The Voice of the Fishermen of Southern Belize

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A Publication by

TIDE & TRIGOH

Edited by Will Heyman y Rachel Graham

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The Voice of the Fishermen of Southern Belize

A publication of the

Toledo Institute for Development and Environment
and
The Trinational Alliance for the Conservation of the Gulf of Honduras

Edited by Will Heyman and Rachel Graham

Toledo Institute for Development and Environment (TIDE)

The Toledo Institute for Development and Environment (TIDE) is a non-government organization (NGO) committed to promoting integrated conservation and development in Southern Belize. TIDE recognizes that local communities are dependent on natural resources so that conservation and wise utilization of natural resources will sustain both cultures and the environment. TIDE is also one of nine members of the Tri-National Alliance of NGOs for the Conservation of the Gulf of Honduras (TRIGOH), and shares a goal of regional fisheries management.

TIDE

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Foreword

Fisheries resources are in a state of decline throughout the world's seas. Overexploitation, destruction of habitats essential for the maintenance of healthy fish stocks and upland sources of pollution are some of the main factors associated with this decline. In many countries it is the small-scale or artisanal fisheries and the dependant communities and families that are the first to feel the impact of such losses. Artisanal fisheries often form an important if not the sole source of income and protein for many local coastal communities.

Little information is available worldwide on artisanal fisheries as compared to their industrial counterparts. This absence of information is notable in national landings statistics and in the associated national fisheries policies which traditionally have reflected the industrial fleet's catches and needs. More recently, these issues have surfaced in the shared waters of the Gulf of Honduras (GOH), an embayment bordered by Guatemala, Honduras, and Southern Belize.

Artisanal fishers in the Gulf of Honduras have been trying to call attention to the steady decrease in the region's fisheries resources, yet their voice has not been heard until recently. Heeding the call the Toledo Institute for Development and Environment (TIDE) a non-governmental organization based in Southern Belize and the Trinational Alliance for the Conservation of the Gulf of Honduras (TRIGOH) initiated a tri-national study on the status of the artisanal fishery in the GOH based on a series of surveys, semi-formal interviews and community meetings held with artisanal fishermen in all three countries from March 1998 to June 1999. The Fundación para el EcoDesarrollo de Guatemala (Fundaeco) completed this same study in Guatemala as did the Fundación para la Protección de Lancetilla, Punta Sala y Texiguat (Prolansate) in Honduras. These sister publications are available directly from Fundaeco and Prolansate.

The Voice of the Fishermen in Southern Belize documents the status of fisheries resources from the perspective of artisanal fishermen in Southern Belize. This publication seeks to document valuable information on shared fisheries resources that local fishermen have collected over many years. It further highlights their recommendations on how to improve the conservation and management of these dwindling fish stocks.

This document aims to reach a broad audience that includes fishermen, policy-makers, educators, conservation groups, researchers and potential funding donors. It is hoped that the tri-national nature of this project will help to clarify the regional priorities for shared fisheries management. It is also hoped that the process and the three resulting *Voice of the Fishermen* documents will lay the ground work for better communication, understanding and collaboration between fishermen and fisheries policy-makers at both the national and regional levels.

Executive Summary

The Voice of the Fishermen of Southern Belize and its sister publications from Guatemala and Honduras form part of a continued process to improve fisheries management within the GOH with the collaboration of the region's fishermen. This document is based on studies and interviews with 37 boat captains representing 84 fishers in Southern Belize. Furthermore, a group of technical experts, including several fishers from the region examined all three documents and provided specific recommendations for the improvement of fisheries management throughout the GOH.

Fishermen in the GOH possess a broad knowledge of marine resources and have noted a distinct decline in fisheries resources. They have the most at stake if fisheries are well -or poorly- managed and are in the best position to affect positive change. However artisanal fishers have little or no representation in fisheries policy-making. Their landings are rarely if ever represented in national landings statistics despite yielding a significant portion of the region's catches.

"No fish hardly out deh

Fisherman's comment

This study indicates that landings from the entire GOH reach an estimated total 14,305,000 pounds of fish catches per year. This figure represents a BZ $22,750,000 ($US 11,375,000) industry and Belize accounts for 4% of total landings (575,000 lbs per year) and 8% of the value or BZ $2,002,000 (just over $US 1 million per year). Lobster landings represent half the value of the fishery, bringing in BZ $920,000 ($US 460,000). During this study lobster commanded an average first payment of BZ $13.27/lb ($US 6.64/lb) with the traditional second payment made to fishermen by the cooperatives nearly doubling the final price. Currently lobster is sold as tail only but may bring a higher value if sold with the bodies, alive or dead. Queen conch also provides a strong yearly revenue (BZ $118,000). Several finfish species dominate the remainder of the catch with snappers (309,478 lbs), mackerel (52,619 lbs), jacks (42,337 lbs), and barracuda (25,249 lbs).

Though much of the scale fish is caught with handlines, a significant portion is still landed with gill nets, and other more destructive fishing gears. Finfish prices range between about BZ 1.25/lb and 2.50/lb (US $0.75 to 1.25/lb). Yet by selling high quality freshly hand-caught fish directly to restaurants, the value of landed finfish could be nearly doubled. Fishers are increasingly interested in the economic alternative of sports fishing as they seek to boost the family income while sustainably utilizing their fishery resource. Catch and release fly fishing for permit, snook, bonefish, and tarpon can bring in far more money to a guide than fishing for the local market, and ensures that the fish brings in a stream of revenue by being potentially caught time and again.

Despite the regional decline in fish stocks perceived by artisanal fishermen throughout the GOH, the number of fishers in the region is increasing. Surveyed fishermen in Southern

"Fish do not know where the borderline is"

Fisherman's comment

Belize believe that the main causes of decline include overfishing–including overfishing of juveniles and females with roe– smuggling, the use of destructive gear such as gill nets, and limited enforcement of existing regulations. Fishermen therefore suggest working towards harmonizing fisheries laws with neighboring countries, revising fishing license procedures, enforcing existing regulations, and restricting destructive gear such as gill nets and shrimp trawlers. They further recommend restricting fishing in sensitive times and places such as nursery areas, and promoting the use of marine reserves for fish stock protection and management. Artisanal fishermen also want to see stronger protection for sport fish species (snook, tarpon, and permit), training in economic alternatives such as the preparation of higher valued products (whole live lobster), and sports fishing, especially fly-fishing.

Fishermen recognize that the GOH is a shared body of water, connected by marine currents. With the lowest population in the region, the largest portion of reef and mangroves, and the smallest portion of the landings, Belize has much to gain from increased enforcement, better harmonization of fisheries policies and shared fisheries management.

Acknowledgements

TIDE wishes to thank the interviewed fishermen for their time and participation in this initiative. TIDE also wishes to thank the Belize Fisheries Department for providing landings data and for working more closely with fishermen and NGOs on enforcement. The study was implemented by TIDE, with technical support from The Nature Conservancy (TNC) and the TRIGOH (see Appendix 4 for members). TIDE's Roberto Echeverria, and Sharon Ramclam helped with several interviews and analysis while Mike Vernon completed most of the interviews and a first draft of the document. Wil Maheia provided oversight, editing, and help in the study design. Dan Haug designed and operated the database to produce the graphics. Sharon Franklin of TIDE produced the maps. Eva Vilarrubi of TNC copyedited the documents. Lindsay Garbutt helped organize the completion of the workshops and the final production of the document. Rachel Graham provided writing, editing, and both designed and completed the layout. Will Heyman conceived the project, served as a facilitator, and provided the analysis and writing. This study was funded by the US Agency for International Development (USAID), via the PROARCA/Costas and Capas Projects, and TNC.

Acronyms

CCAD	Comisión Centroamaericana para el Ambiente y el Desarrollo
CITES	Convention on the International Trade for Endangered Species
DIGEPESCA	Dirección General de Pesca (Honduras)
FUNDAECO	Fundación para el Eco-Desarrollo de Guatemala
GOH	Golfo de Honduras
PROARCA/CAPAS	Programa Ambiental Regional para Centro America (CAPAS)
PROARCA/COSTAS	Programa Ambiental Regional para Centro America (COSTAS)
PROLANSATE	Fundación para la Protección de Lancetilla, Punta Sal y Texiguat
TIDE	Toledo Institute for Development and Environment
TNC	The Nature Conservancy
TRIGOH	Alianza Tri-Nacional para la Conservación del Golfo de Honduras
UNIPESCA	Unidad Nacional de la Pesca (Guatemala)
USAID	United States Agency for International Development

