distance of about half a mile, all round. To the southwest of Saba, however, lies the Saba bank with a surface area of about 700 sq. miles. The east side of the bank lies about 10 fathoms below the surface of the sea, and from here it slopes gradually to the west where the depth is about 22 fathoms. The bottom of this bank is covered by a thin layer of chalk sand, scattered all over with large boulders encrusted with coral growth.

St. Maarten is, together with Anguilla and St. Barths, situated on a shoal, with a depth of about 25 fathoms. The bottom of this bank consists of sand covered by rocks and corals. At the west side of the island the 100 fathom line lies at a distance of about one mile off the shore. Between this line and Saba the sea has a maximum depth of 300 fathoms. The large Simson bay in the island of St. Maarten, which used to be connected to the sea by a narrow passage, became separated from the sea after the movement of the sea accompanying the hurricanes of 1954 and 1955.

*Harbors:* The direction of the prevailing wind and the presence of a steep rocky coral coast at the windward side of the islands make landings practically impossible at the east side. At the west sides of the islands the sea is calm, some beaches have developed and a number of large deep inland bays, connected with the sea by a small entrance, are present. Hence, the fishing centers arose on the sheltered southwest coasts of the islands. During the greater part of the year the fishing boats anchor in the large half circular outer bays, whereas they are brought into the sheltered inland bays during the few days in September and October when the direction of the wind is quite the reverse from the normal one. These inland bays form excellent natural harbors. The capitals of the islands are all situated on the southwest coasts.

*Fishing grounds:* There are plenty of good fishing grounds in the neighborhood of the Leeward islands, particularly on the shelf bordering the South American continent, but the fishermen are not allowed to enter the Venezuelan territorial waters. Fishing licenses can not be obtained. Most fishermen of the three Leeward islands operate within ten miles of their island, as they do not like to stay out at sea overnight. In addition to this some Aruban fishermen—about 27 sailing vessels all except one with inboard motors (about 13 gross reg. tons each)—fish off the eastern part of the Colombian coast in the neigh-

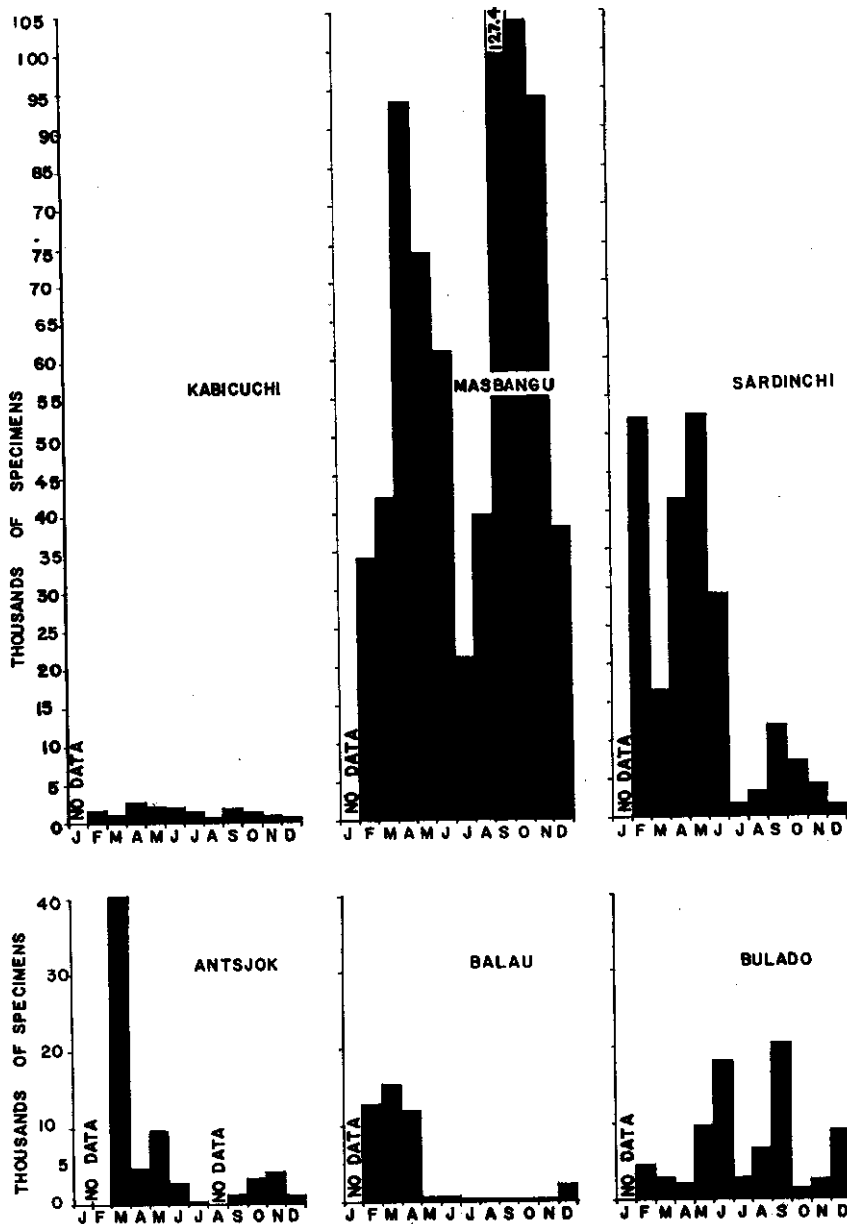


FIGURE 2. Landings (in thousands of specimens) of the most common species of fresh fish at Curaçao in 1908 (cf. Table 5). The seasonal variation of these fish is also obvious.

TABLE 2  
REVIEW OF THE FAMILIES TO WHICH THE NETHERLANDS ANTILLEAN  
FOOD FISHES BELONG

Family	Common English name	Appreciated as food
Carchariidae	Sand Sharks	Little
Orectolobidae	Carpet Sharks	Little
Triakidae	Smooth Dogfishes	Little
Carcharhinidae	Tiger Sharks	Little
Sphyrnidae	Hammerhead Sharks	Little
Pristidae	Sawfishes	Little
Rhinobatidae	Guitarfishes	Little
Dasyatidae	Sting Rays	Moderately
Myliobatidae	Eagle Rays	Little
Elopidae	Ladyfishes	Little
Megalopidae	Tarpons	Moderately
Albulidae	Bonefishes	Little
Clupeidae	Herrings, Sardines	Moderately
Engraulidae	Anchovies	Moderately
Muraenidae	Moray Eels	Moderately
Hemiramphidae	Halfbeaks	Highly
Belonidae	Sea Gars	Highly
Exocoetidae	Flying Fishes	Highly
Holocentridae	Squirrelfishes	Moderately
Mugilidae	Mulletts	Moderately
Sphyrnaeidae	Barracudas	Moderately
Scombridae	Mackerels, Tunas	Highly
Gemphidae	Escolars	Very little
Istiophoridae	Bill- & Speared fishes	Highly
Xiphiidae	Swordfishes	Moderately
Coryphaenidae	Dolphins	Highly
Carangidae	Jacks, Pompanos, Scads	Highly
Serranidae	Sea Basses, Groupers	Highly
Priacanthidae	Big-Eyes	Highly
Lutianidae	Snappers	Highly
Haemulidae	Grunts	Moderately
Sparidae	Porgies	Moderately
Gerridae	Mojarras	Moderately
Mullidae	Goatfishes	Moderately
Sciaenidae	Croakers, Weakfishes	Moderately
Ephippidae	Spadefishes	Little
Chaetodontidae	Angel- & Butterflyfishes	Moderately
Acanthuridae	Surgeonfishes	Little
Scorpaenidae	Scorpionfishes	Little
Triglidae	Searobins	Little
Pomacentridae	Demoiselles	Little
Gobiidae	Gobies	Little
Bleniidae	Blennies	Little
Labridae	Wrasses	Moderately
Scaridae	Parrotfishes	Moderately
Psettinae	Turbots	Moderately
Soleidae	Soles	Moderately
Balistidae	Trigger- & Filefishes	Moderately
Ostraciidae	Trunkfishes	Little
Diodontidae	Porcupine fishes	Little

borhood of the Monks Islands, at the so-called pargo-banks at a distance of 50 to 150 miles from their base, Aruba.

In Curaçao two small Netherlands trawlers operated from 1954-1958 at distances of about 10 to 100 miles from their home island, particularly on a bank lying outside the Venezuelan territorial waters between Margarita Island and Trinidad. As the Venezuelan waters remain closed to vessels registered in the Netherlands Antilles they had to stop their work in 1958. There are, on the other hand, about 20 to 25 Venezuelan sailing vessels (about 15 gross reg. tons each) some with auxiliary motors, which bring fish caught in the Vene-



zuelan waters to the capital of Curaçao. In Bonaire most of the local fishermen operate close to the West coast and around Klein Bonaire and in the great inland bays Lac and Lagoen, though a few may go twenty-five miles or more to sea. Since fishing near the Aves, Los Roques and Orchilla is prohibited by the Venezuelan Government, the fishing grounds around these islands are avoided. As long as these fishing grounds within the range of the local existing fishing vessels are closed, the local fishermen are obliged to develop fisheries around the island itself. Therefore large quantities of demersal fish have never been found in the Netherlands Antilles.

In the Netherlands Antillean Windward islands the only banks that have been fished are the western part of the Saba bank and the Anguilla bank. The Saba fishermen are well known for their good fishermanship. The fishermen of St. Maarten fish on the shallower parts of the Anguilla bank. The fishermen of St. Eustatius never go far into the sea. Formerly some boats fished near the Northern Venezuelan Aves Island off the island of Guadeloupe in spring.

*Distribution and ecology of food fishes:* The food fishes commonly used belong to 50 families. They are enumerated in Table 2, in the sequence given in the Check List of the Florida Game and Commercial Marine Fishes, (Robins, 1958).

With regard to the occurrence of the different foodfishes in the various habitats of the Netherlands Antilles the following groups are to be distinguished:

A. Inland bays and lagoons.

Wide variations in salinity, temperature and turbidity. Salinity mostly higher than normal. Bottom of mud, or sand covered by detritus. Locally seagrass beds. Mangrove swamps surrounding. Some of the fishes like the Groupers, Snappers and Grunts are only feeding here.

