Geography of Fishing

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in British Honduras and Adjacent Coastal Waters

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TABLE OF CONTENTS

- <u>ABSTRACT</u>
- INTRODUCTION
- CHAPTER I

PHYSICAL ASPECTS OF THE STUDY AREA

- <u>CHAPTER II</u>
- EVIDENCE OF ABORIGINAL FISHING ACTIVITY
- <u>CHAPTER III</u>
- DEVELOPMENT OF FISHING IN THE COLONIAL PERIOD
- CHAPTER IV

SHIPBUILDING AND THE EVOLUTION OF BOAT TYPES

MAPS

- 1. Regional location map
- 2. Location map Northern Area
- 3. Location map Central Area
- 4. Location map Southern Area
- 5. Distribution of rainfall, currents, and winds
- 6. Distribution of aboriginal sites
- 7. Hick's Cay site
- 8. Cay Chapel site
- 9. Aboriginal sites in the Colson Point area
- 10. Aboriginal sites in the Salt Creek Lagoon area
- 11. "Caio Cosina" in 1764
- 12. New description of the coast from Cape Camaron to the River of Balis in Honduras 1753
- 13. Private map of the Bay of Honduras for the use of Jamaican smugglers 1780
- 14. Part A; The Bay Islands, Part B; Roatan 1794
- 15. Distribution of culture areas and fishing practices
- 16. Cay Caulker Village in 1965
- 17. St. George's Cay in 1945
- 18. <u>Barranco in 1945</u>
- 19. Distribution of fishing grounds
- 20. Distribution of the spiny lobster
- 21. Distribution of secondary marine resources

• <u>CHAPTER V</u> CONTRASTS IN SETTLEMENT PATTERNS AND FISHING PRACTICES

- <u>CHAPTER VI</u> THE SCALE FISH INDUSTRY
- <u>CHAPTER VII</u>

THE SPINY LOBSTER INDUSTRY

• <u>CHAPTER VIII</u> SECONDARY EXPLOITATION OF MARINE RESOURCES

• <u>CHAPTER IX</u> CONCLUSIONS

PLATES <u>Click</u> for descriptions 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Appendix 1 | Appendix 2 | References |

ABSTRACT

A small but flourishing fishing industry exists in northern British Honduras where it is an exception to the general lack of commercial fisheries along the lightly inhabited western coast of the Caribbean Sea between Cabo Catoche and Cabo Gracias a Dios. Aspects of the cultural geography of fishing are presented with emphasis on historical development and the contemporary distributions of practices established on islands adjacent to an extensive barrier reef. Fishing grounds are located near this reef in a shallow water environment that is relatively uniform throughout the northern half of the study area. The inhabitants of fishing method distinct from their neighbors. This compartmentalization of practices results in a disjunct distribution pattern showing little transition or diffusion between villages. These conditions demonstrate that cultural controls predominate in shaping the traditionally conservative working habits of the fishermen.

Evidence of a substantial aboriginal coastal population was discovered in and around several large lagoons having an environment presently unsuited for agriculture. Surface remains suggest these Indians were sea-oriented, but precise stratigraphic data is required for further research.

Analysis of pertinent colonial literature indicates that few items of the aboriginal fishing cultures were adopted by early settlers, and almost none is to be found in the present inventory of equipment.

Limitations have been placed on the design of boat types and progress of shipbuilding by certain physical factors, but shipbuilding continues to be conducted on an informal basis preserving many antiquated construction methods. Origin of the Belizean fishing smack design has been traced to Cuba, which has been the hearth area for the diffusion of several other important items of fishing equipment.

The introduction of modern processing, transportation, and marketing facilities has stimulated development of the spiny lobster industry so that it now far exceeds in value all other marine resources combined. Lack of effective conservation planning and enforcement may lead to an eventual decline in production unless some practical means of extending fishing into deeper waters can be found.

The exploitation of scale fish continues to remain primarily on a subsistence level based on a multiplicity of species. A bonito fishery has recently been established in the Gulf of Honduras by displaced Cuban fishermen operating out of the Bay Islands. This industry, if it continues to be successful, may provide an excellent example for future developments in this part of the Caribbean.

INTRODUCTION

Click here for a Regional Locations Map

Click here for a List of the Plates (photographs) accompanying this article

British Honduras is a small country of approximately 22, 600 square kilometers, located on the western coast of the Caribbean Sea. On the north, it is separated by the Rio Hondo from the Territory of Quintana Roo, Mexico. A surveyed line carried southward from the Rio Hondo forms the western boundary with the Peten district of Guatemala, and the southern boundary of the country is defined by the Rio Sarstoon.

All of the coastline of British Honduras, its offshore islands, that portion of the Bahia de Chetumal northward to the fishing village of Calderitas, and the Bay Islands of Honduras, comprise the study area shown on Map 1. The dimensions involved are equivalent to that portion of the coast of the United States between Biloxi, Mississippi and Galveston, Texas, an airline distance of some 600 kilometers; obvious logistical problems prevented a detailed investigation of the entire area. In practice, emphasis was given to a study of the northern sector, where the greatest concentration of fishermen exists.

The original objectives of the field program were no more ambitious than to record some of the rapidly disappearing cultural aspects of a folk fishing industry and to give a broader geographic treatment of the pioneer work by Fuller (1955). Certain physical studies of fish habitat were planned using the previous works of Vermeer (1959) and Stoddart (1962, 1963 1 as a guide. Supplementary work in the Bay Islands was undertaken in order to determine the extent of cultural dispersions and to provide a basis for comparison with fishing activities in British Honduras.

An analysis of the results that have emerged from these investigations indicates that they partially substantiate the fundamental observation by Foster (1960: 84) to the effect that the rich and heterogeneous fishing practices developed in Spain have been reduced in the New World to relatively few forms having wide distribution. However, a somewhat divergent theme has been created in British Honduras by the recent introduction of fishing techniques originating in other parts of the New World. They have resulted in a remarkably disjunct distributional pattern that can be described as follows:

Groups of fishermen with similar racial and ethnic background have each adopted a distinctive fishing characteristic of their own village but seldom used by their neighbors, who exploit the same resources using a different method. Since environmental conditions remain basically constant, it is apparent that this specialization is largely governed by cultural controls.

Three principal groups of fishermen are found within the limits of the study area. Spanish Amerindian mestizos constitute the most numerous group, many of whom are bilingual to the extent that their conversation and terminology are an inextricable mixture of Spanish and English. This occasionally presents technical difficulties in distinguishing between loan-words and colloquial terms as transcribed in the text. The second largest group of fishermen are locally known as "creoles." This name is loosely applied to anyone of mixed Negro and Caucasian ancestry and is synonymous to the more familiar (but locally unknown) word "mulatto. "

The remaining group is composed of fishermen who have been referred to in literature as "Black Caribs." In theory, these Negroes are thought to represent the descendants of refractory slaves who escaped to St. Vincent in the West Indies, where they briefly inhabited the island together with Carib Indians in the latter part of the eighteenth century. Whatever physical characteristics led early observers to give Black Caribs their name have now disappeared in the ethnically cohesive element living in British Honduras whose representatives are neither black nor Caribs. A racial origin similar to the one proposed for the Black Caribs does in fact exist along the coast of Honduras and Nicaragua, where descendants of mixed Negro and Mosquito Indian ancestry are known as Sambos.

During the first season of field work (June-September 1964) numerous trips were made in a small, inboard powered skiff that greatly facilitated movement between Belize and neighboring cays.

A larger boat, better suited for extended cruising, was utilized for an additional six months in 1965. Approximately 125 hours of travel time, equivalent to 2, 000 kilometers map distance, were spent in this boat during the final survey. Continuous rough weather and the development of technical difficulties with equipment resulted in the cancellation of a scheduled cruise along the coasts of Guatemala and Honduras to the Bay Islands. A somewhat less satisfactory plan was improvised, and the writer traveled by a circuitous air route to the easternmost of the Bay Islands where two weeks were spent in Guanaja. An unscheduled landing on Cayo Tique provided an opportunity to inspect the interesting Hog Islands.

It is doubtful that any- useful study of the coastal and offshore areas of British Honduras could have been made in a reasonable length of time without the use of air photographs. Although excellent topographic maps of British Honduras, published in 1964 by the Directorate of Overseas Surveys, are now available at a scale of 1:250, 000, they obviously do not provide enough hydrographic detail to make navigation among the myriad islands and shoals a matter to be undertaken with confidence. An air photo, taped to the helm, was particularly useful when steering through tight quarters; the engine hatch served as a convenient flat surface for stereoscopic examination. In certain instances, field annotation was posted to an air photograph and later transferred to a map. It will be noted that the planimetry of eight large scale maps contained in this study has been based on these air photographs, thus affording a vast saving in time and effort over the usual hate-surveying methods.

CHAPTER I

PHYSICAL ASPECTS OF THE STUDY AREA Click here for a Northern Area of Belize Map Click here for a Central Area of Belize Map Click here for a Southern Area of Belize Map

In the following discussion of physical aspects of the study area, only those elements having some direct or indirect effect on fishing activities will be considered. An excellent generalized description of British Honduras as a whole can be found in the report by Romney, et al. (1959: 13-33). Publications by Dixon (n. d.) and Vermeer (1959) also contain extensive summaries of the physical geography, as do the reports of Stoddart (1962; 1963).

A regional location map (Map 1) may be useful in the identification of those additional locations occasionally mentioned outside the immediate study area but within the broader limits established by Cabo Catoche and Cabo Gracias a Dios.

The principal area of interest in the present study is centered on northern British Honduras and parts of southern Quintana Roo (Map 2). More specifically, it includes the offshore islands between Stann Creek and Chetumal, the Bahia de Chetumal, and the southern extension of the Peninsula de Chetumal known as Ambergris Cay.

Central and Southern British Honduras, and the Bay Islands are treated with less emphasis and are shown on separate location maps (Map 3; Map 4; Map 14-A).

COASTAL AND OFFSHORE CONFIGURATION

In general, the northern portion of the British Honduras mainland consists of a broad, gently undulating limestone platform of extremely low relief. The continuity of this platform is interrupted by the shallow Bahia de Chetumal whose apparently fault-controlled shores parallel the regional northeast trend of the coastline. The eastern boundary of the Territory of Quintana Roo extends several hundred kilometers northward as a relatively uninhabited and imperfectly known area recently described in some detail by Edwards (1957).

Bays, lagoons, offshore islands, the barrier reef, and several large atolls comprise the most important physical features of the environment in which fishing activities are conducted. North of Belize, the coastal area of British Honduras is swampy and much embayed. Several of the larger bays have acquired barrier bars that effectively seal off much of the water circulation to form mainland lagoons (e.g., Northern River Lagoon and Salt Creek Lagoon).

A line of low, mangrove-covered islands (locally known as "cays") occurs roughly parallel to, and from ten to fifteen kilometers eastward of the coastline. South of Stann Creek, this distance between the islands and the mainland is increased so that it amounts to a maximum of approximately forty kilometers.

An extensive barrier reef, the second longest in the world, has developed along the fringe of an unusually narrow continental shelf that terminates abruptly some three to five kilometers east of the mangrove cays. This reef can be traced from its southern limit in the vicinity of the Sapodilla Cays, northward past the coast of British Honduras to a point near Cozumel Island, where the discontinuous coral heads can no longer be followed. Although there are numerous barren intervals, particularly in the northern section, the unit as a whole attains a length slightly in excess of 500 kilometers.

Two tiers of offshore atolls are displaced eastward from the barrier reef at distances of approximately ten and fifty kilometers. The first group consists of Turneffe Island and Banco Chinchorro; the second is comprised of Glovers Reef and Lighthouse Reef. With the exception of Banco Chinchorro, these features have been carefully described by Stoddart (1962, 1963). He concludes that the general outlines of these atolls with their conspicuous northeast-southwest orientation of the longer axis is a result of the same normal, block-fault system responsible for the form of the shelf and the Bahia de Chetumal. Deep submarine trenches with precipitous slopes separate the two rows of atolls from the barrier reef and from each other.

Additional faulting associated with the east-west trending Bartlett trough divides the study area into two distinct parts. The southern half, including much of the coast of northern Honduras, seems to have been more active tectonically. It contains a much broader shelf area which narrows sharply in the Bahia de Amatique but still remains contiguous with a similar shelf in southern British Honduras. Utilla, the smallest of the Bay Islands, is located on the extreme northern margin of the Honduran shelf and is remarkable for its remnant volcanic cinder cones. The rugged islands of Roatan and Guanaja constitute structural high points on a horst-like block of ancient gneisses, schists, and granites that are apparently unrelated to the surface stratigraphy of the nearby mainland. The Bay Islands (Utilla excepted) are separated from the shelf area by a deep, fault controlled trench. As a result, the Bay Islands generally lack the broad, shallow banks necessary to provide extensive fishing grounds.

CLIMATE AND WEATHER

Click here for a Rainfall, Currents, and Winds Map

Climatic zones in British Honduras are separated by the centrally located massif of igneous and metamorphic rocks known as the Maya Mountains. These mountains do not exceed 1, 200 meters elevation but form an effective barrier that blocks moisture-laden southeasterly and easterly winds. A typical tropical rainforest (Af) climate' is found in the southern and central parts of the country, where heavy orographic rainfall may reach 5, 000 mm at some stations near the mountains. Belize, with an annual average total of 2, 000 mm, is located near the boundary separating the tropical savanna (Aw) climate found to the north. Monthly average temperatures at this station have a range of about 2°C but remain close to 26°C during most of the year.

9 Climatic data from the .Bay Islands are meager, but Aguilar's (1954) map3 shows that Guanaja (The Town station) has an average annual rainfall of 2, 700 mm, while much of Roatan and Utilla seem to exceed 3, 000 mm. Again, there is an apparent orographic situation in which the windward shores of these mountainous islands receive substantially more rain than the leeward sides.

The presence of a strong, persistent easterly trade wind (see Map 5) has a profound effect on fishing activities in the study area. It is instrumental in the development of oceanic currents, and blowing over a long, uninterrupted fetch, generates heavy seas that break virtually unimpeded on the protective barrier reef. The movements of pelagic fish and the design of fishing boats and equipment have been influenced by this constant wind direction in a number of ways.

Precipitation in the southern half of the study area is often in the form of torrential downpours from a locus of unstable weather situated in the Bahia de Amatique. During the rainy season (June - December), the numerous rivers in southern British Honduras are often in flood and discharge considerable quantities of turbid, silt-laden water into the broad lagoon formed behind the southern terminus of the barrier reef. These sediments inhibit the growth of coral and create a bottom environment that is not attractive to many species of fish.

By comparison, very few rivers drain the northern portion of the study area where convectional thunderstorms (chubascos) are frequently the source of localized precipitation. Under unusual circumstances, the Rio Hondo, forming the border between British Honduras and the Territory of Quintana Roo, has been observed to flood to such an extent that it completely filled the Bahia de Chetumal with dark-brown, muddy water, much to the detriment of the already meager fish population.

The Belize River is also subject to severe floods that have on many occasions curtailed all fishing activities in the shallow bays around the mouth of the river. Several weeks may pass before normal salinities have been re-established.

Hurricanes have struck the coast of British Honduras with considerably more frequency than is generally recognized. Stoddart (1963: 127) has compiled a list of twenty-one instances beginning with the year 1787. While severe physical damage is often restricted to a surprisingly narrow area, high winds, heavy rainfall, and rough seas often extend far beyond the track of the storm center. In the most recent instance (hurricane "Hattie" - 1961), fishing fleets were badly damaged and dispersed so that the industry was disrupted for more than two months.

However, it is the annual passage of a series of frontal storms, sweeping down over the Gulf of Mexico from the interior of North America during the winter months (December February), that constitutes the most significant meteorological phenomenon affecting almost all aspects of fishing activities in this part of Central America. These storms, variously known as nortes or "northers, " appear suddenly, bearing down on the coast of British Honduras in a nearly continuous squall line, behind which are dangerous surface winds that often dismast, capsize, or drive aground any boat that cannot find immediate shelter. Some remarkable movements of fish and spiny lobster appear to be associated with the onset of a none, which in this respect, can be said to have a beneficial but temporary effect on fishing success. On the basis of very incomplete weather data for off-shore stations, it seems likely that these frontal storms supply much of the percolating ground waters that accumulate in a shallow lens beneath the sand of those islands where fishing villages have been located. Thus, these frontal storms are a vital factor in the lives of the fishermen. On the other hand, fishing in general, and particularly the drying of salted fish

caught during this season, must be suspended for several days of gusty, rainy weather that persists in the wake of a norther.

During most months of the year, it is possible for fishermen to carry their catch to market by running before the trade winds, holding to a single straight course. Conversely, the return trip can be made on a single long tack with at most a short jibe or two. This pattern is interrupted by the onset of the "mauger season;'6 which is a period of dry, calm weather that usually occurs in the month of August. Boats are becalmed and the fishermen cannot function efficiently without auxiliary power in the form of a small inboard engine or bracket mounted outboard motor. Heat becomes oppressive in the still air, and noxious insects make life miserable by day and night.

In the area of the Bay Islands, a distinct diurnal sea breeze - land breeze system occurs due to the presence of a high mountain range paralleling much of the coast of northern Honduras. Cool night winds descend from these slopes and spread rapidly out to sea where they are often noted as far north as Guanaja. Fishermen returning to the Bay Islands from the mainland prefer to travel during the day and must beat their way homeward through rough seas generated by the strong daytime sea breeze. Shorter trips between the islands are often made in small motorboats very early in the morning to take advantage of a brief period of calmness in the daily cycle.

TIDES AND CURRENTS

For complex reasons as yet imperfectly understood, tidal range in the Caribbean is very small, seldom amounting to more than a half-meter. This is not to suggest that tides do not have an important role in fishing activities. On the contrary, fishermen in British Honduras, like those in other parts of the world, are acutely aware of the tidal changes and plan their fishing trips to take advantage of these movements. In the shallow lagoons and bays, it is not uncommon that ebbing tides are largely nullified and flood tides increased by the effect of strong onshore winds.

Surface currents (Map 5) in the western Caribbean above Cabo Gracias a Dios are generally directed northwestward until they reach the latitude of British Honduras where they take a more northerly set, increase in velocity, and are funneled through the narrow Strait of Yucatan. Map 5, compiled from a number of published sources, shows these water movements and their relationships to the coastlines and atolls. Southerly counter-currents are developed immediately in front of the barrier reef and in the backreef lagoon areas. Turbid waters discharged by the larger rivers from Belize southward are widely dispersed by these currents and are swept along much of the southern littoral, creating water conditions that are avoided by many of the valuable species of pelagic fish.

A conspicuous circular current pattern exists in the western portion of the Gulf of Honduras between the Island of Utilla and Glovers Reef. Vermeer (1959: 121 ff) suggests that this is a warm eddy current contrasting in temperature with colder upwellings caused

farther north by a zone of divergence created where onshore winds blow over currents flowing parallel to the coast. While it is true that kingfish, dolphin, and several species of swordfish are common in northern offshore waters, recent discoveries by commercial fishermen (see p. 84) indicate that the largest concentrations of bonito and albacore are to be found within the southern circular eddy, where they periodically pass within a short distance of Utilla while pursuing shoals of baitfish. These observations imply that some slightly cooler (and as yet undetected) current is present in the same area, perhaps flowing in a clockwise direction at a slight depth below the surface.

VEGETATION

The rich variety of tropical vegetation that exists in the study area has an important bearing on fishing activities. A long list of woods and other useful plants contained in Appendix III of the Land Use Survey Team report by Romney (1959) gives some indication of the abundant inventory from which the fisherman can choose material to build his boats, traps, and other equipment essential to his occupation. But it is important to bear in mind that the majority of fishermen live on the northern cays and in Belize, both locations being some distance removed from the true tropical rain forest found in southern British Honduras. As a result, they have become dependent upon southern coastal dwellers to supply them with the logs and timbers necessary for boat construction. An obvious unfamiliarity with forest exploitation is everywhere evident among the northern fishermen, who even prefer to buy an ordinary mangrove boat pole rather than enter the "bush" to cut it themselves.

FISH HABITAT

Concentrations of fish normally occur along the coast of British Honduras in environmental situations that depend upon complex relationships involving available food, currents, and the cover provided by bottom topography. Most commercially important species inhabit certain parts of a broad, shallow lagoonal area formed between the mainland coast and a protective barrier reef. This backreef lagoon may be considered a single fishing bank having an approximate length of 200 kilometers and an average width of thirty kilometers, but only in relatively small and scattered sectors do the necessary conditions exist whereby fish are attracted in sufficient numbers to constitute a fishing ground.

The interior lagoons of the three large off-shore atolls of Turneffe, Lighthouse Reef, and Glover's Reef also provide an excellent fish habitat, having a total extent of approximately 2, 000 square kilometers. Although these locations were formerly much visited by fishermen, they were virtually abandoned after the disastrous hurricane of 1961 and have not yet returned to active exploitation.

Fishermen in northern British Honduras show a conservative tendency to concentrate their efforts on a few well-known fishing grounds near the barrier reef that have traditionally proven to be productive. They are not inclined to experiment in new areas created along the coast of the mainland by periodic storm damage and subsequent current action.

Along this littoral zone there are a number of locations where anadromous fish - such as the snook, tarpon, and jack crevalle - congregate daily near river mouth bars and in the deeper tidal channels. These locations provide access to large inland bodies of water such as Northern and Southern Lagoons, Salt Creek Lagoon, Northern River Lagoon, and Shipstern Lagoon (Maps 2, 3). The fish are attracted by the ebb and flow of tidal currents that funnel shoals of baitfish and small shrimp into constricted channels, where they are forced to run a quantlet of predators.

Submerged tidal deltas often occur at either end of the channels connecting a lagoon with the open sea, but they are generally barren areas of rapidly shifting sediments where few fish habitually congregate. As bottom sediments spread over the backreef platform become slightly more stabilized away from the influence of longshore currents, a few stunted colonies of turtle grass (Thallasia testudinum)begin to appear. This characteristic vegetation, locally known as zacate, is found in irregularly shaped beds that parallel the coastline in a band ten to fifteen kilometers wide. Zacate increases in luxuriance and density near the low, mangrove-covered islands where plants reach a maximum size of about sixty centimeters. ? Where turtle grass is prevalent, there are seldom any other conspicuous elements of the bottom environment that provide sufficient cover to attract a resident fish population. As a consequence, little

fishing is conducted over these grass beds, except where fishermen have built artificial fish shelters (page 79 ff).

The first area of markedly favorable fish habitat occurs around the margins of mangrove cays, where the interlaced root systems create ample cover for a wide variety of commercially valuable food fish. These islands tend to be elongate with small current scour channels at either end, where an abundance of snapper can be found.

