WECAF REPORT No. 6
western central atlantic fishery commission
INTER-REGIONAL PROJECT FOR THE DEVELOPMENT OF FISHERIES IN THE WESTERN CENTRAL ATLANTIC

REPORT ON FISH HANDLING, PROCESSING AND QUALITY CONTROL IN JAMAICA

UNITED NATIONS DEVELOPMENT PROGRAMME
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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Interegional Project for the Development of Fisheries
in the Western Central Atlantic

Report on Fish Handling, Processing and Quality Control in Jamaica

by

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DEVELOPMENT OF FISHERIES IN THE WESTERN CENTRAL ATLANTIC

The Interregional Project for the Development of Fisheries in the Western Central Atlantic (WECAF), which was initiated in March 1975, entered its second phase on 1 January 1977. Its objectives are to assist in ensuring the full rational utilization of the fishery resources in the Western Central Atlantic through the development of fisheries on under-exploited stocks and the promotion of appropriate management actions for stocks that are heavily exploited. Its activities are coordinated by the Western Central Atlantic Fishery Commission (WECAFC) established by FAO in 1973. The Project is supported by the United Nations Development Programme (UNDP) and the Food and Agriculture Organization of the United Nations as the Executing Agency.

As in the initial phase, two series of documents will be prepared during the second phase of the Project to provide information on activities and/or studies carried out. This document is the sixth of the series WECAF Reports. The other series of documents is entitled WECAF Studies.

W.F. Doucet
Programme Leader

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1. Conclusions and Recommendations

(a) General Conclusions

From contacts made with Jamaican officers of the Fisheries Division and personnel engaged in fisheries in Jamaica, as well as from the information already available on the Jamaican fishing industry, some general conclusions were arrived at which might be useful for the future work of the present WECAF Project:

(1) since Jamaica is not self-sufficient in the production of fish products and other protein food commodities, it relies heavily on imports to meet domestic demand;

(2) however, imports of fish and fishery products are considered to have dropped by approximately more than one half of FAO's 1977 figure, being expected to reach only 15 000 t in the present year;

(3) this fact would indicate a drastic drop in fish consumption in the country and, therefore, a serious shortage of protein intake, since there is no sign of a compensating increase in other relevant national or foreign sources of protein;

(4) under present conditions, domestic production of fish is critical and should be achieved at satisfactory levels;

(5) nevertheless, there is very little hope that any significant increase in fish production can be obtained from Jamaican waters;

(6) catches on the Nicaraguan-Honduras continental shelf are reportedly good (Anon., 1978), and there is a general hope that an international agreement will be reached with these two countries to guarantee the present fish supplies taken from that fishing area and even to increase such catches. This appears to be the chief actual goal of the Jamaican Government in relation to fisheries;

(7) On the other hand, it appears that no concrete step is being taken to engage in long distance trawling operations (Campeche Banks, Guyana shelf) in order to increase domestic fish landings. A similar and even more pessimistic approach is also taken with regard to the development of pelagic fishing operations;

(8) in fact, it seems that the conclusions and recommendation of the FAO/IDB Cooperative Programme mission's report (Lens et al., 1977) were not well accepted by the Fisheries Division of Jamaica;

(9) however, there is a programme of cooperative fisheries research with the Cuban Government under which experimental fishing/research cruises to investigate fish and lobster resources in Jamaican waters started in 1977. Various traditional and new types of fishing gear are utilized during the surveys. The results are being used to assist in planning fishery development and future expansion programmes (Anon., 1978);

(10) finally, fish farming in Jamaica is being strongly stimulated through the Inland Fisheries Programme of USAID and the Fisheries Division of the Ministry of Agriculture of Jamaica. Efforts have been concentrated on the cultivation of the African perch (Tilapia mossambica) which is already reaching the Kingston markets on an experimental basis (Anon., 1978a).