Mullets	Squirrelfishes	Porgies
Silversides	Barracudas	Mojarras
Sardines	Groupers	Goatfishes
Anchovies	Snappers	Demoiselles
Moray eels	Grunts	Gobies
Blennies		

B. Open bays along the coast.

Little, if any, salinity fluctuations from normal, temperatures constant, sometimes turbid. Depth to 5 m. Sheltered and surf swept areas. Bottom of sand, chalk sand, scattered boulders.

Jacks	Squirrelfishes	Sea gars
Pompanos	Harvestfishes	Needlefishes
Scads	Moray eels	Scorpionfishes
Silversides	Mullets	Demoiselles
Sardines	Barracudas	Trunkfishes
Anchovies	Grunts	Porcupinefishes
Sea basses	Porgies	Flounders
Wrasses	Goatfishes	Rays
	Halfbeaks	Sharks

C. Coral reefs.

Salinities, temperatures and turbidity usually normal. More or less surf swept areas. Bottom of corals, dead coral boulders, and chalk mud. A

number of fishes like grunts, groupers and snappers have their shelters here, and feed elsewhere.

Grunts	Butterflyfishes	Triggerfishes
Croakers	Surgeonfishes	Trumpetfishes
Angelfishes	Demoiselles	Cornetfishes

D. Open areas offshore.

Salinity, temperature and turbidity the same as for the Caribbean Sea. Oceanic circulation.

Mackerels:	Snappers:	Groupers:
Kónéfés	Pargo	Meru
Mulá	Corá	Jacupepu
Pishishé	Caranjitu	Gatu
Tinú	Bers	Olitu
	Barstebers	Djampou
Billfishes:	Grastèlchi	
Balau bandera		Swordfishes
Balau blancu		Dolphins
Balau cora		Sea Gars
Scads:	Jacks:	Needlefishes
Masbangu	Jaru	Halfbeaks
Moulo	Corcobá blancu	Flyingfishes

As to the occurrence of the fishes throughout the year in the Netherlands Antilles two seasons are to be distinguished; the wet season lasts from the end of October to January. Right after the rainy period starting in February and ending in April balaú (marlin), corcobá (jack) and mulá (wahoo) are very abundant. This can also be traced from Tables 5 and 6, and Figure 2. Masbangu (bigeye scad), sardinchi (sardines), and antsjok (anchovies) frequent from February to April and from September to November. Flying fishes (buladó) and dradu (dolphin) are most frequent from May until September, as well as buni (bonita), bersla (mojarra), grastèlchi (yellow tail) and gutu (parrotfish). Corá (red snapper), gepie (needle fish) and boca largu (halfbeak) mostly abound in the three months preceding the rainy season, i.e. between August and December. Kónéfés (kingfish) and pargo (red snapper) are most abundant from July to October in the Leeward Islands, whereas in the Windward Islands, they occur from December until April.

In the Windward Islands a so called "bank" season occurs, that is the period between the end of October and the end of January. Then redman (squirrelfish) and old wife (*Balistes* sp.) are caught by thousands so that everyone is engaged in fisheries at that period. In the Windward Islands there is a strong belief that redman can be caught only in the period beginning two days after full moon and ending when the moon is in its last quarter. Of the old wife it is said that this fish only bites during daytime from two days before full moon until last quarter. Now Boeke (1907) states that on the day of full moon and the next day nearly all the fish caught are females with ripe ovaries, whereas males are caught during the rest of the above mentioned period.

Some idea of the number of fishes occurring during the year around Curaçao

may also be obtained from Table 10 enumerating the quantities of fish kept in cold storage. It is evident from this Table that, during the two years under consideration, the largest quantity of dradu (dolphin) was stored in April, 1957, and in March, 1958. However, more years of careful registration and correct identification are needed before exact conclusions can be drawn from this Table. Mulá (wahoo), for instance, does not occur on the list for 1957, whereas it is present in every month of 1958. Boca largu (halfbeak) and gepie (needlefish) are most frequently sold directly from the boats, hence the very small quantities mentioned in Table 10. To a small extent the seasonal appearance of fish caught in fishpots can be traced from Table 8, as this Table enumerates the catches for about three months only.

Fishing in the Netherlands Antilles takes place during the morning hours from about 5 to 12 a.m.

### **The Fishery Industries**

*Fishermen:* Most of the men engaged in fisheries are part time laborers. Reliable data for 1959 about the number of full-time and part-time fishermen as well as of the fishing boats and seines are known for Curaçao, Aruba and the Windward Islands. They are given, together with the estimated ones for Bonaire, in Tables 3 and 4. In addition to these figures, it has to be added that in Aruba the total number of fishing boats in 1959 was 341, of which 69 were sailing boats and 272 motorboats, the majority of which have an auxiliary motor. For comparison the numbers for 1905 collected by Boeke are also given.

TABLE 3  
THE NUMBER OF FISHERMEN, BOATS AND SEINES IN CURAÇAO  
BY REGIONS (APRIL 1959).

Fishing Center	Fishermen		Fishing Boats				Seines	
	Full-time	Part-time	Sailboat 4-7 gr. reg. tons	Canoa 4-7 gr. reg. tons	Auxiliary Motor ca. 15 hp.	Motorboat 1-3 gr. reg. tons	Rowboat	Reda
Spaanse Water	26	30		3	4	9	30	1
Hala Canoa		10					10	
St. Annabaai	10	23	6		1	18	10	
Riffort	3	3					7	
Piscaderabaai	20	25	3	7	1	1	26	2
St. Michielsbaai	69	180	12	14	1	2	33	5
Daaibooibaai	15						11	2
Port Marie	10						6	2
Cas Abao	8			1		1	3	1
St. Jan	4						3	1
St. Pieter	6			1			3	2
St. Marthabaai				1			1	
St. Kruis	12	15	1	1		1	17	1
Lagoen	11	12		1	2		8	2
Djerimi	5	10		1			3	1
Westpunt	60	70	5	7		7	39	3
Wacao	1	3		1			1	1
St. Catharina	6			2			5	1
St. Jorisbaai	1	1					1	
TOTAL	267	385	27	40	9	39	217	25

From Table 4 follows that in total there were, in early 1959, about 1,150 fishermen in the Netherlands Antilles. Hence the proportion of fishermen to the total population is 1:166. For Curaçao with the more exactly known numbers, the proportion is 1:190. According to the report by Salmon (1958, p.17)

**TABLE 4**  
**NUMBERS OF FISHERMEN, BOATS AND SEINES IN 1905 AND 1959<sup>(1)</sup>**

Island	Fishermen				Fishing Boats		Seines		Population	
	Full-time		Part-time		1905	1959	1905	1959	1900	1959
Aruba	47	220	500	150	258	341	19	?	9591	57213
Bonaire	105	40	305	60	85	90	3	?	4926	5663
Curaçao	46	267	1135?	385	311	332	6	25	30303	124340
St. Maarten	53	50	34	20	47	25	10	4	3485	1558
Saba	25	2	100	10	21	7	1		1383	1055
St. Eustatius	9	2	32	12	4	8	2	2	2189	1087
<b>TOTAL</b>	<b>285</b>	<b>581</b>	<b>2106?</b>	<b>637</b>	<b>726</b>	<b>803</b>	<b>41</b>	<b>31(?)</b>	<b>51877</b>	<b>190916</b>

(1) In 1959 part-time fishermen were considered only the regular helpers of the full-time fishermen, whereas in 1905 everyone who fished in his sparetime was also enumerated. Moreover, in 1905 all those who gave for their profession "seaman" are also included under the heading of the part-time fishermen. Therefore the number of part-time fishermen given for 1959 has to be smaller.

the proportion 1:200 is to be found in Puerto Rico, Jamaica, Trinidad, and Barbados. Therefore, the proportion found in the Netherlands Antilles comes very near to the general conception.

Comparing the numbers of men engaged in fisheries nowadays and in the days when Boeke made his inquiry (1905), it is remarkable that this number has not changed very much during a half a century. This, however, means that the fisheries industry has become more and more insignificant. Owing to the fact that agriculture has more or less disappeared, and the oil refining industry offers much more lucrative wages, the young men are no longer attracted to fisheries. Fishery is still carried on by the same families as it was half a century ago. The name "Zimmerman" at Curaçao for instance stands for "good fisherman." Christiaan Zimmerman, a Netherlander by birth who died in 1867, was the first fisherman in the village of St. Michiel to use the seine.

*Fishing craft:* The most common boat in the Netherlands Antilles is the wooden rowboat. The frequently used type is the locally called "jola" and this type is characterized by a flat bottom without a keel. The size varies greatly: there are very small ones taken on board sailboats and motorboats, called "giki" in papiamentu, and they may have a length of up to 6 m with a beam of 3 m and depth of 0.6 m. In some cases the "giki" is taken aboard or behind a sailboat or motor vlet for fetching water and wood while the ship lies at anchor. The smaller rowboats are propelled by 2 oars, the larger ones by a number of men (up to 6) each with a paddle ("pagai"). They are steered with the oars or with one "pagai". Rowboats with a rounded bottom also occur; they are locally called "vlet". Rowboats are used in shallow water and in the inland bays. They are locally constructed and whereas the ribs are of native hard wood, imported pine is mostly used for planking.

Sailing boats (fig. 3) are of two types: those with a pointed stern are locally called "canoa" and those with a flat stern are called "sailboats" or "boat." Both types are wooden vessels with a single mast, a main sail ("bela") and a fore-sail ("djiep"). A small bowsprit is sometimes present; there is a small keel beam. The canoas are always open and, except for the bows and a small stem, the sailboats are sometimes open and sometimes closed. Whereas the canoas are balanced by sacks filled with sand, the sailboats have blocks of old iron. When the vessels are pulled ashore the iron ballast is dropped into the sea. A piece

of iron or a large stone serves as an anchor. These vessels average about 6 m in length and are excellent sea boats. The crew consists of 2 to 6, usually 4 men. They have a capacity of 4 to 6 gross registered tons. All sailboats are locally constructed, employing some local wood (mostly kalebas) for the ribs, knees and keel and imported pine for planking. The sails are also made locally of imported canvas.

Motorvessels have the shape and size of a sailboat. They are constructed of wood with a deck, some by native craftsmen or some by the fishermen themselves. Locally the motorvessels are usually called "motorvlet". They have a capacity of 1 to 5 gross registered tons. Some sailboats and canoas are also used with imported auxiliary 15 - 20 H.P. outboard motors. These are locally known as "motor-zeilboot".