The larger islands (e.g., the Drowned Cays - Map 3) are often transected by a number of deep, narrow, storm channels, locally known as "bogues." These features are common to many islands in the Bahamas and southern Florida that are similarly composed of poorly consolidated sediments. Bogues are characterized by a "U" shaped profile and gently curving banks where undercutting is common. These overhanging ledges formed below the surface are created by differential erosion of alternating layers of stiff clay and peaty material, in which there are gloomy, cave-like recesses much frequented by large, sedentary grouper. A bogue must be open at both ends in order to acquire a substantial fish population. If the daily flow of currents generated by wind and tide is stopped, scouring action ceases and the bogue gradually becomes filled with silt and debris. This flushing movement of waters through an open bogue often provides a source of temporarily concentrated plankton that are filtered out by shoals of baitfish, which in turn attract larger species to the locality.

On the windward side of the islands, zacate is encountered once again interspersed between submerged outcrops of beach rock and relict reefal masses. Such features often have a superficial growth of poorly developed corals, algae, and sponges that form another favorable fish habitat. These areas are usually quite accessible and well-known to the fishermen. However, they are not always a dependable source of supply, as they are frequently visited and easily overfished. This environment is of considerably greater importance for its lobsters which find refuge in the rocky outcrops during the day and forage over the grass beds at night.

Between the outer limits of turtle grass and the barrier reef proper, the backreef platform typically exhibits a shallow depression filled with shifting detritus that has been swept from the reef flat and deposited in a series of dune-like crests and troughs. This brilliant white sand bottom is generally devoid of cover and constitutes a barren habitat where fish are not plentiful; it does, however, provide the fishermen with a convenient corridor in which they can sail their boats laterally along the leeward fringe of the reef.

The barrier reef of British Honduras is a relatively narrow structure that is basically more chaotic in appearance than the somewhat more subdued topography of reefs found in other parts of the Caribbean. During most of the year heavy surf breaks directly on the barrier reef, and it cannot be closely approached from either side. The innumerable coral heads, crevices, caverns, and surge channels comprise an excellent fish habitat that remains a virtual sanctuary, except in certain sectors where calmer conditions make skindiving possible.

Very little is known of the forereef bottom topography in the narrow zone it occupies before sloping steeply down into abyssal depths. Fish and lobster are abundant to the lower limit of active coral growth, and there -is some evidence (Bradley: 1956) that several species of snapper congregate on the successive, stair-like terraces to a depth approaching 200 meters. In the shallower portions of the forereef area, conventional fishing methods are generally successful where sharks are not prevalent, but it may be the deeper terraces that ultimately prove to be the habitat of the richest fish resources.

In the following pages, additional aspects of the physical environment are described in more detail at appropriate points in the text. In overall analysis, it is certain that the coastal waters of British Honduras are richly endowed with abundant marine resources; but there are physical limitations, particularly in the south and in the neighborhood of the Bay Islands, which suggest that exploitation may never reach the proportions envisaged by planners who have based their estimates on cursory examinations.

CHAPTER II

EVIDENCE OF ABORIGINAL FISHING ACTIVITY Click here for a Map of the Distribution of Aboriginal Sites

A comprehensive and logical geographic evaluation of fishing in British Honduras cannot be made without first establishing the extent and nature of aboriginal fishing activities. This approach to the subject is necessary in order to determine the degree to which contemporary techniques reflect a cultural heritage transmitted by Indians to early settlers, and ultimately, to the present fishermen. With these objectives in mind, considerable time was invested during the course of field work in an effort to map accurately the distribution of prehistoric coastal fishing sites. In addition to several locations noted by previous investigators, thirty-three new sites were found along the coast and offshore islands of northern British Honduras. As the extent of aboriginal interest in the exploitation of marine resources became apparent, a further attempt was made to arrive at a tentative correlation of site location with present ecology to note possible changes that may have taken place. The overall distributional pattern of the sites suggests that they may have had some relationship to large, inland ceremonial centers having substantial peripheral populations (Map 6).

While the results of this study seem to indicate that few aboriginal fishing techniques employed prior to the time of discovery survived into the colonial period in what may be considered an intact state, some items of Mosquitoan origin continue to exist in highly modified form in the inventory of contemporary equipment.

PREVIOUS WORK

It is difficult to establish precisely who were the inhabitants of the British Honduras coastline several centuries before the time of discovery. Thompson (1930) and Morely (1916) point out that the Maya Indians had partially abandoned many of their centers in the Peten of northern Guatemala by the tenth century, in what has generally been regarded as a rather sudden cultural decline. Spanish explorers met with substantial Indian populations in northern Yucatan, Quintana Roo, Honduras, and the Bay Islands, but they found the coast of British Honduras to be virtually uninhabited.

Archaeologic investigations during the past 100 years have shown that large centers of population existed throughout much of the classic period at Tulum on the mainland coast opposite Cozumel Island, Zunantunich on the upper Belize River near the Guatemalan border, and Lubaantun on the Rio Grande in southern British Honduras. Recent work by Pendergast, has resulted in the discovery of still another large Mayan ceremonial center at Altun Ha (Rockstone Pond), located a short distance northwest of Belize City. The location of those principal centers falling within the study area is shown on Map 6, together with coastal fishing sites and ceremonial sites (underlined).

Meighan and Bennyhoff (1951) were among the first to report the presence of a large coastal site in northern British Honduras. On their trip across Salt Creek Lagoon to visit the Last Chance location, they passed within view of a number of additional sites, but were evidently not able to extend the scope of their field work.

In the historical summary of land use contained in the report by Romney, et al (1959: 110), there is a map (Fig. X) indicating and classifying the known Mayan sites in British Honduras and correlating them with soil types. They further divide the sites into four categories according to the principal Indian activity in the area. Only the first of these categories is of immediate concern to the present study. They describe these sites as:

.... spread along the coastline usually on islands which have a sheltered approach . . . [and] are often marked by little more than middenheaps . . . [that] resemble picnic centers, probably occupied each year at the time when a particular sea-bird, mollusc or fish was present in abundance during a breeding or swarming season.

This is a reasonable analysis having much logic to recommend it. Unfortunately, it is not an accurate description of the offshore sites indicated on their map, nor is it appropriate with respect to the new locations to be described. These "midden-heaps" were found to be extensive and in no sense resemble "picnic centers," as they variously contain pyramidal ceremonial structures, human burials, vast accumulations of broken pottery, and the scattered personal possessions of what was obviously an appreciable resident population.

Anderson (1963 1-1 1 is another investigator who recognized the probability of prehistoric habitation of the offshore cays. He states that Moho Cay (located three kilometers north of Belize 1 was "apparently a Maya fishing site." However, it is Stoddart (1962: 3) who summarized the situation as it was known at that time by stating:

There are no pre-Columbian historical remains on either Lighthouse Reef or Glover's Reef, though Maya shellmiddens are reported from the Calabash Cays area and 'Northern Bogue on Turneffe . It is not impossible that the Mayas did visit the two outer atolls on occasion in canoes . . . and in fact this is suggested by the Turneffe middens, located on the eastern exits of the Turneffe Lagoons still used by fishermen making for Lighthouse Reef. There is, however, no evidence of permanent settlement similar to that found on some cays within the British Honduras barrier reef.

With the information provided by these sources as a background, a systematic survey of the northern coastline and offshore islands was begun in 1964, and continued at intervals in 1965, in order to determine the general distribution and nature of these sites. The search was greatly expedited by use of aerial photography at an approximate scale of 1:40,000.

Before proceeding to a description of the individual sites, it is necessary to reemphasize the fact that investigation was based entirely upon examination of surface material. The comments and tentative conclusions with regard to aboriginal fishing activities are therefore possibly subject to extensive modification, in the event that stratigraphic information becomes available in the future. The following order of presentation merely reflects the sequence in which the sites were studied.

SITE DESCRIPTIONS

Moho Cay consists of a small mangrove swamp having on its north shore a narrow ridge of coarse quartz sand2 resting on a poorly indurated outcrop of beach rock. Remnants of a series of habitation sites have been exposed by wave erosion for a distance of more than 125 meters and are nowhere more than 1.5 meters above low tide level. Slumping of the highest layer of black, highly humanized soil has exposed two earlier dark-brown stata in which there is evidence of continuous occupation in the form of numerous pottery sherds, abundant chert cores, flakes, and stone artifacts, including jadeite Celts, and

large (25 cm), finely-wrought projectile points. The total assemblage of artifacts weathering out from the remaining portions of the mound is more diverse than on any other island site studied.

Remains of marine animals are particularly conspicuous on Moho Cay. Most plentiful are the bones of manatee (Manatus americanus) which can be easily identified by the lack of marrow structure. Many fragments of these bones can be seen in situ, and in 1965, there were still numbers of the large, curved rib bones to be found littered about on the irregular surface of beach rock where they have been deposited by bank erosion. Oyster shells, of a variety no longer found in the immediate vicinity, are also common, and there are a few bits of broken conch (Strombus gigas) as well.

A human skeleton was located under one meter of water at a point seven meters distant from the present shoreline. The remains were in a flexed position and were being rapidly eroded from a layer of peaty material by strong tidal scour. Another burial was partially exposed along the northern shore at the time of the latest visit. These and other indications point to permanent rather than temporary residence.

Considered in its entirety, the original site, which was much larger than at present, evidently was occupied over a long period of time by Indians who were primarily concerned with the capture of manatee. These animals can still be found in reduced numbers around the mouth of the Belize River, located due west from Moho Cay and within easy traveling distance by dugout canoe.

The Hick's Cay site (<u>Click here for Map 7</u>), is unusual in its location and ecologic implications. It consists of a small, oval, earthen mound having a maximum elevation of two meters, and is situated near the center of the northeastern point of the island. Surrounded by dense thickets of mangrove, the site represents deliberate artificial construction by the inhabitants over a period of time, as the material composing the mound is largely coarse sand unlike any sediments found on the cay today.

This mound is not readily visible at the air photo scale. It was discovered with the help of fishermen from Cay Caulker, who formerly visited the mound at very infrequent intervals in order to harvest coconuts from palms planted there many years ago.

Although the hurricane of 1961 destroyed all but a few trees on this site, a sufficient number survived to serve as guide points in crossing approximately 300 meters of tidal mud flats and mangrove before reaching high ground of the mound.

Footing on the precarious mud surface was made somewhat more secure by the presence of a thick layer of small clam shells, tentatively identified as a Pita spp., that were fortunately encountered at a depth of about twenty centimeters below the surface. Further investigation showed that live specimens of this pelecypod were scattered over much of the mud flat surface with concentrations occurring along shallow drainage channels winding through the mangrove root systems. These clams were not encountered again in such quantity on several other similar locations subsequently examined. The presence of the clams may constitute a partial answer to the question of why the mound builders would have chosen such an improbable location.

The mound itself is said by the fishermen to have once contained "clay dolls" and a large "stone sword, " but the present accumulation of surface artifacts is more prosaic. Ubiquitous sherds, an occasional small, black obsidian blade3 and a few broken chert hand tools constitute the bulk of what remains. This relative paucity of surface artifacts in comparison with the Moho Cay site is probably due to the fact that the Hick's Cay mound has remained almost intact. Some indication of an increase in the subsurface concentration of cultural material can be found around the depressions left by uprooted coconut palms where bone and shell fragments were noted.

Indians living on the Hick's Cay site appear to have been attracted to the area by the availability of shellfish but the mound itself is not a shell midden. The location of this mound deep within a mangrove swamp may have been influenced by other more important factors no longer discernible; it is obvious that the inhabitants were not able to practice any known form of agriculture, therefore, must have been concerned with the exploitation of some marine resource.

The Cay Chapel site (<u>Click here for Map 8</u>) is located on the southern half of the island, a distance of seven kilometers northeast of Hick's Cay. The long, narrow mound is composed of grayish calcareous beach sand, and is highest at its southern end where it terminates in an oval area of elevated ground slightly more than two meters above sea level. This crescent shaped culmination is unusual in that it has been constructed by the addition of many crudely dressed blocks of reef coral. The blocks have been deposited as aggregate and do not appear to have any structural form.

This mound was discovered under the same circumstances as the Hick's Cay site, but is considerably more accessible. It is situated a short distance south of a series of low, parallel beach ridges that have been planted with coconut palms. The leeward (western) half of this mound was formerly enclosed by a dense stand of mature mangrove. Many of these trees were damaged in the 1961 hurricane, so that an open corridor of mud flats has been exposed around the southern and western flanks of the structure.

Only a few surface sherds can be found along the northern half of the mound, although to the south there are increasing amounts of broken pottery and conch shell. 4 From an examination of Map 8, it is apparent that the site is centrally located with respect to present conch beds in the surrounding shallow waters. This resource is likely to have been one of the principal objectives of aboriginal activities in this area.

There is some likelihood that the island of Cay Chapel was much smaller in extent when the mound was first occupied. All of that portion of the island now covered by mangroves may have been absent, in which case, the location would have been conveniently situated on the south point directly behind an outcrop of beach rock on the eastward projection of the shoreline locally known as "Reef Point."

A complex of sites in the Colson Point area (<u>Click here for Map 9</u>) was identified by photo interpretation during a routine examination of the British Honduras coastline. The presence of two prominent, conical ceremonial structures is especially noticeable on the 1945 photography, where they can be seen as conspicuous topographic features still covered by an undisturbed vegetational suite locally referred to as "high bush. " Of the many new coastal sites located during the course of this study, few retain the original vegetative assemblage, as they have been sought out for many years by subsistence farmers who clear the fertile high ground for the planting of coconuts and plantain.

Map 9 also illustrates the spatial relationships between the two large pyramidal ruins and the adjacent coastal morphology. Exclusive of tree cover, the pyramids rise to a height of approximately twenty meters above the surrounding mangrove swamp and are visible from a considerable distance at sea. The general location is again in, what appears to be, an unfavorable habitational environment judged by present standards. Circumstances did not permit a field check of this interesting area, therefore, it is not possible to comment on the particular type of fishing activity practiced by the inhabitants of the surrounding habitation mounds.

Possible ecologic motives for the clustering of aboriginal sites in the Colson Point complex cannot be determined from photo interpretation alone. However, the presence of structures fringing a lagoon and the distribution of subsidiary sites in concealed swamp locations is remarkably similar to the much larger Salt Creek Lagoon complex, for which field data are available.

These smaller mounds, all of which are located within a few kilometers of the two pyramids, probably do not represent all of the habitation sites to be found in the area. From evidence (to be described) at the similar site of Rocky Point, it may be anticipated that more small mounds will be found along the sharp topographic boundary between savanna and swamp, due southwest of the ceremonial structures.

Perhaps the most important single grouping of prehistoric coastal villages, ceremonial centers, and miscellaneous habitation mounds to be found in British Honduras exists in and around Salt Creek Lagoon (<u>Click here for Map 10, Aboriginal Sites in the Salt Creek Lagoon Area</u>). If additional sites extending from below Rocky Point Lagoon to above Northern River Lagoon are included, more than sixty kilometers of coastline can be demonstrated to have been occupied by substantial numbers of Indians, tentatively estimated by the writer to have reached a possible maximum figure of 14, 000. 5 Seven large village sites have been located (see insert of Map 10), five of which are found near the shores of Salt Creek Lagoon. These locations are locally referred to as "Rocky Point," "Last Chance, " "Marlowe Cay, " "Powell Ridge, " and "Cabbage Ridge. " The southernmost village site is herein designated "Potts Creek," and the northernmost as "Northern River Lagoon" for lack of previously established local place names.

The smaller habitation mounds of the Salt Creek Lagoon complex are composed of an upper layer of highly humanized, blackish soil and have been artificially built to a height of three to four meters above the present lagoon level. 6 These mounds do not contain any appreciable amounts of limestone rubble, nor can they be classified as "middens. " The dimensions of the mounds make it appear that they were inhabited by more than one family at a time. Each of the sites in this complex has been given a numerical designation and is categorized in Table 1.

TABLE 1. Site Classification - Salt Creek Lagoon Area Mayor Village Sites Others

reipie nouse nounds	inayor virrage breeb	001010
S. C. 1	S. C. 6*	S. C. 12*
S. C. 2	S. C. 8*	S. C. 14
S. C. 3	S. C. 11	
S. C. 4*		
S. C. 5		
S. C. 7		
S. C. 9*		
S. C. 10		
S. C. 13*		

*Indicates the site was verified by field check.

Multiple House Mounds

In the Salt Creek Lagoon area, increasing amounts of potsherds and other artifacts are encountered on the surface when approaching one of the sites. This material has been widely scattered by land crabs burrowing in the subsoil. The frequency of remains increases until the distinct boundary of the mound is found. This boundary is usually sharply defined by a change in vegetation from "cutting grass" (Scleria bracteata) to low acacias and other trees anomalous to the general swampy environment. None of the well-known vegetational indicators of Mayan occupance was noted. This is probably due to the selective

cutting by farmers, as previously mentioned. This disturbance of the natural vegetational pattern gives the sites a distinctive light- toned appearance on air photos that is in obvious contrast to the fairly uniform dark grey tones of the surrounding mangroves.

Of the many sites in the Salt Creek Lagoon area, Marlowe Cay deserves special mention for its possible role as a trading port of the type described by Chapman (1957), serving the vast inland complex at Altun Ha. The island is centrally located in Salt Creek Lagoon, being directly opposite the only natural opening in the barrier bar. This channel was closed at its eastern end by the 1961 hurricane and is now rapidly filling with silt. In aboriginal times the channel could have been easily kept open for the passage of large trading canoes.

Beginning along the eastern shore of Marlowe Cay (where there is a limited outcrop of submerged beach rock), much of the surface of the island is virtually paved with multitudes of ceramic sherds of various styles, including the plumbate trade ware described by Shepard (1948). Evidence of prehistoric habitation continues up to a central high point where there is a long, narrow ceremonial structure composed of heaped limestone blocks and rubble standing about three meters above the surrounding surface. There is an ancient well at the base of the western end and a similar, but circular, rubble mound located a short distance to the southwest. Land crabs are very active in the sandy soil and have unearthed specimens of shell ornaments (Olivella spp.), globular jade beads, and numerous pieces of broken obsidian blades. The two subsidiary sites (designated SC-9 and SC-10 on Map 10) are actually contiguous with each other and the main site. All of this high ground has been planted to coconuts, plantains, bananas, and ground foods, but the sites have not actually been disturbed in the process. The quantity and variety of surface material suggest a long period of habitation by a substantial number of people, who, although they may not have been exclusively fishermen, were dependant upon close proximity to a marine environment.

Powell Ridge and Cabbage Ridge were not visited in the field, but can be seen on air photographs to exhibit all the characteristics of large village sites composed of numerous individual house mounds. Other sites were located on the ground just north of Evan's Gap, 10 and on the small islands of Santa Elena (SC-13) and Iguana Cay (SC-5), both of which have firm landings on beach rock.

Small mounds, now located within the mangrove swamps along the southern shore of Salt Creek Lagoon, Carta Blanca Lagoon, and the unnamed lagoon north of Cabbage Ridge, may have originally been more accessibly situated than they now appear today. In any event, it is evident that the inhabitants were attracted to these lagoons. It is highly probable that most of them were fishermen interested in the spearing, trapping, and netting of fish concentrated in protected waters where the small aboriginal dugout canoes could be used to good advantage.

Rocky Point turning station (elev. approx. fifty meters) is an unusually large ceremonial pyramid now much ransacked by treasure hunters. The earliest of the three superimposed structures exposed by these vandals may have been built at a time when it was located directly on the coastline. Successive beach ridges suggest that prograding has occurred, in which case, the low platform of rubble erected at Little Rocky Point may have been built much later, unless it can be shown that it was situated on an offshore cay that later became joined to the mainland.

Further use of air photos resulted in the discovery of three mounds and one village site on Ambergris Cay. These locations were not visited in the field, but they do not appear to differ from sites already described. A mound known to have existed on St. George's Cay was relocated by field examination and found to be almost completely destroyed by hurricane damage, opening up the southern-most storm channel. From descriptions by fishermen familiar with the areas, it is likely that aboriginal remains will be found at Spanish Point, High Bluff, Condemned Point, and north of Shipstern Lagoon at Rocky Point North (see Map 2). Far to the south, in locations that suggest they may have had some connection with the inland center at Lubaantun (Map 6), are prehistoric remains on Wild Cane Cay, Frenchman's Cay, and Hunting Cay (Map 5), mentioned by Thompson (1930). Indian Hill Lagoon is a nearby place name suggesting that the same pattern in the north has been repeated, but efforts to find the site have not been successful.

Aboriginal occupation of the Bay Islands, in contrast to that of coastal British Honduras, continued to the time of discovery at Guanaja in 1502. These inhabitants have been described by Navarette (1829: 283 ff) as "... warlike people of good stature, who were archers. " Remains of an even earlier period were first noted by Rose (1904). Subsequent results of archaeologic studies have been published in some detail by Conzemius (1928), Boekelman (193 >, and Strong (1934, 1935), wherein it is clearly demonstrated that fish and other marine animals were an important subsistence item of a nonMayan people.

During an examination of the island of Guanaja for indications of aboriginal interest in fishing, the writer visited Marble Hill, located several kilometers inland from the village of Savanna Bight. This site has been described by Strong (1935: 126) as a "fortified retreat," but his evidence is not convincing. The hill is a small, isolated karst pinnacle, honeycombed with caves and solution-widened fissures which were discovered to be particularly rich in well preserved marine shells and "killed" pottery carefully placed in natural wall niches. The remains of a summit platform, together with masses of broken pottery scattered around the northern slope, suggest that the hill may have been a sacred repository for votive offerings of a cultist group much concerned with propitiation of their gods.

An accumulation of conch shell, neatly pierced in the aboriginal West Indian tradition, was found on Northeast Cay, which is the easternmost of a series of small islands fringing the southern shore .,f Guanaja. Excellent specimens of this shellfish can still be found today on the nearby conch heck that were exploited by the Indians (see Plate 10, Fig. E).

Cayo Tique (Little Hog Island), located between the mainland and the Bay Islands, was inspected and found to contain a prehistoric habitation site in the same area now occupied by a few fishermen. The caretaker of the island has been entrusted with a remarkable collection of polychrome sherds gathered by the owner who found these artifacts during the construction of a landing field.

ABORIGINAL FISHING TECHNIQUES

In the foregoing accounts of site distributions throughout the study area, no mention has been made W aboriginal fishing techniques. This is a difficult subject to reconstruct realistically from archaeologic remains consisting only of non-perishable items of fishing equipment that seldom include more than a few pottery net weights, or rarely, a bone fishhook. A description of simple gathering techniques would only be an unnecessary elaboration of the obvious but there are other problems concerned with fishing techniques that do require explanation.