(b) Fish Handling at Sea

Since the landing of only one fishing vessel, the DOLPHIN, was observed during the mission, it would be unwise to make conclusive remarks on Jamaican practices in the handling of fish at sea. However, from the description of previous reports (Vidaeus, 1970; Lens et al., 1977) one might be justified in suggesting that there are no wet fish spoilage problems in Jamaica. In any event, at least with regard to the DOLPHIN, some slight improvements could be introduced:

(1) the fish catch should be separated by size and stored separately in the fishroom in such a way that larger sized fish are not on top of the smaller varieties;

(2) at least one shelf should be used to divide each fish hold in order to avoid the pressure of the upper layers of fish and ice on the bottom layers;

(3) since the catches are being divided 50/50 between the crew and the vessel (Fisheries Division), it is advisable, in view of the actual inadequate landing facilities, to make such division at the time the fish is stored in the fish holds at sea, rather than during the unloading;

(4) since there is some accumulated data indicating that gutting of fish in the tropics is not always recommended, it is advisable to make some experimental trials with black jack in order to observe the behaviour of this particularly fatty species when iced, ungutted;

(5) in the case of snappers, there seems to be no doubt about the benefits of gutting. However, it is advisable to try a more complete bleeding, since this operation is being considered extremely successful in the preservation of iced tropical species.

(c) Fish Unloading

Kingston, where the landings of the carriers and large fishing vessels are concentrated, badly needs a proper fish terminal, since the actual landing places do not offer minimum facilities for adequate operations. The location where the new Kingston fish terminal is being built could not be visited. However, from an analysis of its design, it is believed that it will improve the actual situation considerably. Nevertheless, since it is not known how long it will take for the new fish terminal to go into operation, the design of a very simple fish landing building has been included in this report which might be easily built at New East Port as a prompt and adequate solution to the present situation. The adoption of

the suggested design is strongly recommended, particularly in the case of installations and equipment to land, sort, re-ice and ship fresh fish, using native cheap materials and, therefore, avoiding the common expensive infra-structure facilities which are being planned for various developing countries.

With regard to the landing beaches used by the canoe fishery, the following is recommended:

Some landing beaches, if provided with adequate facilities, might operate as a catalytic point for the concentration of fish landings within a certain area. In consequence, the following simple facilities should be provided at selected landing beaches:

(1) a small pier (when feasible and adequate);

(2) a proper "non-access" area surrounding the landing place in order to avoid the congregation of animals (dogs, pigs, chicken, etc.) and strangers;

(3) a covered area with an adequate floor in order to protect the catches against the sun and rain, and to permit proper procedures for washing, weighing, sorting, icing and boxing;

(4) always, when possible, clean sea or potable water;

(5) always, when necessary, a small ice machine and at least an ice store, and an ice crushing machine;

(6) a proper deposit for fishing gear, boxes, tools, etc.;

(7) a Fisheries Division officer at the disposition of the fishermen.

(d) Fish Handling and Processing on Shore

JAMC premises are completely inadequate for the purposes for which they were intended and so a decision must be taken for the future. They could just close the place down and move to an area in the new fish terminal, as suggested by the FAO/IDB mission (Lens et al., 1977), or to a different place, in both cases building new facilities and introducing proper equipment. On the other hand, they could stay where they are and, in this case, virtually build a new plant with the introduction of proper equipment.

Whatever decision is taken, JAMC will need the help of a fish technologist to plan and design a proper layout and select the equipment to be introduced. Since it appears that there is no such expert in Jamaica, FAO through the WECAF Project might offer this kind of help. In any case, the following items should be taken into account in the projection of the improvements needed:

(1) a fish reception handling area with proper facilities for trucks to unload, to wash fish, weigh, sort and inspect;

(2) a holding room (0° C) to keep any excess fresh fish; this room should have direct access to the previous area;

(3) an ice machine and an ice store (or at least an ice store); the ice store should have direct access to the fish reception area;

(4) a fish filleting, steaking, cutting, cleaning room with proper tables and other equipment of suitable material to carry out these operations; packing operations might be carried out in this same room or in a separate area;

(4) blast freezer unit(s) able to quick freeze the volume of fish handled by the corporation;

(5) a proper covered area for truck loading of frozen fish;

(6) adequate restrooms and changing rooms for the workers.

According to Lens et al. (1977), there is a surplus of ice production and of cold store space in Kingston. Therefore, despite the inconveniences of not having these facilities in any fish freezing establishment, they are not initially recommended for the present time, in view of Jamaica's financial situation.

Moreover, JAMC should try as soon as possible to substitute the fish boxes they are now using as they are completely inadequate. Plastic boxes of proper size should be introduced in order to transport fish to their facilities. Fresh, unused ice should be available at the landing areas. IQF should be carried out instead of bulk freezing. Finally, FAO through the WECAF Project, might provide proper training in fish technology and quality control for at least one of JAMC's technical staff.

In the case of Jamaica Frozen Foods Ltd. (JFF) the problems appear to be concentrated at the moment on the shelflife of the salted-dried fish they produce. Therefore, since the Dominican Republic and Venezuela are also employing artificial driers and seem to have similar problems, it would be advisable that FAO, through the WECAF Project, provide an expert in this specific field to tackle the problems involved in these three countries at least. For Jamaica and the Dominican Republic, the problem is very serious, leading to a wastage of money and first-class protein that they cannot afford. It is, therefore, strongly recommended that this kind of help be offered to these countries.

(e) The Establishment of a Fish Inspection and Quality Control Section within the Fisheries Division of the Ministry of Agriculture

Fish inspection and quality control regulations, standards and services are presently non-existent in Jamaica. Moreover, it appears that there is also a complete lack of trained people in fish technology in the country.

Although the Jamaican fisheries make a relatively low contribution to the domestic product and employment, several considerations enhance, however, the relative importance of the fisheries activity in the national economy. The more critical consideration, however, is the fact that Jamaica is not self-sufficient in the production of protein food and, therefore, rational domestic production of fish must be an important source of nutrient food and of foreign exchange

savings (Lens et al., 1977). Under these conditions, and considering the actual situation of fish handling, processing and marketing in Jamaica, adequate measures should be taken to achieve a more rational utilization of fish as food in the country, which can only be done with the proper use of the available tools of modern fish technology and quality control.

The particular case of Jamaica, where the Government is responsible for the major activities related to handling, processing and marketing of fish through JAMC, JFF and the Fisheries Division, calls for the introduction of very special and particular measures in the field of fish inspection. The active participation of the Fisheries Division staff in almost all aspects of the utilization of fish as food in Jamaica suggests that this agency is the most appropriate organization to take care of fish inspection and quality control in the country. Therefore, the following measures are recommended:

(1) the establishment of a Fish Inspection and Quality Control Section within the Fisheries Division of the Ministry of Agriculture;

(2) the selection and training of a Fisheries Officer to be responsible for the activities of the proposed section;

(3) after his training period, this officer should be responsible for the domestic training of a certain number of staff that should work under his direction, coordination and supervision;

(4) the main activities of the proposed Fish Inspection and Quality Control Section should be directed toward the following objectives:

   (i) promote the introduction of improved practices for handling fresh fish at sea and on shore, through the active practical education and orientation of fishermen, wholesalers, retailers, Fisheries Division officers, utilizing the existing working system and the large experience of fisheries extension services already available within the Division itself;

   (ii) liaise with national bodies working in fisheries, such as JAMC, JFF and the Zoology Department of the University of the West Indies;

   (iii) encourage the formation of fish trade organizations;

   (iv) prepare regulations, codes of practices and standards of hygiene and quality for fish establishments and fish products;

   (v) advise the Director of the Fisheries Division in all matters related to fish technology, inspection and quality control;

   (vi) plan the operations of the fish inspection and quality control activities to be carried out in the new Kingston fish terminal;

   (vii) plan any further step necessary in order to expand the activities of fish inspection within the country (creation of a control laboratory, control of imported fish and fishery products, etc.).

(f) Training

The knowledge and years of experience of fish plant management, together with research, both technological and biological, are the basis of all fish inspection and quality control (McNeill, 1970). Therefore, in order to achieve the goal of a more rational and adequate utilization of fish as food in Jamaica, it will be necessary to concentrate efforts in these fields. In view of the lack of trained personnel in fish technology, inspection and quality control, the following recommendations are made with regard to training in these areas:

(1) at least one staff member of each of the institutions listed below should be given proper training in the field of fish technology and quality control:

(i) Fisheries Division of the Ministry of Agriculture;

(ii) Jamaica Agricultural Marketing Corporation (JAMC);

(iii) Jamaica Frozen Foods Ltd. (JFF);

(2) this training might be provided through the WECAF Project in institutions existing in Canada, U.K. or Cuba, for instance;

(3) the Fisheries Division officer responsible for the proposed new Fish Inspection and Quality Control Section should be given the opportunity of a study tour of 30 to 60 days in a country within the WECAF area having an established working national fish inspection service, such as Brazil, Cuba or Peru. Brazil would be particularly suitable since there is a Fish Inspection Training Centre with an annual training course having the technical support of a Cooperative Programme with the Canadian Fish Inspection Service (a CIDA Project).

2. Introduction

Data from FAO (1977) gives a population for Jamaica of 2 029 000 inhabitants. Fish consumption is estimated by the same source to be around 22.6 kg per caput/ year originating from a national fish production of 10 000 t and 35 000 t of imported fish and fishery products.

Comprehensive inventories of the Jamaican fishing industry are available from the reports of the UNDP/FAO Caribbean Development Project (Vidaeus, 1970; Christensen, 1971) and the FAO/IDB Cooperative Programme Mission (Lens et al., 1977). These reports, particularly the latter, offer a detailed overall picture of fish as food in the island at the time they were prepared. Therefore, taking into account the very short period of the mission just terminated in Jamaica, and the fact that the general situation does not appear to have suffered any significant change, it would add little to the value of this work to present data already available in the reports mentioned above. For this reason, the present report is directly related to the fish handling and processing practices observed during the mission and how these affect fish as food in Jamaica.

3. The Present Situation Regarding Fish Handling and Processing

(a) Fish Handling at Sea

The canoes which are engaged in inshore fishing operations in Jamaica generally do not employ ice for the preservation of their catches. It appears that these canoes have to make only short trips and, since their predominant fishing gear is the fish trap, most fish remain alive until they are brought aboard the canoe. Thus, on average, fish at the time of landing have been dead for only 2-4 h and, even though the prevailing temperatures are high, they are generally in marketable condition. Some offshore canoes on the south coast do use ice, as the catch at the time of landing is normally 10 to 15 h old (Lens et al., 1977).

Unfortunately, there was no opportunity to see any landings by these canoes, so that it cannot be confirmed that spoilage is not a problem for the canoe fishermen of Jamaica (Vidaeus, 1970; Christensen, 1971; Lens et al., 1977). Lobsters caught by the canoes are brought alive to the beach landing places. Some fish species are normally gutted on board.

The catches from the offshore (Nicaraguan-Honduran shelf) and the Cays fishing grounds are always preserved with ice. Most fish are gutted at sea.

According to Lens et al. (1977) two carrier vessels freeze at sea through an inadequate slow freezing process.

During the first day in the country, there was an opportunity to observe the fish and ice stowage on board the fishing vessel DOLPHIN which is operated by the Jamaican Fisheries Division (together with her sister vessel BLACKFIN). The DOLPHIN is a gulf-shrimp trawler having the fishroom surfaces made of cement, with an adequate drainage system and wooden-made stanchions and divisions. There were no transversal divisions to reduce the weight on the bottom layers of fish. The catch was well gutted, washed and iced, but not classified by size or species. The catch was composed mainly of black jacks with a small quantity of snappers, kingfish, bluefish, parrotfish, grouper and barracudas. Crushed ice was used. Therefore, despite the fair state of preservation of the catch after 14 days at sea (with 8 days fishing), the fish were physically damaged by the excessive weight of fish and ice on bottom fish layers, the mixture of fish of different sizes and by the large lumps of crushed ice used.

Unlike the carriers, the DOLPHIN and the BLACKFIN operate as fishing vessels, having a crew of 14 men and employing the traditional fishing gears used in Jamaica (pots, hook and line). The fish handling procedures observed on these two fishing vessels are considered by the Jamaican officers of the Fisheries Division as the best existing practices of fish handling at sea by Jamaican boats. Captain Jennigs, the man responsible for the DOLPHIN operations, has attended a ten-month course in Newfoundland, Canada, and his crew is made up of trained fishermen (the DOLPHIN and the BLACKFIN operate also as training fishing vessels).

There was no opportunity to observe the handling and stowage practices employed by the carriers, although a few of them were visited. These carriers generally are old wooden boats, shrimp trawlers which were brought from other fishing grounds of the area (for instance, Guyana).

(b) Fish Unloading

At present there are no proper facilities for fish landing in Jamaica. Canoes land their catches on the same beaches where they are based. There are about 150 beaches where fish are landed from the inshore fishing canoes (Lens et al., 1977). Only two of them were visited - Port Anderson and Greenwhich Beach - where there are no landing facilities at all and where the hygienic conditions are extremely poor (no protection against the sun, rain, dust, dirt, animals; no clean sea or potable water; no ice or proper boxes).

The carriers and the large fishing vessels (DOLPHIN, BLACKFIN) unload their catches in the Kingston area (Zero Wharf, Number II Pier, New East Port). None of these sites offers proper facilities for fish unloading. The unloading procedure observed when the DOLPHIN landed its catch was too long and inadequate. The boat had a cargo of approximately 7 000 lbs of black jack, with some snappers, bluefish, parrotfish, kingfish and barracuda. The fish occupied four holds of the fishroom with no transversal shelves. All the catch was gutted, well iced and in a good state of freshness, although the jacks were showing signs of superficial oxidation. The unloading operation started at 10.30 hours on a very hot and sunny day. Three men worked inside the fishroom with the help of another four or five on the deck. An iron hook was used to get the fish off the ice. Since the fishermen were paid by the "share" system, the catch was divided during the unloading (50 percent for the crew and 50 percent for the Jamaican Agricultural Marketing Corporation). Two wire baskets were used to collect and weigh the fish after separation from the ice (a scale was placed into the fishroom). The part of the catch destined for JAMC was boxed (boxes made by thin open wooden strips closed by wire) without ice and kept in the fishroom until the fishermen got all their share off the vessel. The whole operation was completely unsatisfactory and time consuming, damaging the quality of the fish.

Fish handling on board the DOLPHIN and the BLACKFIN as well as the unloading operations from both fishing vessels are considered by Jamaican officers of the Fisheries Division as the best practices within the country, when compared with the same operations carried out by the carriers.

During the unloading operation of the DOLPHIN we had a clear picture of previous descriptions (Vidaeus, 1970; Lens et al., 1977) of the traditional Jamaican way of marketing fresh fish during landing of fishing vessels. Therefore, the fishermen's share of the catch was taken from the fishroom and most of it was immediately sold to several buyers that were all around the boat's deck. The larger part of the fishermen's share was transferred (using the same wire baskets employed to collect, weigh and take out the fish from the fishroom) to big insulated boxes placed on the back of two or three small open vans. The fish were placed into these boxes uniced or with small quantities of the used ice from the fishing trip. Small buyers collected the fish in buckets, bags and boxes of all sizes and any kind of material. Sometimes, during the transferring operation, the fish was just thrown down on the deck or street.

The boxed fish to be delivered to JAMC was kept uniced in the fishroom until approximately 03.30 hours when the boxes were thrown into an insulated truck which had been the whole day with its door open under the sun, parked in front of the fishing vessel.

Unfortunately, it was not possible to visit the New Fish Terminal that is being built at Kingston. A strike was going on and the Fishery Division Acting Director thought that it was not advisable to visit the place on that occasion. Therefore, we only had the chance to give a quick look at the actual building project and we do not know if it is the same as the one included in the Lens et al., (1977) report.

(c) Fish Handling and Processing on Shore

According to the previous reports (Vidaeus, 1970; Christensen, 1971; Lens et al., 1977) and the information obtained during this mission, the freezing of gutted fish is the only type of processing carried out in Jamaica using local material. These activities are carried out in small fish depots (JAMC, Fish of Jamaica, Grace Kennedy, Lane Supermarkets, Hilo Supermarket chains). The only other significant fish processing activity carried out in Jamaica is the salting and drying operation of imported raw material by Jamaica Frozen Foods Ltd. (JFF). The facilities of JAMC and JFF were visited.

The Jamaica Agricultural Marketing Corporation (JAMC) is a statutory body established in 1963 under the Ministry of Marketing and Commerce. The role of the corporation is to acquire, from specified sources, agricultural products and other designated items and to distribute these through various retail outlets. The corporation purchases foodstuff through 194 buying stations spread on the island and sells products through its retail stores and to supermarkets, other grocery trade outlets, hotels, Government institutions, ship's chandlers and processors (Lens et al., 1977).

The small plant of JAMC at Kingston has very inadequate facilities, kept in a very poor, unhygienic condition. Its size, floors, walls, ceiling, equipment, lay out, rest and changing room facilities are completely unsatisfactory. They have two cold stores of approximately 1 100 ft^3 [1/] capacity, of which only one is working. The cold store in operation is used to slow freeze 2 t/day of boxed fish. According to Lens et al. (1977) all fish freezing in Jamaica is slow freezing in cold stores.