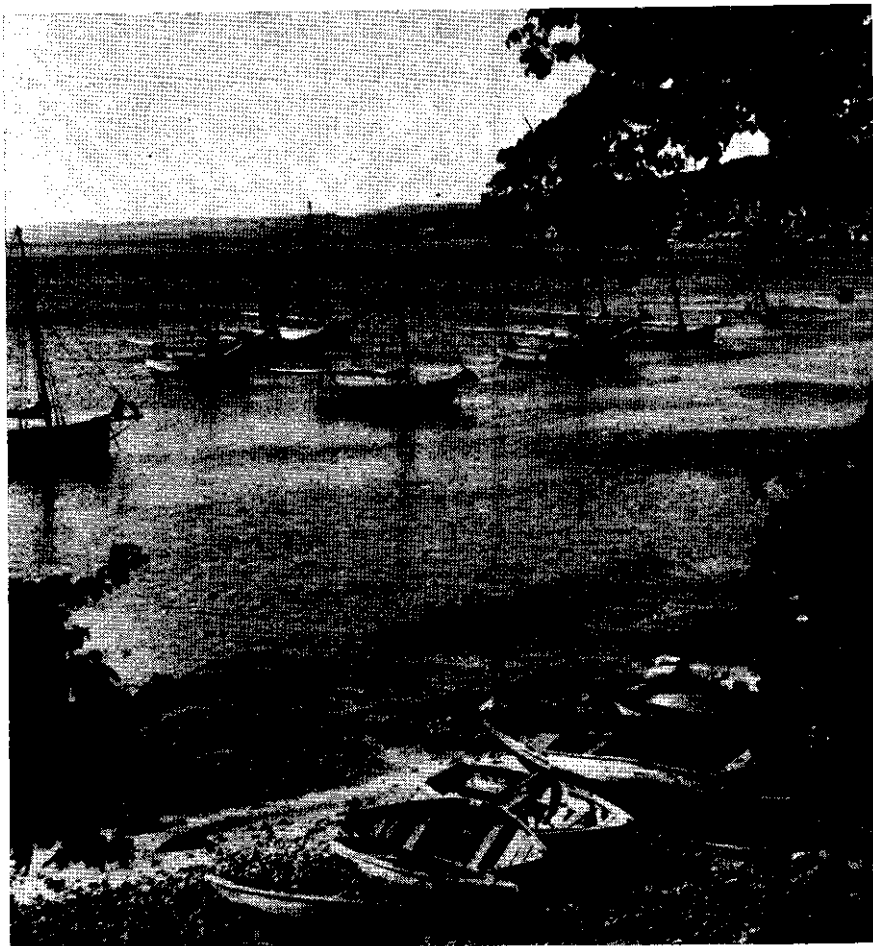


FIGURE 3. Common fishing craft of the Netherlands Antilean Islands. Sailboats and rowboats in St. Michielsbaai, Curaçao.

None of the boats have a live-well on board; in a few cases a wooden live-well or "bun" is towed behind the boat. In Bonaire some fishermen use a triangular, floating wooden live-well called "skalchi". Neither ice nor salt is used for the preservation of the fish; right after the catch it is dumped into the hold of the vessel.

All boats have to be registered at the Harbour Master's office. The number and types of fishing boats are given in Tables 3 and 4, and shown in Fig. 3. As a matter of fact the numbers of fishing boats in 1900 and in 1959 do not differ very much, as the numbers of fishermen are more or less the same. The Dutch firm operating with two vessels (56 and 40 gross reg. tons respectively) since 1951, using flat trawlnets of 90 ft and a balloon trawlnet of 68 ft ceased their work in 1958. A more striking fact is that the types of boats do not differ either, indicating that the enormous technical developments in fishing craft elsewhere in the world have not affected the attitude of the fishermen in the Netherlands Antilles.

*Fishing gear:* Trolling with a floating handline and one or more hooks mostly used while running to and from the fishing grounds, is very often used for pelagic surface fishes such as balau (marlin), dradu (dolphin), gepie (needlefish), etc. Two or three lines are used at the same time from one boat. The yield is normally between 15 and 30 fish per boat per day. For catching flying fish, jaru, corcoba, and bonito a light floating handline is used.

Bottom handlines of various types are used for fishing at depths of 30 to 100 fathoms. They have a heavy sinker and up to four hooks. The yield appears to be about 20-50 lb of fish per man per day. Caranjitu (*Lutianus griseus*), carpitan (*Lutianus analis*), jacupepu (*Epinephelus striatus*), olitu (*Alphestus afer*), gatu (*Epinephelus adscensions*), purunchi (*Cephalopholis fulvus*), pisca-



FIGURE 4. The reda is pulled close to the shore keeping the catch enclosed.

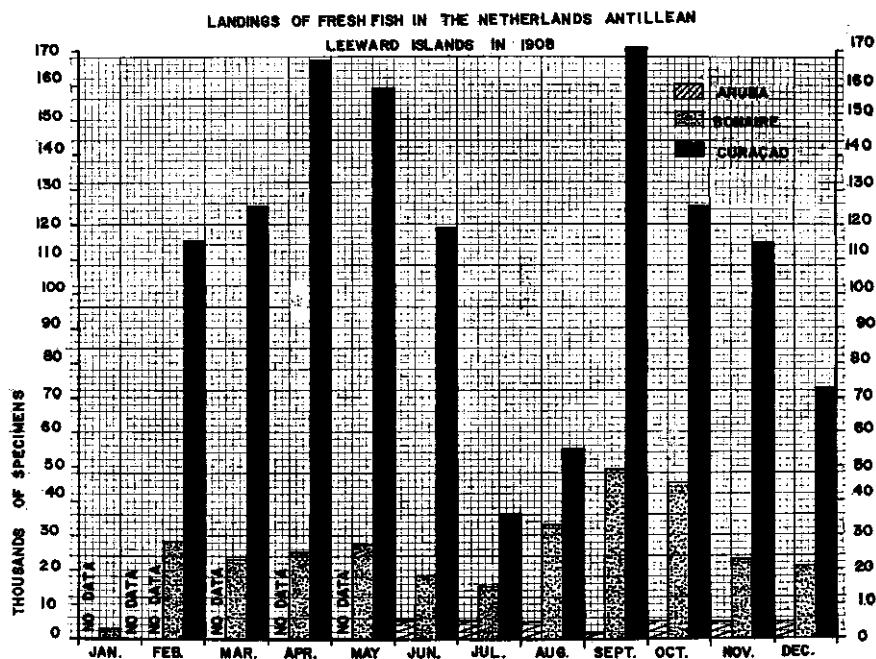


FIGURE 5. Seasonal variation in landings of fresh fish in the Netherlands Antillean Leeward Islands in 1908. (cf. Table 6).

raai (*Malacanthus plumieri*), kónefés (*Scomberomorus cavalla*) and pargo (*Lutianus aya*) are the usual fish caught. This type of ground line is also used for red snapper which, according to the fishermen, often occur in pits along the rough northeast coast of Curaçao. As yet no trial has been made to introduce the long line method so successfully used by visiting Japanese fishing boats in catching tunny.

In shallow water the coast beach seines ("reda", Fig. 4) are used. These are rectangular nets about 45 x 5 m, which are set from a rowboat in a half circle with the opening facing the coast. The meshsize varies between 3 and 10 cm. Watchers on a high rock along the shore warn their fellow fishermen by blowing a conch horn when a school of fishes is seen. The fishermen quickly man their boats. One end of the hauling line is left ashore while the boat is rowed in a semi-circular course enclosing the school and back to the coast. Subsequently the net is hauled to the shore. Sometimes a reda is used as a purse seine, while the boat is rowed in a circular course and when the fish school is encircled both ends of the nets are tied together. As many nets are used as is necessary to keep the catch close together. Some divers are alert to prevent the escape of fish. As a rule several fishermen each owning a reda cooperate with their redas to secure one school of fishes at that time. There are usually 5 to 7 rowboats working together. When there is a larger catch than can be used immediately the net with the fish is left in the water during the rest of the day and the night. As a matter of fact this method is mostly used for large

schools of masbangu (*Selar crumenophthalmus*), buladó (*Exocoetidae*), gepie (*Strongylura acus*), and boca largu (*Hemiramphus brasiliensis*). The same beach seine net is sometimes used as a gill net in the entrance of the bay.

Very commonly in shallow water up to 40 or 50 fathoms, the galvanized chicken wire fish-pots, "kanasters", of the rectangular type are used. This is the only type used, both for fish and lobsters. They are made in two sizes, namely 125 x 120 x 57 cm and 100 x 95 x 40 cm.

The pots are usually baited; bait used is either roasted morays, all kinds of roasted small fish, roasted gourd (=kalebas), or fresh gills, etc. To enable the pots to be recognized in the water they are marked by a white saucer or another glittering object, bound to the top of the pot. The fishermen look for their pots with the aid of a glassbottomed box, which can be easily done as the water is very clear in this part of the Caribbean sea. All kinds of small fishes are caught in these kanasters as well as juvenile fish, lobsters and crabs. The fact that so many immature fish are caught is the reason that these kanasters, as well as the cast nets form a serious danger to the existence and development of the fisheries around the islands. The fish pots are usually lifted by hand every day early in the morning. During the months of December, January, February and March, however, they are mostly lifted only once a week.

The cast-net, "taraai", another very popular fishing gear is used along the shore, in lagoons and inland bays, mostly for catching bait: sardines (*Sardinella* spp., *Harengula* spp.) and sometimes shrimps. Sometimes aaldu (*Mugil curema*) and cabicuchi (*Gerrus cinereus*) are also caught in this way.

In Bonaire a hoop-net is sometimes used for the same purpose. Bonaire is the only island where I ever saw this type of net. It may be operated from a jetty. Fish scraps are used as bait. This net is also very effective for catching crabs.

Tangle nets for catching tortoises are nowadays only used in Bonaire.

*Cooperation:* The fishermen are not organized in any official way for fishing activities. As a rule each fisherman owns his own rowboat. The owners of the sail and motorboats have to go with one or two helpers. After the return the owner first takes half of the catch and the rest is divided among the helpers.