The quantities of manatee bones found in some coastal sites of British Honduras prove that the inhabitants had some very effective means of killing these large, wary animals, and it is far from obvious how this task was accomplished. Dampier (1906: I, 66 ff) answers the question in his own inimitable way by describing the methods used by Mosquito Indians who were acknowledged masters at

the art and who may have taught the technique to their northern neighbors. 12 Dampier's account is as follows:

One of the Mosquitos (for there go but two in a Canoa) sits in the stern, the other kneels down in the head, then they lye still or paddle very softly, looking well about them, and he that is in the head of the Canoa . . . stands up with his striking staff . . . about 8 foot long, almost as big as a mans Arm, at the great end, in which there is a hole to place his Harpoon in. At the other end . . . is a piece of light wood called Bobwood . . . through which the small end of the staff comes . . . [with] a line of 10 or 12 fathom wound neatly about . . . When he strikes, the Harpoon presently comes out of the staff, and as the Manatee swims away, the Line runs off from the bob; and altho' . . . both staff and bob may be carried under water, it will rise again [and] the Moskito-men paddle to the bob and begin to hale in the line Thus the Canoa is towed with a violent motion, till the Manatee's strength decays. Then they . . . knock it on the Head, and tow it to the nearest shore, where they make it fast, and seek for another.

Perhaps the most ingenious part of the whole procedure is explained by Dampier when he describes how two Indians in a very small canoe manage to handle the second manatee:

... they go on shore with it, to put it in their Canoa: For it is so heavy that they cannot lift it in, but they hale it up in shole water, as near the shore as they can, and they overset the Canoa, laying one side close to the Manatee. Then they roll it in, which brings the Canoa upright again, and when they have heav'd out the water, they fasten a line to the other Manatee that lieth afloat, and tow it after them. I have known two Moskitomen for a week every day bring aboard 2 Manatee in this manner.

Another problem relating to aboriginal fishing techniques has been created by the recovery of large clusters of oysters (Spondylus americanus) found in burials by Pendergast at Altun Ha. These shells are in a nearly perfect state of preservation with both valves and and the delicate spinal processes intact. This is almost certain evidence that these shells were plucked alive from their relatively deep-water environment and were not simply picked up on some beach after a storm. The minimum depth at which this brilliantly colored oyster grows apparently has not been accurately determined, but it is not seen today by fishermen who habitually skin dive to a depth of four or five fathoms. 13 The implication in this case seems to be that the Maya (or some other group) were capable of retrieving shellfish from greater depths than present-day fishermen equipped with face-mask and flippers care to venture.

As of this writing, virtually nothing has been found as a result of archaeological investigations in the study area that can be said to represent a characteristic item of Mayan fishing culture. There are no items in the present inventory of fishing equipment that can be traced back directly to a Maya origin. 14 Only the structural form of the "dorey" or dugout canoe and the pointed, eared canoe paddle are of certain aboriginal design. These items were introduced into British Honduras by Mosquito Indians during the seventeenth century under circumstances referred to in chapters dealing with colonial fishing practices and the evolution of boat design.

CHAPTER III

DEVELOPMENT OF FISHING IN THE COLONIAL PERIOD

Following the discovery of the Caribbean coast of Central America by Columbus in 1502, and its subsequent exploration by the Spaniards Pinzon and Solis in 1508, Cortez in 1524, and Montejo in 1528, no attempt was made to establish a settlement along the coasts of the present study area until 1531. At that time Davila, acting under the instruction of Montejo (who had become governor of Yucatan), founded the temporary outpost of Payo Obispo (Chetumal). Historical circumstances, concisely described by Waddell (1961: 3 ff); were such that Spanish colonization efforts were channeled into what they considered to be more important areas of Yucatan, Guatemala, and Honduras. The coast of British Honduras was visited by exploration parties from Chetumal and condemned as unsuitable for

settlement. 1 In later years, it was virtually abandoned by the Spanish who treated it with the indifference due a backward province for more than two centuries.

Contemporary accounts of the early seventeenth century are vague with regard to the exact date for the arrival of the first English settlers in British Honduras. The year 1638 is repeatedly given by a number of recent authors, all of whom fail to give a citation of their primary sources. They are evidently using Gibbs (1883), who may have used the Honduras Almanack (1826), which in turn, is without any definite reference. Parsons (1956: 10 ff) indicates that initial settlement was by members of the Providence Company via the Bay Islands, and suggests that they were interested in trading for "silk-grass" (Aechmea mag- dalenensis). Caiger's (1951) account is demonstrably inaccurate, and Winzerling (1946) confounds the issue by wading into the morass of place-name origins, with an eccentric toponymic analysis that is highly questionable. Waddell's (1961) historical survey soberly separates legend from fact, and as a result, leaves the question unresolved.

BUCCANEERS

In the considerable literature concerned with the various disputes over the territorial status of what is now British Honduras, pirates are most commonly invoked as the first residents, and the mouth of Haulover Creek (confused with the Belize River) is described as their lair. In all probability, no such situation ever existed. It is much more likely that buccaneers were the first to establish a base along the coast. St. George's Cay is known to have been their favorite place of business. The buccaneers' occupation of smoking, drying, and salting turtle and manatee meat for sale to passing privateers, logwood cutters, and possibly an occasional bona fide pirate was a perfectly legitimate venture and considered by Dampier to be an indispensable service to all seafarers in the Caribbean. The Spanish were obviously aware of the activities on this island, for they named it "Cayo Cosina' (Kitchen Cay) at a very early date. Buccaneers were clearly the first fishermen of the colonial period. The unsavory reputation they have acquired as the country's first settlers is best reserved for the raffish logwood cutters, who did in fact soon build a chipping station on the north bank of Haulover Creek in the midst of mud and mangroves.

Details are lacking concerning the processing methods used by the buccaneers on St. George's Cay to prepare turtle meat for sale to passing ships and the logwood cutters. 6 There is no reason to believe that the methods of buccaneers on St. George's Cay varied in any significant respect from the description of Tortuga buccaneers by Esquemaling or from Dampier's account of the practice in Yucatan. Recent research by Parsons (1954: 7, 16-17) shows that buccaneering was a commonplace activity on San Andres and Providencia. Doran (1953: 144) indicates they may also have been operating on Gran Cayman as early as 1642.

The meat racks, or boucans, were erected over beds of glowing coals probably made, in the case of St. George's Cay, from nearby mangrove or buttonwood (Conocarpus erecta). These same woods may also have been used to fire the evaporating pans for production of salt, as there is no natural source of this substance in the vicinity.

EVIDENCE FROM EARLY MAPS

An adaptation of the earliest known map of St. George's Cay (<u>Click here for May 11</u>) shows that five large turtle pens were still present on the island in 1764. More than seventy houses and other structures can be seen on this map, and it is likely that turtle fishermen continued to constitute a high percentage of the population.

Different interests of the Spanish and English are reflected in the Cotilla map of 1753 and the Jamaica smuggler's map of 1780, adaptations of which are included in this study for comparative examination. The former (<u>Click here for Map 12</u>) gives a reasonably accurate representation of the coastline below the Seventeenth Parallel, particularly in the Trujillo, Omoa and Golfo Dulce areas, but becomes progressively more distorted further north until it departs entirely from reality in the neighborhood of the Eighteenth Parallel. Offshore cays are approximately in their correct positions, but Turneffe (Tierra Nova) is unaccountably rotated to the east. It is obvious that the primary sources for this cartographic information provided no proper conception of its interior. On the other hand, Lighthouse Reef (referred to simply as "4 cayos") is remarkably realistic.

The smuggler's map of 1780, (<u>Click here for Map 13</u>) published twenty- seven years after the Cotilla Map, is far more accurate in general and gives considerable practical navigational information missing from the earlier Spanish map. Passes in the barrier reef are well marked, as are a number of courses utilized by ships at that time. Strangely enough, Turneffe Island and Lighthouse Reef are more misleading in outline than on the Cotilla map. The Bay of Chetumal, called "Hanover Bay," is shown in detail, as are the coasts of northern British Honduras and Quintana Roo to the latitude of Cozumel. Outlines of the Bay Islands show a long familiarity with this area and are a great improvement over the earlier map. This wealth of coastal data on the English map is undoubtedly a legacy derived from more than 100 years of logwood activities in the area. The disparities in the two maps show that the intimate knowledge of the littoral zone, so necessary for the exploitation of any marine resources, was preponderately in the hands of the English, who continued to maintain this advantage throughout the colonial period.

TURTLING

From the middle of the seventeenth century to the end of the nineteenth century, turtling constituted the most important form of colonial fishing. Mosquito Indians from the Caratasca Lagoon were highly esteemed as specialists in the harpooning of turtle and manatee. Very early alliances were formed between English settlers and the Indians who were eventually carried along the entire length of the western Caribbean by privateers and merchants. A ship's captain felt himself poorly equipped if there were not at least one Indian "striker" on board whose responsibility was to provide the crew with fresh turtle and manatee meat. Dampier (1906: I, 67) tells us:

The manner of striking Manatee and Tortoise is much the same; only when they seek for Manatee they paddle so gently, that they make no noise . because it is a Creature that hears very well. But they are not so nice when they seek for Tortoise, whose Eyes are better than his Ears. They strike the Tortoise with a square sharpe Iron peg, the other with a Harpoon.

Tortoise-irons, or pegs, according to Dampier (1906: I, 67), were made by the Indians themselves and were "4 square, sharp at one end, and not much above an inch in length. " It is unlikely that the design is truly aboriginal, as archaeological investigations in this part of the Caribbean have so far failed to uncover any prototypes. 7 Dampier's (1906: I, 68) description of the turtle peg leaves no doubt that it was intended to function as a legitimate harpoon:

... the small spike at the broad end bath a line fastened to it, and goes also into a hole at the end of the Striking staff; which when the Tortoise is struck flies off, the Iron and the end of the line fastened to it, going quite within the Shell, where it is so buried that the Tortoise cannot possibly escape. Throughout most of the colonial period, it is evident that turtle were much more abundant than at present. Harpooning was the principal method of capturing these animals, but at some time during the eighteenth century, turtle nets were introduced. It is conceivable that the use of turtle nets became more

popular with the fishermen when fashion dictates forced a rise in the price of hawksbill turtle shell. 9

Harpoons were certain to damage at least one segment of the valuable shell whereas netted animals were captured intact. Very little specific information on the colonial turtle industry of British Honduras has been preserved in literature, but we are indebted to Henderson (1809) for his keen observations and a succinct analysis:

Of fisheries, the most profitable, and consequently the most pursued in this country, is that of the turtle. This forms an exclusive occupation and the quantity usually taken is considerable. A few of the turtle find their way to the London market . . . but the principal consumption of this article of food is domestic, and it is very generally preferred by the settlers.

Comments on the fishermen themselves are particularly valuable, as it would be difficult to reconstruct their activities from any other source than that of an eye-witness, such as Henderson, who tells us: The persons engaged in turtling are generally inhabitants of the different keys in the neighborhood of

Belize . . . they commonly form themselves into parties of four or five; and, . . a more independent description of beings could scarcely be found. When the time for taking turtle is past, they are chiefly occupied in the catching of fish for themselves and their families. The produce of their labour, which in successful season is often considerable, is invariably disposed of in the most licentious way, being solely appropriated to the gratification of one indulgence, an immoderate consumption of rum.

Not content with this denunciation, Henderson waxes poetically, and in his indignation at the conduct of these fishermen, cites verse that seems no less appropriate today:

Of the Turtler, as of the voluptuous Anthony, It may be said, He fishes, drinks and wastes The lamps of Night in revel.

Victorian demand for hawksbill shell revitalized the earlier turtle industry of the buccaneers, which had diminished somewhat with the establishment of permanent settlements and modest attempts at agriculture on the mainland of British Honduras. Shipping recordsl0 indicate that many "cases" (300-400 lbs.) of hawksbill shell left Belize Harbor during the period 1864-1910. Toward the latter part of this era, considerable speculation affected the market until the price finally fell from about \$6.00 per pound to the equivalent of \$1.50 per pound, due largely to the competition of imitation celluloid products.

Substantial fortunes were made in British Honduras when the market for turtle shell was expanding. Business establishments in Belize, particularly the firm of C. Melhado, began the practice of "grubstaking" fishermen to search for hawksbill turtles. Sums averaging \$250 were advanced for the purchase or repairs of boats and equipment. In return, the investors had exclusive rights to purchase the catch at favorable prices.

According to Henry Melhado (personal communication), son of the founder of C. Melhado & Co., the firm recognized two classes of shell. The first, known as "yellow belly, " was purchased from the fishermen at a reduced price while a slight premium was paid for "selected pale and reddish. " Carlos Malhado, who was demonstrably a successful businessman, evidently also had an acute understanding of the creole fisherman's mentality. For many years he was able to convince them of this difference in shell quality, when in reality, the price he received for yellow belly was more than double that for selected pale and reddish.

With the advent of steam navigation and the subsequent improvement of the somewhat erratic communications between British Honduras and Great Britain, an unusual facet of the colonial turtle industry developed. Beginning as early as the 1830's, there is evidence that a number of live turtles were exported from Belize. In the Shipping Intelligence section of the weekly Gazette, there are frequent references to cargoes consisting (among sundry other things) of so many "heads" of turtle. In the latter half of the nineteenth century, the export of "shipping turtles" was clearly an established practice.

Parsons (1962) indicates that the trade in shipping turtles was common throughout many of the English-speaking parts of the Caribbean and not confined to British Honduras alone. A five cent "head tax" was imposed by Belizean Customs for the exportation of live turtle, and from a sampling of the records in the Gazette, we can determine that the following quantities were sent out of the country:

1867 2,730 head 1868 5,325 head 1869 5,520 head

until in 1894, 149 head, and finally in 1896, 63 head.

Shipping turtles were carefully selected from immature green turtles weighing not more than fifty or sixty pounds. 12 Special wooden tanks, each evidently having a capacity of three turtles, 13 were built on the decks of large ships making scheduled runs to Great Britain. 14 Pimm's Restaurant in London was the ultimate destination of many of these turtles which were sold at auction on the dockside. In 1896, Mr. Henry Melhado, on whose authority this section is based, was invited to attend an elaborate party at Pimm's in the company of gourmets who had assembled in the "Thieve's Kitchen" to sample a banquet featuring shipping turtles recently arrived from Belize.

As the green turtle declined in numbers due to heavy fishing pressure in British Honduras waters, Mexican fishermen from Isla de las Mujeres, Cozumel, and Xacalak imported a considerable amount of these animals, together with bags of their eggs dug up from the famous nesting grounds along the deserted coast of Quintana Roo. This trade flourished for a time until rising transportation costs and trade restrictions brought the business to a virtual standstill in the early 1920's.

MANATEE

The exploitation of manatee during the colonial period never reached the proportions of the turtle industry. While many of these inoffensive animals were killed by buccaneers and settlers, they do not appear to have been slaughtered on what may be considered a commercial basis. This may be due in part to a steady reduction in numbers of these slowbreeding animals, so that the survivors retreated into the more remote areas of the coastline that were not easily accessible (see page 107 for further comments on distribution). With the exception of meat sold to passing ships, the manatee catch was consumed locally. Dampier (1906: I, 65) claims the skin was used by privateers to make flexible oarlocks for their skiffs; the back hide they found to be particularly well-suited for horsewhips. 15 The flesh was in demand for the feeding of slaves, although Henderson's (1809: 133) account of the receipt for pickled tail meat indicates that manatee was enjoyed by the slave owners as well.

At least one instance of a "shipping manatee" is known. The intrepid C. Melhado is reputed to have used (ca. 1910) a shipping turtle tank to send from Belize, what must surely have been, the first manatee to arrive at the London zoo. The animal is reported by his son to have weighed 160 pounds and was brought up from the Mosquito Coast by paddlers who fed the beast two cans of condensed milk during each day of the trip.

FISHING EQUIPMENT

Fishing during the early colonial period was characterized by the widespread use of the harpoon, a trait evidently assumed by the settlers from their association with Indians of the Mosquito Shore. In addition to the descriptions of Dampier (1906), Henderson (1809), Strangeways (13221, and Young (1812), Forbesl6 (1915), writing of the period ca. 1795, devotes an entire chapter to a dramatic, and possibly

inaccurate account of young "buckras" spearing an assortment of large fish by torchlight in the bogues of the Drowned Cays, located between Belize and St. George's Cay. What Forbes described as a sport of the white gentry may well have had some basis in fact and represent what was common practice among the humbler fishermen of that period.

Even though there are indications that seine nets were known in the western Caribbean at an early date, they do .not appear to have been widely used. Young (1842: 160), traveling along the coast of Honduras on his way to Belize, passed by several Black Carib villages where he noted "... seines for hauling fish, made by themselves, hanging on ranges to dry." Much later, in the year 1870, a large seine, 150 fathoms in length, was advertised for sale in the British Honduras Gazette for a number of months before it was eventually sold. An item of fishing equipment as expensive as the seine, was (and still is) out of keeping with the rather meager inventory of simple tackle used by most fishermen in British Honduras. Furthermore, seine nets would have required the cooperative efforts of at least a half-dozen men, who traditionally were highly independent and disinclined to enter ventures of this sort.

FOOD HABITS AND PRESERVATION

Handlining with wire hooks provided the Negro and creole population with a dependable means of subsistence and was undoubtedly the most popular method during the latter part of the colonial period. As early as 1870, there is evidence that barreled mackerel and salt cod were imported, intended for elements of the local society who still retained food habits inculcated in England. Salt cod has remained stubbornly popular throughout much of the Caribbean and particularly in Jamaica, where to this day, codfish and akee18 constitute a national dish.

Mackerel was a staple in the diet of the common people and must have been consumed in much larger quantities than at present. A local ordinance observed in Belize during the 1870's made mandatory the annual display in public places of the grim menu served up at H. M. The Prison. Mackerel is featured monotonously in this bald attempt to intimidate the populace by publicizing the diet for those on hard labor. An abstract from the Gazette is shown as Table 2. We have no indication of the effectiveness of this public announcement, but evidently the prospect of eating mackerel twice a day, five days a week, year on end, was believed to be a great deterrent on those contemplating crime.

During most of the colonial period, fishing barely produced enough food to keep pace with the expanding population. This is due, in large part, to the fact that most able-bodied men were employed in the exploitation of forest resources to the near-exclusion of all other occupations. In the 1830's, Black Caribs were brought to British Honduras from the northern coast of Honduras by lumber contractors who located them inland at the lumber camps. The mestizo immigrants, who later became the fishermen of the northern area, had not yet arrived; hence the supply of fresh fish was dependent upon the efforts of a few Creoles operating out of Belize.

On the infrequent occasions when a surplus of fish was caught, salting was the only means of preserving the catch. This method of preservation was also common on certain cargo ships sailing from New Orleans bound for Belize. Weather permitting, they would stop at well-known locations along the coast of Quintana Roo and spend several days catching, salting, and barreling kingfish for sale in Belize; the chronic shortage of fish provided them with a ready market. Favorite fishing grounds for this supplementary activity included the Arrowsmith Bank and partially sheltered anchorages near the south end of Cozumel Island and the Chinchorro Banks. There is no indication in the literature that the prolific grouper grounds at Cay Glory had yet been discovered.

TABLE 2 Diet of Prisoners at Hard Labor

	(Breakfast)	(Dinner)
Monday	<pre>1 lb. plantains when boiled 1/2 lb. mackerel before boiling 2 tablespoons full of Syrup</pre>	Same as breakfast (Syrup excepted)
_	1 pint water	
Tuesday	Same as Monday	Same as Monday
Wednesday	Same as Monday	Same as Monday
Thursday	(mackerel replaced by 8 oz. beef	 Same as breakfast
Friday	Same as Monday	Same as Monday
Saturday	Same as Monday	Same as Monday
Sunday	Same as Thursday	Same as Thursday

N. B. For prisoners not on hard labor, and for all female prisoners the scale of diet shall be the same except that all fish and meat portions are reduced - the Mackerel to 6 oz., Plantain to 3/4 lb. and Beef to 6 oz.

The traditional pattern of fishing practices developed during the colonial period continued in force until the end of World War I, at which time it was evident that no aspect of fishing activities could be said to be prospering. The turtle population had been decimated without any attempt at conservation, and no new markets were established for the export of scale fish. The fishing industry, together with lumbering and agriculture, stagnated in a general atmosphere of economic depression.

CHAPTER IV

SHIPBUILDING AND THE EVOLUTION OF BOAT TYPES

Shipbuilding in British Honduras has developed largely in response to the need for small fishing boats suited to local waters. An examination of the present status of the industry- indicates that it still retains many of the practices and techniques that were first introduced in colonial times. Several interesting relationships are apparent in the materials employed by shipwrights and the physical and cultural factors that have influenced boat construction.

Physical conditions in the study area were unfavorable for the establishment of elaborate ship yards capable of producing large, wooden, sailing ships. With the exception of a few locations in the Bay Islands, 1 there are no protected harbors with deep water approaches. Navigational hazards of the atolls, barrier reef, and shoal lagoons required highly maneuverable, shallow to medium draft boats that were stable under gusty winds.

Abundant forest resources were at hand throughout much of the colonial period, but there is no record to indicate that any ambitious shipbuilding programs were started during the early years of the settlement. This may be due in large part to the fact that Spanish authorities prohibited the establishment of any permanent industries while the area was under their effective control. 2 Prior to the battle of St. George's Cay in 1798, shipbuilding activities were generally restricted to the careening of hulls for repairs and the replacement of damaged spars and rigging.

At the beginning of the Nineteenth Century, after the threat of Spanish intervention had been removed, trade increased and merchants began the practice of chartering cargo ships in order to assure the dependable delivery of their merchandise. As the economy expanded, it became customary for wealthy individuals to buy cargo ships outright. By the end of the century, several commercial firms3 in Belize maintained substantial fleets of sailing ships -- nearly all of which were built elsewhere.

Even though the lack of proper physical facilities for shipyards prevented the construction of large merchant ships, for many years the fishermen occasionally built small boats for their own use. The techniques they used appear to have been borrowed from a few Scotch shipwrights who are thought to have become active in Belize about the year 1810. Within a decade, lighters and shallow draft coastal trading boats were produced in increasing numbers from local shipyards.

The earliest commercial shipyards were located along the northern bank of Haulover Creek in the center of Belize, but there were few natural advantages to be offered by such a site. Although the yards were close to barquediers4 where suitable logs5 were readily available, the ground itself was unstable and continually sinking. Ships entering or leaving Haulover Creek had to be warped or poled by hand, as there was seldom as much as a fathom of water over the hazardous, shifting sands at the bar. 6 In addition to the constricted nature of the entrance, poor water circulation caused a stagnant condition (similar to "Callao Painter") to arise and provided an environment much to the liking of teredos.

