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THE GUINEAN TRAWLING SURVEY

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INTRODUCTION

The original investigation for the exploration of the Gulf of Guinea (Guinean Year) as conducted by the Commission for Technical Co-operation in Africa (CCTA) in 1960 included:

1. an oceanographic program (for measurement of physico-chemical conditions, movements of water masses, productivity, etc.);
2. a trawling survey on the continental shelf;
3. an exploratory fishing survey for sardines (Clupeidae); and
4. an exploratory fishing survey for tunas and tuna-like fishes (Scombridae).

As is now generally known, the oceanographic investigation expanded into a study of the waters of the whole of the tropical Atlantic Ocean--the International Co-operative Investigations of the Tropical Atlantic (ICITA). Those investigations have been coordinated by the Intergovernmental Oceanographic Commission (IOC) of UNESCO, and the three phases of the survey (EQUALANT I, II, and III) have now been completed. The exploratory fishing survey for tunas has so far been restricted to a small project started in Ghana by the Fisheries Biology Branch of FAO. However, it is hoped that a large-scale international survey of the tuna stocks will be initiated in the not-too-distant future. The exploratory tuna fishing survey, being conducted by the Bureau of Commercial Fisheries of the U. S. Department of the Interior, commenced in 1963 and will continue through 1965.

Of the original Guinean Year there remained to be carried out under the aegis of CCTA the trawling survey which was renamed the Guinean Trawling Survey (GTS). The principal sponsor is the U. S. Agency for International Development (US/AID) with further direct financing from the United Kingdom Department of Technical Co-operation (UK/DTC).

PURPOSE

The purpose of the survey is to investigate the demersal fish potential of the West African continental shelf in relation to the environmental conditions.