When seines are to be used the fishermen work together. If the net (reda) belongs to one owner he first deducts his expenses and subsequently he gets the half of the catch, whereas the remainder is divided in a complicated way depending on the labour the individual fishermen furnished. A diver for

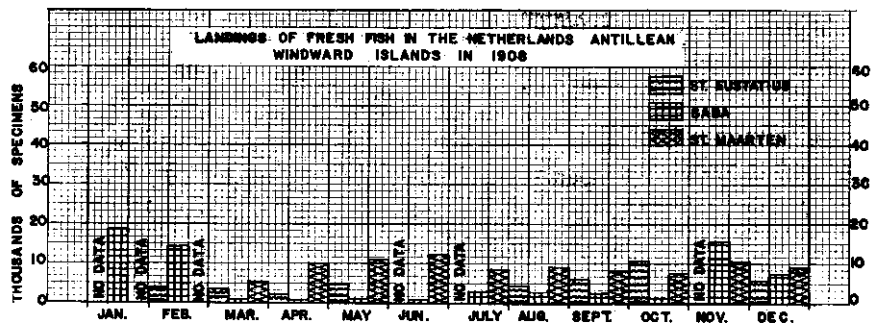


FIGURE 6. Seasonal variation in landings of fresh fish in the Netherlands Antillean Windward Islands in 1908 (cf. Table 6).



example who has to repair a damaged net under water gets an extra share, etc. Another share has to be paid to the driver of the car for transporting the catch to the city. If the net belongs to several fishermen the system of dividing is very complicated. There are rules, but nevertheless the share system is often a source of trouble.

*Production:* Exact data about landings of fresh fish were only known for the year 1908. They were collected by the Fishery Advisor at that time, Dr. P. J. van Breemen, and are as far as I am aware, not yet published. By courtesy of the Government archivist, Mr. R. Boskaljon, the records of Dr. van Breemen are to be seen in Table 5 and 6. These catches of fresh fish in the different months of the year are shown in Fgs. 5 and 6 for the Leeward and Windward Islands respectively.

For Bonaire, Curaçao and St. Eustatius, the numbers of each species of fish which was landed were given. For Aruba, St. Maarten and Saba the fish is not mentioned by species. Moreover, for Aruba and Saba the *numbers* of fishes are given, whereas for St. Maarten the *quantity in kilograms* is mentioned.

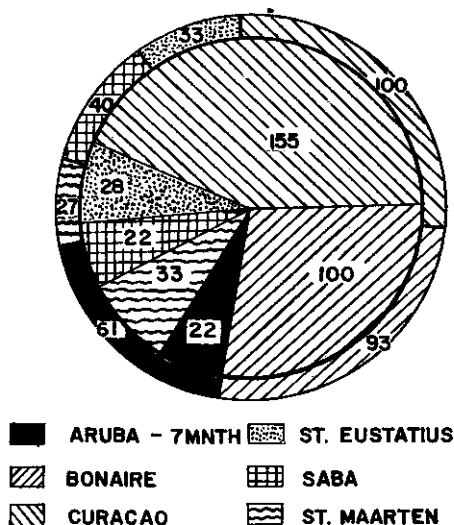


FIGURE 7. Approximate landings of fresh fish per fisherman in the years 1908 and 1958 in the six islands of the Netherlands Antilles expressed in percentages of the total catch for that year. (cf. Table 6).

It is evident from Table 5 that in Curaçao, antsjok, (*Engraulis* spp.), balaú chikí (*Hemiramphus brasiliensis*), buladó (*a.o. Hirundichthys affinis*), masbangu (*Selar crumenophthalmus*), cabicutchi (*Gerris cinereus*), robekie (*Haemulon flavolineatum*), and sardinchi (*Harengula* spp.) outnumber the rest. In Bonaire the favorite species are balaú, buladó, corá (red snapper), gepie, jager, masbangu, piscarai, purunchi and snook. And in St. Eustatius these species are, balaú, grunt, hine, cavally, redman, jack and sprat.

At the bottom of Table 6 the average landing per full-time fisherman per year is calculated. For the number of fishermen the data mentioned were taken

TABLE 5

SPECIMENS OF FRESH FISH LANDED AT BONAIRE, CURACAO AND ST. EUSTATIUS,  
IN 1908, BASED ON HITHERTO UNPUBLISHED DATA BY DR. P. J. VAN BREEMEN  
(— = no fish recorded; x = no data available)

SPECIES	JANUARY			FEBRUARY			MARCH		
	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.
Aal <i>Conger esculentus</i>				45					16
Aaldu <i>Mugil curema</i>				325					542
Abrico <i>Thunnus thynnus</i>	—	x		10	13		9		16
Antsjok <i>Engraulidae</i>		x							40500
Balaú (grandi) <i>Makaira ampla</i>		x			22				32
Balaú (chiki)	53	x	x	109	13306	1520	287	15459	347
<i>Hemiramphus brasiliensis</i>									
Barbi <i>Upeneus martinicus</i>		x	x		2236	—			366
Bers <i>Lutianus apodes</i>	17	x		82	271		89		125
Bersla <i>Lutianus apodes juv.</i>		x			—				48
Buladé <i>Exocoetidae</i>	107	x		550	4663		328	2857	
Buni <i>Katsuwonus pelamis</i>	—	x		29	24	—	25		17
Calala <i>Lutianus mahogoni</i>			x			—			127
Caranjitu <i>Lutianus analis</i>	—			49			24		
Caricabai <i>Selene vomer</i>		x			10				18
Carpitan <i>Lutianus analis</i>	—	x		22	88		23		219
Chuchu <i>Dasyatis americana</i>		x			2				2
Colebra <i>Gymnothorax Junebris</i>		x			28				60
Corcobá <i>Caranx hippos</i>	11	x		27	271		149		223
Corá <i>Lutianus aya</i>	26	x		365	318		301		389
Djampou <i>Mycteroperca bonaci</i>		x			7				12
Dora <i>Balistes ringens</i>	38			37			45		
Dradu <i>Coryphaena hippurus</i>		x		23	134		37		416
Gatu <i>Epinephelus adscensionis</i>	13			20			17		
Gepie <i>Strongylurus acus</i>	27	x	x	158	101	—	153		98
Gramanie ?		x			—				—
Grastélchi <i>Ocyurus chrysurus</i>	13	x	x	15	400	—	9	600	—
Gramél <i>Mycteroperca rubra</i>	—			42			37		—
Grons <i>Haemulon sciurus</i>	7		x	8			3		—
Grouper <i>Epinephelus sp.</i>			x						—
Gutu <i>Scaridae</i>		x	x		631	—		634	—
Hèring <i>Opisthonema oglinum</i>		x			2			15	—
Hine <i>Epinephelus drummond-hayi</i>		x	x		—				107
Jacupeper <i>Epinephelus striatus</i>	3	x		5	226		12	118	—
Jaru <i>Caranx ruber</i>		x			—			36	—
Jager <i>Caranx crysos</i>	12	x	x	110	132	108	93	46	105
Kabijou <i>Seriola dumerili</i>	2	x		35	14		83	10	—
Kabicutchi <i>Gerres cinereus</i>		x			1764			1051	—
Kandelchi		x	x		—	—		115	101
<i>Holocentris ascensionis</i>									—
Kleinfés <i>Acanthuridae</i>			x			—			—
Klipvis		x			150			346	—
<i>Labrisomus nuchipinnis</i>									—
Kónefés	—	x		16	22		23	20	—
<i>Scomberomorus cavalla</i>									—
Margatefish <i>Haemulon album</i>			x			—			—
Masbangu	1100	x	x	25800	34102		20800	41810	3000
<i>Selar crumenophthalmus</i>									—
Moulo <i>Decapterus punctatus</i>		x	x			—		—	800
Mulá <i>Scomberomorus regalis</i>	31	x		178	167		114	161	—
Olitu <i>Alphestes afer</i>	—	x		13	44		25	26	—
Pamper <i>Trachinotus glaucus</i>		x			7			7	—
Piscaraai <i>Malacanthus plumieri</i>	161			226			199		—
Pishi porco <i>Balistes vetula</i>			x			—			—
Porky <i>Calamus sp.</i>			x			—			—
Purunchi <i>Bodianus stellatus</i>	112	x		346	625		236	632	—
Purunchi pretu	16		x	15		—	18		—
<i>Cephalopholis fulvus</i>									—
Robèkie		x			1402			838	—
<i>Haemulon flavolineatum</i>									—
Sábalo <i>Megalops atlantica</i>		x			3			6	—
Sabunèchi	32			173			123		—
<i>Rhomboplites aurorubens</i>									—
Sardinchi <i>Harengula humerales</i>		x			52000			16500	—
Silk (?sill) <i>Lutianus vivianus</i>			x			—			—
Snapper (black)			x			—			—
<i>Lutianus buccanella</i>									—
Snapper (red) <i>Lutianus aya</i>						190			—
Snoek <i>Sphyræna picudilla</i>	515	x		657	144		593	149	—
Sprat <i>Harengula sp.</i>			x			3500			—
Tapa tapa <i>Psettinae</i>		x			—			5	—
Timpóni <i>Elops saurus</i>		x			43			23	—
Tribón <i>Carcharhinidae</i>	3	x		20	53		9	36	—
Voorn ?		x			1099			228	—
TOTALS	2299	x	x	29120	114794	5588	23864	124747	5087

TABLE 5 (continued)

APRIL			MAY			JUNE			JULY		
Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.
	8			35			19			—	
	493			321			391			381	
8	4	—		10			4		2	2	
	4700			9800			2700			200	
	77			80			8			13	
212	9556	1010	98	788	870	217	890	x	106	500	x
	586	—		351	—		239	x		122	x
206	399		129	171		217	215		45	85	
	58			163			319			651	
307	2139		188	9927		682	17199		390	2728	
26	21	—	29	64	129	10	26	—	12	27	—
		—			—			—			—
20			82			35			27		
	209			47			70			10	
17	134		19	132		14	186		8	78	
	5			4			3			3	
	76			53			46			17	
205	540		243	144		55	70		—	28	
272	250		128	38		256	29		315	901	
	7			40			7			12	
40			25			39			48		
11	591		—	820		14	636		—	671	
37			9			19			21		
204	179	—	36	121	117	76	108	—	88	603	—
		—			—			x			x
8	2171	—	17	1044	—	5	838	x	12	505	x
9			33			22			—		
6		—	—		—	7		x	5		x
		80	2		—			x			x
	1831	123		1398	203		1271	x		928	x
	28			11			36			13	
		295			149						x
6	509		13	288		17	263		9	137	
	11			20			10			72	
104	39	106	349	20	94	194	7	x	176	170	x
95	4		6	8			3		—	26	
	2864			2141			2065			1668	
	135	92		282	51		351	x		172	x
		—			—			x			x
	419			341			284			1279	
28	14			15			23		—	43	
		153			—			x			x
21300	93525	—	24500	74290	—	14800	61000	x	13000	21010	x
59	155		43	53		37	27		46	29	
65	86		65	49		39	11		22	—	
	18			18			4			2	
313			202			162			376		
		185			64			x			x
467	2071		740	945		817	470		265	228	
								x			x
17		—	19		—	12		x	15		x
	1399			1532			767			818	
	9			9			1			—	
248			—						—		
	41580			52500			29000			1820	
		—			—			x			x
		—			—			x			x
181				118				x			x
538	236		519	273		516	175		525	188	
		—			—			x			x
	2			2			1			—	
	72			62			63			70	
14	55		3	44		5	33		6	12	
	99			134			20			6	
24842	167424	2221	27495	158580	4869	18267	119888	x	15719	36208	x