Shipbuilding activities reached a peak during the last three decades of the nineteenth century when commerce in coconuts and other tropical products of the region was flourishing. Since this period, the number of shipyards in Belize has gradually dwindled to the point where there are now six. The remaining builders are hardpressed to meet the demands of new construction and maintenance, but it is clear that the profession is dying out. Although an occasional tug or small coastal steamer is built, most of the shipwright's efforts are now devoted to the construction of sailing boats having an overall length of six to nine meters. These boats are used almost exclusively for fishing.

These shipwrights comprise a group that has preserved the skills and traditional methods of careful handwork that were common several generations ago. Their standards seem remarkable today only because such traits have largely disappeared in modern shipbuilding practice. There is nothing in the record to indicate that Belize formerly enjoyed a special reputation in this respect.

The details of boat construction contained in the following paragraphs are typical of the industry in general, but specifically reflect the personal preferences of Simeon Young, Sr., a third generation shipwright who is locally regarded as something of a purist in his approach.

CONSTRUCTION TECHNIQUES

Before any construction work begins, the shipwright prepares a "half-model" (see Plate 1, Fig. A) based on his understanding of the owner's desires with regard to design. Alternating layers of dark and light woods are glued together so that hull lines in the finished model are emphasized. Since no plans are prepared, this model serves as the only guide the shipwright will use during the course of construction.

When agreement on design has been reached, a price is quoted by the shipwright based on his labor charges. The owner must purchase the building materials separately and have them delivered to the shipyard. Lumber yards in Belize no longer maintain inventories of the select grades of wood needed in ship construction, with the result that considerable delays may take place before all of the appropriate building materials are at hand. In some instances, the available supply is so limited that a special order must be sent to a district noted for the quality of its timber. Black Carib lumberjacks in the Monkey River area are well known for their ability to provide choice logs.

Construction begins with the arrival of the keel wood. Current practice favors the use of "cabbage bark" (Andira inermis) or sapodilla (Achras zapota), both of which are characterized by dense grain and high specific gravity. Keel logs are delivered in a roughly squared condition that requires much

additional handwork with a specialized tool known as a "dubbing" adz. Plate 1, Fig. B, illustrates an apprentice sharpening a small "hoe" adz; an example of the larger "dubbing" adz can be seen on the table to the right. After the keel wood has been reduced to the approximate dimensions needed, further refinements are made with a "dugging" adz. The semifinished keel sections are built up to achieve the necessary depth of deadwood, then are closely fitted by planing and secured with large bronze bolts. Details of this construction are shown in Plate 1, Fig. C.

In former times, framing attached to the keel was selected from the naturally bent branches of larger trees and adzed to shape - a practice that gave the ship considerable inherent strength. At present, a sufficient supply of these timbers cannot be obtained, and the builders must resort to sawing the ribs from sections of trees that are slightly curved. The wood most commonly used for this purpose is Santa Maria (Calophyllum brasiliense). In the Bay Islands there are still fairly extensive stands of somewhat stunted, wind-sheared Santa Maria trees to be found on the island of Guanaja.

WOOD PREFERENCES

Shipbuilders in the Belize area discovered many years ago that prime mahogany planking, so esteemed elsewhere in the world, would not long survive the attacks of shipworms that are extremely- active in the anchorage. No doubt the industry would have been seriously retarded if some satisfactory substitute were not available. Fortunately, the "Carib" pine (Pinus caribea) proved to be relatively resistant to attack by these worms. The wood is comparatively slow-growing and contains an unusually high percentage of resin (locally referred to as "fat"). Apparently, it is this high resin content that discourages teredos and provides the wood with good weathering characteristics. Although an occasional yacht built for export may be mahogany-planked, boats now being built for local fishermen are planked and decked with this easily worked pine.

Prior to the exploitation of the pine resource on a substantial scale (ca. 1920), a number of small fishing boats were built in Belize with planking of Douglas fir imported from the United States. Evidently this wood could be landed in Belize at a very cheap price when pine was not yet generally available. The cypress was used primarily in the construction of water storage vats because of its resistance to rot, and was also used fur the ribs and interior bulkheads of the large live wells built in the center sections of fishing boats.

Rosewood (Dalbergia Stevensonii) and palo Santo (Guaiacum sanctum) continue to be used for deck fittings that are subjected to considerable friction (cleats, sampson post, etc.). The use of cast metal fittings has never been popular due to the high initial cost and import duty. The superstructure typically contains hatches of "glassywood" (Astronium graveolens).

A supply of spar wood has been one of the most important traditional requirements for the successful development of shipbuilding. In this respect, the shipwrights of British Honduras and the Bay Islands have been fortunate, as they have always been able to obtain tall, straight lengths of Spanish cedar (Cedrela mexicana) and pine (Click here for Map 14-B, "Observations"). This wood is preferred for its excellent strength to weight ratio and the ease with which it can be worked round with a spoke shave. However, there is a recent tendency to substitute pine masts for cedar, particularly in the case of "rough boats" where cost is a critical factor.

Bamboo (Guadua angustifolia) is commonly used for the booms on small fishing boats; its light weight reduces the strain on the mast and rigging, and its flexibility lessens the chance that it will break when the boat is reaching before a strong wind. "My Lady" (Aspidosperma megalocarpon) seems to be

preferred for the "antenna" or upper yard of the sliding Gunter rig. The special characteristics of this wood that recommend it for this particular use are no longer generally understood, but it is said to have been used for a similar purpose on the earlier botalon design where it may have had some exceptional quality.

Belizean shipwrights have a number of secondary woods from which to choose. It is not uncommon for them to depart from the varieties that have been listed, particularly if the change involves some minor part of the superstructure or interior fittings.

The evolution of boat design is a subject intimately related to shipbuilding. Comments on this aspect of the material culture are restricted to those boat types that have been primarily used by fishermen. Although numerous varieties of boats have been introduced along these coasts from time to time, the types that have played the most important role in the development of fishing are, in order of their historic appearance, the "pitpan," "dorey," botalon, and "smack. " *THE PITPAN* In the chapter on aboriginal fishing activities, it has been suggested that the Maya dugout canoe may have been one of the few items of the aboriginal fishing culture that was adopted by the early settlers in the form of the pitpan. The striking similarity in hull design between the Maya dugout canoe and the pitpan can be seen in the following description, quoted in some detail in view of the fact that the pitpan design appears to have become extinct within the last few years.

Edwards (1819: I, 103), describing a large trading canoe, states

the piraguas of the West Indians were fully sufficient for the navigation they were employed in, and indeed were by no means contemptible sea-boats. We are told that some of these vessels were navigated with forty oars; and Herrera relates that Bartholomew Columbus, in passing through the Gulph of Honduras, fell in with one that was eight feet in bredth, and in length equal to a Spanish galley. Over the middle was an awning compased of mats of palmtree leaves . . . It was laden with commodities from Yucatan.

The description continues in a footnote:

These vessels were built of cedar, or the great cottontree hollowed, and made square at each end like punts .

Anderson (1963: 16) describes pitpans as:

puntlike craft hollowed out of a single log and carry up to 30 paddlers; when a pitpan is sawn in half lengthways and a wide plank inserted it becomes a batteau with up to forty paddlers. Both craft are fast disappearing.

From the Honduras Almanack (1830: 27) we find:

There is a craft peculiar to this colony called the Pitpan . . . like the dorey, [it] is round at its bottom, but rather more flattened, and without keel. It is excavated from a solid tree, and extends to a length to which the dorey is never produced, not infrequently to forty or fifty feet . . . Instead of being sharp at both or either end, it is squared . . . like a butcher's tray . . . The pitpan is usually fitted up in handsome style, with awnings and curtains of oil cloth on rollers . . .

The probability of a direct relationship between the Maya canoe and the pitpan is strengthened by the fact that both were paddled by men in a standing position. If the pitpan is indeed a direct descendant of the Maya dugout canoe, then it was clearly adopted by the settlers at a very early date. It is certain that the pitpan design was firmly established throughout the colonial period. It seems reasonable to assume that it was used for general fishing purposes before the introduction of the dorey.

THE DOREY

The dorey (Plate 2, Fig. A) is a much smaller type of dugout canoe with lines that are more delicate than those of the pitpan. It is characterized by a round bottom and gracefully pointed bow and stern. Although the design is clearly aboriginal, it is apparently not of Maya origin. The direction of dispersal was evidently from the south. References to the dopey in early literature by Dampier (1906: 64 ff) indicate that it was extensively used by the Mosquito Indiansl0 who were hired as "strikers"11 by the captains of privateers.

A group of Mosquito Indians, known as the "Waikas, "12 were brought to the Belize area by returning settlers who had temporarily established themselves along the Mosquito Shore during the 1739-48 war with Spain. These Wiaka Indians may have introduced the dorey design to British Honduras at that time if it had not already dispersed northward along the coast. By the latter part of the eighteenth century, the dorey was the standard boat used by creole fishermen.

After Spanish authorities removed the Black Caribs from Roatan in 1797, they were relocated on the adjacent mainland of Honduras, where they spread rapidly westward, establishing a series of small fishing villages. Within a short time, these fishermen had gained a reputation for the excellent quality of their doreys. By the 1840's, Black Carib fishermen from Truxillo to Stann Creek were supplying doreys to the creole and white inhabitants who had formerly depended upon the Waikes to provide them with these dugout canoes.

THE CREAU

The sailing dorey or "creau" (Plate 2, Figs. C & D) was a logical refinement of the basic dorey design. The hull was made more seaworthy by the addition of plank gunwales and a short deck forward and aft. A raked mast carried a small, sloop-rigged sail, and there was often a set of movable iron ballast. Steering was accomplished by means of a rope and tiller-yoke arrangement. Although no longer common among the Creoles, the design still exists and is a great favorite among the Black Carib fishermen.

THE BAY ISLANDS DOREY

A distinctive variety of the dorey has appeared recently in the Bay Islands (Plate 2, Fig. F). Islanders have begun the practice of installing small, air-cooled engines in the large, beamy dugout hulls that they purchase from Black Caribs on the mainland. A raised coaming, somewhat inset from the sides of the hull, and an elaborate wooden engine cover with louvered air intake are the characteristic modifications. Before relatively inexpensive air-cooled engines were available, these boats were rigged as sailing doreys. A few of the owners still equip their motorized doreys with an emergency sail that can be quickly erected on a seat adapted to serve as a mast step.

THE BOTALON

The botalon appears to have been one of the earliest of conventional frame construction designs used in British Honduras. It is the consensus of present shipbuilders that the design was of Mexican origin. Surprisingly, little mention of this type can be found in local references before the 1860's when it is noted in the shipping intelligence section of the British Honduras Gazette. If the botalon design is Mexican, then it was likely to have been introduced by refugees from the Yucatecan War of the Castes during the period 1848-1858.

Technical data on the double-ended hull are lacking, but the sail plan was that of a modified dipping lug with the boom controlled by a long halliard manipulated by the helmsman. Details of this design are

readily apparent in the interesting sketch made by Simeon Young, Sr. at the request of the writer (Fig. 1.). This type of rig was not altogether satisfactory, and the botalon was notorious for making little headway into the wind. Old fishermen claim that a trip from Corozal to Belize in one of these boats took as much as two weeks under adverse circumstances. In spite of this disadvantage, the botalon gradually replaced the sailing dorey in popularity because of its superior carrying capacity and more stable handling characteristics.

The botalon design died out soon after the introduction of the first "smack." The last example to be seen in British Honduras was the "<u>Mal Golpe</u>" owned by Liberato Carrasco, a fisherman of Cay Caulker, who used it continuously until the year 1925.

THE BELIZEAN SMACK

Through a series of rather peculiar circumstances, the famous Belizean fishing "smack" was introduced into British Honduras in the year 1911. The graceful lines of this important boat type attract the attention of many visitors, who are often told that the design was copied from a former Governor's sailing yacht. In point of fact, the smack is a Cuban design brought back from the Isle of Pines area by a resident of Cay Caulker who lived in Cuba for several years. The prototype example was built to his specifications in Belize and is still in excellent condition after 54 years of almost daily use (see Plate 3, Fig. A). The present owner has retained the original name "Lion R." and kept a careful account of the boat's antecedents, thus providing the source of the present details.

The smack design features a deep bilge that passes almost imperceptibly into the long, narrow keel area, making these boats exceptionally "stiff" and fast sailers. But it is another very radical innovation in the smack hull - the live well - that has changed the entire pattern of fishing practice over much of the study area. 15 This live well is designed to keep the catch alive and consists of two water tight bulkheads built transversely across the hull at equal distances from the center of gravity. Seawater circulates into the live well through a number of large holes (3 to 4 inches in diameter) that have been bored through the planking below the water line.

Another distinctive feature of the Belizean smack is the unusual "sliding Gunter" sail design. 16 This rig involves the use of a small spar (locally called the "antenna") to which a rope halliard is attached that passes through a hole near the top of the mast. To raise sail, this rope is hauled tight, causing the yoke on the butt end of the antenna to slide up the mast. When fully raised, the antenna and attached sail extend as much as two meters beyond the top of the mast. This design has great practical value to local fishermen. By eliminating a series of masthoops, the sail can be quickly raised or lowered with much less chance of jamming or fouling the gear at a critical moment.

Sufficient time has elapsed since the introduction of the smack design to allow the development of several significant modifications. According to local shipwrights, the original doubleender hull was abandoned some twenty years ago to be replaced by the present transom stern, in the belief that it further improved the steering in short, choppy seas. A second modification occurred with respect to the live well. Initially this change met with considerable resistance among the more conservative fishermen who considered it a dangerous contraption, prone to leaking if improperly installed or subjected to stress. Shipwrights reacted to this understandable point of view by offering the same boat type without the live well, in what has come to be known as the "dry-boat."

Although the smack design was first introduced in northern British Honduras among the mestizo fishermen of Mexican background, it was soon adopted by the Creoles of Belize and is now found as far

south as Stann Creek. The dry-boat variety has a wider distribution, being found in Calderitas on the Bay of Chetumal and at least as far north as Zacalak on the coast of Quintana Roo. Below Stann Creek dry-boats are seldom seen, but they appear again in small numbers in the Bay Islands.

The evolution of boat types has reached .a momentary standstill. The next development will likely involve the drastic change from sail to power in a design that is capable of being used effectively in the deeper offshore waters. Dres' (1964: 37) suggestion that a catamaran "... might prove ideal for fishing off the Belizean Coast" is naive and shows a lack of familiarity with local conditions. 19 A general purpose fishing boat somewhat scaled down from the lines of the Gulf Coast shrimp clipper would be much more suitable. A few such boats are now being built in the Bay Islands, but the design has not spread into other parts of the study area.

Traditional hand methods and the use of local woods will continue to dominate shipbuilding activities. Estimates as to the total number of boats currently in use varies, but the figure might reach 800 in Belizean waters alone if account is taken of the larger fishing doreys. With the passing of time, this number will probably diminish as more attention is given to the production of modern power boats. Future studies may show a further change in the distribution of fishing fleets from their present concentration in northern waters to a wider area including the undeveloped eastern coast of Quintana Roo.

CHAPTER V

CONTRASTS IN SETTLEMENT PATTERNS AND FISHING PRACTICES

Cultural traditions of the mestizo, creole, and Black Carib fishermen are reflected in characteristic settlement patterns and associated fishing practices that can be categorized throughout the study area. Boundaries of the culture areas of each group are relatively distinct so that zones of transition from one complex to the next are rare. An analysis of fishing methods within a given culture area shows that they are often compartmentalized in the sense that the majority of fishermen in a given village exhibit a culturally determined preference for a particular fishing practice to the near exclusion of all others. These relationships have been established in recent years in an environment that is essentially uniform along the barrier reef sector, clearly indicating that the dominant formative factors have been cultural rather than physical. With minor exceptions, these remarks apply equally well to the fishermen of the Bay Islands, who constitute a fourth group of separate ethnic background but whose cultural traits are basically similar to those of the creole fishermen.

SETTLEMENT HISTORY

The settlement of British Honduras was a relatively slow process after the first buccaneer station had been established on St. George's Cay in the early seventeenth century. For the next hundred years a motley assortment of English ex-privateers spread through the swampy interior of the northern districts, searching for stands of logwood (Haelmatoxylum campechianum). Their activities resulted in the growth of Belize and the appearance of many small camps along the major rivers, but most of the coastline and offshore islands remained virtually uninhabited.

Negro slaves from Jamaica were introduced around the year 1700 to assist their masters in the extraction and shipment of logwood. Throughout most of the eighteenth century, the colony remained in a state of flux as a consequence of repeated Spanish efforts to evict the settlers and stamp out the logwood industry. During this period there were violent fluctuations in the population as refugees moved both to and from the Mosquito Shore of Honduras and Nicaragua.

Racial composition of the inhabitants changed as the creole element continued to increase from intermarriage between the minority of white settlers and their Negro slaves. Waika Indians, brought to Belize from the Mosquito Shore, were present in small numbers but generally kept to themselves in a separate community on the outskirts of the town. Black Caribs from the island of St. Vincent finally ended their odyssey along the southern coast of British Honduras, where they were recruited as laborers in the inland mahogany works.

As late as the 1830's, there were still no coastal settlements of consequence other than Belize, and there are no indications that permanent fishing villages (with the exception of St. George's Cay) had been established on the offshore islands. Within a few more decades, the population became exceedingly cosmopolitan by the addition of East Indian cane workers; Chinese, Syrian and Lebanese shopkeepers; and a scattering of French, Dutch, and German settlers who came largely as farmers and tradesmen.

The most important historical occurrence leading to the appearance of a substantial group of fishermen in British Honduras seems to have been the War of the Castes, which began in southern Yucatan and Quintana Roo in the year 1848. Uprisings by the Maya Indians, under the messianistic leadership of Canul, continued spasmodically until 1872. According to Caiger (1951: 132 ff), some 4, 000 Mexican refugees of Spanish descent crossed the Rio Hondo into northern British Honduras in an attempt to escape the massacres.

Although there are no specific records to indicate where these refugees settled, it is likely that some of them who were fishermen moved to Ambergris Cay and Cay Caulker to establish new homes. This hypothesis is partially substantiated by the fact that many of the families presently living on the islands still maintain contact with relatives in the Chetumal area, and in some instances, as far north as Cozumel and even Progresso in northern Yucatan. The village of San Pedro on Ambergris Cay is generally thought to be somewhat older than that of Cay Caulker, but specific dates are lacking. The oldest inhabitant of the latter village was born there in 1882, ten years after the War of the Castes had ceased.

The Black Caribs were the latest group of immigrants to arrive in British Honduras to have had some bearing on the present distribution of fishing villages. During the slow decline suffered by the mahogany industry since the late nineteenth century, many of these workers left their inland camps to settle in a number of very small coastal villages where they became subsistence farmerfishermen, largely selfsufficient, and contributing relatively little to the general economy. This withdrawal from the interior coincided with a second, non-related movement of Black Carib fishermen northward out of Honduras into the coastal area of southern British Honduras. In contrast to what was evidently a rather sudden influx of mestizo fishermen into the northern area, the spread of Black Caribs was a gradual process that has continued to some extent down to the present.

DISTRIBUTION OF CULTURE AREAS

<u>Map 15 illustrates the extent of the principal culture areas</u> and indicates the prevailing fishing practice associated with each village. Italicized words found in parentheses beside the village name briefly suggest the associated settlement pattern.

The most numerous group of fishermen are found in the northern part of the mestizo culture area in the villages of Xacalak, San Pedro, and Cay Caulker. A few other fishermen are distributed throughout this culture area in Calderitas, Chetumal, Corozal, and Sarteneja, where they constitute only a small percentage of the residents. The settlement patterns of these subsidiary towns have been governed largely by agricultural interests.

The creole culture area has its most important center at Belize, where there is a fairly large fishing fleet and several hundred fishermen out of a total population of approximately 35, 000. Boundaries for this group, as shown on Map 15, have been established by inclosing those areas most frequented by these fishermen, which include the Drowned Cays, the southern coast to Colson Point, and the northern coast to the vicinity of Northern River Lagoon. In years past, they also were commonly found at work, together with mestizo fishermen, in and around Turneffe and on Lighthouse Reef. Since the 1961 hurricane devastated these atolls, fishermen seldom visit them, hence they can no longer be considered under active exploitation. Other fishing grounds traditionally used by the Creoles extend southward along the barrier reef to Gladden Entrance, located due east of Placentia Point, where the only important creole fishing village is located.

Black Carib fishermen are in effective control of the longest extent of littoral fishing grounds in the study area. The cultural boundaries are clearly defined; the northernmost group of these fishermen live at Stann Creek and rarely make fishing trips above Cay Glory. While the mainland coast from Commerce Bight southward past the Sittee River to Seine Bight Village in the Placentia Point area is exclusively their domain, they share fishing ground of the barrier reef and general backreef lagoon sector with the Creoles at certain times of the year. From Monkey River southward to Punta Gorda, Barranco, and the Rio Sarstoon, Black Caribs are the only fishermen to be found. Further eastward in Guatemala, there is a very small group of these men working in the Livingston- Puerto Barrios area, where they make short trips out into the Bahia de Amatique.

Many Black Carib fishermen are located along the coast of northern Honduras. They have settled in a series of approximately twenty small villages (having an average of thirty to forty inhabitants) that extend from a point slightly west of Puerto Cortes (a distance of more than 130 kilometers 1 to the Trujillo area near Cabo de Honduras.

Bay Islanders compose the remaining group having a distinct distribution. They are treated in Map 15 as a disjunct segment of the Creoles whose settlement pattern and fishing practices are very similar. A dozen or so families of Bay Islanders live on Big Hog and Little Hog (Cayo Tique 1 Islands which accounts for the extension of the culture boundaries into this area.

MESTIZO SETTLEMENT PATTERN

The settlement pattern typical of the northern mestizo area is that of a simple line village with the long axis parallel to the coastline. A wide, sandy street, kept free of grass, determines the form of the village, which is usually increased in size by extending the main street rather than by the addition of smaller parallel side streets. San Pedro village on Ambergris Cay and Cay Caulker village are two outstanding examples of this pattern. Neither town has what might be called a central plaza, the lack of which is a remarkable departure from the normal settlement pattern established by the Spanish-speaking inhabitants of the neighboring towns of Chetumal and Corozal.

The topographic situation in which these island villages have been located makes them susceptible to hurricane damage, particularly in view of the fact that the residents have destroyed almost all the natural vegetative cover in order to plant coconut trees. 1 Fuller (1955) was of the opinion that San Pedro village had suffered considerable physical destruction during the hurricane of 1942 and was in a more or less derelict condition at the time of his visit. However, it received even more extensive hurricane damage in 1961 but has since been repaired and enlarged to the point where it no longer resembles his sketch map (1955: 27).