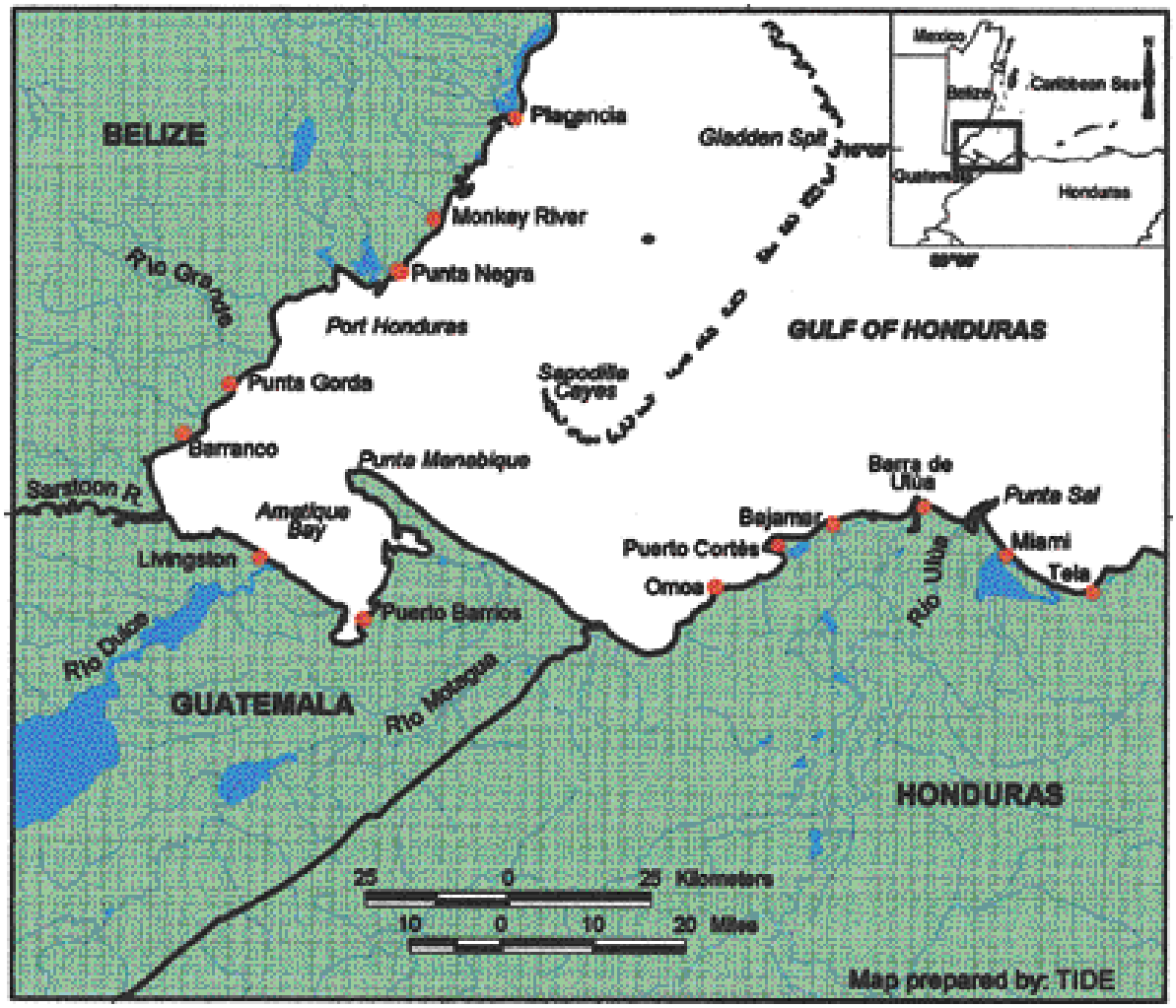
Introduction

The main objective of this report is to document the status of fisheries resources from the perspective of the small-scale artisanal fishermen of Southern Belize. In the absence of any other data available on artisanal fisheries, it is hoped that this rapid survey will provide fishermen, conservationists, educators and policy-makers with information leading to the harmonization of fisheries laws and policies in the GOH countries.

The Gulf of Honduras includes the entire Atlantic coast of Guatemala, the Atlantic coast of Honduras from the border with Guatemala to Triunfo de la Cruz (a village near the city of Tela). In Belize it includes the area from Placencia and Gladden Spit to the Sappodilla Cayes and the Sarstoon River. The gulf encompasses a range of habitats such as reefs, mangroves, sea grasses, estuaries, and the open sea. Most fish species need most if not all of these areas during their life, and the linkages between them are critical to maintain healthy fish stocks.

The three "Voices" documents produced for Belize, Honduras and Guatemala follow a similar structure to facilitate the comparison of data, key fishery resources and issues for each country differ and are addressed as

Figure 1. The Gulf of Honduras



such. In Belize the lobster fishery is very important to fishermen, yet is not as important to Guatemalan fishermen, whereas the manjua fishery is a key resource in Guatemala and is barely considered in Belize. This document is divided into four main sections that include:

1. Summary of data on fisher socioeconomic information
2. Landings data
3. Fishermen's perception of the fishery resources
4. Conclusions and recommendations.

Fishermen recommendations appear throughout the document in pertinent sections and are further compiled in the conclusions and recommendations. Additionally, a team of technical experts working on fisheries issues drafted a set of trinational recommendations based on fisheries issues and recommendations common to all three countries, many of which were highlighted by the fishermen (see Appendix 4 for TRIGOH technical team members). The conclusions and recommendations are followed by a list of useful contacts and several appendices that include a multilingual guide to the fishes of the GOH.

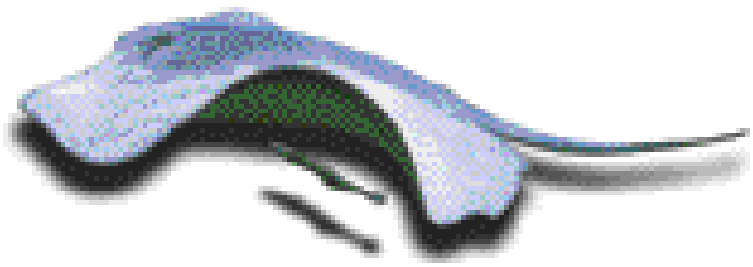
It is further hoped that these documents will provide baseline information on artisanal fisheries and landings useful to national institutions and organizations such as national fisheries departments and to regional organizations and initiatives such as the TRIGOH, and the regional Mesoamerican Reef projects.

Box 1. Ecosystem Function of the Gulf of Honduras

The Gulf of Honduras (GOH) includes territorial waters of Guatemala, Belize, and Honduras. The surrounding watersheds receive a significant amount of rainfall each year (3,000-4,000 mm, or nearly 12 feet). Sixteen major rivers carry this water into the Gulf, where the freshwater mixes with the Caribbean Sea. Peak river transport of freshwater (and sediments) occurs in the wet season, from July to October. The result is that the GOH has two basic states: wet season when coastal processes dominate, and dry season, when oceanic processes dominate.

During the wet season, the basin maintains brackish or estuarine characteristics including lower salinity, increased turbidity, and usually higher temperatures. The high volume of freshwater in the inner gulf also gives rise to easterly flowing, density-driven surface currents that exit the inner Gulf of Honduras between the Sapodilla Cayes and Punta Manabique. Floodwaters from the Motagua, Ulúa and Chamelecón dominate the inner gulf, affecting water quality in the Sapodilla Cayes. During the dry season, when freshwater input is limited, the deep oceanic waters of the Caribbean enter coastal waters. Southerly winds increase the westerly flow of nutrient-rich oceanic waters from the deep Cayman Trench into the inner gulf. The seasonal changes in oceanographic conditions dictate the migration of fish species.

These seasonal patterns are reflected in landings data whereby estuarine species such as snook are caught more commonly during flood conditions. In comparison, oceanic species such as tuna are more commonly caught in the dry season, when oceanic waters come close to the coast, and the fish are more accessible to coastal dwelling artisanal fishermen.



Summary of Data

This document is based on a set of interviews with 37 fishing boat captains that were conducted by TIDE during March to June, 1998. Although only captains were surveyed they represent the fishermen who work with them in their boats. The survey methodology is detailed in Appendices 2 and 3. Only artisanal fishermen were included in the GOH survey, as larger shrimp trawlers and other industrial fishermen were not interviewed. In Belize, most fishermen think of themselves as small scale commercial, but by regional standards are considered artisanal.

Socio-economic information

This section provides some basic socioeconomic and population data on the coastal region of Southern Belize that includes the surveyed fishermen, the equipment they use, and their fishing economy. Fishermen were also surveyed concerning the economic occupations they maintain in addition to fishing. These data provide the context for the recommendations made by the artisanal fishermen to better both national and regional fisheries management and policies.