TABLE 5 (continued)

SPECIES	AUGUST			SEPTEMBER			OCTOBER		
	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.
Aal <i>Conger esculentus</i>						1			2
Aaldu <i>Mugil curema</i>		122				4			143
Abrico <i>Thunnus thynnus</i>	—	—		4	—	—	—	—	3
Antsjok <i>Engraulidae</i>		—			1100	—			3400
Balaú (grandi) <i>Makaira ampla</i>		1			26	—			65
Balaú (chiki) <i>Hemiramphus brasiliensis</i>	612	885	—	719	320	—	—	—	30
Barbí <i>Upeneus martinicus</i>		107	118		205	743			132
Bers <i>Lutianus apodes</i>	131	13		244	52	—	311		122
Bersla <i>Lutianus apodes juv.</i>		106			167	—			213
Buladó <i>Exocoetidae</i>	1810	6928		1021	20343	—	—		1507
Buní <i>Katsuwonus pelamis</i>	10	218	—	—	204	—	35		84
Calala <i>Lutianus mahogoni</i>		—	—		—	—			—
Caranjitu <i>Lutianus analis</i>	43			39			41		—
Caricabai <i>Selene vomer</i>		6			13	—			2
Carpitan <i>Lutianus analis</i>	7	93		—	335	—	15		822
Chuchu <i>Dasyatis americana</i>		1			—	—			—
Colebra <i>Gymnothorax junebriis</i>		—			7	—			1
Corcobá <i>Caranx hippos</i>		6			30	—	141		124
Corá <i>Lutianus aya</i>	93	273		362	1732	—	235		1943
Djampou <i>Mycteroperca bonaci</i>		—			3	—			7
Dora <i>Balistes ringens</i>	27			26			36		—
Dradu <i>Coryphaena hippurus</i>	—	257		19	476	—	17		123
Gatu <i>Epinephelus adscensionis</i>	15			36	—	—	8		—
Gepie <i>Strongylurus acus</i>	478	2327	—	477	317	—	868		956
Gramanie ?		—			—	—			150
Grastélchi <i>Ocyurus chrysurus</i>	11	140	—	10	1342	—	17		790
Gramèl <i>Mycteroperca rubra</i>	—	—		—	—	—	12		—
Grons <i>Haemulon sciurus</i>	3		463	4		505	—		379
Grouper <i>Epinephelus sp.</i>		—	—		—	—			144
Gutu <i>Scaridae</i>		131	127		642	—			329
Hèring <i>Opisthonema oglinum</i>		—			—	—			—
Hine <i>Epinephelus drummond-hayi</i>			679			894			1500
Jacupeper <i>Epinephelus striatus</i>	8	51		7	161	—	—		353
Jaru <i>Caranx ruber</i>		30			47	—			473
Jager <i>Caranx crysos</i>	741	8	108	218	59	391	219		16
Kabijou <i>Seriola dumerilli</i>	—	7		36	11	—	—		46
Kabicutchi <i>Gerres cinereus</i>		705			1780	—			1273
Kandelchi <i>Holocentris ascensionis</i>		—	426		169	705			130
Kleinfès <i>Acanthuridae</i>		—	142		—	211			397
Klipvis <i>Labrisomus nuchipinnis</i>		—			29	—			—
Kónefés <i>Scomberomorus cavalla</i>	—	16		12	23	—	13		43
Margatefish <i>Haemulon album</i>		—	—		—	298			338
Masbangu <i>Selar crumenophthalmus</i>	23900	39010	641	45100	127442	869	42200	103420	482
Moulo <i>Decapterus punctatus</i>		—			—	—			—
Mulá <i>Scomberomorus regalis</i>	26	10		34	66	—	50		95
Olitu <i>Alphestes afer</i>	23	—		14	1	—	15		—
Pamper <i>Trachinotus glaucus</i>		—			2	—			27
Piscaraai <i>Malacanthus plumieri</i>	176			184		—	151		—
Pishi porco <i>Balistes vetula</i>		—	157		—	264			87
Porky <i>Calamus sp.</i>		—			—	—			195
Purunchi <i>Bodianus stellatus</i>	432	116		265	350	—	820		386
Purunchi pretu <i>Cephalopholis fulvus</i>	19		174	22		374	18		463
Robekie <i>Haemulon flavolineatum</i>		467			806	—			1286
Sábalo <i>Megalops atlantica</i>		100			1	—			—
Sabunèchi <i>Rhomboplites aurorubens</i>	106			129		—	73		—
Sardinchi <i>Harengula humeralis</i>		3250			11800	—			7260
Silk (?sill) <i>Lutianus vivianus</i>		—	112		—	233			80
Snapper (black) <i>Lutianus buccanella</i>		—	54		—	—			175
Snapper (red) <i>Lutianus aya</i>		—	1908		—	120			—
Snoek <i>Sphyræna picudilla</i>	505	162		513	218	—	529		320
Sprat <i>Harengula sp.</i>		—	—		—	867			—
Tapa tapa <i>Psettinae</i>		—			—	—			4406
Timponi <i>Elops saurus</i>		4			9	—			19
Tribón <i>Carcharhinidae</i>	4	5		6	11	—	8		12
Voorn ?		—			—	—			—
<b>TOTALS</b>	<b>33280</b>	<b>55555</b>	<b>5315</b>	<b>49501</b>	<b>170304</b>	<b>6657</b>	<b>45832</b>	<b>125957</b>	<b>11118</b>

TABLE 5 (continued)

NOVEMBER			DECEMBER			TOTAL		
Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.	Bonaire	Curacao	Eust.
	1			3			130	
	218			574			3414	
2	—		1	—		36	52	
	4200			1200			67800	
	29			65			368	
387	224	—	25	2225	—	3025	44183	3847
	99	—		135	319		4578	1641
287	225		131	107		1889	1785	
	58			71			1854	
877	2785		645	9173		6905	80319	
15	104	—	14	43	—	205	832	129
		—						127
50			11			421		
	1			4			430	
5	110		4	52		134	2149	
	2			3			25	
	4			16			308	
110	176		43	187		984	1799	
731	1976		289	1075		3373	8924	
	12			14			121	
65			50			476		
21	210		35	192		177	4526	
45			27			267		
672	607	x	310	838	337	3607	4255	454
		x			90			240
19	738	x	16	212	—	152	8780	143
34						189		
4		x	5			207		1554
		x				149		373
	459	x		456		—	8710	453
	—						105	
		x			455			4079
—	315		—	272		80	2685	
	37			6			742	
199	457	x	99	10	71	2514	1034	1312
—	9		43	7		300	145	
	780			642			16733	
	280	x		298	365		1932	2204
		x			140			890
	15			54			2917	
	42		22	24		114	285	
		x			134			923
19000	94110	x	18100	38455	—	273700	728174	4922
	—						7000	
128	128		92	225		838	1136	
19	—		2	7		302	214	
	1			—			86	
467			11			2628		
		x			317			1774
		x			—			195
265	637		546	477		5311	6937	
14		x	16		123	201		
	629			601			10545	
	1			—			130	
—			—			884		
	4360			1460			234710	
		x			—			425
		—						54
		x						
507	221		571	243		6488	2329	
		x			3375			12148
	—			—			10	
	3			21			389	
3	10		7	9		88	280	
	—			—			1566	
23926	114273	x	21175	73596	6265	315340	1265426	47120

**TABLE 6**  
**SPECIMENS OF FRESH FISH LANDED AT THE DIFFERENT NETHERLANDS**  
**ANTILLEAN ISLANDS IN 1908**

(These data were collected by Dr. P. J. van Breemen)  
(x = No data available. The landings for St. Maarten are in kilograms.)

Month	Island Number of Fishermen	Aruba	Bonaire	Curaçao	St. Eustatius	Saba	St. Maarten
		123	183	498	149(?)	180	220
	Number of Sail- and Rowboats, Respectively	12—25	44—10	12—150	(?)—3	2—20	27—28
January	x	2299	x	x	22319	x	x
February	x	29120	114794	5588	16583	x	x
March	x	23864	124747	5087	460	6338	6338
April	x	24842	167424	2221	650	12195	12195
May	x	27495	158580	4869	650	10836	10836
June	598	18267	119888	x	610	12646	12646
July	4738	15719	36208	x	1570	10593	10593
August	5075	33280	55555	5315	2709	11263	11263
September	1592	49501	170304	6657	1579	9735	9735
October	4695	45832	125957	11118	1709	9445	9445
November	4277	23926	114273	x	18200	12254	12254
December	4260	21175	73596	6265	9500	11130	11130
TOTAL		25235 sp.	315340 sp.	1265426 sp.	47120 sp.	66539 sp.	106435 kg.
Average landing per month		3882 sp.	26278 sp.	115039 sp.	5890 sp.	5545 sp.	5358 kg.
Average landing per year		46584 sp.	315340 sp.	1380468 sp.	70680 sp.	66540 sp.	10644 kg.
Approximate landing per fisherman per year in tons (estimated weight per fish: 1 kg.)		0.4	1.8	2.8	0.5	0.4	0.6

**TABLE 7**  
**ESTIMATED CATCHES OF FISH IN THE NETHERLANDS ANTILLEAN**  
**ISLANDS GIVEN BY DR. G. C. SALMON IN 1958**

Island	Estimated total catch in tons in 1956	Average catch per fisherman in tons
Aruba	300	1.0
Bonaire	140	1.4
Curaçao	500	1.5
Saba	15	0.6
St. Eustatius	10	0.5
St. Maarten	30	0.4

by Van Breemen himself. The approximate landings per fisherman in tons could thus be calculated for 1900. They are for St. Eustatius, Saba and St. Maarten 0.5, 0.4, and 0.6 respectively, and for Aruba, Bonaire and Curaçao, 0.4, 1.8 and 2.8 (Fig. 7). Comparing these values with those estimated for the year 1956 by G.C. Salmon in his F.A.O. Report (1958) (0.5, 0.6, 0.4 and 1.0, 1.4, 1.5, respectively) it is evident that the catch per fisherman in the three Windward Islands agrees very well with Salmon's estimation. The figures for the Leeward Island, however, are somewhat higher than those estimated by Salmon. With regard to the low value for Aruba this may be due to insufficient numbers of data.