Click here for a Map of Caye Caulker Village in 1965

Hurricane damage also accounts for some of the peculiarities to be seen in the settlement pattern of Cay Caulker village. The insert on Map 16 has been prepared in order to show this pattern in detail. A tabulation of the 101 structures present in 1965 has been included in the appendix and identifies the structure, or in the case of a house, gives the name of the owner. Prior to hurricane "Hattie" in 1961, the majority of houses in this village were located along what now appears to be a secondary street closely paralleling the eastern shoreline. Many of these houses were demolished in the space of fifteen minutes by a series of storm surge waves. The surviving owners have tended to relocate along what is now the main street, which at the time of the hurricane was a mere path. Before 1961, there were four secondary paths normal to the main street that divided the settlement into three more or less equal blocks. Storm waves turned these paths into deep, irregular scour channels that later became partially filled with sand They have since become thoroughfares again but no longer retain their original form or dimensions. The three southernmost paths perpendicular to the main street represent post-hurricane developments as do most of the structures in this area. Other unusual features of Cay Caulker village, shown on the insert to Map 16, include a cricket pitch (1), community centre and hurricane shelter (731, a concrete and steel reinforced "hurricane-proof" school (91), a fishermen's cooperative warehouse and meeting room (50) , and a defunct hotel (36). Government aid was secured by many householders to rebuild their homes; the construction of new wooden docks, locally known as "bridges" (99, 100), was accomplished by the same means. A similar pattern of docks at either end of a centrally located transverse path is repeated at the village of San Pedro.

House types in these two northern villages no longer retain the two-fold division noted by Fuller (1955: 35), who classified them as Hybrid-Mayan, and British West Indian. Thatch roof houses of classic Maya design have long since disappeared, as have the hybrid types with windows, clapboard siding, and other modifications. They have been replaced by a miscellaneous collection of houses that usually bear some resemblance to the general type better known as the West Indies cottage.

On Cay Caulker, a typical post-hurricane house is raised from one to two meters above above ground on wooden posts brought over from the mainland. A simple gable roof with the long axis parallel to the street is covered with corrugated galvanized iron sheeting2 (calamina) as is the narrow shed porch which may be adorned with Victorian "gingerbread" painted in bright colors The interior frame construction is of the simple balloon variety faced over with indifferently milled vertical plank siding. There are usually six to eight large windows with single shutters that are often tightly closed at night to impede momentarily the entrance of the inevitable mosquitoes. Interior doors are replaced by cloth curtains; a large kitchen is located in the rear, occupying the entire length of the house.

In those instances where a house has been sufficiently raised above the ground, the space underneath may be used to store all manner of fishing equipment-motors, doreys, masts, sails, rigging, and assorted lumber. This is also a favorite location for incidental carpentry work of various kinds, including the construction of small speedboats and the building of new lobster traps.

Outbuildings consist of a bath house, latrine, locked equipment shed, and occasionally a pig sty. Some of the older houses surviving the 1961 hurricane have the kitchen and cooking facilities in a separate outbuilding which also serves as a eating place. "Vats" (circular wooden tanks) are used for the storage of rainwater collected from the roof by a series of gutters and a downspout. Since the hurricane, many families have not been able to replace this expensive structure, and as a consequence, have had to depend - with indifferent success- on shallow wells and the generosity of their neighbors.

Yards are kept according to two theories, the most recent of which holds that all grass should be eradicated with a machete, leaving the bare sand surface exposed to harden gradually under continual foot traffic. In former times, much of the village had carefully tended grass lawns, but many of these were damaged in 1961 and have not been restored. Fruit trees, herbs, and ornamental shrubbery are much reduced in numbers, as are the coconut trees which were formerly planted in an almost continuous grove occupying all high ground along the eastern shore of the island. With the exception of a few clusters of plantains, there are no crops grown whatsoever, nor do these islanders attempt to maintain a "provision ground" on any part of the mainland. They depend entirely upon their skill as fishermen to provide themselves with enough cash to purchase the quantities of rice, beans, and corn products that are consumed together with various seafoods that are staples of their diet.

CREOLE SETTLEMENT PATTERN

The clustered settlement pattern of Belize, where many of the creole fishermen live, is not of their own making. That is, fishermen do not constitute the dominant element in this town which has grown from early beginnings centered around logging and mercantile interests based on the banks of Haulover Creek. The present street pattern in the northern half of Belize remains basically unchanged from that already established in 1787, as shown by by Burdon (1931-Map "D") who uses the survey of David Lamb.

Rectilinear provision grounds laid out on the south bank of Haulover Creek later became the basis for the present network of town blocks that have been occupied by a rapidly growing population. The creole fishermen of today are no longer found in any one particular part of the town. As less prosperous members of the community, they have been forced out of the more desirable central sector near the harbour where their boats are anchored, and have become dispersed around the fringes of the town in areas that have only recently been reclaimed from mangrove swamp. This inconvenience is, in part, recompensed by their unique marketing facilities, commented upon by Hickling (1950) and others, whereby the fishermen are able to transfer their catch directly from boats anchored in Haulover Creek to the market stalls.

Click here for a Map of St. George's Cay in 1965

A much smaller group of creole fishermen can be found in a settlement of eight houses located on the extreme northern shore of St. George's Cay. Map 17 shows the line pattern of this village in 1945 when it was located immediately northwest of a series of pretentious vacation houses built by wealthy businessmen. It is interesting to compare this relatively recent arrangement with that in existence in 1764, shown in partial facsimile form as Map 11. This unusually detailed map was made by a Spanish "spy, "3 evidentally commissioned to secure evidence of the English settler's violations of treaty agreements which forbade the erection of fortifications, substantial or defensible buildings, and especially prohibited the planting of gardens or provision grounds. The area now occupied by the fishing village was then being used for what was apparently slave quarters. 4 The "Cain Cosina" map indicates that thirteen such buts were present.

Another feature of considerable cultural interest is the retention of structures that were formerly turtle corrals, but now much modified into swimming "crawls" by the addition of cat walks around all four sides and a board walk or wooden pier extending out from shore. The five turtle corrals of 1764 were located on sites identical, or nearly so, to present crawls which serve no other purpose than to provide the vacationers with a protected swimming area. The palm wood walls of these crawls were all destroyed in the 1961 hurricane but have since been speedily replaced; there are now seven structures in active use.

The creole fishing village at Placentia Point has declined in recent years with many of the inhabitants moving inland. The remaining fishermen live in some thirty houses rather evenly dispersed along the shore of the narrow peninsula in the midst of a coconut "walk" (grove) in a physical setting that is very similar to the northern mestizo villages. Only incidental storm damage has occurred at Placentia in recent years, and the houses of cottage type are somewhat larger than those in the northern islands.

BLACK CARIB SETTLEMENT PATTERN

Black Carib fishermen have spread from Honduras northward along the coast of British Honduras to Stann Creek where many of them live in the northside district. This area is bounded by Goomagarugoo, Sawai, and Yampa streets - all good Carib names contrasting with the remainder of the streets that have common English names such as Front Street, Commerce Street, Plum Street, etc. 5 Very little information concerning the settlement pattern of Black Carib fishermen can be gained from an analysis of Stann Creek, as it is not a typical example. The Black Carib settlements at Seine Bight and Punta Gorda are also unsatisfactory in this respect due to the alterations in form that have come about as a result of government planning.

In the case of Barranco, we have an excellent example of a Black Carib village originally founded by fishermen who emigrated from the neighboring coast of Honduras late in the nineteenth century. A detailed description of Barranco and surroundings is contained in Romney (1959: 135 ff) and emphasizes the agricultural aspects which were important during the 1930's before the arrival of Sigatoka disease destroyed the banana crop. The land use pattern shown on Map 18 is based on air photographs taken in 1945 and suggests that little, if any, increase in field clearing had taken place compared to the Survey Team's analysis based on 1939 photography. Agricultural activity today is largely restricted to the planting of cassava (Manihot utilissima) and plantain, which are crops that every Black Carib fishermen will attempt to grow if provided the opportunity.

The settlement pattern of Barranco, **illustrated in the insert of Map 18**, indicates that the forty-six structures present in 1945 were arranged in a rectilinear manner unlike that of other fishing villages that have been considered. There is no principal street facing the shoreline nor is there any suggestion of a central plaza. The thatch roof houses of aboriginal design are grouped in rows facing narrow, secondary dirt streets only partially interconnected and oriented perpendicularly to the waterfront. The absence of docks, public buildings, cemeteries, and recreational facilities is not only a result of the small size of the village, but also of the Black Carib's disinterest in these appurtenances. As fishermen, they are considerably more self-reliant than their northern counterparts, who must depend upon commercial facilities for an important part of their livelihood. Other Black Carib fishing villages, little changed in appearance from Barranco, are found further eastward along the coasts of Guatamala and Honduras at a number of inconspicuous localities such as Caribal, Zambuco, Zambo, Crique, and Quinito. Thomas Young (1842) noted that these fishermen had selected their village sites with some care within a short period of time after their transferral from the island of Roatan in 1797. The factors which influence their choice include a suitable beach for the hauling out of doreys, an ample supply of potable water, and the proximity of well-drained ground for the planting of subsistence crops.

SETTLEMENT ON GUANAJA

Settlement patterns observed in the Bay Islands were restricted to the island of Guanaja were the principal village is known as "The Town." It consists of a heterogeneous collection of about 150 houses, large and small, many of which belong to fishermen engaged in shrimping on the eastern part of Honduras and the Mosquito Coast of Nicaragua. These dwellings are .crowded together on artificial fill connecting two cays that probably do not exceed two hectares in extent. The original pattern is difficult

to extricate from this tightly clustered settlement where a number of houses recently have been built on frail pilings precariously situated in relatively deep water. 6 Since the founding of this town ca. 1850, the inhabitants have clung tenaciously to this one particular locale, leaving near-by Gays and a broad expanse of level shoreline of the main island almost uninhabited. Less than half a kilometer away, plantation grounds and coconut walks can be seen on Guanaja, which is the source of fresh water that has been piped out to The Town.

The earliest historic settlement on Guanaja was located at Savanna Bight where some twenty houses can still be found situated along the shore of the protected bay. Another row of houses at Savanna Bight rest on pilings built out into the shallow water. These structures, now used as living quarters, were originally constructed as coconut sheds when that industry was of more importance.

A few scattered families of fishermen can be found on the more exposed northern coast around the peripheries of Northeast Bight and Mangrove Bight (see Plate 6, Fig. F), but the remainder of the island is only lightly inhabited by a few farmers and ranchers. Stock raising is also an important occupation on the island of Roatan, which has a much larger population than Guanaja but nothing in the way of a settlement that can be considered a fishing village.

CONTRASTS IN FISHING PRACTICES

Referring again to Map 15, it can be seen that there is no uniformity of fishing practice to be found within the mestizo and creole fishing culture areas. The Black Caribs consistently use handlines throughout the southern areas, but in the north, there is considerable diversity that requires explanation.

Fishermen of Xacalak and Calderitas primarily use handlines, while the villagers of San Pedro are noted for seining and skin diving. Cay Caulker fishermen are predominantly concerned with trapping spiny lobster but also practice some handling and trolling. They have never attempted skin diving as a method of commercial fishing, and there are no seines present on the island. Comparatively little trapping is done by the Creoles of Belize who prefer to catch scale fish with handlines and the seine. The creole village at Placentia is known for its skin divers who concentrate on capturing spiny lobster rather than reef fish. On Guanaja we again encounter variations in practice in a relatively small area. Skin diving is popular along the northern coast, but handlining is preferred by residents of The Town.

Some of these changes in fishing methods from one village to the next may be partially explained by slightly different bottom environments close at hand, making one practice somewhat more advantageous than another. The overall distributional pattern of fishing practice is so disjunct that we must consider cultural factors to have been predominant. The distribution of handlining can be disposed of rather easily, as it has been established that this is the normal, conservative practice inherited from the colonial period and is to be anticipated in any area where other cultural factors have not been at work.

The great emphasis on trapping lobster found at Cay Caulker seems to stem directly from the efforts of Captain Frank Foote, who introduced the lobster trap? and organized the fishermen to provide him with lobster for his pioneer canning plant (see p. 91 ff. for details).

The popularity of skin diving among San Pedranos is a recent manifestation which came about through the introduction of the specialized equipment and techniques by a series of touristsportsmen who began visiting the area frequently during the past fifteen years. How skin diving first became introduced to the Placentia group and how it became established on the northern coast of Guanaja has not been successfully determined.

Seining by the Creoles of Belize is very likely another holdover from the latter stages of the colonial period when it was undoubtedly a more extensive practice than at present. The appearance of this method around San Pedro (completely by-passing Cay Caulker) is anomalous, but possibly due to the extensive shallow embayments found in the Bay of Chetumal behind Ambergris Cay.

From the preceeding descriptions it is evident that three distinct fishing cultures have developed along the relatively short coastline of British Honduras. The fragmentation of practices among these groups is an unusually complex pattern that appears to have been fostered by a diverse settlement history in which cultural controls have been predominate. These conditions have resulted in an abnormal distribution of fishing equipment and methods that is remarkable for its discontinuity and lack of transition between adjacent groups of fishermen.

CHAPTER VI THE SCALE FISH INDUSTRY

Click here for a Map of the Distribution of Fishing Grounds

The entire western coast of the Caribbean Sea is remarkable for its lack of well developed scale fish industries. This is particularly true of British Honduras where there are abundant offshore resources that remain virtually unexploited. Hickling (n, d. : 27) was impressed by this potential and states "... relative to its land area and population, British Honduras must have one of the largest areas of sheltered fishable waters in the tropics, or indeed anywhere in the world. "Map 19 indicates the extensive nature of these fishing grounds in comparison with adjacent land areas.

In spite of the accessibility of the fishing grounds, Belizean fishermen continue to provide the local market with what may be termed "daily subsistence fishing" without demonstrating any strong tendency to increase their efforts on a more elaborate commercial basis. This apparent paradox between the abundance of fish and failure of a substantial industry to develop has attracted the attention of a series of fisheries experts. 1 They are in agreement that the present industry should be expanded but have varied opinions as to how this might be accomplished. None of these proposals has met with any appreciable degree of success; the fishing industry today remains much as it was fifty years ago.

Former research on the problem seems to have been oriented toward establishing the physical potential of the area and generally included a treatise on some technological aspect involving a scheme to increase the fish-pounds per hour effectiveness of equipment. Few, if any, of these investigators appear to have made a thorough analysis of the complex cultural factors that provide the fisherman with a choice in the matter. Too much emphasis has been placed on the fish and not enough on the fisherman.

Estimates vary as to the total number of full and part-time fishermen working in British Honduras. The majority of professional fishermen are to be found north of Stann Creek in the town of Belize and in two fishing villages located on Cay Caulker and Ambergris Cay. This northern group may contain as many as 500 full-time fishermen. South of Stann Creek, there are perhaps another 100 distributed along the coast, particularly at Placentia. Many of the coastal Black Caribs are considered fishermen but devote considerable time to agricultural pursuits as well. If this group is included in the total, the figure would approach 1, 000 with concentrations in Stann Creek, Seine Bight, Monkey River, Punta Gorda, and Barranco. Of a total population which the Government believes to be in excess of 100,000, only a very small percentage can be classified as fishermen by profession. Of this number, even fewer are equipped to engage in commercial fishing operations.
The fishing fleet based in Belize has traditionally provided the town with much of its daily supply of fresh fish. Some contributions are made by fishermen from the two northern villages as well, but to arrive at an accurate accounting of the men primarily concerned with scale fishing, we must discount those fishermen who specialize in trapping spiny lobster during at least eight months of the year. These men have little incentive to increase scale fish production as long as the Government controls limit the maximum market price of fish to thirty cents per pound and exporters continue to pay two dollars and twenty-five cents per pound for lobster tails.

Fishermen are keenly aware of this disparity in price and of the social benefits gained by the individual who advances himself in the hierarchy of fishermen from conch gatherer to scale fisherman to lobster chambista (specialist). The ordinary fisherman must not only clean his fish but peddle them as well in the early morning market. On the other hand, lobster fishermen have considerable prestige and can enter a grog shop with the conspicuous authority of a cash customer. Shopkeepers defer to them and extend credit on expensive items of merchandise.

In the following description of scale fishing activities, other elements are noted that help provide a partial explanation of the static nature of the industry. It is unrealistic, however, to infer that the problem has a geographic solution.

Daily fluctuations in demand have considerable influence on the fisherman's plans for the next trip. From his attendance at the morning market, he knows that a certain species is likely to bring a few cents premium. If there are no unusual concentrations of some other fish at hand, he will attempt to capitalize on this "best seller. "

Before sailing out to the fishing grounds in the early afternoon, the fisherman has a plan of action which he hopes will enable him to catch a quantity of the one particular kind of fish. The plan is not always successful, but it does avoid unnecessary sailing about on a haphazard basis. For example, if a decision is made to troll for kingfish, a course is set for the nearest entrance in the barrier reef and the balance of the day spent in trolling along the deep forereef grounds. Similarly, if the plan calls for handlining snapper in quiet waters behind the reef, it is unlikely that any detours will be made to bogues in the mangrove islands. Davenport (1960) describes a similar habit among fishermen of a village in Jamaica. who are forced to decide whether to fish "inside" or "outside. "

CONTEMPORARY EQUIPMENT AND TECHNIQUES

Fishing in British Honduras is presently conducted with a relatively limited variety of equipment and techniques, which are, however, remarkably effective in those particular areas where the fishermen choose to employ them. Changes in equipment have occurred as a result of the gradual shift in the emphasis from aboriginal gathering to colonial use of the harpoon, and ultimately, the introduction of nets, traps, and handlines. The present fishing industry is characterized by lack of modern equipment designed for large-scale commercial exploitation. Only a few items of the present suite of equipment can be definitely established to have originated within the study area, but there are interesting modifications that have local provenience.

Among the most important of a fisherman's possessions is the small, circular cast net known as a taraya. This net is an absolute necessity to most fishermen as it is the only practical means of catching "sprat" (Harengula spp.). These small sardines must be caught in quantity for use as bait in daily subsistence fishing.

Cast nets have a world-wide distribution throughout many tropical areas. In general, the net consists of a cone-shaped body that is closed after the net is thrown by a series of drawstrings passed through the apex; these radiating strings are attached to the heavily weighted rim and converge to a single rope held by the fisherman. The design is particularly effective for capturing bait fish, shrimp, and mullet in very shallow water. Cast nets are found in many parts of Latin America among fishermen of both fresh and saltwater areas.

Two radical modifications of the traditional cast net design have taken place in British Honduras - all draw strings have been removed and a "gutter," or pocket, of mesh has been added around the outer circumference next to the weighted rim. At first glance, it would appear that the removal of draw strings prevents the net from being closed and thereby allows the fish to escape. In actual practice, the net is thrown with a sweeping motion from the bow of a dorey into a dense school of sprat and allowed to remain on the bottom for several minutes while the fish mill about and become gilled. The retrieve is begun by slowly pulling on the handline until the apex of the net can be grasped. When this point is reached, the net is then twisted to further constrict the enclosed area so that the remaining fish are forced into the gutter. After the lead weights have been completely bunched and are located directly below the fisherman, the net is quickly lifted into the boat and the sprat shaken out.

Absence of draw strings does not seem to materially reduce the effectiveness of this net and is in part compensated by the fisherman's careful twisting movements of the apex. Distribution of this modified net design is evidently restricted to British Honduras. Fishermen of Guanaja in the Bay Islands were observed using a traditional net with draw strings pulled through an apex ring of cow horn.

A simple notched-stick shuttle and gauge are used to knit seine nets as well as tarayas. Considerable improvisation is shown in the construction of seine nets which may reach lengths of 100 to 150 "fathoms. "3 The expensive cork floats and moulded lead weights normally used on seine nets are replaced by local substitutes. Floats are made from the dried roots of the "gov-apple" tree (Anona _spp.) cut into appropriate lengths and provided with a center hole made by burning each section with a hot iron poker. Lead weights are fashioned from salvaged lengths of condemned telephone cable from which the central wires have been removed. Cutting this lead sheathing into standard lengths distorts the opening so that each weight must be reshaped by hammering it onto a mandrel.

Beach seines are used in the normal manner by leaving the running-end anchored on the beach while a boat carries the body of the net out in a half-circle surrounding a concentration of fish. These same nets are also used in an entirely different technique that is evidently confined exclusively to northern British Honduras. This peculiar use of the beach seine involves an alteration of the environment that merits description in some detail.

Normal beach seining is practiced southward of Belize, but along the northern shore seine nets are used to surround ramas. The construction of these artificial fish shelters is evidence of the well developed understanding local fishermen have of fish ecology and environment. Northward of Belize, the broad expanse of shallow, protected waters between the mainland and mangrove cays extends to the Bay of Chetumal and usually has a smooth bottom free of obstructions. These conditions make it ideal for seine handling if it were not for the fact that there are few natural concentrations of fish in this area. The uniformity of the bottom makes it difficult for sedentary species to find shelter from predators. As a result, the fish population is widely dispersed during the daytime when fish seek refuge (primarily under mangrove root systems) . When the fishermen build a rama, they create a small "oasis" of shelter in the almost featureless "desert" bottom.

Ramas are built by seine fishermen in a random pattern in order to hide the location as as much as possible from competitors. A site is chosen that can be conveniently relocated, and four corner posts of "botan" palm (Sabal mauritiiformis) are just below the surface. A crib-like structure approaching two meters on each side is formed by lashing mangrove saplings to these posts. The interior is then filled with additional mangrove branches and leaves.

Fish react to this change in their environment almost immediately. Small fry collect around the brushfilled interior of the rama within a few days. They are soon followed by a school of sprat that patrol the outer perimeter. Nocturnal snapper leave their former hiding places and take up residence among the branches where they have better opportunity to feed on the sprat. As the snapper pods increase, adolescent grouper and jewfish are likely to arrive. After several weeks of gradual immigration, at least one barracuda is certain to include the new location in his territory. All this activity tends to attract schools of jack and Spanish mackerel that rush about from rama to rama followed, at times, by sharks and the giant sawfish.

When the seine fishermen arrive, they approach the rama cautiously; if it has not already been looted by other fishermen using handlines, they surround the site with their net. Nothing unusual happens for several minutes as the fish withdraw into the protection of the branches. This impasse is resolved by the fishermen who swim over the top of the net and proceed to flush out whatever is lurking inside the rama by thrashing the framework with sticks and, in general, creating a great commotion. In the ensuing melee, all of the larger fish dart out and are entangled in the net. This essential step in the technique is not relished by the older fishermen who generally try to impose the responsibility on younger members of the crew.

Unfortunately, very little additional information can be offered concerning the origin of this unusual application of the seine net. Colonial records suggest that seining was not a particularly popular practice, and there is no mention at all of rama construction. Fishermen who specialize in handlining techniques continually seek out natural ramas formed by trees swept off the cays during hurricanes, but they do not deliberately build ramas and seldom visit the shallow waters frequented by seiners, unless it is to cause mischief.

Another distinctive technique employed exclusively in the Caribbean areas by fishermen of northern British Honduras is the heart weir. These simple, but effective traps are found primarily on the lee side of Ambergris Cay, Cay Caulker, Cay Chapel, and rarely, on the adjacent mainland coast.

Although the heart weir has, a primitive appearance suggesting an aboriginal origin, details of its introduction from Canada in the 1930's area matter of common knowledge among the present generation of fishermen. Heart weirs are built in shallow, protected water by erecting a fence that extends perpendicularly from the beach line a distance of 100 to a maximum of 200 meters, where it terminates in a heart-shaped enclosure. Fencing is made of galvanized chicken wire supported by a double row of mangrove saplings driven into the bottom. The enclosure is normally about ten meters wide with lobes overlapping on each side of the fense to provide two narrow entrances. At night, fish moving parallel to the shoreline are intercepted and instinctively swim along the fence seeking an opening until they finally are funneled into the enclosure. If left to their own devices, most fish will eventually find their way out again, and the traps must be visited almost daily to remove the accumulated catch.

When the first heart weir was built on the north point of Cay Caulker (ca. 1935), it was soon noted that during the winter months large quantities of snapper began to fill the weir shortly before the arrival of

strong frontal storms known as "northers." After the bad weather subsided, fishermen checked the trap and often found the enclosure packed with fish. In the authoritative study by Sanchez and Gomez (1952 : 141 ff), a number of similar fish movements associated with nortes are cited for the northern coast of Cuba where the phenomenon is well known to local fishermen.

During World War II, the construction of heart weirs declined when it became difficult to obtain the necessary wire. In later years, interest was centered on the growing lobster industry to the detriment of other fishing practices, so that as late as 1964, there were probably. no more than a dozen of these weirs in active use in all of British Honduras. In 1965, a contract, requiring a substantial daily amount of scale fish for the supply of public institutions, was awarded to a fishermen's cooperative with the result that within a few weeks members constructed twenty-sit heart weirs on Cay Caulker and Cay Chapel alone.

Fish traps of conventional rectangular design are used to a limited extent by a few fishermen on Cay Caulker and St. George's Cay. These are baited traps having a single funnelshaped opening in the light wooden frame which is covered by chicken wire. Fish traps are usually deployed around rocky areas where a proliferation of coral growth makes handline fishing difficult. The use of basketry traps by the Black Caribs, reported by Taylor (1951:), was not, observed, and informants claim the technique is no longer widely practiced. It is possible that the most peculiar basketry fish trap illustrated by Adderly (1886: 154) is of Carib origin, but his description is too brief to make positive identification.

The use of "poons" (harpoons) has also declined in recent years to the point where they are no longer a significant item of contemporary equipment. In colonial times, harpoons were used extensively throughout the western Caribbean to strike manatee and turtle, but these animals have now dwindled in numbers to such an extent that the pooh is seldom seen today in British Honduras.

Handlines of stout cotton twine are still popular among professional fishermen who are reluctant to replace them with the more effective nylon monofilament tackle. Although synthetic lines are stronger, impervious to rot, and less likely to tangle, they are also more apt to damage the hands, particularly when a large fish is hooked. For this reason, cotton lines are used for trolling (curicaranando) outside the barrier reef where some of the larger species are encountered. Trolling with handlines, supplemented by swivels and stainless steel leader, is largely restricted to northern British Honduras where the method is used to catch kingfish, Spanish mackerel, and other fast-moving species. Trolling is seldom attempted behind the barrier reef except when schools of jack are plentiful.

Skin diving as a fishing technique has recently been adopted by young men from Placentia to San Pedro and along the northern shore of Guanaja in the Bay Islands. As in Jamaica, there is little attempt to improvise equipment from local materials (e.g., bamboo goggles), and the fishermen must buy the expensive imported masks and spear guns. This method of fishing initially produces an impressive quantity of large sedentary fish, but after these specimens have been killed, it soon becomes unrewarding on a commercial basis in view of the amount of time and energy expended.

The present list is a rather meager inventory in comparison with the development of fishing in Europe. Foster (1960) concludes that this reduction in cultural traits originating in Spain and Portugal is characteristic of the diffusion process that accompanied the conquest of the New World and points to the difference in diversity of fishing equipment and techniques as a particularly clear example.

SEASONAL FISH CONCENTRATIONS

A routine survey of the fish landed in Belize makes it quite apparent that during most o of the year very

little fishing is being done outside the barrier reef. Larger plagic species, such as the dolphin (Cory phaena hippurus), "queenfish" (Acanthocybium solandri), and cobia (Rachycentron canadus), are reasonably plentiful but seldom caught. On an annual basis, fully eighty per cent of the fish sold in the Belize market are shallow water, sedentary reef species predominantely composed of small snapper caught between the first line of mangrove islands and the barrier reef flat. Fish representative of this group are the "dog teeth" snapper (Lutjanus apodus) and "silk" snapper (Lutjanus analis). This preoccupation with shallow water species is particularly noticeable among the Black Carib fishermen, whose vocabulary is noticeably deficient in names of fish found in waters beyond the barrier reef (see Section I of the Appendix, "Glossary of Marine Fauna - Caribbean Central America").

In the month of August, an unusual concentration of silk snapper occurs in the grass flats of the Long Cay area. Fishing smacks from northern British Honduras converge on this location for several days at a time to take advantage of, what appears to be, a spawning run. In spite of the sudden influx of silk snapper, the market price for fresh fish remains more or less stable, due to the fact that there is a corresponding drop in the numbers of other species caught.

During the snapper run, boats anchor in three to five fathoms of water over beds of zacate located in the vicinity of submerged rocky prominences. Multiple hooks on short droppers are attached to a nylon monofilament handline and baited with sprat. Fishermen using this equipment are usually able to see the fish swarming over the bottom and are able to catch an amazing amount in a short time. When the live well of the smack is filled, the fishermen sail before the wind on the short run back to Belize, but must anchor during the night behind the western point of North Drowned Cay where there is no danger that the catch will be killed by overnight exposure to brackish water at the normal market side anchorage.

Before dawn, boats move into position directly alongside the Belize marketplace while the catch is "rocked" 6 to increase water circulation in the live well until the fish can be transferred by dip nets to the market counter. After each fish has been clubbed with a short billy, it is dipped in a bucket of water and arranged in a neat display for the inspection of customers. Within a few hours, all fish have been sold before there is danger of spoilage.

Another, and even more important exception to the general pattern of subsistance fishing in British Honduras, is the annual grouper run at Cay Glory. This phenomenon occurs in late December and continues for several weeks, during which there is intense activity on the part of scale fishermen. During the 1964-1965 season, more than 300 fishing boats from all parts of the coast converged on the former site of Cay Glory, located a short distance northeast of Southern Long Cay in a shoal immediately behind the barrier reef.

On the seaward side of the reef, grouper (Epinephelus straitus) congregate in astonishing numbers in waters fifteen to twenty fathoms deep where they can be seen moving slowly over the rocky bottom. These fish are believed to be spawning, as many specimens caught by the fishermen are in roe. The concentration of so many grouper in an area of not more than ten square kilometers may be the result of a strong southerly current reported by the fishermen to occur just above the bottom. This current is deflected to the southeast by a predominent projection of the barrier reef opposite Southern Long Cay. Fish seeking spawning grounds along the reef front may be carried southward by the current until they become "stacked" in the Cay Glory area in an attempt to remain in relatively shallow water. Whatever the physical circumstances surrounding this seasonal run may be, it is not known to occur at any other point in British Honduras. However, a similar concentration of grouper can be found in the Little Hog

Island banks off the shore of northern Honduras during the same months; reports indicate a third run somewhere around the Chinchorro Banks adjacent to the coast of southern Quintana Roo.

A typical fishing crew leaving for Cay Glory stocks sufficient food and water for a three-week stay. The only other necessity is an abundant supply of bagged salt to use in "fresh corning" the catch. In recent years, it has become common practice for three or four men to combine resources by using a single boat and sharing the initial expenses. Any profits from the venture are evenly divided after a double share is given to the boat owner.

Professional fishermen make their preparations well in advance of the date they calculate the grouper run will begin, 9 and leave for the grounds to establish a "camp." On arrival $a\pm$ the Cay Glory shoal, a fish "crawl" (pen). butchering platform, tendedor (drying rack), and small "trash" (thatch) house built on short pilings must be erected in a favorable location. Plate 5, Figs. B, D, E, and F illustrate these structures that have been made from an assortment of mangrove poles, coconut palm thatch, and driftwood.

No actual fishing operations can begin until a supply of live bait has been obtained. Sprat are scarce in the area, so the fishermen depend upon small grunt (Haemulon sue.) which they carry to the grouper bank in a vivero-cubano (see page 60 and Plate 4, Fig. E). The crew member who has been elected cook and must remain at the camp is charged with the additional responsibility of securing an adequate quantity of grunt for each day's fishing.

Fishing smacks move out at dawn through a narrow opening in the reef and anchor in a suitable spot where grouper can be seen through the clear water. Fishing gear is transferred to a dorey that is maneuvered into a better position by paying out a line attached to the stern of the smack.

Strong cotton handlines are used when the fish are biting well, as it is easier to handle and less likely to cut the hands. When the grouper become "tricky" (i. e., refuse to bite), the fishermen switch to the less visible nylon monofilament lines. Two No. 10 Kirby hooks and a salvaged iron bolt constitute the terminal rigging.

When the grouper are hauled to the surface, the swim bladder expands and the fish must be "winded." This is accomplished by piercing the grouper with an ice pick under its "wing" (pectoral fin). The winded fish are kept on a light rope stringer at the side of the dorey where they can be protected from sharks. Fishing continues in this manner until midday when the stringers of fish (often several hundred at a time) are towed back to the campsite and transferred to the fish-crawl.

The "fresh corning" (salting) process begins in the afternoon with the removal of dead and dying fish from the pen. These moribund grouper are the first to be picked out and carried to a butchering table where the head, skin, and guts are removed. Offal is dumped behind the table in ankle-deep water where it attracts numerous scavengers including small sharks. When one of these small sharks appears, it is promptly dispatched and also corned. After the grouper carcass has been split open longitudinally, a series of closely spaced transverse cuts are made in the flesh. The average size of these fish (eight pounds) makes them well-suited for this treatment, but an occasional larger fish may require cutting into several smaller sections. Salt is liberally sprinkled over the flesh and rubbed into the scoring. Experienced fishermen are able to treat adequately about eighty-five fish in this way from a 100 pound bag of "Liverpool" salt. There is a tendency to spread this relatively expensive salt over a greater number of fish, but in doing so, the chances of spoilage are considerably increased.

Further curing occurs when the slabs of meat are placed in the sun to dry. At least three days of brilliant sunshine are needed before the flesh is sufficiently preserved. During this period, the fish must be turned every few hours to achieve uniform dryness. In the more elaborate camps, several tendedores made of mangrove poles may be used to expedite the drying process. If these racks are not used, salted fish are draped over the mainboom, cabin, and decks of a boat. It is not uncommon for the drying process to be suddenly interrupted by the arrival of a frontal storm (norther) that can ruin the corned meat if it is not protected, and in general, disrupt the fishing operations for several days.

When the corning is complete, the slabs of fish are bound up in bundles of convenient weight and stored below deck until they completely fill all available space. In a good season, lasting perhaps four or five weeks, fishermen estimate an experienced crew can anticipate catching and curing from 100 to 150 dozen grouper. In recent years this figure has generally been much lower, and some crews have returned after a few days almost empty handed. "Old Heads" who have participated in the run for many years attribute the decline to overfishing by increasing numbers of boat crews. In 1964-1965, for example, some eight or ten boats of milperos (farmers) from the coastal village of Sarteneja in northern British Honduras arrived to participate in the run with approximately 300 other boats but were largely unsuccessful.

Black Carib fishermen customarily appear in the midst of the smacks and dry-boats in their small sailing doreys (Plate 5, Fig. A). Not being equipped to anchor in deep water, they try to establish a friendly alliance with some larger boat to which they can fasten their doreys. If the two groups are compatible, a limited symbiotic relationship may develop whereby the Caribs supply the larger boat with fresh bait and may even make trips to Stann Creek to replenish water or food supplies. The mestizo fishermen refer to them rather contemptuously as Konchas (houseflies) but have great respect for their endurance and fishing ability.

No accurate figures are available on the average total production of fresh-corned grouper from the Cay Glory run. Much of it is shipped inland where it is widely sold during the Lenten season when bundles of dried fish even reach some of the most remote villages. Official export statistics for 19631 show a total of 71,123 pounds exported to Puerto Barrios, Guatemala, and Puerto Comes, Honduras, but the actual figure may be much higher. Brokers from Guatemala City and Tegucigalpa come to these two ports each year to bargain for quantities of fresh-corned fish from Cay Glory.

Many of the same circumstances that have been described in the Cay Glory grouper run are repeated on a much smaller scale at Providencia Bank and Little Hog Island, located some thirty-five kilometers northeast of La Ceiba, Honduras.' Several English-speaking families of Bay Islanders living on privately owned Little Hog Island annually produce several thousand pounds of corned grouper which they sell in La Ceiba and Trujillo.

THE BONITO FISHERY

The recent establishment of a bonito fleet and canning plant in northern Honduras constitutes another, somewhat unexpected aspect of the scale fish industry. Thirty-five displaced Cuban fishermen using three small boats and operating out of Utilla Island are engaged in catching oceanic bonito (Katsuwonus pelamus) and "albacore" (Thunnus atlanticus). The fish are brought to a small combination ice plant and cannery that has been built at La Ceiba. The canned meat is sold primarily to specialty markets in France that were established by the management before leaving Cuba in 1961.

These Cuban bonito fishermen use methods learned from Japanese interned in Cuba during World War II. Stout bamboo poles, barbless hooks, and live bait chumming are typical Japanese traits; the working vocabulary also contains loan words such as katacuchi (sprat) of Japanese origin.

Large schools of bonito frequent the Gulf of Honduras for at least nine months of the year. The fish apparently follow circular surface currents (see Map 5) as they return repeatedly to an area roughly half-way between Utilla and Glovers Reef. The presence of these fish is not well-known locally, and it was only by the casual suggestion of an oceanographer that the possibility of commercial exploitation was brought to the attention of the refugees in Miami, Florida. Their privately financed pilot study in 1963 indicated that there were enough fish present to provide a sustained yield for a cannery. Further investigation disclosed that the nearest harbor facility to these new grounds was located at the eastern end of Utilla Island. Abundant live bait was found by seining at night in the shallow waters around mangrove thickets fringing the western half of the island. La Ceiba was chosen as a location for the canning plant because of its dependable fresh water supply and available partime labor.

Although this scale fish industry has not been in operation for a sufficient time to test the long-range likelihood of success, it would appear that it provides an example that may be of some benefit to the aspirations of the government in British Honduras. Any attempt to improve the static fishing industry in that country by fiat in order to increase export earnings is likely to result in a reduction of the more valuable spiny lobster production. Since it is basically the same limited group of fishermen that would be required to perform both duties, one industry must decline at the expense of the other. On the other hand, there is the interesting possibility of resolving the problem by encouraging immigrants of Cuban refugees already familiar with the specialized fishing methods and market conditions. The idea has historic precedent in the establishment of the northern fishing villages by refugees from the War of the Castes. Cuban bonito fishermen have a cultural background similar in many respects to this northern group and would augment rather than compete with the local fishermen.

CHAPTER VII

THE SPINY LOBSTER INDUSTRY

Click here for a Map of the Distribution of the Spiny Lobster

Exploitation of the spiny lobster has become the most important fishing activity in. British Honduras. It is the only marine resource that is presently utilized on a large-scale commercial basis; in value, the lobster catch far exceeds all other fishing industries combined. The development of a large market in the United States occurred only after the introduction of modern processing and shipping techniques made the delivery of frozen lobster tails a profitable enterprise. The expansion of the industry is still based on methods the fishermen learned a number of years ago from a Canadian sailor.

LOBSTER HABITS AND HABITAT

The spiny lobster (Panulirus argus) is found in relatively shallow waters throughout most of the Caribbean. This crustacean bears a strong resemblance to the common lobster but lacks the heavy crushing claws (see Plate 7, Fig. A). As the name implies, the spiny lobster has a number of short spikes projecting from the carapace, leg joints, and antennae. The shell is normally a mottled brownish-red color but may be a deep magenta or olive green depending upon the type of bottom the animal frequents.

The experience of fishermen indicates that lobsters are found in the greatest numbers in and around rocky areas. The population density decreases somewhat over zacate beds and tends to be substantially lower in the mangrove habitat. Very little information is available with regard to the deeper waters of the forereef although specimens of unusually large size have been found in this environment.

Distribution of the spiny lobster within the study area is shown on <u>Map 20</u>. The range is restricted to three distinct bottom environments which are, in order of importance, (1) rocky areas adjacent to the reefs, (2) zacate beds, and (3) mangrove root systems.

Having a great number of natural enemies, the lobster must remain near cover and consequently avoids areas where there are soft, shifting bottom sediments or unusually strong currents. For this reason, it is not found in any appreciable quantities in the coastal lagoons, the extreme southern part of British Honduras, or the mainland coast of northern Honduras. The central lagoons associated with the atoll-like Turneffe Islands, Glover's Reef, Lighthouse Reef, and Chinchorro Banks, all support large populations of spiny lobster.

The results of investigations by marine biologists indicate that the spiny lobster is primarily a nocturnal feeder, usually remaining hidden during the day. From a rather small number of tagging data by Smith (1959: 13), it would appear that under special circumstances lobsters in southern Florida are capable of moving nearly 100 miles, at the rate of at least one mile per day. Movements of this magnitude do not seem to be characteristic of the species in British Honduras where normal travel in connection with feeding is probably restricted to individual territories within a short distance of a favorable hiding place. However, it is evident that mass movements of spiny lobster take place under certain conditions, but it is not at all clear that these unpredictable movements represent a "migration."

ORIGIN AND DEVELOPMENT OF THE INDUSTRY

There is very little evidence to indicate that the aboriginal inhabitants made any attempt to utilize the spiny lobster. During most of the colonial period there was a similar lack of interest in this animal. It is likely that this indifference can be attributed to the lack of any effective means of catching lobsters other than simple gathering of an occasional straggler. The situation changed dramatically about the year 1921 when a successful trap was introduced by an individual from Nova Scotia.

After a long career in sailing ships, Captain Frank Foote came to British Honduras for reasons of health on the suggestion of a relative engaged in the coconut trade. By all accounts, Foote was an energetic man of impressive physical appearance. He soon became acquainted with his new surroundings and developed an interest in the spiny lobster. Foote decided to attempt an experiment and found that the tropical lobster could be successfully caught in the traditional "pot" used in the Maritime Provinces of Canada.

The results were sufficiently encouraging to justify the importation of equipment for a small, baremounted canning plant. The barge was initially located near the south end of Water Cay where there were shallow wells with water potable enough to be used in the rather primitive canning process. Steam heat for cooking the tail meat was provided by a boiler fired with mangrove wood.

For the first few years of operation, the packing plant employed no more than a dozen women to process the catch. Lobster were brought to the barge by fishermen who had been trained by Foote to build and set the new traps.

In 1925, an apparent scarcity of lobster in the surrounding area caused the plant to be moved further north to the windward entrance of Baldwin's Bogue. As production slowly increased in volume, organizational difficulties began to occur. Foote had been working with a small group of creole fishermen based in Belize who were paid one cent per pound for lobster tails. There was more or less continual agitation for a better price, and the quantities landed at the barge became erratic. Although the

price warm later increased to five cents per pound, the retail market apparently was not yet sufficiently developed to yield a substantial profit. This dilemma was solved by the disastrous hurricane of 1931 which demolished the barge and caused a temporary halt to fishing activity.

In 1932, another barge and packing plant was acquired, and the operation moved still further northward to a protected location in the shallow bay on the lee side of Cay Caulker. The problem of dependable supply was resolved by training an entirely new group of fishermen who lived on the island. Production was relatively high in the following years, as it was a virgin fishing ground that had previously received little or no attention by the earlier lobster fishermen. At the peak of operations at Cay Caulker, some twenty-five women were employed and perhaps a dozen smacks were kept active during most of the year. After an initial surge in production, the industry began to falter, primarily due to unsettled market conditions in the United States. By 1935, the enterprise was largely abandoned, and Foote concentrated his efforts on developing a series of coconut plantations located along the eastern fringe of the Turneffe Islands.

In spite of this commercial failure, the fishing techniques that Foote had introduced were firmly instilled in the fishermen of Cay Caulker who continued to harvest spiny lobster on a reduced scale for their own consumption. During this period of retrenchment, significant changes were made in the equipment.

TRAP DESIGN AND CONSTRUCTION

A simplification of the conventional trap design was adopted in order to reduce the cost of construction. The dimensions and form of the Nova Scotia trap were retained, but the double entrance was discarded in favor of a single opening. This modified version built almost entirely of local materials remained in vogue and has now become the standard form. Details of the construction in these Belizean traps can be seen in Plate 7, Fig. B.

Construction methods have settled into a rigid pattern that does not vary throughout the area where traps are used. Mahogany "shorts"5 are fastened together with galvanized nails to form the trapezoidal frame. Specially prepared bundles of lath made from the "freshwater pimento"6 (Thrinax Wendlandiana) are used for the slat sides (five strips to a side), bottom, and entranceway. A small opening with movable latch is installed in the top of the trap through which the lobsters are removed. The traps, locally known as nazas, are built during the closed season (March 15th-July 15th) by each fisherman who usually assembles them on a component basis depending upon his ability to pay for the raw materials. Thus, a shipment of mahogany shorts will be entirely converted to end frames that are stored under the owner's house until another supply arrives and construction can proceed. In the past two years, the cost of materials has risen abruptly to the point where a trap that formerly cost S4. 00 BH now costs \$7 00 BH. Some idea of the investment involved in this specialized form of fishing can be gained from the fact that many fishermen today own as many as 200 or 300 of these wooden traps.