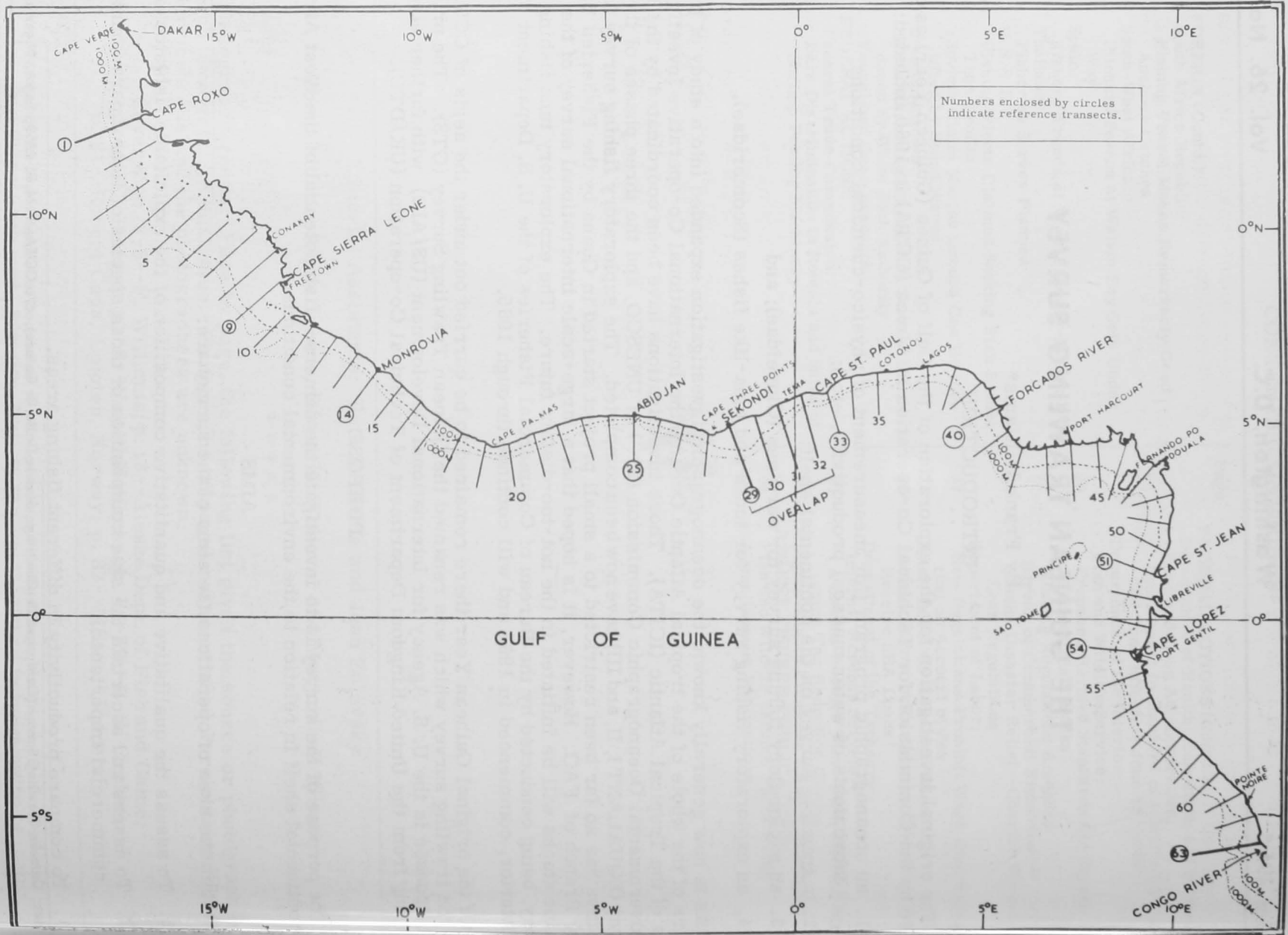
AIMS

Within the area of operations the aims of the survey are:

1. To assess the qualitative and quantitative composition of the exploitable fish stocks.
2. To assess and ascertain the size composition of those species of fish of paramount commercial importance.
3. To compare productivity in different fishing areas.

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Sep. No. 707



4. To relate 1, 2, and 3 to the hydrographic climate.
5. To locate areas which seem to be most favorable for commercial trawling in relation to depth, nature of ground, and availability of exploitable fish stocks.
6. To provide reference and study collections of fish of the area for those countries, organizations, institutes, and individuals desirous of receiving them.

AREA OF OPERATIONS

The area of operations extended from Cape Roxo (lat. 12°30' N.) to the mouth of the Congo River (lat. 6° S.), a distance of nearly 2,700 nautical miles (see fig. 1).

TIMETABLE

Preparatory Phase	September 1, 1962, to September 1, 1963.
Operational Phase	September 2, 1963, to June 15, 1964.
Report Phase	June 16, 1964, to August 31, 1965.

OPERATIONAL PHASES:

GUINEAN I	September 2, 1963, to December 20, 1963.
GUINEAN II	February 15, 1964, to June 15, 1964.

The timing of the survey was planned to coincide as closely as possible with the hydrographic seasons in the area. In the transition zones Cape Roxo to Conakry and Cape Lopez to the Congo River, there are two distinct seasons with a considerable temperature variation. The timing of the survey was such that trawling in those areas was carried out in the last 4-weeks of GUINEAN I and GUINEAN II and thus the two seasons were covered effectively. In the Equatorial Zone, Conakry to Cape Lopez, the hydrographic variations are not so great, except for the area of upwelling centered off the Ghana coast during July to September. Part of the period of upwelling was covered during the opening months of GUINEAN I, while normal conditions prevailed during GUINEAN II.

VESSELS

Two French trawlers were chartered for 13 months--June 15, 1963, to July 15, 1964, from Monsieur R. Sanquer of La Rochelle, France. The vessels--Thierry (fig. 2) of 230 tons and La Ra-

... of 200 tons--were 35 m. (115 ft.) overall, with a beam of 10 m. (33 ft.) and a draft of 4.5 m. (15 ft.). Powered by 600-hp. engines, the trawlers are equipped with hydraulic trawl lines carrying 1,800 m. (5,900 ft.) of 21 mm. $\frac{4}{5}$ -inch wire. The vessels were converted for scientific use and equipped for operations in tropical waters prior to leaving France for West Africa. The conversion included provision of a small laboratory, extra accommodations, mess, cold-rooms (-20° F. and 0° C. or 32° F. and 0° C.), electronic log, additional depth-sounder, additional auxiliary engine, alternators for

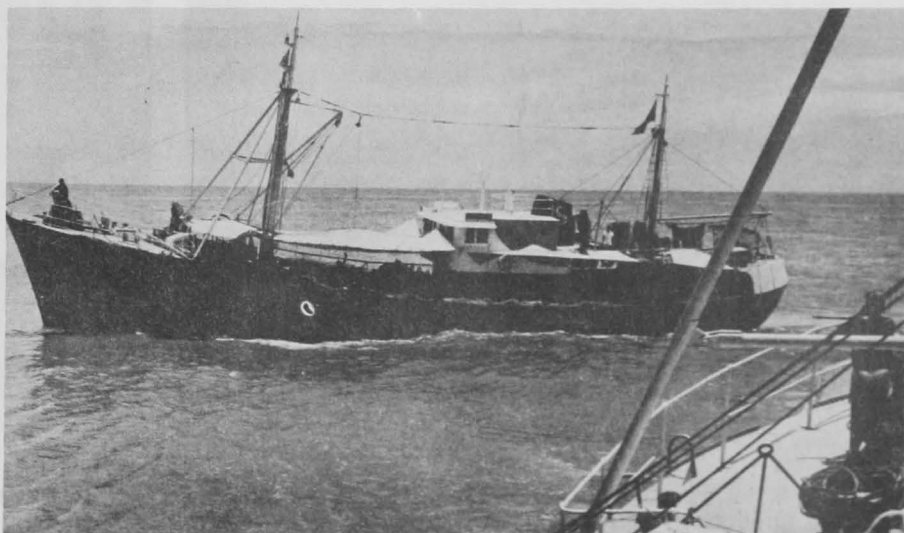


Fig. 2 - Trawler Thierry seen from the bridge of La Rafale.

a.c. current, air conditioning units, etc., and installation of a hydrographic winch on each vessel.

OPERATIONAL PLANS

Fishing took place at each of 63 transects spaced 40 miles apart at right angles to the coast from Cape Roxo to the Congo River (fig. 1). Eight stations were fished on each transect at the following depths: 15-20 m., 30 m., 40 m., 50 m., 70-75 m., 100 m., 200 m., 400-600 m. (8-10, 15, 20, 25, 35-38, 50, 100, 200-300 fathoms). To be able to estimate the difference in the fishing power of the vessels, during the first month of each operational phase 4 transects off the coast of Ghana were fished simultaneously twice by the two vessels. All routine trawling was carried out during daylight, but some night trawling was undertaken at selected stations. The fishing gear for the survey was standardized aboard the two vessels; the headrope size was 25 m. (80 ft.) and that of the cod-end mesh 40 mm. stretched ($1\frac{3}{5}$ in.). The cod-ends were made of nylon, the rest of the net of manila. Mesh measurements were made on cod-ends at set intervals using the I.C.E.S. mesh gauge.

SCHEDULE OF OBSERVATIONS

A continuous record of sea surface temperatures was made throughout the survey and notes were made on sightings of schools of fish, sea birds, drifting organisms, etc.

Before trawling began at each station, the following observations were made: bottom sampling; bathythermograph cast; reversing bottles for water samples for temperature; salinity, and oxygen at surface and bottom; meteorological and sea surface observations (ICITA style); Secchi disc; microbiomass; etc. The oxygen analyses were carried out on board the trawlers, while salinity samples were processed ashore at the Federal Fisheries Service, Lagos (Nigeria) and the Oceanographic Centre, Abidjan (Ivory Coast). The trawl hauls at all stations were each of one hour's duration, and all trawling was normally made with the current, following closely the requisite

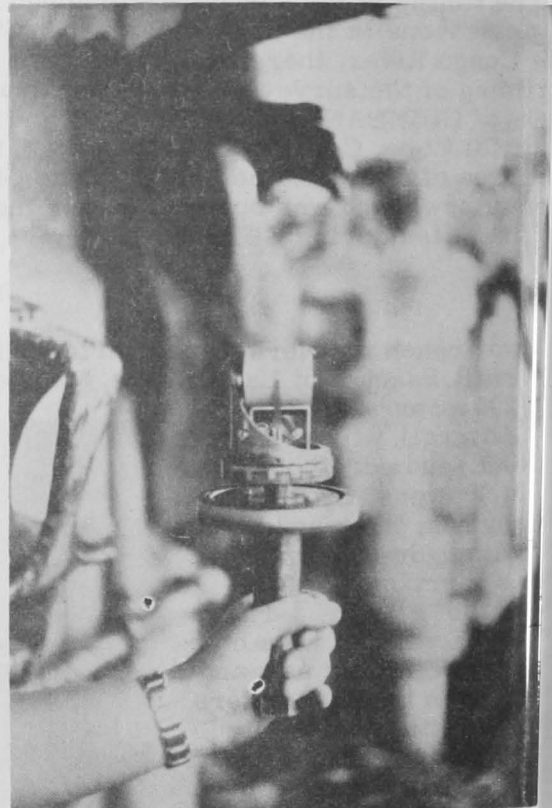
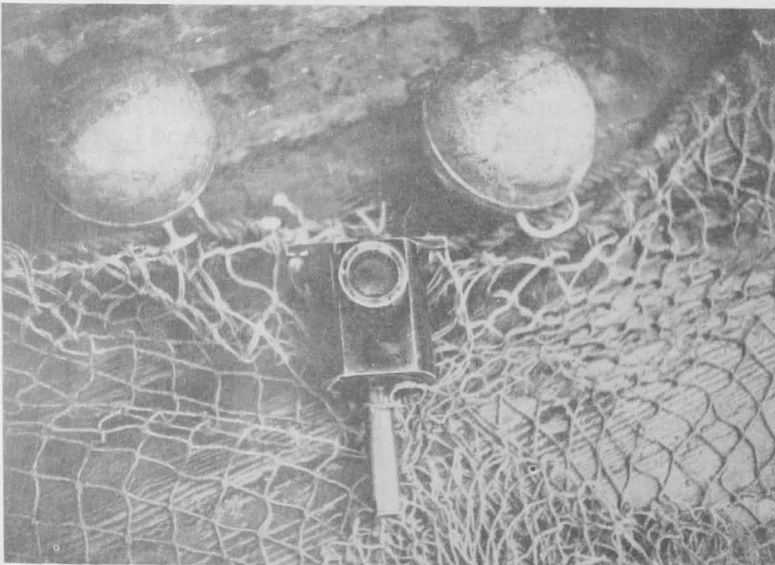


Fig. 3 - The independent trawl thermograph: (a) left--mounted on the head rope of the trawl; (b) right--with the pressure casing removed to show the recording drum.

depth contour. The water temperature at the mouth of the trawl net was recorded by an independent thermograph mounted on the headrope (figs. 3a and b).

The catches made by the trawl (figs. 4a and b, and 5) were sorted into the various constituent species, and the number and weight of each recorded. With large catches, random samples of the total catch were used for this purpose. For 12 commercially important

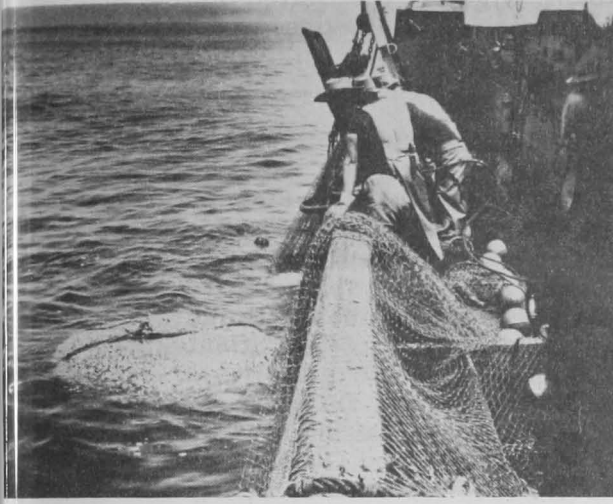


Fig. 4 - An exceptionally large catch made by the *La Rafale*, off the Ivory Coast (about 4 metric tons): (a) left--cod-end at the side of the vessel; (b) right--because of the weight of the catch, the cod-end was split and lifted in two sections. The small grunter (*Achydauterus auritus*) seen here formed about 90 percent of the catch.

Species of fish, length-frequency measurements were made on random samples of 250 fish. Measurement of the various species of shrimp was based on the number of individuals per kilogram.

Comprehensive collections of fish and invertebrates of the West African continental shelf were made during the survey.

EQUIPMENT

Equipment for oceanography and fisheries to cover the agreed program as well as the general items required by any scientific survey was provided. Three types of logbooks (hydrographic; general for trawl stations; fish-length frequencies) were designed and used by the survey.

Additional scientific equipment was provided by FAO, UNESCO, and the German Federal Republic.

SCIENTIFIC PERSONNEL

The scientific personnel on each vessel consisted of three biologists (one was cruise leader) and one hydrographer/biologist. The personnel were assigned to the survey by European countries and the United States under technical assistance agreements, West African fisheries research or oceanographic organizations, and international organizations. The countries and organizations represented included Belgium, France, German Federal Republic, Ghana, Ivory Coast, the Netherlands, the United States, and FAO. A total of 64 man-months of service was provided by those scientists.

FACILITIES IN WEST AFRICA

Facilities (e.g. housing, office, base port facilities, etc.) were granted by West African governments and CCTA.

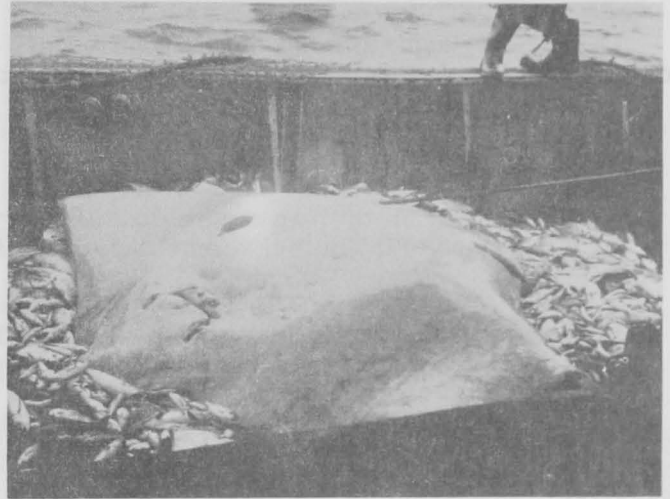


Fig. 5 - A sting ray (*Dasyatis* sp.) taken by *La Rafale* off the Ghana coast. Length of body 6 ft., length of tail $7\frac{1}{2}$ ft., width across wings $7\frac{1}{2}$ ft., weight about 700 lbs. Sting rays up to 500 lbs. are not uncommon in West African trawl catches.

SCIENTIFIC COMMITTEE

The Director of the Guinean Trawling Survey is advised by a scientific committee composed of fisheries scientists from France, Ivory Coast, Nigeria, the United States, and CCTA. In addition, FAO, UNESCO, and other interested organizations are represented by observers. The committee meets annually under the Chairmanship of Professor Th. Monod, President of the Scientific Council for Africa (CSA).

REGIONAL AND INTERNATIONAL LIAISON

Close contact has been maintained between the survey and the fisheries and oceanographic laboratories in the West African area, in relation to local research and other programs being carried out by those organizations during the lifetime of the trawling survey.

In the international sphere, close liaison has also been maintained with the Fisheries Biology Branch of FAO and the Bureau of Oceanography and the IOC of UNESCO.

The National Oceanographic Data Center (NODC), Washington, D.C., has agreed to process the survey's hydrographic data for the West African continental shelf and publish them as ICITA supplementary data reports (GUINEAN I: EQUALANT II, and GUINEAN II: EQUALANT III). The Smithsonian Oceanographic Sorting Center (SOSC) Washington, D. C., has agreed to sort benthic samples collected by the survey. UNESCO, under a training scheme, is to provide a fish taxonomist at Abidjan to set up a temporary fish sorting center to (1) effect a basic breakdown of the survey's fish collections, and (2) train local West African staff in that task and also in the curating of collections.

PROGRESS TO DATE

During the whole period of GUINEAN I and II, fishing proceeded satisfactorily and a scheduled biological and hydrographic observations were made.

Two aspects of the results have been investigated so far:

1. Analysis has commenced of the results of the overlap transects for GUINEAN I and II (when the two vessels fished together for one month) to determine the degree of variation between the catch rates of the two vessels.
2. For GUINEAN I and II the catches of pelagic fishes caught in the trawls have been analyzed. Preliminary results show that considerable catches of sardine (Sardinella), mackerel (Scomber), scad (Trachurus), and mackerel scad (Decapodus) were made in many areas at depths of 30-100 m. (15-50 fathoms). Those findings are of great interest, especially in the view of the existing seasonal fisheries at the surface and the possible projected resources survey for those species in the West African area.

FUTURE

The methods for the Stage I analysis of the results (which mainly concerns data extraction from survey records) have been planned and three types of data forms printed. Stages of the analysis and the publication of the final reports have also been considered, but those all depend to a certain extent on the results of Stage I.

The operational phases of the survey ceased in mid-June 1964. About the end of October 1964, it is hoped that the Director of the trawling survey will transfer his offices to the Biological Laboratory, U. S. Bureau of Commercial Fisheries, Washington, D.C., for the report and analysis period. It is expected that the survey report will be completed and sent to the printers towards the end of 1965. Progress reports will be issued at intervals during that period so that governments and the fishing industry in West Africa may be able to use information for future planning as rapidly as possible.