Distribution of fishermen in Southern Belize

The total population of Belize's coastal portion of the GOH is estimated at 4,510 inhabitants. Table 1 shows the population of villages surveyed, and both the number of surveyed and estimated number of captains and fishermen in each village. Nearly 45% of the fishermen in Southern Belize are represented in this study and the survey results presented here indicate a highly representative sample. As indicated in Table 1, a total of 37 boat captains were interviewed (representing 84 fishermen) further representing an estimated total of 187 fishermen. The category "Gladden Spit" includes surveys undertaken at Gladden Spit during a mutton snapper spawning aggregation in May 1998. Only two of the 37 fishers surveyed are women reflecting the male-oriented nature of the profession. Additionally, two captains from Gladden representing four additional fishers were surveyed and their landings included in the "Artisanal fishery landings"

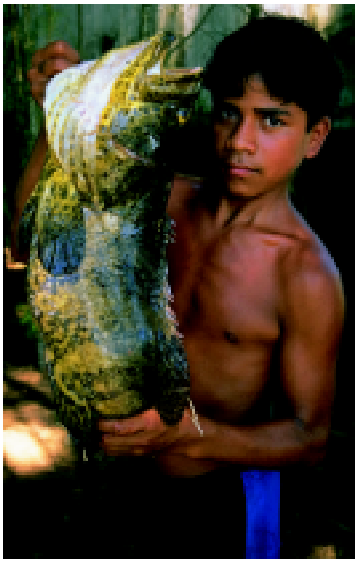


Table 1. Distribution of fishers in communities in Southern Belize

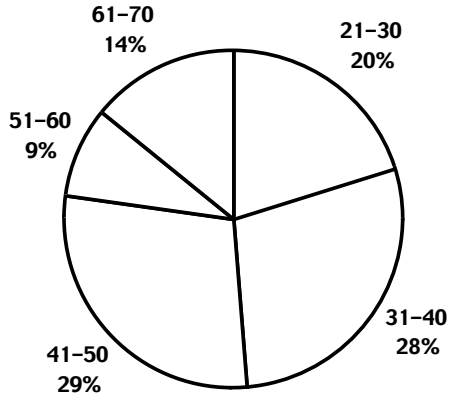
Home port	Estimated population	Estimated No. of captains	Estimated No. of fishermen	No. of captains surveyed	No. of fishermen represented
Barranco	240	4	9	2	5
Port Honduras Cayes	30	10	22	5	11
Monkey River	220	8	30	8	30
Punta Gorda	4,000	67	107	19	31
Punta Negra	20	8	19	3	7
Total	4,510	97	187	37	84
Gladden Spit		20	40	2	4

section but their data is not reflected in the socio-economic section. Although Gladden fishing grounds lie within the study region they are exploited by many fishers from outside the area.

Southern Belize's coastal population of less than 5,000 people represents a fraction of Guatemala's Atlantic coastal population, estimated at 100,655 people, and Honduras' coastal Atlantic population (Omoa to Triunfo de la Cruz), also about 100,000 people. These statistics translate into heavy pressure on Belizean marine resources from neighbouring countries.

Fishermen age and years spent fishing

Over 80% of fishers are over 30 years old and close to 70% of all fishermen surveyed possess more than ten years fishing experience– in fact 20% have more than 30 years of experience. This is a strong indication that these fishermen have acquired in-depth knowledge of the region and its marine resources (Figures 2 and 3).



Figures 2. Fishermen ages

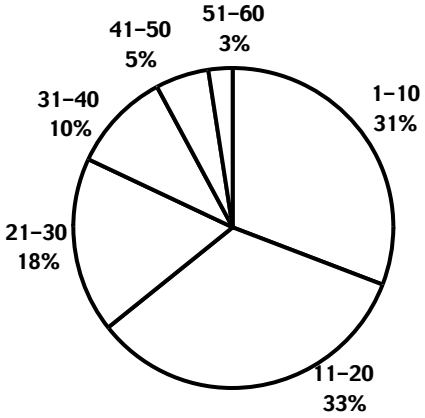


Figure 3. Number of years fishing

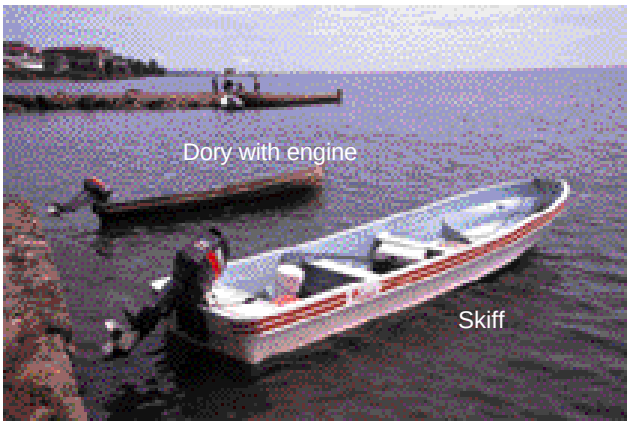
Nonetheless, many young fishers are entering this accessible and occasionally lucrative profession despite declining resources. Close to one third of fishers interviewed (represented by 12 boat captains) entered the profession less than ten years ago.

Boat types

Fishermen often travel by boat up to 50 km away from their homes and within the GOH to target productive fishing grounds and market their catches (e.g. Monkey River to Gladden Spit or Punta Negra to the Sapodilla Cayes). For this reason, fiberglass skiffs are increasingly used over sailing dories and motorized dories. This may also reflect a change in fishing methods and the need for larger, more stable boats to venture out further and obtain the same or larger catches. Ownership and use of fiberglass skiffs in Belize is high compared to Guatemala and Honduras. Furthermore, large trees required to make a large durable wooden dory are becoming harder to come by, making this an increasingly unattractive option.

Skiff numbers are increasing in Belize waters despite the high capital outlay associated with the purchase. A 25ft skiff, considered the current standard for fishers in Belize costs about BZ 8,000 (US$ 4,000). Coupled with one of the engines of choice, a 60 horsepower Yamaha that sells for about BZ 10,000 (US$ 5,000), sets a boat

Boat types used for fishing in the Gulf of Honduras



captain back by close to BZ 18,000 or US$ 9,000. As gas prices continue to rise and make long fishing trips uneconomical, boat captains are slowly replacing their two-stroke engines with the new fuel-efficient four-stroke engines.

Fishing gears

Artisanal fishers surveyed in this study fish a range of species according to the seasonal availability and geography of different fish stocks. A multi-species approach to fishing ensures a greater possibility of an economically successful catch, particularly in light of declining fish stocks. This ability to fish several species is further reflected by the wide variety of fishing gears used by artisanal fishers in the GOH including gill nets, beach seine nets, cast nets, hook and line, rod and reel, lobster traps, fish traps, and shrimp trawlers.

In Belize, the gear of choice is clearly the handline as used by at least 61% of fishers (Figure 4). Fishers also use gear types such as gill nets and lobster traps, and free dive for conch and lobster. Several fishermen also use fish traps, and lobster nets – gill nets baited with cowhide that entangle lobsters.

Gill nets are often set to maximize catch and are therefore placed to intersect fish migration routes, across river

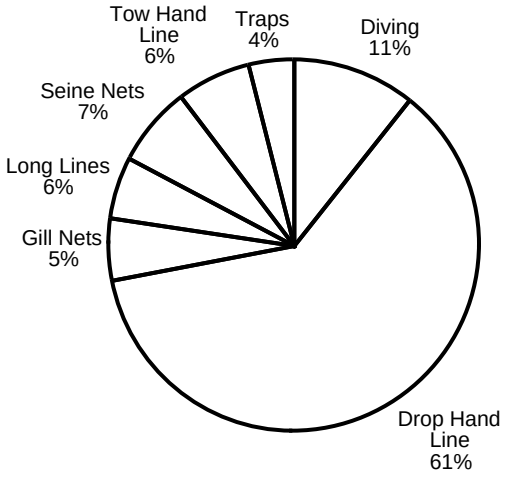


Figure 4. Percentage of fishing gears used by Southern Belizean fishermen

Pulling in a gillnet near the river mouth

mouths, and other areas from which fish have little or no escape. Nets may still be used because of a fisher's lack of skill in using a handline successfully.

The majority of fishermen interviewed clearly stated that lobster nets and gill nets are very damaging to marine habitats and have petitioned to have them excluded from the Port Honduras Marine Reserve. Additionally, Belizean buyers hesitate to purchase fish caught in gill nets because net caught fish are generally in poor condition when they reach market. The fish may have died in the net and remained there for several hours before retrieval. According to several local net fishers, about 10 pounds of fish are thrown away for every 5 pounds that makes it to market. A recent petition generated by a local fisher in Punta Gorda showed 270 people favor of a national ban on gill nets.

Shrimp trawlers represent another type of fishing gear that many artisanal fishers oppose. They feel strongly that trawler nets damage reefs, seagrass, and mud bottom habitats. Fishermen from Belize and Honduras agree that hook and line fishing is the most sustainable fishing gear available.

Artisanal fishermen with a handline-caught snapper

The fishermen recommend:

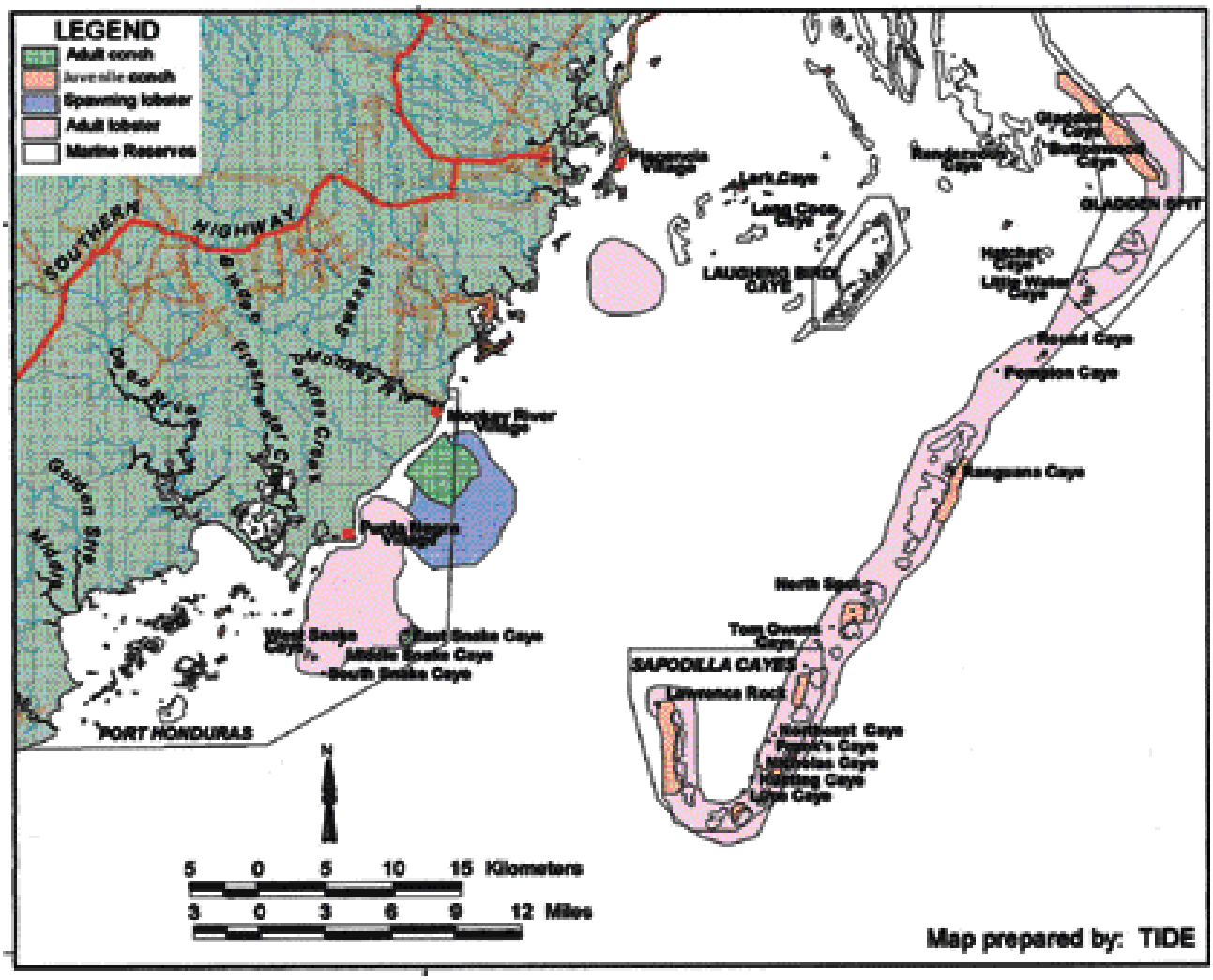
- Promote a national ban on gill nets
- Promote the use of non-destructive fishing gear such as hand-lining

Geography and seasonality of fishing

TIDE sponsored and facilitated a meeting of fishermen from Southern Belize during 1999 as part of a continued effort to hear and incorporate the *Voice of the Fishermen* into conservation and fisheries management. As part of this meeting, fishers mapped out the geography and seasonality of fishing patterns in facilitated group mapping exercises. The resulting maps and data are included below.

Lobster and conch fisheries are by far the most lucrative for fishermen of Southern Belize. Adult lobster and conch are found commonly along the Belize Barrier Reef and in some areas of Port Honduras (Figure 5). The fishermen also indicated the important juvenile areas for lobster and conch and suggested that these areas be particularly well cared for. Several areas for juvenile conch, locally called “roncoyo”, are found within the Sapodilla Cayes Marine Reserve, and the newly created Gladden Spit Marine Reserve (Figure 5). Lobster’s bearing eggs are often captured within the northern part of the Port Honduras Marine Reserve (Figure 5).

Figure 5. Fishing areas for conch and lobster including spawning and nursery areas



The fishermen recommend:

- Juvenile conch areas be carefully protected within special zones in marine reserves
- Egg bearing lobster should not be harvested

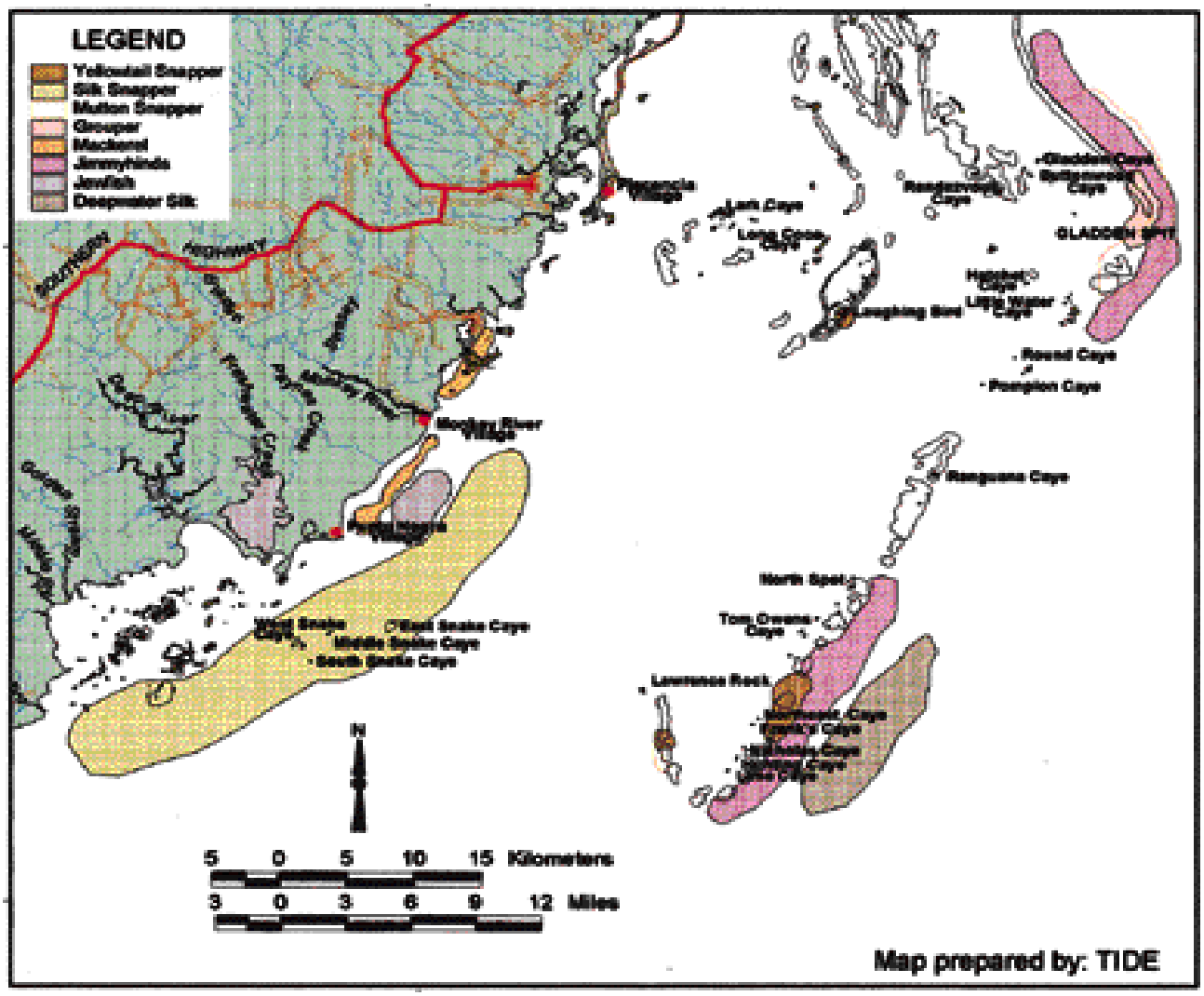
Finfish captures vary with season and fishermen have learned these patterns after generations of fishing. The outer barrier reef slope harbors mutton snapper, yellowtail snapper, grouper, and jimmy hinds at various times of year (Figure 6). Many of these species spawn in aggregations outside the outer reef, particularly at sharp bends in the reef such as Gladden Spit and at a few spots within the Sapodilla Cayes. It is interesting to note that the distance from Omoa, Honduras to the Sapodilla Cayes is less than the distance from Punta Gorda, Monkey River, or Placencia. Fishermen from Honduras know of the snappers and groupers off the reef, and harvest them during the night. Deepwater silk snappers are caught in waters over 200 feet, outside the steep barrier reef dropoff. Silk snappers are most heavily harvested within the Port Honduras area, while mackerel, jewfish, and snook are found close to the coast (Figure 6).

The fishermen recommend:

- Better protection from foreign fishers who work the outside reefs for snappers and groupers

Sportfishing is becoming more popular in Southern Belize and is highly dependent on healthy sport fish populations. Interviewed fishermen roughly mapped

Figure 6. Finfishing areas in Southern Belize



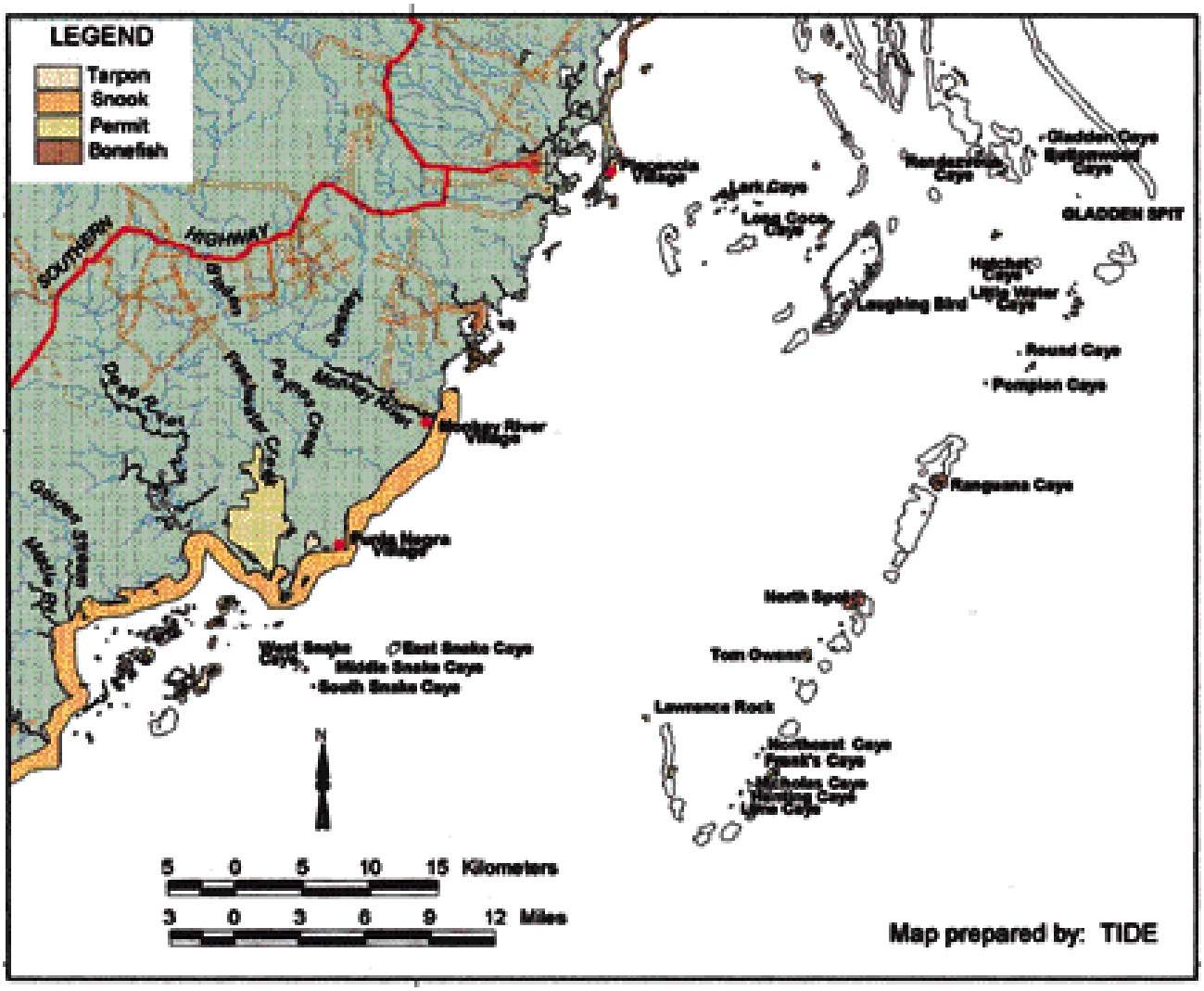


Figure 7. Sportsfishing areas in Southern Belizean

sportfishing areas (Figure 7) and strongly suggest that these areas be well protected. Snook are found all along the coast, especially within the Port Honduras Marine Reserve. These fish are very vulnerable to gill net fishing. The new reserve, which bans nets throughout the area, should help snook populations to rebuild. Similarly, permit are found most commonly within the Ycacos Lagoon, which is now under total protection within the Payne's Creek National Park. Permit are also found on banks within the Port Honduras, and again are protected from nets within the reserve.

The fishermen recommend:

- Ban on the sale of permit and tarpon (similar to regulations for bonefish)

Time spent fishing versus other occupations

Fourteen fishers (38% of those surveyed) fish full-time. Yet surveyed fishermen are often multi-talented and flexible enough to engage in alternatives to fishing when the season is poor or the costs of fishing prove too high. This is apparent in Figure 8 whereby fishermen spend about 62% of their time fishing, and work as skilled laborers, masons, farmers, tour guides, etc., for the remainder of their working year.

During the highly lucrative lobster season, fishers will often take alternative jobs such as guiding or fishing for other species that fit in between pulling the lobster traps, which usually takes place every four days.

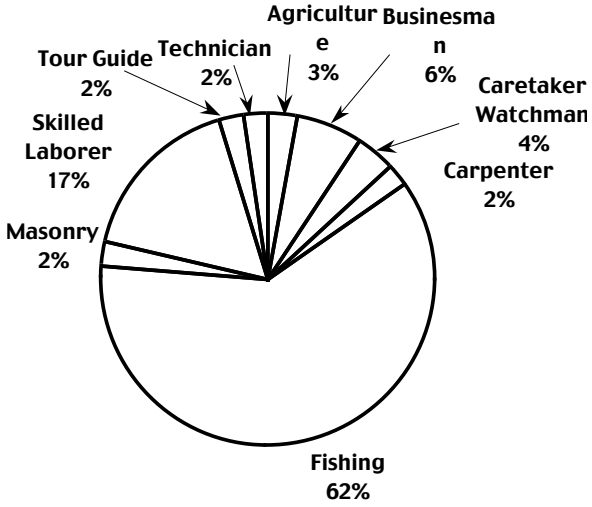


Figure 8. Occupations other than fishing

Costs and marketing of fisheries catch

Apart from the capital costs outlined in the boat and fishing gear sections, fishers also need to consider the operational costs of fishing, including licensing and the marketing of fisheries products.

Where the fish caught in Southern Belize are marketed depends on the species. Lobsters are primarily exported to the United States via Belize City's two fisheries cooperatives. Some snapper filet is exported to the United States and also sold locally in Punta Gorda, Placencia, Dangriga and Belize City. Grouper used to be exported internationally but stocks have crashed in the past ten years from overexploitation thus providing barely enough to supply local markets. All other species are generally sold at the dockside.

To market their fish, Southern Belizean fishermen either sell at the dock to local markets such as Punta Gorda or gut their fish and sell them on ice to the cooperatives, and in some cases sell their products in Guatemala. Cheap ice is not always readily available to fishermen; particularly those with limited access to Placencia. Located on the fringe of the GOH, until very recently Placencia possessed the only fisheries cooperative near Southern Belize. Access to cheap ice and landings incomes may improve for the southernmost fishers of Belize following the recent creation of the Rio Grande Fisheries Cooperative in Punta Gorda.

Economic alternatives

When considering alternative activities to artisanal fishing, the fishermen's greatest interest lies in tourism and sport fishing (Table 2). These industries are consistent with the fishers' culture and knowledge base. The alternatives also promote the protection and sustainable use of fisheries resources and associated habitats. Sport fishing generally includes fly-fishing, spin casting, trolling, and droplining. Catch-and-release fly-fishing is the most highly valued in the sports fishing industry, not only due to sporting challenge but also because capable fly-fishing guides may earn upwards of US$ 200 per day.

Tarpon, snook, bonefish, and permit are all highly prized by fly-fishing sport anglers and all of these species are readily found in the waters of Southern Belize. Since the fish are released after capture, this industry has very little impact on the fishery resource. In fact, bonefish sales are illegal in Belize to promote sport fishing. Other important but lower valued sports fish include jacks, kingfish, barracuda, and snappers.

Fishermen are also interested in supplying fresh fish directly to restaurants. Establishing better co-ordination between fishermen and restaurants could ensure a more regular supply of fish to restaurants and higher prices for the fishermen. Another potentially lucrative economic alternative lies in the production of smoked fish. This

Kayaking tours provide fishers with yet another water-based alternative to fishing that also taps into the birdwatching tourism market.

Fly fishing has become a highly lucrative alternative to traditional fishing, and an alternative of choice for younger Belizean fishers.

Table 2. Number of fishermen interested in different economic alternatives and associated training

Alternatives	Interest	Training
Tourism	23	11
Sport Fishing	12	7
Fresh fish to restaurants	7	3
Smoked Fish	3	1
Agriculture	2	1
Aquaculture	1	1

value-added fishery can fetch very high prices in national and international markets. In the US or Europe, smoked salmon, a fish caught in cooler northern waters, can fetch over $40 BZ/pound. Although salmon do not venture into Belizean waters, oily fish such as mackerels and jacks found in the GOH can successfully be smoked and command good prices once they are prepared and neatly packaged for national restaurant use, or as an export product. Furthermore, the product is cured and slightly dried, making it less expensive to handle after processing (see Appendix 1 on the Value-Added Fishery).

The fishermen recommend:

- Increase training for fishermen in desired economic alternatives
- Increase protection for valuable sportfish species, snook, tarpon, permit and bonefish
- Facilitate marketing of fresh fish products

Box 2. Belize's endangered manatees

The West Indian Manatee, *Trichechus manatus manatus*, was once a very common animal within the waters of the Gulf of Honduras. Due in part to their slow reproductive patterns and to years of exploitation, manatees are nearly extinct within their natural range. These large docile marine mammals are important part of the heritage of the region and without proper protection, could disappear forever. It is goal of the Trinational Alliance of NGOs however that this threatened, charismatic species, be protected through a regional conservation program.

Manatee are large grey marine mammals that inhabit shallow coastal waters but sometimes venture out to the reef. Manatee can reach about 3 m (10 ft) in length and can weigh up to 1,000 kg (2,200 lbs.). Though large, these gentle, slow moving animals are vegetarians, surviving on a diet of seagrasses and freshwater plants.

Manatee reproduction is very slow. Manatees reach sexual maturity in 5 - 7 years. The gestation period for a manatee is 13 months and each pregnancy usually yields only one calf. The interval between reproductive periods is generally 3 - 4 years given that young stay with or near the mother for most of their subadult life.

There are probably fewer than 250 manatees remaining in the Gulf of Honduras (personal communication N. Auil 2000). They are primarily threatened by boat traffic, upland pollution and poaching. The Trinational Alliance suggests that the penalty for killing manatee within the Gulf of Honduras be harmonized with Mexico at $US 37,000.

A recently slaughtered manatee

Legal context

Knowledge of existing laws and regulations

About 75% of fishermen interviewed are familiar with the fishing laws of Belize. However, when asked specifically about these laws, only half of the fishermen accurately reported the legal size for lobster (4 ounces) and dates of the closed season (February 15-June 14). A larger percentage (about 60%) know that a net cannot be set any closer than 1/2 mile from any inhabited area. All fishermen know that harming or poaching of manatees is illegal (see Box 3 for the summary of current fisheries laws and regulations).

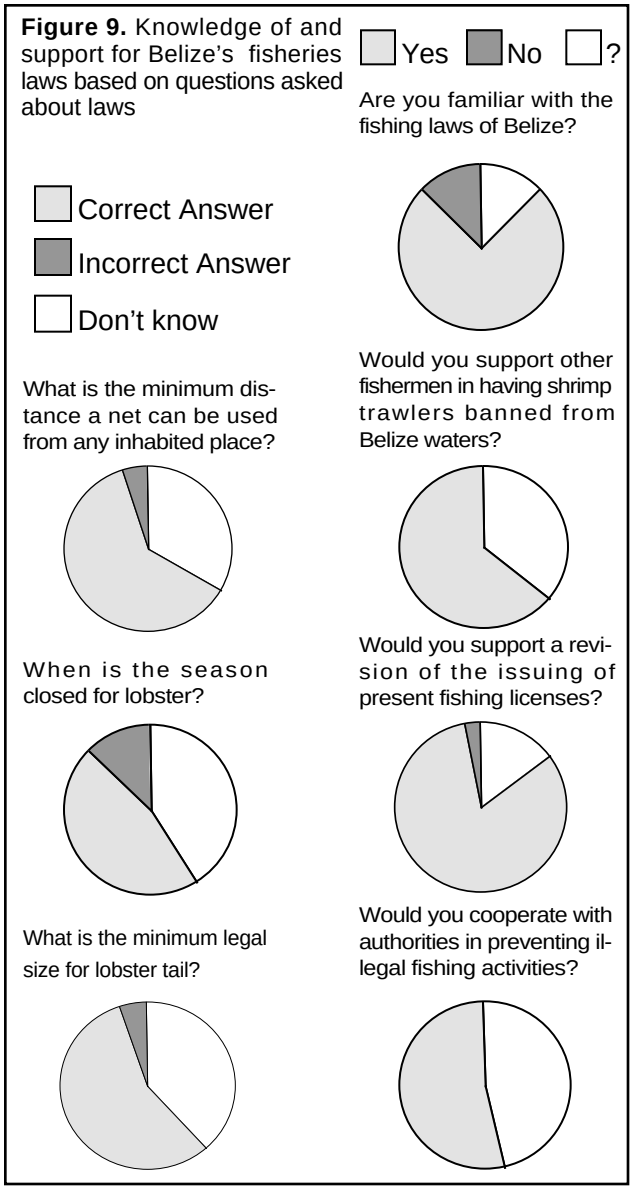


Figure 9. Knowledge of and support for Belize's fisheries laws based on questions asked about laws

However, manatee poaching continues despite legal protection for this species in Belize, Guatemala and Honduras. The Port Honduras area has been a traditional poaching ground for these large docile mammals. Poaching often takes place at night or in the early morning when animals can be located by the bioluminescence they create in shallow waters. The animals are shot or harpooned and dragged on to the beach to be slaughtered and fileted. The meat is allegedly transported at night to Guatemala and sold on the black market. The declaration of Port Honduras as a marine reserve in January 2000 and the associated ranger patrols have helped to slow poaching down significantly.

The fishermen recommend:

- Total protection for manatees in the Gulf of Honduras

Proposed laws and regulations

Fishermen of Southern Belize are well aware of the damage shrimp trawlers inflict on fish stocks. For every pound of shrimp harvested, trawlers throw away about 9 pounds of "by-catch" which includes large numbers of juvenile fish. Trawlers also damage sea floor habitats that are critical for fish to feed, grow and reproduce, the cornerstones of a fish's life cycle. As a result, 62% of surveyed fishermen support a ban on shrimp trawlers in Belizean waters.

Over 80% of Belizean fishermen support a revision in the issuance of fishing licenses. They are aware that foreigners hold Belizean fishing licenses and fish in Belizean waters, often smuggling fishery products out of the country. Revision of licenses might help to curb these illegal practices. Alternatively, one fisherman suggested tighter controls on gill nets and lobster nets – fishing gears preferred by foreign fishermen.

More than half of the fishers surveyed believe that cooperation with fishing authorities will benefit them directly. Effective cooperation will help to eliminate illegal fishing activities including illegal netting and smuggling of fishery products. Fishers surveyed strongly feel that if everyone shares the responsibility they can reap the benefits of good fisheries management. Fishers fur-

ther believe that marine reserves which incorporate traditional use zones will help to strongly promote the support and local involvement in marine reserve protection and management.

The fishermen recommend:

- Ban shrimp trawlers from Belizean waters
- Revise licensing procedure and reissuing of licenses
- Identify specific ways of promoting and strengthening cooperation between fishermen and authorities
- Ban the use of gill nets in Belizean waters
- Promote local traditional fishing rights within Marine Reserves

Box 3. Summary of current regulations governing the marine environment in Belize

The laws of Belize state that no nets, traps or wire fishing device can be used to catch fish within 100 yards of the barrier reef. It is illegal to place nets or traps within 1/2 mile of a town, village, community, or any inhabited place.

- Turtle nets must not be placed within 100 yards of shore.
- Nets must not be placed across river mouths.
- Mesh size must be larger than 3 inches.
- Trawl net mesh can be 1.5 inches.

Manatee:	Do not kill, sell, injure or harass manatee
Reef fish:	Commercial fishing requires an annual license issued by the Fisheries Department
Turtles:	The Hawksbill is totally protected by law. Only small green or loggerhead turtles less than 60 cm (24 inches) can be captured and killed and only during November 1 - March 31. You cannot buy or sell turtle shell or turtle shell objects
Coral:	By law you cannot take, possess, buy or sell any coral with the exceptionof black coral. Black coral cannot be taken without a license.
Shrimp:	It is illegal to trawl within 100 yards of the reef and between March 15 and July 14 inclusive.
Bonefish:	You cannot buy or sell bonefish.
Lobster:	Do not take undersized or egg-bearing lobsters and adhere to the closed season (February 15 - June 14).
Conch:	Only take conch with a shell longer than 7 inches and with 3 ounces of meat

Artisanal fisheries landings

The artisanal fisheries landings data for Southern Belize presented in the following section have been compiled from data provided by 39 boat captains (data includes the two captains from Gladden). Data included represents total landings for all species, and by species for several of the commercially important types of fish. Each captain reported their boat landings by month, species and gear type, and by dockside fish prices. These data were extrapolated out to the total number of fishermen working in the southern waters of Belize (227 fishers) thus providing estimates of the total landings in pounds and in dollars. More detail on these methods is provided in Appendices 2 and 3.

Misreporting of catches may have occurred due to forgetfulness, difficulty in estimating catch size, or intent to skew the data. Some of the figures may also represent an under-reporting of catches because gill net fishers may sell their fish in Guatemala. To overcome this possibility, the data was cross-checked through multiple interviewing or comparison with other boat captains. Many of the fishers and their capacity to fish successfully are well known to the interviewers and other fishing colleagues, and their catch numbers easily corroborated. Further, in the absence of any other landings data, these figures provide a rough estimate of total and seasonal landings and trends by species.

Estimated landings

Landings in Belizean GOH waters between Monkey River and the Sarstoon River total about 575,000 pounds of fisheries product caught annually (Figure 10). Snapper, lobster, mackerel, jack, and conch dominate the catches. Snappers are largely caught on hand-lines and consumed locally. Jacks and mackerels are caught largely in gill nets and sold at low prices as salt fish. Conch is caught free-diving. Lobster represents the most lucrative fisheries product and is caught with traps and by free diving. Both lobster and conch are exported largely via the cooperative fisheries system. It is worthwhile noting that turtles and manatees make up a significant portion of the annual catch, despite their endangered species status and protection under international law.

Southern Belize's catch totals only about 4% of the estimated 14,305,000 pounds harvested annually by artisanal fishermen within the GOH, suggesting that 96% of the catch from the gulf is landed in Guatemala and Honduras. While the majority of foreign landings are caught in the territorial waters of Honduras and Guatemala, Belizean fishermen often report unlicensed foreigners fishing in Belize waters.

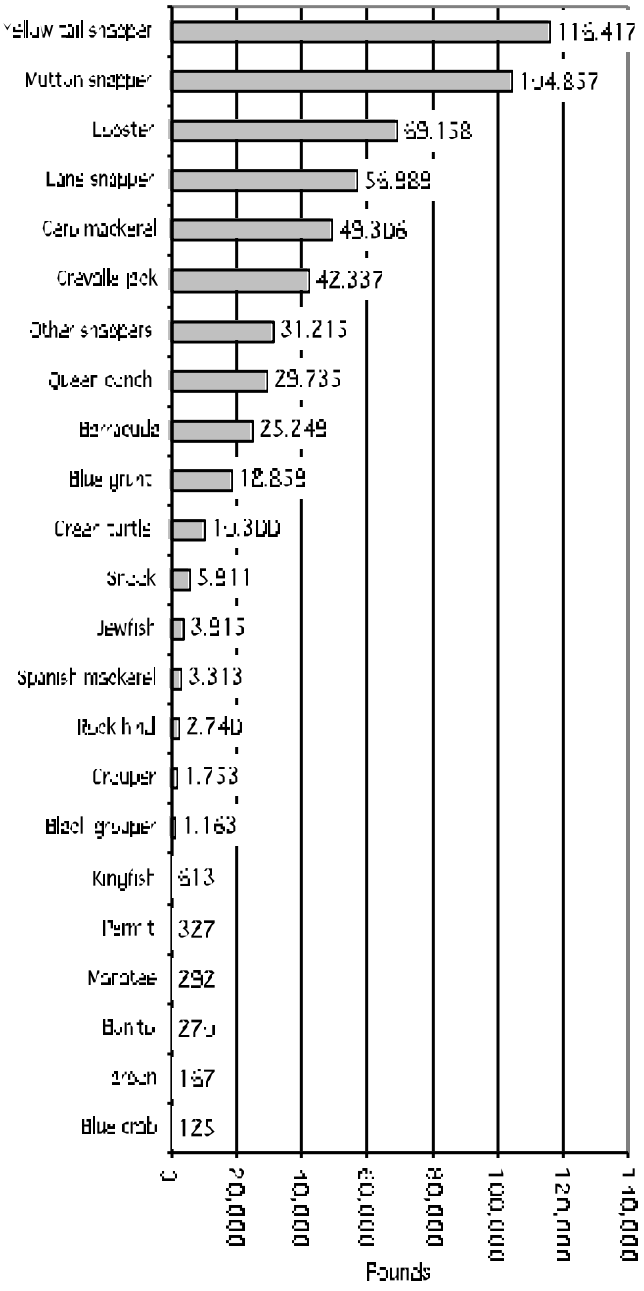


Figure 10. Total landings in pounds caught in Southern Belize

The majority of reported landings represent fish caught by hand lines. These gears can catch nearly every type of commercially harvested fish in Belize waters and are considerd by fishers far less damaging to the environment than gill nets, seine nets, and shrimp trawlers. Both seine and gill nets account for 12% of total landings but are not very selective and harvest a great deal of unwanted and unused fish (including juveniles). Much of this by-catch is thrown overboard and not reflected in the landings data.

Value of the fishery

The total value of Belizean fishery in the GOH is about $BZ 2,002,000 (about US$ 1 million) or about 8% of the value of the total catch of the Gulf of Honduras which has been valued at BZ $22,750,000 ($US 11,375,000) (see Appendix 5 for table of comparative values of species). The product is sold to local markets both directly and through intermediary buyers to restaurants and cooperatives. Clear market preferences exist for different species, even within the same family of fish. Lane snappers are generally sold and consumed locally, while mutton and yellowtail snapper are generally sold in bulk to the cooperatives, and to individual intermediaries. Cero mackerel and crevalle jack are largely sold as salt fish and usually transported illegally to Guatemala. Legal sized lobster and conch are sold almost exclusively to the cooperatives. They offer good prices and an incentive "second payment" at the end of the season.

Although Southern Belize currently supports a small yet strong fishing industry, more efficient handling, processing and marketing of the catch could increase the value of this fishery without needing to increase landings. For example, when snook is sold in the local fish market, it fetches about BZ $2/lb (see Appendix 5). Yet, restaurants in Northern Belize are willing to pay 3 to 4 times that amount for fresh, well-handled snook filets. Similarly, large, fresh, whole snappers are a great delicacy and fetch higher prices than smaller, less desirable fish.

While the lobster fishery is valuable, only the tails are generally used. Markets for whole lobsters exist and might increase the value of the fishery. In addition, "lobster heads" can be boiled to make lobster stock and sold either dehydrated or frozen to local restaurants as the base for highly valued lobster soups. Finally, mackerels and jacks are being sold largely as salt fish but can make excellent smoked fish. Smoked fish is a highly prized and priced delicacy in the United States and Europe. Market research and experimentation with higher value products might increase the value of the Belizean fishery, and reduce harvest on an overfished resource (see Appendix 1).

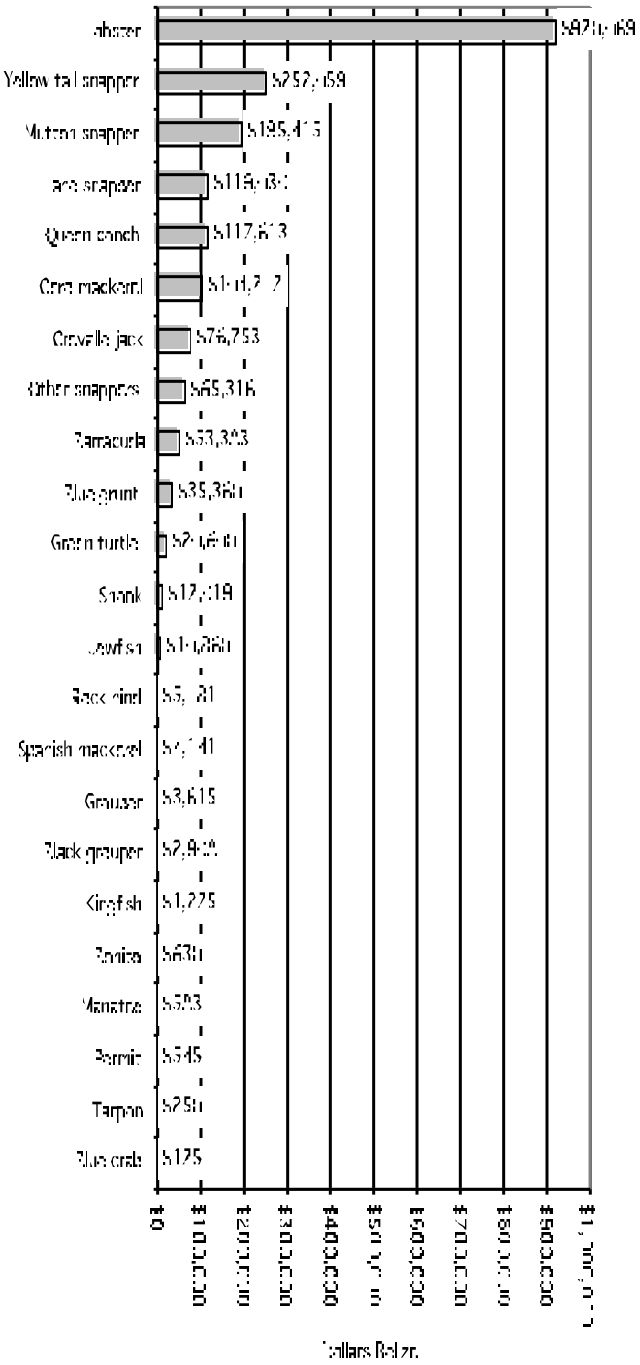


Figure 11. Value of landings per species in ($BZ)

The fishermen recommend:

- Ensure local, artisanal access to the resource via better enforcement of existing regulations, and updating the licensing system
- Develop mechanisms that assist in handling, marketing, and transport of fisheries products including better post-processing handling and access to ice for fishers such that the value of the product is maintained or increased.
- Develop quotas and management plans for specific species and fishing gear types

Fishermen gutting mutton snappers in readiness for market

Monthly distribution of landings by species

Snappers

Yellowtail snappers are the most heavily harvested of the snappers, with total annual landings estimated at 116,000 pounds, providing a dockside annual figure of BZ $252,000 ($US 125,000). Peak landings occur from January to March when they are known to spawn along the outer reef and other steep dropoff areas. Other species of snappers and grunts are harvested consistently through the year. Lane snapper is the most common fish in the Punta Gorda fish market, a staple food source and income generator. Lane snappers show a peak in landings during September which may be reflect the demand entrained by the traditional September celebrations and the start of the new school year. Fishermen complain that the size of lane snappers landed has decreased in the last five years.

Mutton snapper landings peak dramatically in April and May when nearly all of the annual total of 105,000 pounds are landed at Gladden Spit and in the Sapodilla Cayes. The landings peak is based on the fishing of mutton snapper spawning aggregations in small geographically well-defined sites. The total landed value of the mutton fishery in 1998 is about $BZ 195,000 ($US 97,500) caught by an estimated 40 fishermen. The individual gross revenue is estimated at about $BZ 4,900, harvested during two consecutive full moon periods for a total of about 20 days of fishing, or a gross of only $BZ 243/day (US$ 122/day).

Fishing on grouper spawning aggregations has lead to their complete collapse in several places in Belize, such as Caye Glory and Mexico Rocks, and in other locations in the Caribbean. Harvesting fish at aggregation sites is not considered sustainable. Protection of spawning aggregations will allow fish to reproduce and promote their long term survival and growth (see Box 4).

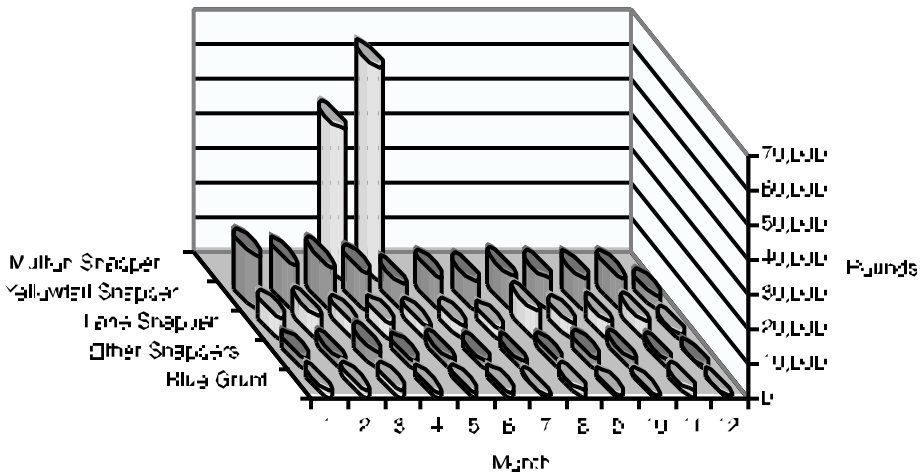
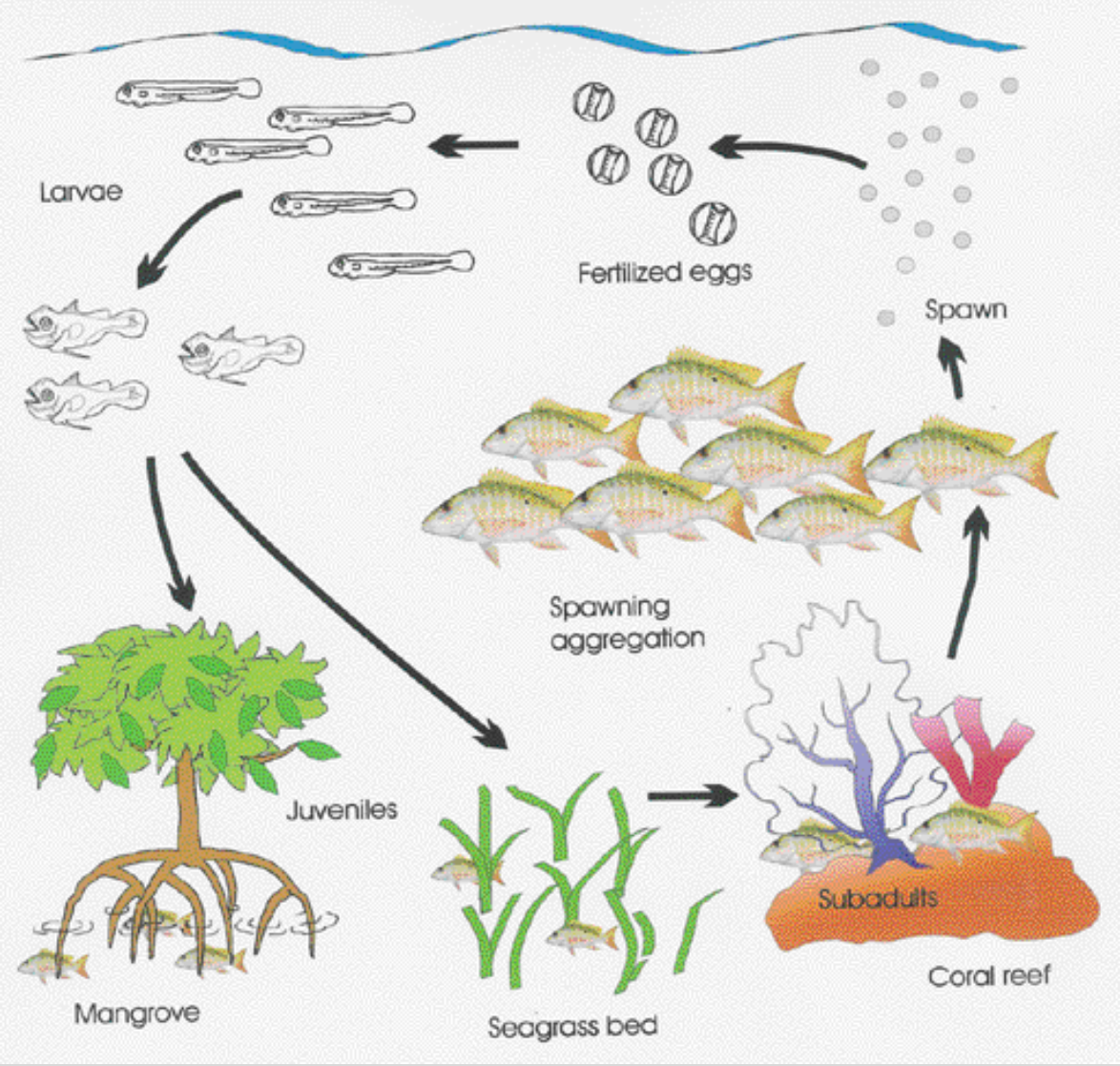


Figure 12. Snapper landings in pounds per month

Box 4. Life cycle of a grouper or snapper

Grouper and snapper have a complex life cycle which requires most tropical marine habitats. They spend their juvenile period of 3 - 5 years in mangrove and seagrass areas, and gradually migrate out to shallow reefs and eventually deep reefs. The fish aggregate at specific times and places for mass spawning events. At these times, fish release millions of eggs and sperm into the water, which meet to form small swimming larvae and remain in the plankton for about three weeks. In the rare successful events (1 in 1,000,000) these larvae settle into mangrove or seagrass areas and begin the cycle again. Fish are very vulnerable during reproduction. In order to complete their life cycle they require connected and healthy marine habitats.



An aggregation of dog snappers preparing to spawn

The fishermen recommend:

- Fishing on spawning aggregations may require regu lation

Lobster

Lobster is the most valuable fishery in Southern Belize and yields an annual total value of $BZ 920,000 ($US 460,000). Lobster landings are highest when the season opens in mid-June (Figure 13), and decline gradually over the course of the season until February 15. The only exception is a small peak in January, just before the season closes again. Data collected indicates lobster is landed illegally in the "off-season" between February 15 and June 15. Fisherman also report that undersized lobsters are smuggled to Guatemala throughout the year, where size and seasonal restrictions do not exist. Although most lobster is caught by trap or free-diving, some fishermen use baited gill nets known as lobster nets to harvest lobsters. This technique is known to damage reef habitat and create by-catch, and according to surveyed fishermen should be stopped.

> "Is there a way that Guatemala could close their lobster season when we close our one?
>
> A fisherman's comment

Lobsters are in great demand in the international market and therefore garner a price 6 times higher than the average finfish. Though the average price reported is about $BZ 13/lb ($US 6.50) some is sold for as low as $BZ 9/lb ($US 4.50). Lobster prices are far higher in Belize than in Honduras, where lobster sales by artisanal fishermen average only $US 1.67/lb.

The whole family helps build traps in readiness for the opening of lobster season

Interestingly, almost all lobster is sold as tail-only. Lobster could fetch higher prices if a market for live lobster or whole lobster could be developed. Restaurants sometimes maintain aquariums with live lobsters that guests can choose from. There is also a market for whole, boiled frozen lobster. Alternately if the "heads" were used to make lobster bisque, or the meat extracted, (as it generally is in Northern Belize) the value of the product could be increased (see Appendix 1 on Value-Added Fisheries).

Due to the high prices and high demand, illegal fishing, and general overfishing, fishermen agree that lobster stocks have declined in size and abundance. Data from the Northern and National Fisheries Cooperatives indicate that the average size of tail export has gradually declined in recent years, and now rests at 4 ounces, the legal minimum size. These data further indicate that the largest (and thus most valuable) lobsters currently har-

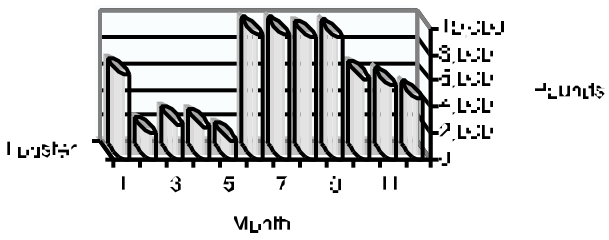


Figure 13. Lobster landings in pounds per month

vested in Belize are from southern waters. Better management of valuable lobsters, especially females with eggs, is needed to ensure sustainable harvests over time.

The fishermen recommend:

- Ensure excellent handling, storage, and shipping of high value lobster
- Explore markets for whole lobster and lobster "head meat"
- Promote a complete ban on the use of nets to catch lobsters
- