LITERATURE CITED

CAHN, A. R.
1948. Japanese sponge culture experiments in the South Pacific islands. U. S. Fish and Wildlife Ser., Fish. Leaf. 309.

MOORE, H. F.
1910. A practical method of sponge culture. Bull. U. S. Bureau of Fish. XXVIII.

SMITH, F. G. W.
1948. Sponge cultivation. Marine Lab. Univ. Miami, Spec. Ser. Bull. No. 3.

Developing A Caribbean Fishery

D. W. WILES
Fishery Officer, Barbados, B.W.I.

THE ISLANDS OF THE WEST INDIES are mostly divided by vast stretches of water, often with 100 miles or more between islands. As a consequence, the islands have been isolated in their approach to fishery development. This paper is not directed to any particular scientific approach to the problem that confronts fishery development for the West Indies, but is a suggestion for the persons administering fishery matters for the area.

In August, 1956, the islands of the British West Indies agreed to become a Federated British West Indies. With some general agreement now possible between the British islands, it is felt that a quicker approach to fishery development may now be possible. It is hoped that West Indian islands of other nations might be encouraged to join with the new union in a general approach to fishery matters, and it is suggested that the time has arrived when it should be possible to zone the islands of the Caribbean into areas of fishery research. Each zone would then approach their research problems on some organized plan which would have some relation to the research work being undertaken in the neighboring zones.

To carry out the necessary research each zone would be required to establish a number of research boats, equipped to develop and explore new types of gear and techniques, always bearing in mind that the fishermen and boat-owners of the Caribbean are usually persons of limited means. Elaborate ships are not required, but rather a number of good 30-40 foot sea-worthy diesel powered boats, fitted with two engines to create confidence and with the necessary instruments for communication and navigation, and manned by capable West Indian seamen.

Research, as is being suggested in this development program, is of a long term nature, and the islands should be prepared to join in these experiments for a term of at least ten years.

Fishery development affects so many aspects of fishery matters that the entire structure on the respective islands must come in for adjustments, so as to fall in line with advances that might be brought about as a result of improved fishery techniques and gear. This may mean a complete change to a better type of boat, which from observations, is the first major problem for almost all of the islands of the Caribbean. A better market price for fish, as against the price of other proteins, may also encourage new blood to enter the fisheries. Research into methods of distribution and storage is required, where large catches may justify such activities.

The suggestion of zoning the islands is not only for matters of research,

but is really a collective approach to the general uplifting of the fisheries of an area. The following zones are suggested as being logical:

(I) Working from the southern area of the Caribbean, the islands of Trinidad and Tobago are big enough to form a zone. The fisheries of Trinidad are of a somewhat different nature than the islands to the north.

(II) The next zone could be Grenada, the Grenadines, St. Vincent, Barbados and St. Lucia. This second group starts in what might be termed the clear waters of the Caribbean and many important fisheries could be developed, if the administrative problems were first settled.

(III) The third zone could be Martinique, Dominica and Guadeloupe, if some agreement could be worked out with the French authorities; otherwise, Dominica, Montserrat, Antiqua, St. Kitts and the dependent islands would form group IV.

(IV) It is hoped that the British and United States Virgin Islands would work together.

(V - VII) Puerto Rico, the Dominican Republic and Haiti are all large enough to be considered three separate zones.

(VIII - X) Jamaica and the Cayman Islands would be another zone; Cuba yet another, and the Bahamas the last zone.

Many of the larger islands, such as Cuba, Jamaica and Puerto Rico have realized the importance of fishery development and are organizing programs to suit their individual needs. The size and financial positions of many of the smaller islands southeast of these, do not allow them to tackle fishery development singly. Hence it is my opinion that these smaller islands should come together under respective zones and group themselves together financially to undertake what could become very extensive fisheries. The islands could then engage the services of fishery workers, whose business it would be to arrange and plan research programs and pass them over to be implemented by the Fishery Officer of the zone. The Fishery Advisor himself should visit the islands of the zone from time to time, with a view of making recommendations to the governments of the various islands as to matters that may require improvement. Such officers would be the key men connected with matters of administration and be the liaison between governments of the area in these plans for fishery development.

Many years ago it was felt that the waters around Barbados contained little or no fish, but after only six years of fishery research the production of the fishing industry has been quadrupled.

Fish similar to those taken off Barbados are caught in commercial quantities as far north as Dominica, and south and northwest off Grenada, St. Vincent and St. Lucia.

For example, such species as the flying fish *(Hirundichthys affinis),* and the dolphin *(Coryphaena hippurus),* which make considerable contribution to the Barbados fisheries, have been taken by boats over two hundred miles southeast of Barbados. Yellowfin tuna can be found from Barbados to Grenada and on to Dominica, where they appear in considerable numbers in the Martinique channel. The same fish are often seen off Florida and in the Gulf of Mexico.

In all of the British West Indian islands, fisheries have been entirely left to the native fisherman, whose financial resources are in most cases very limited—so much so, that some three hundred years after colonization, we find fishermen of some of these islands going to sea in the type of canoe their forefathers used, and applying ancient fishing techniques. While it may be admitted

that some of the old fishing techniques may be useful, a gradual adoption of modern methods would increase catches.

To a large extent the developments of modern fishing methods are restricted to the particular type of craft used in the area, so it would appear that the first major problem is a gradual conversion to a better type of fishing boat. The entire Caribbean area appears to require modernization of their fishing boats before fishery workers can expect to accomplish much.

Some surveys have been carried out of most of the Caribbean fisheries, and although reports present a generally pessimistic outlook in many cases, this is because of the limitations of the boats and gear available in most cases.

Fishery workers in the Caribbean must be prepared to develop boats and techniques which can be used to catch pelagic species, since only in limited areas can trawling be carried out. Besides, in clear water fish cannot usually be taken in commercial quantities by trawling.

The number of schooling pelagic species seen in the Caribbean often runs into many millions of fish. Especially plentiful are the bonito family, of which at least three species are known. Next is the dolphin, followed by the yellow-fin tuna, which are taken from Barbados to Grenada to beyond Dominica. Wahoo are also caught on isolated fishing banks. Added to these is the flying fish, for which Barbados is fast becoming a tourist attraction, and which also provides food for many of the other fish listed. The flying fish catch in Barbados is the most important phase of the fishery of this island. Over 6,000,000 lbs. of flying fish were marketed in Barbados over each of the last three years. There is no reason why these fish should not be taken in large commercial quantities in many of the islands, since they are off their shores in considerable numbers.

After noting the rate of population growth in the West Indies, it would be reasonable to expect that most of these islands could consume more fresh or frozen fish caught locally. This could replace the large quantities of salted fish which are imported annually.

Governments were forced during the last world war, and in some cases up to the present time, to subsidize salted fish. Even with a subsidy, the selling price of salted fish exceeds that of some of our prime fish species, (prices of which are still controlled in some islands), by as much as 8-10 cents per pound. Surely this is a situation that requires study. A fisherman sometimes must buy salted fish at prices higher than he receives for his prime fresh product.

With the high price of salted fish, fresh fish is in great demand and should be encouraged to remain so; but the demand in a number of islands exceeds the supply. Governments would be well advised to consider allocating sums comparable to the annual subsidy on salted fish, to develop their fishing industries. These, in many instances, are depressed and in need of considerable financial help and guidance. Governments should realize the high protein value of fresh fish to their peoples and should assist this important food industry, in order that their countries might become self-supporting in fishery products. Otherwise, in a short time from now, islands will be forced to import fresh frozen fish at prices beyond the means of the ordinary people of the islands.

With proper organizing, the fisheries of the West Indies could easily be worth millions of dollars more than at present. These same fisheries could also

employ many more persons than at present and feed thousands more people.

To carry out the re-organization of West Indian fisheries first requires on-the-spot expert advice, fishery administration, legislation, better boats and gear.

With determined programs of fishery development, calculated to bring a better type of living to the active fisherman, the islands would advance in fishery production beyond their fondest dreams. The fish species of the Caribbean only have to be seen to be believed, and man's job should be to devise ways and means to produce such species as food. This cannot be done without the tools. To quote Sir Winston Churchill—"Give us the tools, we'll do the job."

The Survey of Living Aquatic Resources

H. Rosa, Jr.

Fisheries Division, Food and Agriculture Organization, Rome, Italy

The detection, appraisal and measurement of living aquatic resources is a sequence of development and refinement of information in which all sections of the industry and Government have deep interest. Unfortunately it is a process which is sometimes allowed to stop before completion; it is also one which some people believe can be telescoped. For those to whom fishing is little, if anything, more than hunting, it may seem sufficient if a resource is discovered, for them the scientist's work ends with the discovery. However, it is generally recognized that some estimate of the magnitude of the resource is desirable, and that the scientist is best equipped to make this. Nevertheless, whatever the prevalence of such views in some sectors of the "fishery" community, the main trend of thought on fishing theory is that effective conduct of fishing operations, let alone practice of fish-culture, requires detailed analysis of the resource, identification of its components and of the relations between these components, *per se,* and between the resource and its environment, and measurement of the influences exercised through these relations. In consequence, a theory of resources is evolving for the description of resources, *in situ,* for measurement of their response to simple exploitation and for identification of the opportunities they offer for postive intervention.

FAO has been informing regional fisheries councils and commissions of its work and plans in connection with resources survey, the term "survey" being employed to signify the whole range of theory and practice indicated above. The purpose of the present note is to give a detailed account of these plans which, naturally, have been developed in the last two years, and to report the progress that has been achieved in this work.

The FAO survey is, in a manner of speaking, a survey of surveys. It is an examination of information already accumulated concerning resources, of what is being done at present to increase and improve upon that information, and of the uses being made of the information. FAO does not carry out field or laboratory survey work, except in its Technical Assistance Programme, and even here its role is chiefly advisory and pedagogic. Some people have thought that FAO would commission sea-going vessels, carry out survey work and measure resources of particular areas. This thought derives from a misconception of the functions enunciated in Article I of the Constitution of the Organization.