Under the present closed season program, the average life of a trap is estimated by the fishermen to be from one and one-half to two years, depending upon where the trap is habitually placed. Pimento lath is relatively resistant to the attack of marine growth in comparison to untreated mahogany shorts which are soon riddled by numerous small boring organisms. In addition to this natural deterioration, traps are often broken up by storms and the unwelcome attentions of porpoise, loggerhead turtles and the gata (nurse shark). Fishermen have repeatedly observed these animals molesting their traps. In the case of the loggerhead turtle, it can be established (see p. 101) that the motive is to extract and eat the lobster. In proportion to the actual number of traps lost, the fishermen stoutly maintain that their most serious natural enemy is other fishermen. This threat of stealing has had an inhibiting effect on the entire

industry and is the reason behind several practices (described on the following paged that otherwise appear illogical.

TRAPPING TECHNIQUES

In recent years, the use of traps has largely supplanted skin diving and hooking as a means of gathering lobster. The routine of the trap fisherman has become complicated by the the introduction of more efficient subsidiary equipment designed to increase the number of traps that can be effectively used by one man. There are numerous physical and cultural factors that influence the way in which this equipment is used. These factors have complex interrelationships that are evident in the following somewhat detailed description of trap fishing methods.

With the opening of a new season, actual fishing operations cannot begin until the new traps, built to replace last year's losses, have been properly "seasoned." The fishermen believe that a lobster will not enter a newly built trap unless the strange scents and "slime" have been ameliorated by a coating of marine growth. Consequently, several weeks before opening day the traps are carried out to areas where this growth has been found to be most prolific which, by coincidence, happens to be the lobster grounds. Therefore, (so the fishermen reason), it is through no fault of their own that the traps often contain lobster before the official opening date of July- 15th. Lobsters caught prematurely in this manner are kept in a special holding pen known as a "bomber" (see Plate 7, Fig. D) that is seldom used during the remainder of the season.

The traps are transported to the fishing grounds by stacking them on a smack or dryboat having sufficient space to accommodate several dozen on a single trip. For this initial setting, placement of the traps is a relatively simple procedure. Two small blocks of coral are fastened inside the trap at either end to act as anchor stones. Since bait is very seldom used, the traps may be lifted directly over the side and appropriately positioned on the bottom with a general purpose hooking pole having two curved, metal tines. The depth of water in which traps are placed is governed by this pole which is rarely more than four fathoms in length.

Once it has been lowered to the bottom, no buoy is used to mark the location of the trap, and the fishermen are careful to scatter them about so they are not placed in orderly lines. Furthermore, some effort is made to hide each trap or make it as inconspicuous as possible if bottom conditions permit. These practices have no other motive than to prevent competitors from finding their traps. As a result, the position of each trap must be memorized by the owner who usually fixes the spot in his mind by triangulation with conspicuous shore features. When several hundred traps are owned by one man, this system obviously becomes impractical: in such case, only the locations of key traps are remembered to help recover the additional traps that are placed about them in the same general area. Once a boat is stationed over one of these key traps, finding the outlying traps usually presents no difficulty as the water is often exceptionally clear over the lobster grounds. However, if the key trap has been destroyed or removed, it sometimes becomes virtually impossible to locate tile remainder. and `the entire sequence may become temporarily lost.

Favorite lobster grounds are not chosen on the basis of areas having the highest population density-, but rather on the ease with which the traps can be placed and periodically inspected. The greatest number of lobster per unit area is to be found immediately adjacent to the barrier reef in a hazardous zone in which few fishermen care to venture with their sailing boats.

On the other hand, the extensive zacate beds are often almost free of natural obstructions, but unfortunately, have fewer resident lobster. In actual practice, many fishermen attempt some form of compromise whereby their traps are more or less evenly distributed over the grass beds and concentrated around some of the more accessible rocky areas.

Generally speaking, the majority of traps are placed on zacate bottoms, particularly where there are a series of blanquizals. These shallow, dish-shaped depressions occur in the grass carpet where root systems have been removed and a thin layer of brilliant white sand has accumulated. 7 A distinct ledge often projects out from the perimeter of a blanquizal as a result of undercutting. This is a favorite abode of the spiny lobster. Traps placed near the ledge can be seen easily against the contrasting white bottom.

The rate at which lobster accumulate in traps is subject to much debate among Belizean fishermen. Some contend that if the traps are left untended for too long a period the lobsters tend to find their way out again, or even become cannibalistic and destroy each other. Conversely, if the traps are inspected too often, the animals will not have had sufficient time to explore this strange object and enter it. As a result, experience indicates that under normal conditions a trap should be hauled and emptied every seven to ten days. Searching out and hauling twenty-five or thirty traps constitute a hard day's work for a fisherman and his helper. From these statistics, it is obvious that the maximum number of traps a single fisherman can effectively use, assuming he works seven days each week (a very unlikely event), is slightly more than 200.

The elaborate routine connected with hauling a series of traps to the surface is known as "running." Before the fisherman can run a trap, his helper must station the boat directly over the spot by "planting a setting" pole. The trap is raised to the surface by inserting the the tines of the hooking pole under the frame above the entrance and lifting with a rapid handover-hand motion. To perform this task correctly, a fisherman must brace himself against the the side of his boat and lift the trap aboard without hesitation. Strain on the back muscles becomes so severe that many men use a type of home-made girdle, or kidney belt, that closely resembles the contraption affected by motorcycle riders.

After the lobster have been removed, the fisherman hastens to inspect the trap to make certain that it is his own before proceeding any further with the cleaning operations. Ownership can easily be established by the presence of a secret mark. Each man has his own system for applying this mark - a common pr practice is to add an extra nail in some inconspicuous part of the frame. Cleaning of the trap is accomplished by passing an ordinary stiff bristle scrub brush over the slats and frame to reduce any flourishing marine growth. If left uncleaned, the traps not only deteriorate more rapidly but also do not seem to attract as many lobster.

While the anchor stones are reset, an inspection is made for damage. Broken pimento strips must be replaced and the frame reinforced with additional nails if it has become loose. When the last of these maintenance operations is complete, the trap is hoisted over the side and gently lowered into place once more with the hooked pole.

In the meantime, the fisherman's helper has collected any lobster that were thrown in the bottom of the boat and placed them in a wet jute bag that is usually kept in the shady bodega (locker) under the bow. He than retrieves the setting pole and makes preparations to move the boat to the next location.

These laborious chores connected with the running of traps become uncomfortably hot on a still day and very difficult at best in a choppy sea. By early afternoon the fishermen are anxious to return home for

"tea" (a colloquial term for any meal) and a brief siesta. Later in the afternoon they must return to their boats to "clean" the catch.

PROCESSING AND MARKETING

Lobster are prepared for market by "twisting, " a process that involves a series of deft hand movements which begin by seizing the struggling lobster by its tail. The point of a long-bladed knife is inserted at an angle under the carapace while the animal is being rotated to help make a clean separation of the tail from the rest of the body. The severed tail is passed to an assistant who removes the intestine or "vein" with a short section of a lobster's antenna. This improvised tool is forced into the anus with a jabbing motion that ruptures the sphincter muscles, whereupon the intestine can easily be removed by pulling it out from the front.

Cleaned tail sections are unceremoniously dumped in a solution of "soda" (actually sodium sulfide) that has been prepared in the bottom of some handy dugout canoe. When all of the catch has been processed, the tails are sacked and carried ashore to one of several communal ice boxes where they are stored until enough are on hand to justify a trip to Belize.

When there is a shortage of ice in the village, as is often the case, the live lobsters must be taken immediately to precessing plants in Belize, as they cannot survive more than a few days under crowded conditions in a bomber pen. Before the use of small speedboats powered with outboard motors became wide-spread, spoilage of all or part of a catch was a common occurrence when ice was in short supply. Now there are enough of these utility boats in use so that one is almost always available to carry in a few sacks of lobster when the occasion demands.

Twisted lobster tails are delivered to one of several fisherman's cooperative plants in Belize where further processing and freezing take place. The iced tails are weighed and paid for immediately once the undersized or spoiled tails have been rejected. Large washtubs of tails are carried to a miniature assembly line of women who industriously snip off bits of scrap meat with scissors before they wrap the exposed end in a polyethylene bag specially designed for this purpose. Wrapped tails are neatly placed in hardware cloth freezing trays and stacked in a holding room until trey. become glazed. Actual freezing takes place in separate rooms kept at a temperature of -3° C.

When sufficient tails have been frozen, they are removed for sorting at a time when no other processing is being done. The tails are selected according to weight categories and packed in cardboard boxes until each box weighs exactly 10 pounds. Four of these boxes are then placed in a master carton and sent back to the freezer room.

The manager of the plant is responsible for arranging shipment of the frozen tails to wholesale dealers in the United States. Northbound cargo planes stop at Belize on request and carry the tails to ':Miami, Florida, in consignments of 6, 000 pounds each. Air freight cargo on the relatively empty northbound flights are presently fixed at the very favorable rate of six cents per pound. In view of the fact that the cooperative receives approximately 11-'1. 50 per pound for lobster, transportation costs are remarkably low. Air freight has proven to be altogether more reliable and economical than ocean transportation, since ships with refrigeration seldom called at Belize, even if there was enough freezer storage space to await their arrival. The perishable nature of the cargo further contributes to the impracticality of using ships because of delays in transferring all goods by barge to the anchorage located several miles from the town of Belize.

From these remarks, it is apparent that the expansion of the spiny lobster industry is due in large measure to the establishment of an efficient air freight system capable of delivering the products at an economical rate. The lack of these facilities is a partial answer to the question of why a similar exploitation has not taken place in the Bay Islands.

The maximum amount of lobster that can be legally exported from British Honduras is fixed by an annual quota system based on the recommendations of F. G. W. Smith, who predicted in 19-18 that the annual catch would eventually stabilize at approximately 400, 000 pounds. He further suggested that the quota might be raised to double this figure when fishing spread to deeper waters. According to Idyll (1961: 6), lobster fishing in the colony was restricted at the time of Smith's survey to the northern and middle areas shown on Map 20, with the southern cays and offshore reefs largely left untouched. There is virtually no change in the limits of exploitation today. The quota, however, was doubled, then raised to its present 900, 000 pounds and will soon be increased again to 1, 200, 000 pounds if the curious provisos of the Seven Year Development Plan are enforced.

These calculations by marine biologists and government planners fail to recognize the fact that the fishermen are totally unwilling to extend their trapping operations into deeper water. Even ii the problem of buoying the traps could be overcome, an entirely new - and substantially- more expensive - boat design and assortment of handlining equipment would be necessary. Without some form of program that takes these cultural and practical problems into consideration, it is exceedingly unlikely that the fishermen themselves will change their practice. The result will be eventual overfishing with an inevitable decline of the industry. Idyll's (1961) excellent report points out these dangers but suggests the remedy is to be found in the collection of better statistical data. While this is undoubtedly a crucial facet of any intelligent conservation program, it ignores those geographic factors, both physical and cultural, that proscribe the fishermen's activities to areas that are unable to support additional exploitation.

CHAPTER VIII SECONDARY EXPLOITATION OF MARINE RESOURCES Click here for a Map of the Distribution of Secondary Marine Resources

Emphasis on secondary exploitation of marine resources in British Honduras has centered in recent years on the turtles and conch, with only a passing interest in sponges. The present production of all these items combined is minor in comparison to the daily catch of scalefish and even more insignificant in value when compared with the spiny lobster industry. Nonetheless, these comments should not be construed to imply that there is little of geographic interest to be found in their distributions and the associated fishing activities.

CONTEMPORARY TURTLING

A study of the vestigal remnants of the once thriving turtle industry was undertaken in order to record some of the details while they can still be observed. According to Uring (1726: 357 ff), explorers and early settlers along the coast of Yucatan and Honduras depended heavily upon turtle fishermen to provide them with a source of fresh meat. Today, there are not more than a few dozen men in British Honduras who have retained the lore and skills necessary to capture these animals. Of slightly more than 100 fishermen living on Cay Caulker, only three consistently catch turtles as a means of livelihood. A somewhat larger number are operating out of San Pedro on Ambergris Cay, and there are five turtlers stationed on the minute cay known as Spanish Lookout, near Water Cay. South of English Cay Channel, there are no resident turtle fishermen, nor do the handful of men living on the offshore atolls catch more than an occasional turtle.

<u>Map 21</u> shows the combined distributions of three marine turtles: the cahuamo, or loggerhead (Caretta caretta) ; the tortuga blanca, or green turtle (Chelonia mydas), and the "turkey " or hawksbill (Eretmochelys imbricata). Even though these turtles are commonly found somewhat outside the habitat boundaries shown on the map, it is interesting to note that all three species are concentrated near the barrier reef in close proximity to the sandy cays that are favorite human occupation sites. Parsons (1962) , in his impressive monograph on the green turtle, points out this geographic coincidence as one of the contributing factors to the decline of the species.

At the present time, the general scarcity of turtles, particularly the green and hawksbill, has resulted in a change in the basic fishing technique. Whereas the harpoon was formerly the preferred equipment for capturing these animals, it has now been largely supplanted by the turtle net. Reference to the use of nets appears in the literature of previous investigators such as Ingle and Smith (1949), Doran (1953), and Parsons (1962), but the origin of the design remains obscure.

Along the coast of Quintana Roo and on the Nicaraguan beaches, turtles are "turned" at night when they crawl out on the sand to deposit eggs. Although this custom is practiced on occasion in British Honduras, the net is preferred and is found from Ambergris Cay southward along the barrier reef to Punta Gorda. A turtle net of almost identical appearance is made on Guanaja in the Bay Islands and is carried much farther east to the Vivario and Hobies Cays area by these Bay Islands fishermen. Throughout its range, the net remains more uniform in design and employment than any other material item of the fishing culture.

Turtle nets are usually not more than ten or twelve fathoms in length and resemble gill nets with oversize mesh. The first row of mesh (malla) is made with openings one and one-half times as large as the remaining four or five rows of thirty centimeter mesh. The body of the net is suspended from a rope, along which small "cedar" (Cedrela mexicana) floats known as "short-cakes" are fastened at intervals of three brazos (see footnote, p. 86). Two of these floats can be seen on either side of the man in the center of Plate 8, Fig. A. A rather large cylindrical anchor buoy, 1 also made of cedar, can be seen resting on the plastron of the turtle in Plate 8, Fig. C; it is designed with a tapering bottom section having three holes for the attachment of a weighted anchor line and the mainline supporting the net. Only two small weights are used on the net to overcome any tendency to float. The end opposite the anchor line is allowed to swing freely with the current, supported by a buoyant, cedar-wood decoy.

This turtle decoy (see Plate 9, Fig. A) is remarkably life-like when seen from a distance as it bobs about in a choppy sea. A few fishermen still paint their decoys with garish yellow, green, and black spots, as shown in the example on the left of Plate 8, Fig. C, but this practice is rapidly dying out. Turtle fishermen go to some pains to make a decoy, as they believe it is particularly effective in catching cahuamos during the breeding season (March-April). According to witnesses, these large turtles mate at sea, and the males instinctively "rush" any floating object of appropriate size. If the turtle is not entangled in the net during his preliminary maneuvers, fishermen maintain it is not uncommon to see one of them attempt to mount the decoy.

Fishermen place their turtle nets in a location where there is more than a mere chance that turtles will be encountered. One of the favorite sites is in front of the harrier reef among spur-and groove structures where turtlers believe the animals sleep during the day in rocky dormitorios (bedrooms). The nets are actually placed across the "drains" (grooves) in hope that a turtle will be intercepted either on entering or leaving. In practice, the placing of the nets close to the reef produces good results, as this is one of the favorite feeding grounds of the loggerhead. An examination of the stomach contents of the nine

cahuamos shown in Plate S. Fig. E indicated that they had been feeding exclusively on spiny lobster and soldier crabs. The fishermen, however, are of the opinion that loggerhead turtles eat loggerhead sponges and were surprised to have this evidence of a "richer" diet brought to their attention.

During the active egg-laying season (June-July), turtle nets are placed a short distance offshore from beaches where turtles lay their eggs, with the result that any of the three species is likely- to be caught. Nets are seldom positioned over turtle grass beds, where the green and hawksbill feed, since there are no natural constrictions of the subsurface topography that provide any advantage over a random setting. In addition, there is often heavy boat traffic over the grass beds which would interfere with, or even destroy, nets left in these areas.

In spite of the fisherman's attempts to utilize a naturally advantageous position, turtles do not frequently become fouled in these nets. Several days may pass before a fisherman checks his settings. A turtle that has spent more than a few hours in one of these nets becomes so entangled (see Plate 8, Fig. C) that it is not possible to extricate it without hauling the entire net on board and cutting the animal free.

Getting a large turtle into a small, outboard-powered skiff is, at best, a rather dangerous procedure. Cahuamos, unlike the smaller species, are not docile. The heavy beak of the loggerhead, so efficient in crushing crustacea, is also capable of doing harm to the fisherman and his boat. The large specimen shown in Plate 8, Fig. D. splintered the floorboards and stove in a knee brace of the boat "Civet" before it was subdued. In flailing about with its front flippers, the loggerhead can do serious damage to the unwary handler by slashing with the sharp claw located on the anterior edge of the member (see Plate 8, Fig. C, specimen on the left). Many fishermen avoid this risk by piercing the flippers of these turtles with copper wire in order to "tie their thumbs together," as shown in Plate 9, Fig. C.

On arrival at the village, considerable grappling takes place before a turtle can be hoisted overboard into shallow water, where it is temporarily tethered by a rope fastened to a hole in the rim of the carapace.

If only one or two animals have been captured, butchering takes place immediately and the meat is consumed locally. When a number of turtles have been collected over a period of several days, they must be removed from the water and placed in the shade of a temporary thatch but (Plate 8, Fig. E) where they await execution.

The use of turtle pens ("crawls") 2 as a means of temporarily holding a quantity of turtle in captivity has almost ceased in recent years as a result of general scarcity of the animals, and is also related to the fact that they are no longer held for live shipment outside the country. Two rather poorly-built pens were located immediately west of the municipal pier in Chetumal, Quintana Roo, and are illustrated in Plate 9, Fig. F.

The slaughtering (locally described as the furia) is accomplished by dragging the turtles into ankle-deep water and chopping the jugular with a rusty axe. The carcass is butchered by removing the plastron and dismembering the exposed parts. Meat recovered from the turtles is rushed by speedboat to the Belize market where it brings a fancy price that makes each large loggerhead worth about twenty-five dollars to the fisherman. In the processing of turtles, there is no longer any attempt to save the calipee3 that is so highly esteemed by Englishmen for the construction of turtle soup as described by Parsons (1962).

THE CONCH INDUSTRY

In contrast to the fluctuations suffered by the turtle and sponge fishing industries, conch gathering in

British Honduras has maintained a steady, if unspectacular, role in the inhabitants attempts to exploit marine resources. The common conch4 (Strombus gigas) was an important item in the diet of coastal Indians and remains an important staple in the Belize market today.

The conch is a scavanger that usually frequents grass beds in shallow waters between one and eight fathoms depth. According to Doran (1958: 391), the conch inhabits even deeper waters, but the extent is imperfectly known. Conchs are found throughout coastal waters of British Honduras and the Bay Islands where there is a reasonably firm bottom covered by turtle grass. In general, they avoid rocky areas, particularly on or near reefs where coral proliferates. Map 21 shows that the conch has a fairly extensive distribution but is not found to any considerable extent in the south and along the coast of northern Honduras where rivers discharge a substantial amount of silt.

The light-colored marine growth that flourishes on the periostracum of conchs makes them particularly conspicuous against a dark background of zacate. On calm days when the surface of the water is not overly agitated, conchs may be seen quite easily as they move slowly through the grass beds. Virtually no skill is required to dive overboard and pluck them from the bottom. However, the prevailing easterly trade wind often reduces visibility so that special equipment is necessary in order to gather conchs on a commercial scale.

Conch fishermen normally use a small "sea glass" consisting of a trapezoidal, watertight wooden box, sealed with a pane of glass at one end and left open at the other end for viewing. Manipulation of the sea-glass in British Honduras is curiously contrary to the method employed in other parts of the world. Belizean fishermen fit the glass pane over the smaller opening, invert the box, and look through the open base.

Conchs are "hooked" by men in doreys who lean over the side, grasping the sea-glass in one hand while they hold a pole with one or two metal tines in the other. The animal must be flipped over so that the aperature of the shell is exposed; the curved tines are forced into this opening and the shell is lifted to the surface. 5 Using this method, it is not uncommon for a team of conch gatherers to collect five or six dozen shells in the course of a day's work.

Conchs are placed in a small "crawl, " or pen, made of mangrove saplings or built up from blocks of coral piled in a roughly circular pattern until they rise above the surface, s The animals are able to subsist within these enclosures for several weeks without any special care. When a sufficient quantity has been accumulated, they are carried by boat to Belize where they are prepared for sale while the boats are moored alongside the market.

The processing of conchs for sale is a fairly simple operation: the muscle attaching the animal to its internal columella is severed by breaking a hole in the penultimate whorl with a machete (or any other similar tool that may be handy) and cutting the attachment. Plate 10, Fig. E. shows the shell of a prehistoric specimen on the right with the characteristic circular puncture hole? probably made by using a wave-worn spire of another shell as the tool. In the same figure, the example on the left is an exceedingly large specimen of a variety known as "Bay Islands broad leaf"; the hole broken in the shell of this conch will have a distinctly different appearance, often irregular in outline or reflecting the shape of the machete blade.

After the animal has been extracted from its shell, fillets are prepared by removing the incidental appendages and arranging the meat in what is hopefully an attractive display.

A special concrete counter is reserved in the Belize market for conch fishermen to display their wares.

During the past three years, a substantial quantity of frozen conch fillets have been exported to the United States by one of the fishermen's co-operatives. Cartons of fillets are shipped to New York City where they are sold almost exclusively to the Cuban refugee population. In 1964, customer demand forced fish brokers to specify that the eyes, siphon, and other identifiable organs not be removed in Belize before shipping. 8 Accustomed to Cuban processing methods, customers became suspicious that the cleanly-dressed conch fillets from British Honduras were, in actuality, some other form of inferior seafood.

The majority of conchs collected along the narrow coastal shelf of Guanaja and Roatan are consumed locally. Small amounts are sold on occasion in La Ceiba and Trujillo, but they are seldom exported to neighboring countries and are not common in the markets of Livingston, Puerto Barrios, and Puerto Cortes.

Plate 10, Fig. F . gives some idea of the quantity of conch consumed in Belize. This mound of shells has been gathered since 1961 by a man whose sole occupation is the daily collection of discarded conch shell which he gathers from boats tied up at the marketplace. If thrown overboard, these shells would soon clog the quay - consequently, the fishermen are content to donate the shell in exchange for having them carried away. Local citizens consider this pile of shells to be one of the outstanding physical attractions of the town and calculate that it represents a handsome fortune to the owner. In point of fact, the municipal government has, on occasion, purchased small quantities of shell from this stockpile for use as concrete aggregate in various construction projects. Broken conch shell seems to possess sufficient strength for this purpose and is much cheaper than quarried rock.

For reasons that are not altogether clear, a prejudice against the gathering, processing, and eating of conch has developed in British Honduras in recent years. There is a certain furtiveness about the men who gather them: the animals are extracted from the shell and filleted almost surreptitiously, and the product is bought by customers who shrink from attention. Conch is not served in the better hotels in Belize. Indeed, conch seems to be considered an indelicate subject in polite society. This attitude is certainly not shared in other parts of the Caribbean where the subject of conch is approached in a straightforward manner, acknowledged by all to be a delicacy.

THE SPONGE INDUSTRY

Sponges constitute another marine resource, the exploitation of which has all but disappeared within the last two decades. Prior to the 1920's, shipping records in the British Honduras Gazette indicate that sponges were gathered on a somewhat desultory basis with an occasional shipment being sent to Great Britain or the United States when an attractive price was offered. "Velvet," wool (Hippospongia lachne), and "glove" sponges formerly grew in profusion on scattered rocky areas in the central lagoon of Turneffe Island and were found over much of Lighthouse Reef and Glover's Reef. Additional concentrations were found over the rocky bottom adjacent to the barrier reef.

Although Anderson (1963: 67) claims the sponge industry was almost destroyed by "oversponging and injurious methods," this view seems overly pessimistic, and is not justified by the literature. However,, it is clear that the Colonial Research Committee made efforts to revive the industry after 1925, particularly in the matters of restocking and quality control. The central lagoon of Turneffe Island was divided into 1, 000 acre concessions and leased to individuals who were instructed in special techniques of sponge cultivation.

The program involved the transplanting of numerous "seed" sponge cuttings, carefully prepared and attached to concrete discs about five centimeters in diameter. A "wild" sponge of mature size and uniform appearance was detached from its natural habitat and cut into small cubes while held under water. Each section was then placed on the flat surface of the disc, to which it was firmly fastened by means of a split palmetto (Acoelorraphe Wrightii) clip that would rot away only after several months immersion. Large quantities of seeded discs were then transported in fish-cars (see p. 60) to selected beds within the concession area. Success of this technique depended upon handling methods which assured that at no time were the diced sponges exposed to air.

The use of a concrete disc was, in effect, another attempt to improve upon the existing environment, the motive being much the same as that behind the seine fisherman's construction of brush piles. Sponges, like oysters, require a solid foundation upon which to grow. The central lagoon of Turneffe, which otherwise seems ideally suited for sponge cultivation, is in fact covered to a large extent by poorly consolidated bottom sediments that do not provide a suitable base for sponge growth.

For several years the sponge scheme prospered, the growth rate being thirty-three per cent greater than that observed in the Bahama sponges. Prospects were dimmed by the disastrous hurricane of 1931, which did great damage to the Turneffe sponge concessions. Regeneration was rapid so that by 1935, another crop of adult sponges was ready for market; Anderson (1958) reports that "the export of sponges had become a thriving business."

In 1939, the industry came to an abrupt halt. A fungus-like disease, first reported by Brown, et al. (1939) in the Bahamas, and later by Galtsoff (1940), and Smith (1941), appeared within a remarkably short time in British Honduras. It completely decimated the cultivated sponge beds of Turneffe and spread northward along the coast of Quintana Roo according to Osorio-Tafall and Cardenas (1945). The local sponge industry has failed to recover from this disaster even though some apparently disease-resistant specimens survived and the lagoons now contain a reduced population. The recent tendency to substitute synthetic material has now reduced the market for natural sponge to a fraction of its former demand.

A few fishermen continue to "hook" wool sponge along the barrier reef in the vicinity of Ambergris Cay and Cay Caulker. An unusually well-formed specimen from the latter locality is shown in Plate 10, Fig. A. These sponges are sold locally at a very nominal price and used primarily to clean boat bilges.

An unusual opportunity to examine some of the traditional Caribbean sponge-fishing equipment occurred during the summer of 1965 with the unexpected arrival in Belize of the "Joseheres," crewed by two Cuban sponge fishermen. 10 Plate 3, Fig. F., shows the general deck plan of this large smack whose beam is sufficiently wide to accommodate a chalana (dinghy) athwartships. The "Joseheres" is an example of continued evolution of the original Cuban design brought to British Honduras in 1911 and subsequently little changed. Plate 3, Fig. F, indicates that the Cuban ship is rigged for a second jib sail that requires a bowsprit; the mainsail remains a sliding Gunter with extremely long boom and antenna. An unusually long sponge hook (Plate 10, Fig. B) with wrought-iron tines was found on board the "Joseheres." Pole length of seven meters indicates that it was intended for use in waters much deeper than would be attempted in British Honduras. The natural buoyancy of the wooden staff has been partially overcome by wrapping sheet lead around the lashings that attach the tines. Further investigation resulted in the discovery of the two tools shown in Plate 10, Fig. C. The forked stick on the left is used to impale the sponge while it is beaten vigorously with the wooden mallet, or paddle, on the right. In

normal practice, sponges are beaten periodically for several days, after which they are allowed to soak in fresh water for three to four weeks in order to promote the decomposition of the fleshy animal matter.

The failure of the British Honduras sponge industry to revive after the pandemic of 1939 may have obviated another disaster in 1961 when hurricane "Hattie" devastated Turneffe even more severely than the hurricane of 1931. Stoddart's map (1963: Fig. 14) shows the track of the storm passing squarely over the center of Turneffe's central lagoon.

Although the sponge industry is apparently a dead issue, it is interesting to speculate on another phenomenon associated with hurricanes that may in turn have been partially responsible for the susceptibility of the sponges to disease.

Marine sponges are intolerant of low salinities and can be readily killed by sudden influxes of fresh water into restricted areas. Torrential rainfall during convectional thunderstorms often causes thermohaline currents to develop in the backreef lagoon along the coast of British Honduras, and particularly large storms of this type commonly form over the shallow Turneffe lagoon during the summer. Two or three days of exceptionally heavy rainfall associated with the passage of a major hurricane may conceivably have produced a sufficient lowering of salinity to the extent that it seriously impaired sponge growth. Hurricanes are known to have visited the area in 1934, 1942, and twice in 1945, but there is no official record of such a storm in the disease year of 1939. Nonetheless, it remains a possibility that unsettled weather producing abnormal amounts of rain may have weakened the sponges and at the same time triggered a "bloom" of some widespread, latent natural enemy.

The value of this hypothesis is not strengthened by the fact that it requires coincidence of heavy rainfall to explain the near-simultaneous appearance of the disease in both British Honduras and the Bahama Islands. Tierney (1954: 259) repeats the opinion of Smith (1941) that the disease was current-borne but does not specify the currents involved. An inspection of Map 5 shows that the surface currents entering British Honduras waters come from the south rather than the east. It is difficult to imagine how deeper currents could have spread the disease, detouring around Cuba in a direction opposed to the Gulf Stream.

PRESENT STATUS OF MANATEE

Only a brief mention can be made of the manatee, which is the last to be considered and least exploited of the secondary marine resources. Since the introduction of legislation making it illegal to kill these large, walrus-like animals, it has become impossible to observe the contemporary techniques of law-abiding fishermen who have ceased searching for manatee as a source of subsistence food.

Map 21 indicates that the manatee has an extensive distribution in British Honduras and Quintana Roo. Sightings by fishermen from widely scattered localities suggest that the animal is not rare. Large herds are reported from the northern extremities of the Bay of Chetumal, the Bahia del Espiritu Santo, and the Bahia de la Asencion - areas almost entirely without human population.

The manatee typically inhabits brackish waters in and about coastal lagoons and river mouths of British Honduras, being most active in the early morning hours. A group of approximately eight individuals was observed on a number of occasions at the mouth of the Belize River. The firmly ingrained belief that these animals feed primarily on turtle grass is incompatible with environmental conditions in or near this river. The Salt Creek Lagoon area is similarly devoid of grass beds, yet informants state manatee are found there throughout most of the year and are particularly conspicuous in the month of May when

they have been observed breeding. While it is obvious that more field data are needed, the possibility remains that the present distribution of the manatee represents a considerable withdrawal from a feeding range that formerly included the extensive turtle grass beds now heavily trafficked by boats.

A low reproductive rate makes the manatee an unsuitable subject for consideration in any future plan to increase the productivity of marine food resources. Conservation practices are undeniably commendable, but the manatee, like the tropical monk shell before it, is inevitably doomed to extinction in the face of eventual human intrusion into its remaining habitat.

CHAPTER IX CONCLUSIONS

The present study indicates that commercial fishing activities along the western coast of the Caribbean Sea between Cabo Catoche and Cabo Gracias a Dios are poorly developed. Fishing on a subsistence basis is more widespread but has a discontinuous distribution such that the greatest number of fishermen are found in northern British Honduras. In this area, fishing activities have traditionally been restricted to shallow waters adjacent to the nearly continuous barrier reef that parallels the coast, with very little sustained effort made to exploit pelagic species of deeper waters.

Investigations of prehistoric fishing activities were originally undertaken in order to determine the extent to which aboriginal material fishing culture was transmitted to early settlers of the colonial period. The results suggest that very little in the way of equipment and techniques was diffused in this manner, with the important exception of harpooning which became one of the principal fishing methods of the colonial period. However, during the course of field work designed to establish possible relationships between aboriginal and present day fishing grounds, evidence of an extensive, previously unreported, prehistoric coastal Indian population was discovered. The distribution and present ecologic surroundings of seven large villages and numerous habitation mounds strongly indicates that these lagoonal areas were inhabited by non-agricultural, sea-oriented people. The antecedents of these coastal aborigines cannot be accurately determined without supplementary stratigraphic data.

The fundamental conservatism commonly attributed to fishermen in general is apparent throughout most of the colonial period, and until recent years, fishing in the study area has remained greatly underdeveloped. Development of fishing methods in British Honduras did not take place at a uniform pace; advances were made only after long periods of static practice. In many instances, cultural factors have considerably limited the successful exploitation of fish resources.

Several examples of relatively recent cultural diffusion has been recognized and details of the process described. It has been shown that Cuba has provided much of the cultural inspiration in techniques and equipment, in spite of the well-developed Mexican affinities and background of many fishermen in northern British Honduras.

Settlement patterns of fishing communities show some direct relationships to physical features, but aside from location, they exhibit characteristics that are repeatedly found within each of three distinct cultural groups. The distribution of techniques among these three groups is sharply defined with remarkably little transition between adjacent communities. There is a definite tendency toward the establishment of preferred techniques by the fishermen of a particular village that contrasts markedly with those of their neighbors in the same culture group. The marine resources being sought by these fishermen are often the same, and there are no outstanding differences in the fishing ground environment. Therefore, it has been concluded that these disparities in practice by members of the same ethnocultural group have occurred

as the result of culturally determined factors that create unpredictable changes in methods and under circumstances that have not been obvious in every case. The advent of modern transportation, processing, and marketing facilities has enabled fishermen of the northern area to develop an industry based on the exploitation of the spiny lobster. Prior to these events, fishing was maintained on a bare subsistence level without making any appreciable contribution to the national economy on a commercial basis. Success of the spiny lobster industry is dependent upon international arrangements and assistance provided by business interests outside the country. There are indications that national aspirations may eventually result in the introduction of fishing practices that are not in keeping with economic realities and sound conservation.

PLATE 1

Fig. A. Preparing a half-model. Fig. B. Sharpening a hoe adz.

Fig. C. Detail of deadwood construction. Fig. D. Shrimp clipper construction - Guanaja.

Fig. E. Smack construction - stern view. Fig. F. Smack construction - planing of pine planking.





Fig. A.







Fig. E.

Fig. D.



Fig. F.

Fig. A. Dorey design - "silk-cotton" ceiba) wood. Fig. B. Large seining dorey with outboard bracket - La Ceiba.

Fig. C. The "creau" or sailing dorey. Fig. B. Sail plan of .small Black Carib dorey.

Fig. J. Motorized doreys - Belize Harbor. F _g. r . Motorized dorey - "The Town," Guanaja.

. Motorized dorey - "The Town," Guanaja.





Fig. B.







Fig. E.

Fig. D.



Fig. F.

Fig. A.

Fig. A. The "Lion R." and "Cruzita" - Cay Caulker. Fig. B. Detail of the "Lion R. Is" live well - Cay Caulker.

Fig. C. The "Lion R." becalmed near Hick's Cay. Fig. D. The smack "Alice May" - a delicate double-ender from Stann Creek.

Fib. E. Careened smack on Cay Caulker. Fig. F. The "Joseheres" - large Cuban smack impounded in Belize Harbor.





Fig. A.



Fig. C.



Fig. E.

Fig. B.







Fig. F.

Fig. A. Sprat net - Cay Caulker. Fig. B. Seine nets drying in Belize Harbor.

Fig'. C. Details of wire bait-car - Belize. Fig. D. Wooden bait-car and lobster traps - Cay Caulker.

Fig. E. A large fish-car - Calderitas, Quintana Roo. Fig. F. Mackerel and "bomber" - Cay Caulker.





Fig. B.











Fig. F.

Fig. A. Handlining over grouper banks - Cay Caulker. Fig. B. Shacks and fish corrals at Cay Glory.

Fig. C. Grouper in corral - Cay Glory. Fig. D. Butchering Tables - Cay Glory.

Fig. E. Shack with fish drying on "tendedores" - Cay Glory. Fig. F. Corned fish drying on boat - Cay Glory



Fig. A. Aerial view - Belize City. Fig. B. Aerial view - Belize City.

Fig. C. Cay Caulker village - windward shore. Fig. D. Cay Caulker village - leeward shore.

Fig. E. Fishing village at St. George's Cay. Fig. F. Fishing settlement near Savanna Bight, Guanaja.



Fig. A.



Fig. B.



Fig. C.



Fig. D.







Fig. F.

Fig. A. Large spiny lobsters - Guanaja. Fig. B. Detail of lobster traps - Belize.

Fig. C. Detail of lobster trap entrance and top - Belize. Fig. D. Detail of a "bomber" - Cay Caulker.

Fig. E. Detail of oval lobster trap - Mediterranean design used by French on Guanaja. Fig. F. Improvised throwing trap for lobster -Guanaja









Fig. F.

Fig. E.

Fig. A. Repairing a turtle net - Guanaja. Fig. B. Loggerhead and captors with tattling gear - Cay Caulker.

Fig. C. Two loggerheads entangled in turtle net - Cay Caulker. Fig. D. Unloading a large loggerhead - Cay Caulker.

Fig. E. Loggerheads awaiting execution - Cay Caulker. Fig. F. Details of turtle butchering - Cay Caulker.



Fig. E.

Fig. F.

- Fig. A. Detail of turtle decoy Drowned Cays.
- Fig. C. Loggerheads with "thumbs tied" Cay Caulker.
- Fig. E. Male loggerhead harpooned near Cay Caulker.
- Fig. B. Detail of green turtle Cay Caulker.
- Fig. D. Hawksbill turtle northeast coast of Guanaja.
- Fig. F. Turtle corrals Chetumal, Quintana Roo.



Fig. A.









Fig. E.



Fig. D.



Fig. F.

Fig. A. Wool sponge - Cay Caulker area.

Fig. C. Cuban sponge-cleaning tools on board the "Joseheres."Fig. D. Deck view of the "Joseheres" - Belize Harbor.Fig. E. Bay Islands "broad-leaf" conch and prehistoric specimen.Fig. F. Mound of empty conch shells on Haulover Creek, Belize.

Fig. B. Detail of Cuban sponge hook.



Fig. A.



Fig. C.



Fig. E.



Fig. B.



Fig. D.



APPENDIX I

Identification and Ownership of Structures Shown on Insert to Map 16

1.	Cricket Pitch	34. Jack Sabido
2.	Miguelina Lopez	35. Clotilda Alamina
3.	Leopold Franco	36. Hotel Sabido
4.	Belisario Martinez	37. Leopoldo Heredia
5.	Catholic Mission	38. Siriaco Marin
6.	Angel Nunez	39. Teddy Blease
7.	Flora Badillo	40. Bonifacio Allen
8.	Flora Badillo	41. Nelson Young
9.	Grog Shop	42. Filiberto Bobadillo
10.	. Pablo Canto	43. Bernalina Vega
11.	. George Belease	44. Esteban Reyes
12.	. Melvin Badillo	45. Abdulio Gonzalo
13.	. Flora Badillo	46. Fernando Magana
14.	John Badillo	47. Luis Heredia
15.	Luis Marin	48. Pedro Marin
16	Grog Shop	49. Julio Bobadillo (Gen. Store'.
17	Santiago Guzman	50. Co-op Office
18	Ernesto Marin	51. Tiburcio Badillo
19.	Erica Novela	52. Taudoro Marlin
20	Felix Bradlev	53. Jesus Heredia
21	Hector Alamina	54. Rodolfo Heredia
22	Rogelio Novelo	55. Teresa Canto
23.	Geral Badillo	56. Desiderio Rosado
24	Magdalena Badillo	57. Faustinu Canto
2.5	Rav Auxilou	58. Leslie Pitsole
26	Rogelio Novelo	59. Thomas Rodriguez
27	Alonso Novelo	60. John Rodriguez
28	Enrique Castillo	61. Juanito Rodriguez
29	Pastor Rosado	62 Burley Balderramos
30	Daniel Marin	63. Fish cleaning tables
31	Valentin Alamina (Gen. Store) 64. Conch cleaning area
32	Police Station	65. Emma Bevins
33.	Leoniino Marin	66. Bartolo Rodriguez
67.	Abelardo Rodriguez	85. Alejandro Canto
68	John Marin	86. Thomas Young
69.	Leonardo Bobadillo	87. Christine Rosado
70.	Carlos Marlin	88. Antonio Gonzalez
71.	. Mel Klinan	89. Luis Heredia
72.	Willy Leslie	90. Feliciano C`nteuero
73.	. Community Center	91. Public School
74.	. Santiago Marin	92. Tony Young
75.	Gregorio Menzie	93. Peter Young
76.	Manuel Marlin	94. Cemeterv
77.	Emilio Marlin	95. Latrine
78	Policarpo Bevans	96. Latrine
79.	. Emilio Novela	97. Latrine
80.	. Filimon Pariente	98. Latrine
81	. Eduardo Bevans	99. The Front Bridge
82.	. Paula Marin	100. The Back Bridge
83.	. Alberto Pariente	101. Skiff anchorage and trap storage area
84.	. Eduardo Reyes	

GLOSSARY OF MARINE FAUNA CARIBBEAN CENTRAL AMERICA - Part 1

LITTORAL SPECIES

ENGLISH	CREOLE	SPANISH	CARIB	WAIKA
(Caribbean)	(Belize)	(Cay Caulker)	(Punta Gorda)	(Crata)
Manatee	Manati	Manati	Manadi	Pa'lpa
Conch	Conch	Caracol	Nadaba also Wadabo	
Loggerhead Turtle	Loggerhead	Cahuamo	Gawamu	Logerit
Hawksbill Turtle	Hawksbill		Gararu	
Green Turtle	White Turkel		Gadaru also gagaro	Li
Shrimp	Swimp	Camaron	Gamaroun	Wah'nsi
Sawfish	Swordfish	Pez sierra	Gasieran	Taslivin
Stingray	Skate	Raya	Sibari	Quisawa
Snook	Snook	Robalo	Burutauba (adult)	Kronhi
			Kaluwa (young)	
	Crana	Crana		Krana
	Tuba	Tuba		Tuba
Mangrove Snapper	Black Snapper	Mulato	Hiyawah	Mas-mas
Mullet	Mullet	Lisa	Barasi	Konkali
Nurse Shark	Nurse	Gata	Alerio	N'yanta
Bonefish	Boneyfish	Macabi	Masimasi	
Tarpon	Tarpum	Sabalo	Haba (also gahsenso)	
Sardine	Sprat	Sardina	Guriswa	
Porpoise	Blackfish	Lobo del Mar	Suguni also Sigeh	
Spiny Lobster	Crayfish	Langosta	Isuru also hugu'wero	
Blue Crab	Rawty	Cangrejo	Harquru	
Hermit Crab	Soldier Crab		Hawaili	

Saltwater Catfish	Shittifish	Bagre	Baguri							
Gafftopsail Catfish	Sea Cat	Bagre	Bogan'juh ("old man")							
Octopus		Pulpo								
Manta Ray	Manta	Manta		Kisuwatara						
Leopard Ray	Spotted Ray			A'hntaki						
GLOSSARY O	F MARINE FAU	NA-CARIBBEAN	CENTRAL AME	RICA - Part 2						
SHALLOW WATER SPECIES										
ENGLISH	CREOLE	SPANISH	CARIB	WAIKA						
(Caribbean)	(Belize)	(Cay Caulker)	(Punta Gorda)	(Crata)						
Dogtooth Snapper	Dogteeth Snapper	Can-Xic (Mayan?)	Galali							
Margate Grunte		Zapatero	Galali							
Mutton Snapper	Mutton Snapper	Pargo Colorado								
Red Snapper	Satin Snapper	Huachinango	Gagubanagai							
Yellowtail Snapper	Yellow Tail	Rubio	Galali							
Cubera Snapper	Black Snapper									
Red Grouper	Grouper	Mero	Kurupa							
Black Grouper Sp.	Rockfish	Abadejo	Waga'nut							
Jewfish	Jewfish	Yerna	Inego							
Jack Crevalle	Crebally	Jurel	Yawariga	Mupeh						
Permit	Pompous Jack									
Barracuda	Barra	Picuda	Yamura	Baracuta						
Blue Grunt	Grunt	Cachi (Mayan?)	Guwego also quequru							
Yellow Grunt	Grunt	Cachi (Mayan?)	Guwego also quequru	Cago Masi maska *						
Spanish Mackerel	Mackerel	Sierra	Wahrupi							
Cero Mackerel	Mackerel	Cero								
Silk Snapper	Silk Snapper	Rayado								
Amberjack		Dorado (?)	Likahula mopika							
Reef Snapper	Reef Snapper	Huach								
		(Mayan?)								
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Hammerhead Shark	Shovel-bill Shark		Gabuteri							
Kingfish	Kingfish	Pejerey	Awawi							
Ballyhoo	Bally	Aguja								
Triggerfish	Old Wife		Hano also hanau							
Puffer	Shuf-Shuf		Limili							
Remora		Remora	File							
Ladyfish			Hurupata							
Parrot fish	Gillybore	Peje Toro								
Wahoo	Queenfish	Pejereina								
Bonito	Bonito	Bonito	Bunigu							

*Because it is striped like the chevrons of a Spanish corporal, or cabo.

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