From Table 5 it is evident that in 1908, 1890 metric tons of fish were available. As the population in that year was 53,000, the per capita availability of fresh fish in 1908 was 35.6 kg. It is highly interesting to compare these data with the estimated ones by Dr. Salmon. According to his report (Salmon, 1958, appendix IV) the total catch in tons and the average catch per fisherman at the end of 1956 was estimated as shown in Table 7. Most probably these figures are still valid at the beginning of 1959 (Fig. 7). As the total amount of fresh fish thus is 995 tons and the total population in the Netherland Antilles amounts to 190,916 (1.1.1958) the amount of fresh fish available per head per year should be approximately 5.02 kg. This means that in 1958 for every inhabitant of the Netherlands Antilles 30 kilograms *less* of fresh caught fish were available than in 1908!

The average yield by the local fishermen may roughly be estimated as follows:

trotling:	20-40 lb. per man per day
groundlines:	20-30 lb. " " " "
fishpots:	10-20 lb. " " " "

Moreover, there are between 20 - 30 Venezuelan sail ships with auxiliary motor of about 15 gross reg. tons which regularly bring in fresh fish to Curaçao. These fish, however, are caught along the shelf off the Venezuelan coast.

The two big Dutch vessels ceased their fishing operations at the end of 1958.



FIGURE 8. The floating fish market of the Venezuelan sailing boats at Curaçao. The boats are tied up close to the shore. Here is a concrete counter where fish and fruit are laid out for selling.

TABLE 8  
NUMBER OF FISHES CAUGHT IN FISH POTS IN ARUBA, BONAIRE AND CURAÇAO  
DURING THE MONTHS OF FEBRUARY, MARCH AND APRIL, 1955

ISLANDS		ARUBA	BONAIRE	CURAÇAO	
Locality		Off Eagle River	Off Kralendijk	Bullenbaai	Caracasbaai
Number of Days		7	12	36	93
Number of Fish Pots		9	24	18	31
Barbí	<i>Upeneus martinicus</i>	4	1	80	28 (3)
Bèrs	<i>Lutianus apodus</i>	1	3	1	3
Brandhorifes	<i>Scorpaena grandicornis</i>	0	1	2	1
Cabicuchi	<i>Gerris cinereus</i>	0	2	0	2
Caha di morto	<i>Lactophrys triqueter</i>	1	24	0	4
Chamba	<i>Chaetodon spec.</i>	3	17	4	45 (2)
Chamba pinctet	<i>Prognathodes aculeatus</i>	0	0	0	6 (6)
Chapín	<i>Lactophrys bicaudalis</i>	0	1	0	3
Culebra's	<i>Muraenidae</i>	0	4	12	4 (2)
Debojo	<i>Myripristis berndti</i>	2	0	9	4
Diente di cacho	<i>Bodianus rufus</i>	1	1	0	0
Djindja	<i>Diodon hystrix</i>	1	7	0	1
Gatu	<i>Epinepheles adensionis</i>	0	0	0	1
Gepi	<i>Strongylurus acus</i>	0	0	0	1 (1)
Grastèlchi	<i>Ocyurus chrysurus</i>	0	0	1	19 (2)
Gutu	<i>Sparisoma spec.</i>	11	17	49	159 (6)
Habón	<i>Rypticus saponaceus</i>	1	1	3	6 (2)
Kandelchi	<i>Holocentris ascensionis</i>	1	10	21	62 (16)
Katabòh	<i>Abudefduf marginatus</i>	0	0	0	8
Kleinfeshi	<i>Acanthurus spec.</i>	18	1	21	211 (3)
Ladronchi	<i>Holocentrus tricolor</i>	4	0	1	4
Masbangu di piedra	<i>Decapterus macarellus</i>	0	2	1	3 (2)
Pekchi	<i>Thalassoma bifasciatum</i>	0	4	11	11 (4)
Piscarai	<i>Malacanthus plumieri</i>	0	1	0	0
Pishi porco	<i>Balistes vetula</i>	3	9	7	47 (2)
Purunchi pretu	<i>Cephalopholis fulvus</i>	9	7	6	34 (8)
Rei di laman	<i>Eques lanceolatus</i>	2	2	0	0
Robèki	<i>Haemulon flavolineatum</i>	6	11	5	95 (2)
Sabunèchi	<i>Rhomboplites aurorubens</i>	0	0	5	12 (1)
Sheu	<i>Pomacanthus spec.</i>	0	2	0	1
Stelchi	<i>Chromis marginatis</i>	1	4	6	4 (1)
Takitaki	<i>Brachygenys chrysargyreus</i>	2	4	33	19 (1)
Trompet	<i>Aulostomus maculatus</i>	8	2	23	27 (2)

(1) The numbers between parentheses indicate the catches in a specially constructed cylindrical fish pot with one entrance at each side. This fish pot was constructed to be certain that the entrances are always open when lowering the fish pots in the sea-water out of eye sight.

A review of the species of fishes and the number of specimens of each species caught in fish traps in Aruba, Bonaire and Curaçao may be seen from Table 8. From Table 8 it is evident that *Acanthurus* spp., *Sparisoma* spp., *Haemulon flavolineatum* and *Upeneus martinicus* outnumber the rest of the catches. Boeke (1907, p. 188) gives a list of fish pot catches in Aruba, which shows a variety of four species only. The number of specimens of *Haemulon flavolineatum* caught in about 200 fish pots during 31 days amounted to 2354.

With regard to the production of fish it may be of interest to know how many fishes are brought ashore by spear fishermen. The results of the fish games held in 1956, 1957 and 1958 are to be seen in Table 9. Contrary to the catches in fish pots the game fishes are large specimens, therefore it is not to be expected that the numbers of fish around the islands be decreased by these games.

*Transport:* As soon as the boats are landed the fish is brought by open



pick-ups to the main market on the island. On none of the islands does this transport take more than one hour. On each of the six islands there is only one main market: on Aruba at Oranjestad, on Bonaire at Kralendijk, on Curaçao at Willemstad, on Saba at The Bottom, on St. Eustatius at Oranjestad, and on St. Maarten at Philipsburg.

*Marketing:* In the Netherlands Antilles fresh fish is not sold wholesale. At several landing points along the coasts of the islands fish is sold directly to retail traders, mostly women. The fish is thrown into open baskets, buckets or wooden boxes and the fishwives and their fish are brought to the market by cab. The market is not very popular on these islands. Most people prefer buying directly from the fishing boats. They form the so called "floating market" (Fig. 8). This can easily be done at Curaçao where some boats stay in Anna-baaiharbor and others in the Waaigat. Here the Venezuelan sailships also sell their fish directly to the public. Otherwise, the catches are retailed either in the Island Government market or illegally in the streets in the neighborhood of the market. In the market about 25 stalls are occupied daily at a rate of NAfl. 0.11 per day.

*Storage:* For overnight storage the Island Governments of Curaçao and Aruba own a small walk-in coldstore, which is annexed to the slaughterhouse near the market. The minimum charge for storage is NAfl. 0.11 for 10 kg per week with a minimum charge of 10 kgs. The capacity of the government storage is 24 tons of fish. In Curaçao the total quantity stored during 1957

TABLE 9

THE CATCH BY SPEAR FISHERMEN AROUND THE ISLAND OF CURAÇAO DURING A 5-HOUR PERIOD, AND AROUND THE ISLAND OF BONAIRE DURING A 10-HOUR PERIOD

DATE		12.22.1956	11.22.1957	11.18,19.1958
ISLAND		CURACAO	CURACAO	BONAIRE
NUMBER OF SPEAR FISHERMEN		22	21	7
SPECIES		Number kgs	Number kgs	Number kgs
Aaldu	<i>Mugil curema</i>	4	8.70	—
Barracuda	<i>Sphyraena barracuda</i>	3	2.90	5
Bers	<i>Lutianus apodus</i>	2	2.45	6
Bocachitu	<i>Kyphosus sectatrix</i>	4	2.45	—
Cabicuchi	<i>Gerres cinereus</i>	2	1.85	—
Caranjitu	<i>Lutianus griseus</i>	2	1.15	—
Chuchu	<i>Dasyatis americanus</i>	—	—	—
Corcobá	<i>Caranx hippos</i>	1	0.10	—
Diente di maishi	<i>Calamus bajonado</i>	4	5.50	14
Djucfés	<i>Garrupa nigríta</i>	—	—	—
Gramel	<i>Epinephelus ruber</i>	2	7.40	3
Grastelchi	<i>Ocyurus chrysurus</i>	—	—	1
Groupers	<i>Epinephelus spp.</i>	8	71.90	6
Jacupeper	<i>Epinephelus striatus</i>	4	2.30	14
Jaru	<i>Caranx spec.</i>	10	10.00	4
Juana di awa	<i>Synodus intermedius</i>	2	0.50	—
Kónéfés	<i>Scomberomorus cavalla</i>	1	1.50	—
Pampano	<i>Trachinotus glaucus</i>	—	—	3
Pishi porco	<i>Balistes ringens, B. vetula</i>	2	3.40	55
Pishi porco	<i>Monacanthus spp.</i>	1	0.10	8
Roubéki	<i>Haemulon flavolineatum</i>	1	0.10	—
Wowo dibojo	<i>Myripristis bernáti</i>	2	0.40	—
Sheu	<i>Pomacanthus arcuatus</i>	—	—	—
Tarpon	<i>Megalops atlántica</i>	—	—	—
Tribon di santu	<i>Ginglymostoma cirratum</i>	—	—	—
TOTAL		55	122.70	119
			268.40	40
				334.50