During the visit to the JAMC premises, it was explained that any surplus fish is frozen at one of the various cold stores existing in Kingston (where there are five of them, according to Lens et al., 1977). It was also explained that big fish is cut into steaks after freezing for the JAMC retail outlets. A further piece of information provided was that 5 000 lbs of African perch (Tilapia mossambica) is being shipped iced from inland ponds to the JAMC facilities. This Tilapia is then gutted, washed and packed in retail-size packs (1-1.5 lbs), slow frozen and sold at the JAMC retail outlets.

Jamaica Frozen Foods (JFF) is a Government-owned company which operates as a private liability company, and is expected to be profit making. The company processes a variety of high protein foodstuffs such as meat, soya beverage, canned peanuts and peanut butter. However, its main priority is to produce a substitute for the salt-dried cod traditionally imported from Canada. As no suitable raw material is available locally, frozen raw material has to be imported. Since 1975 production has been based on H & G Alaskan pollack from Japan. The company bought

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4.5 million lbs of Alaskan pollack last year producing 2.0 million lbs of salted-dried fish. Their facilities are, in general, quite satisfactory from the technological and hygienic point of view. The 40 lb cartons of frozen H & G fish are thawed in water (large vats), then split manually on two tables which have a conveyor belt to move the processed fish. The fish are being salted in dry piles (kench piles) in the interior of refrigerated rooms where the temperature is approximately 15° C. After salting, the fish is washed in its own brine and laid on drying wooden trolleys. The plant has seven drying tunnels (8 200 lbs of fish in each) of the countercurrent design. The air is heated by propane and blown over the trolleys; there is no proper control of temperature and of the relative humidity of the air. The company uses 64 workers in its fish processing sector and has a quality control section.

The end product was said to have a moisture content of 40 percent, although it appears to be slightly higher (43-45 percent). The quality of the final product at the plant was satisfactory, being inferior to the traditionally imported salted-dried codfish from Canada and European countries but quite superior to similar products generally elaborated in developing countries (Brazil, Colombia, Venezuela, Argentina, India). It was noted that the drying was not uniform, the centre part of the fish having a higher moisture content than its surface. This was probably due to an excessive drying temperature (35° C according to Lens et al. report), cooking the fish outside and therefore not allowing the same drying of the inner part. The final product is cut in small regular pieces, packed in plastic bags, and sold in retail outlets.

On inspecting the sale of salted-dried JFF fish in the Kingston Mall Supermarket, it was observed that all the packs showed pink and were spoiled. According to Lens et al. (1977), there were several complaints about the product's shelflife; several cases of spoilage were reported which were most probably due to the fairly light cure and the high moisture content of the product.

JFF management also informed the consultant that the company produces pickled mackerel from imported raw material and is experimenting with canning small Tilapias.

(d) Fish Marketing

Previous reports on the Jamaican fishing industry (Vidaeus, 1970; Christensen, 1971); Lens et al., 1977) give a quite detailed picture of fish marketing aspects in the island. During the stay in the country, it was possible to get a realistic picture of the traditional way of selling fresh fish, as already described under Fish Unloading on page 8. Moreover, two supermarkets were visited (JAMC and Kingston Mall). The first had only frozen African perch in retail size packs whereas the second had the JFF salted-dried fish (pink and spoiled) plus canned Yugoslavian sardines and Japanese mackerel.

(e) Fish Inspection and Quality Control

In Jamaica there are no specific sanitary regulations or agencies for the inspection and quality control of fish and fishery products.

Ciguatera is not reported as a problem in the island.

4. Acknowledgements

During the course of his mission, the consultant was constantly assisted by all members of the Fisheries Division of the Ministry of Agriculture of Jamaica, whose enthusiastic cooperation contributed immeasurably to his understanding of the fisheries of the country. In particular, special appreciation and thanks are extended to Mr. E. Royer, Acting Director of the Fisheries Division, Mr. K.A. Aiken and Capt. C. Jennigs.

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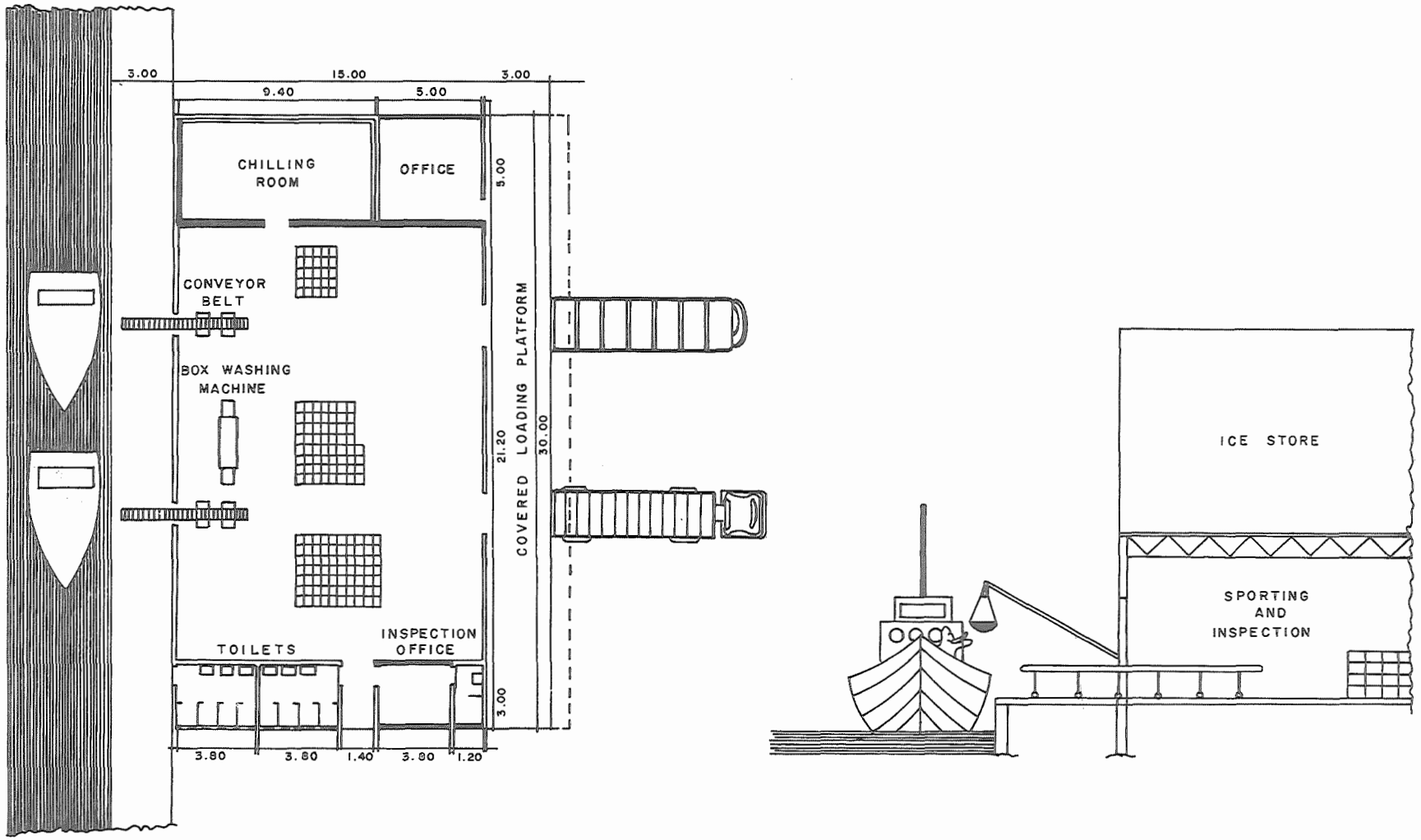

Design of a simple fish landing building
(measures in meters)

Annex I

WECAF Reports

1. Fishery Training Needs in the Western Central Atlantic by R.C. Cole, 1976. (Restricted distribution).

2. Review of Status of Fishery Statistics and Fishery Research Capabilities in the WECAF Project Area by L. Villegas, November 1978.

3. Shark Fishing in the Western Central Atlantic by S. Springer, March 1979.

4. Report of the First Session of the Executive Committee of the WECAF Project, 18-20 May 1978.

5. Technical Aspects of the Artisanal Fishery in the Dominican Republic and Recommendations for its Improvement and Development by M. Giudicelli, June 1979. (Only Spanish version published).