TABLE 10

THE FISH SPECIES AND THE QUANTITY OF EACH IN KILOGRAMS STORED IN THE GOVERNMENT COOLHOUSE AT CURACAO, 1957-1958

SPECIES	Number		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total KG.	
	1957	1958													1957	1958
Aaldu <i>Mugil curema</i>	900															67
Balaú <i>Makaira ampla</i>	273	152	1807	643	503	573	574	547	170	117	83	1207	2736	723	9683	5137
Boca largu <i>Hemiramphus brasiliensis</i>	7958	1575	430	322	503	652	509	337	267	54	434	623	570	436	547	87
Buladó <i>Exocoetus volitans; Sarda sarda</i>	368	1547	95	368	64	3									57	361
Buní <i>Sarda sarda</i>	3043	1158	35	25	3				24	18	87	118	71	45	57	361
Caranja <i>Lutianus griseus</i>	8		260	1417	1389	225	1416	2796	541	573	630	314	168	379	10108	19460
Corcobá <i>Caranx hippos</i>			231	126	840	2453	2765	2416	1579	178	3771	1238	1627	2236	23	23
Córá <i>Lutianus aya</i>	484	406	4	26	12	10	67	29	14	104	300	196	26	218	825	456
Djampau <i>Mycteroperca bonaci</i>	6	17	14	20						47	152	103	31		29	73
Draú <i>Coryphaena hippurus</i>	2647	3147	1109	2052	3832	4480	1964	4537	11	30	14	18	18	22709	30432	30432
Fleerchi <i>Hirundichthys affinis</i>	1599	450	2494	3931	8288	1878	3578	3779	4780	411	438	164	460	231	142	357
Gatu <i>Epinephelus adscensionis</i>	68		33	39	37	50	127	49	30			62			139	139
Gepi <i>Strongylurus acis</i>	492	583	30												144	390
Grastelchi <i>Ocyurus chrysurus</i>	661	282	207	9	301	212	84	16	13	372	8	18	52	2130	1127	1127
Jacupeper <i>Epinephelus striatus</i>	13	12	40		10	10	10		17	16	41		73	141	91	109
Kabijou <i>Seriola dumerilii</i>	77	39	22	22	5	9	30				13	31	29	482	212	212
Masbangu <i>Caranx crumenophthalmus</i>	100		221	46	16				7	27	29	32	2	2	2	2
Meru <i>Epinephelus morio</i>	3	14	45												37	37
Mulá <i>Scomberomerus regalis</i>									7	4	7		14			32
Purunchi <i>Cephalopholis fulvus</i>	42	163	2229	918	783	844	523	654	557	269	577	837	716	1013	25	9920
Snoek <i>Sphyræna picudilla</i>	150		125	25		85	52		42	66	60	227	45		682	398
Tribon (parts) <i>Sharks Selachii</i>	27	46	206	16	4	71	15		40	100	76	37		65	480	1273
TOTALS 1957 and 1958	18919	9676	10089	10492	16642	11834	12018	15249	9315	3897	7969	6413	7320	7263	48592	69864

and 1958 was 48,592 kg and 69,878 kg respectively (Table 10). Moreover, at the abattoir an extensive store is also available to the industry. The minimum charge per week is NAfl. 0.13 per 10 kg. The temperature varies between 9° and 14° F.

There are also some privately owned cold stores, for example at the big self service stores; they have a capacity of about 0.75 m<sup>3</sup> each, and an average temperature of 27° F. These shops have some small facilities for deep freezing also with a capacity of about 0.75 m<sup>3</sup>. There are no special facilities for deep-freezing fish. The temperature is 0° F.

Neither salt nor ice are used by the fishermen. The catch is brought directly to the market, or only a part of it, while the rest is put into cold storage. If the fish is still alive the remainder is kept in the sea surrounded by a net. The only fishermen using ice are those from the Venezuelan and Colombian sail-ships, who preserve their fish in ice aboard the ship.

There are two iceplants at Curaçao, Willemstad; one belongs to a private person, the other to the Shell Curaçao Company. The capacity of these plants is respectively 48 and 92 bars per day. The temperature is 30° and 32° F. The ice is produced in bars of 100 lb and sold for NAfl. 6.00 to the fishermen.

N.B. All prices quoted in this and the following paragraph were valid in April 1959.

*Prices:* While a great many species can be used as food, the fish is preferred by the population in the sequence shown in Table 11. The prices quoted in Table 11 were those paid during early 1959. These prices are all retail prices as fresh fish is not sold wholesale.

TABLE 11  
SELECTED FOOD FISHES AND THEIR PRICES, EARLY 1959.

Group	Species	Price per kg in NA fl. (U.S. \$1.00 = NA fl. 1.92)	
1	Kónéfés	<i>Scomberomorus cavalla</i> 3.00 - 3.50	
	Mulá	<i>Scomberomorus regalis</i> "	
	Pishishé	<i>Scomberomorus maculatus</i> "	
	Tiniú	<i>Thunnus</i> species "	
	Dradu	<i>Coryphaena hippurus</i> "	
2	Snappers	<i>Lutianus</i> species 2.00 - 2.50	
	Pargo (red snapper)	<i>Lutianus ayo</i> "	
	Buní bunita	<i>Sarda sarda; Katsuwonus pelamis</i> "	
	Balaú blancu	<i>Makaira ampla</i> "	
	Balaú cora	<i>Makaira albida</i> "	
	Balaú bandera	<i>Istiophorus americanus</i> "	
	Masbangu	<i>Selar crumenophthalmus</i> "	
	Barracuda	<i>Sphyræna barracuda</i> "	
	3	Groupers incl. meru	<i>Epinephelus</i> spp.; <i>Serranidae</i> 1.75 - 2.00
Jacks etc. incl. moulo		<i>Carangiidae</i> "	
Corcoba		<i>Caranx hippos</i> "	
Jaru		<i>Caranx ruber</i> "	
Gepie		<i>Strongylurus acus</i> "	
Bocalargu		<i>Hemirhamphus brasiliensis</i> "	
Buladó		<i>Cypselurus bahiensis</i> "	
Fleerchi		<i>Hirundichthys affinis</i> "	
4		Grunts incl. rooibékie	<i>Haemulon flavolineatum</i> 1.25 - 1.50
		Takitaki	<i>Haemulon chrysargyreus</i> "
	Corcó	<i>Haemulon bonanense</i> "	
5	Kandélchi	<i>Holocentrus ascencionis</i> "	
	All other species	Mostly caught in fish traps and by cast nets 1.00	

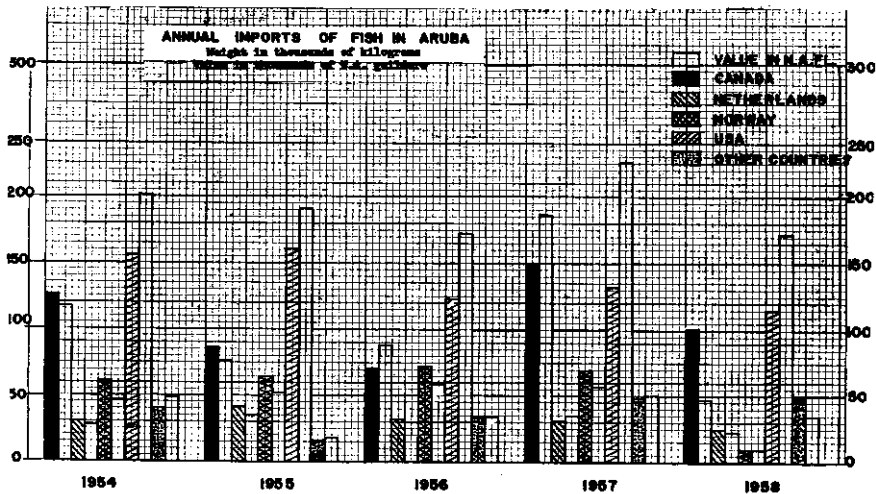


FIGURE 9. Annual imports of fresh fish in Aruba. Weights are in thousands of kilograms; the value is in thousands of Netherlands Antillean guilders.

Very often the fish are not sold per kg but by slices or by specimens. There are 2 or 3 slices of dradu in 1 kg, 3 to 5 specimens of bulado and fleerchi to the kg, 8 to 10 moulos to the kg.

*Consumption:* An extensive inquiry into the consumption of fresh and frozen fish in Curaçao has been held on behalf of the Information Service of the Welfare Planning Board of the Netherlands Antilles, Amsterdam, Netherlands. It has been conducted co-operatively by the above institute and the Department of Economic and Social Affairs of the Netherlands Antilles at Curaçao.

The inquiry has been split into a sample survey under families dwelling separately and a census under possible fish-consuming institutes (hospitals, hotels, etc., military and brothel camps, and prison). The number of families covered was 428, of which 389 gave responses. Non-response under institutes did not occur. The reference period was during two successive weeks, April 2 - 15, 1951.

From this inquiry the following conclusions can be drawn:

1. The weekly consumption of fresh or frozen fish by families dwelling separately was 26,800 kg, geographically distributed as follows:

Town district (Willemstad and environments)	13,100 kg
Second district (central part of Curaçao)	12,000 kg
Third district (northern part of Curaçao)	1,700 kg

It became evident that the consumption levels per family do not differ significantly between the three districts, although there is reason to believe that the consumption level in the sparsely populated third district is less than that in the town and in the second district.

2. In the period under consideration, of the total consumption of fresh or frozen fish, red snapper accounts for 13,500 kg (50.4%) and dolphin (dradu) for 6,100 kg (22.9%) weekly.

3. In the period under consideration the average frequency of consumption of fresh or frozen fish was found to be 1.79 times per week.
4. (a) The average quantity of fresh or frozen fish consumed per family is significantly higher for the families of clerical workers than for families of laborers. As to the average frequency of consumption the situation is just the reverse.
- (b) The quantity of fresh or frozen fish consumed per family increases with family size. As to the frequency of consumption the same holds true.
- (c) The average quantity of fresh or frozen fish consumed per family was definitely higher for families, when the housewife was born on Curaçao, than for families when the housewife was born elsewhere. As to the frequency of consumption the situation is just the reverse.
5. Whereas the average frequency of fish and meat meals combined does not reach a level of seven times a week (exactly 4.6) in any of the districts of Curaçao, the average frequency of consumption of meat in the period under consideration appeared to be 2.59 times a week, and that of dried and salted fish only 0.22 times a week.  
Therefore dried and salted fish does not cause any competition for fresh or frozen fish in the nutrition of the inhabitants of Curaçao.  
Moreover, the inquiry indicated that availability of fish was not the limiting factor in fish consumption. As a matter of fact it may be accepted that the price of the fish must be the most important limiting factor.
6. The average weekly consumption of fresh or frozen fish by institutes was in April, 1931, 6,300 kg, in April, 1951, being 23 per cent of the weekly consumption of 26,800 kg by families dwelling separately.
7. The total consumption of fresh or frozen fish at Curaçao in the period under consideration amounted to 33,100 kg weekly or 1,716 tons annually.

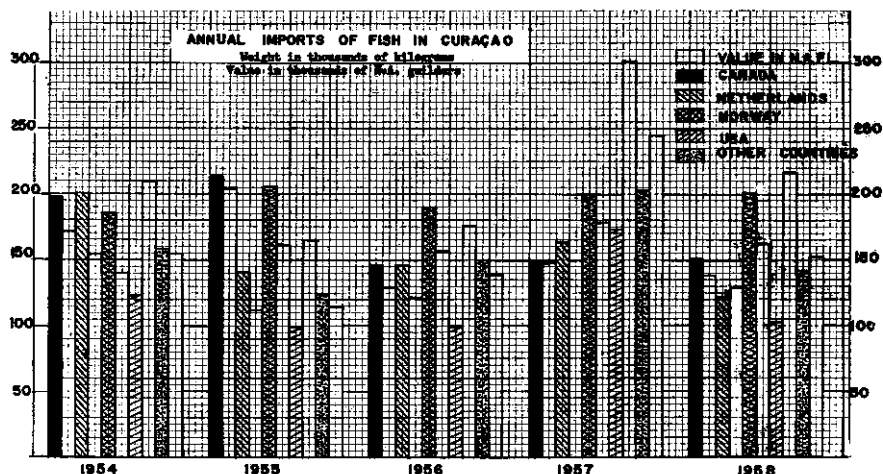


FIGURE 10. Annual imports of fresh fish in Curaçao. Weights are in thousands of kilograms; the value is in thousands of Netherlands Antillean guilders.

TABLE 12  
ANNUAL IMPORTS OF FISH IN ARUBA  
(Weights and Values in Thousands)

COUNTRY	1954			1955			1956			1957			1958								
	fresh KG	dried KG	otherw. KG	fresh KG	dried KG	otherw. KG	fresh KG	dried KG	otherw. KG	fresh KG	dried KG	otherw. KG	fresh KG	dried KG	otherw. KG						
Argentina			1 1																		
Canada	2 3	27 17	99 101																		
Colombia																					
Cuba																					
Denmark			7 9																		
France			1 1																		
Great Britain			3 3																		
Germany E.																					
Germany W.																					
Hong Kong																					
Japan																					
Netherlands	9 7	10 10	1 1	11 10	12 12	7 6	10 9	5 3	10 11	10 9	8 12	4 3	7 7	9 7	5 5						
Norway		47 34	14 12			58 47	15 12			58 46	12 11				8 8						
Portugal			6 8	2 2			3 5				9 9				5 5						
Sri Lanka							5 5				13 13				6 6						
U.S.A.	18 23	35 36	103 143	1 1	21 26	24 27	113 131	3 7	13 17	21 26	86 124	3 5	25 34	22 28	83 161	2 4	12 19	15 21	68 103	1 1	
Venezuela	19 22																				
Yugoslavia																					
Total	48 55	119 94	243 290	4 4	38 41	111 98	214 225	6 9	37 39	106 99	182 237	8 8	46 54	107 103	274 392	6 7	33 38	41 46	168 164	1 1	

TOTAL GENERAL 414 KG. NA FL 443 369 KG. NA FL 373 333 KG. NA FL 383 433 KG. NA FL 556 253 KG. NA FL 249



(This is a rather high estimate in comparison to the numbers for the period 1954 - 1958. Cf. Table 13.)

As the population of Curaçao was at that time 111,100, the consumption of fresh and dried fish at that island in 1951 was, therefore, 15.6 kg per head.

To this the following remark can be added.

As the production of fresh fish in 1908 amounted to 35.6 kg per head (cf. Table 6) it is evident that the amount of fresh fish that is available per head per annum has decreased considerably.

The consumption rate could also be obtained by dividing the total import of fresh and frozen fish into Curaçao in 1951 (1,134,545 kg) by the number of inhabitants in that year (111,100). The quotient being 10.2 kg. As the average import by the local fishermen according to the present report (p. 14) is 5.02 kg the above mentioned value of 15.6 kg must give a good impression of the per capita per year consumption.

*Imports:* The volume of fishery imports from foreign countries into Aruba and Curaçao has been registered very accurately since 1954. Table 12 and Fig. 9, and table 13 and Fig. 10 give the data of annual fish imports in Aruba and Curaçao, respectively. From these Tables it is evident that the average yearly import in Aruba over the period 1954-1958 amounts to 6.47 kg per head per year and in Curaçao to 6.48 kg per head per year. Contrary to the statement by Burdon (1955, p. 14) these figures indicate that the import of fish in Aruba and Curaçao is as important as the production of fish by the local fishermen.

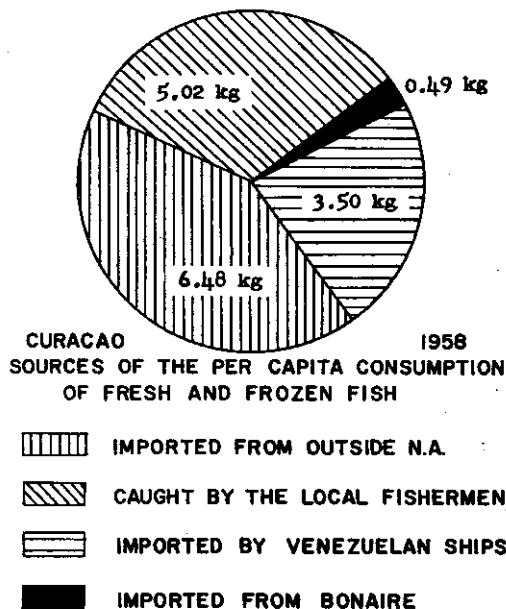


FIGURE 11. Sources of the per capita consumption of fresh and frozen fish in Curaçao in 1958.



TABLE 14

ANNUAL EXPORTS OF FRESH FISH FROM BONAIRE IN N.A. GUILDERS.

Year	1954	1955	1956	1957	1958
Value (NAfl.)	56,484	68,983	84,906	57,750	39,748

Fresh fish is also exported from Bonaire, most probably into Curaçao. Table 14, published by the Island Government of Bonaire, gives the annual values in N. A. guilders for the years 1954-1958. The weights are not mentioned. As the average price paid for 1 kg fish is at least NAfl. 1.00, the values given in Table 14 are also roughly the weights in kg. This means that an average of 61,574 kg fresh fish has been exported yearly from Bonaire to Curaçao during the period 1954-1958. Therefore, an additional amount of 0.49 kg of fresh fish per year is available for each inhabitant of Curaçao.

Moreover, in Curaçao the inhabitants profit from the imports by the Venezuelan sailing ships, 20 to 30 ships of about 15 gross reg. tons. The imports amount to about 375,000 kg yearly. This means that the inhabitants of Curaçao have another source of fresh fish amounting to 3.5 kg per head per year.

According to the Consumption Report for Curaçao, 1951, quoted above, the per capita consumption of fresh and frozen fish amounted to 15.6 kg for that year. Now it is clear that this amount comes from the following sources (Fig. 11):

Fresh fish imported from Bonaire	0.49 kg (cf. Table 14)
Fresh and frozen fish imported	6.48 kg (cf. Table 13)
Fresh fish from the local fishermen	5.02 kg (cf. Table 6)
Fresh fish imported by the Venezuelan ships	3.50 kg (cf. this page)

Average amount of fresh and frozen fish available per head per year during the period 1954-1958 is 15.49 kg.

The remainder of the consumption may be lobsters, shrimps, crabs, oysters, etc., which are not taken into consideration in our present survey of the fisheries.

These numbers show for Curaçao that an average yearly consumption of 15.6 kg of fresh and frozen fish per head as found by the inquiry of 1951 gives a very good impression of the reality. At the same time these numbers prove the reliability of the data obtained by such a careful organized inquiry.

With regard to the remark that the price is the limiting factor in the consumption of fish (cf. point 5 of the paragraph on the Consumption), during the five years under consideration the average prices per kg fish were (cf. Tables 12 and 13), in Aruba: NAfl. 2,054 for 1,853 kg fish, that is per kg NAfl. 1,11 and in Curaçao: NAfl. 4,240 for 4,029 kg fish, that is per kg NAfl. 1.05. In comparison to other Caribbean islands these prices are high indeed.

From the Netherlands Antilles there is no export whatsoever of fish to foreign countries.

#### *Future*

Recently it has been emphasized (Zaneveld, 3rd Caribbean Fisheries Seminar, 1959) that new and readily accessible sources of protein can be made available to the population of the Netherlands Antilles by introducing night fishing for red snapper and gill nets for flying fish. During the 3rd Caribbean

Fisheries Seminar held at St. Maarten, N.A., it was shown in two trials by Mr. U.C. Hodge, Fisheries Officer at St. Kitts, that night fishing on red snapper is very promising; in a period of about two hours a crew of three men caught between 300 and 400 kg of these highly desirable fish.

As to the flying fish it is to be expected that in the coming years the fishing methods will be studied at Barbados and subsequently tested in the Netherlands Antilles.

Fish farming in the large, fertile inland bays is already considered. As could be shown by the present author (Zaneveld, 1958) *Tilapia mossambica* is able to reproduce in water with a high salinity, even of 36.2 p.p.t. In introducing and cultivating this species in the salt water inland bays another source of protein and at the same time of bait fish, will become available to the inhabitants of these islands.

It is to be hoped that a plan for the development of the fisheries in the Netherlands Antilles will get under way very soon.

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## The Developing Shrimp Fishery of Honduras

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### Abstract

Honduras exported over 820,000 pounds of shrimp to the United States in 1958, the first year of major production. In 1959 the exports of shrimp decreased to 823,000 pounds. The decrease was due partly to lower shrimp prices and partly to Honduran legislation curtailing operation of foreign vessels. (Under certain conditions foreign boats can now be licensed.) Exports in 1960 reached 343,000 pounds. Currently 15 boats are licensed to shrimp in Honduras.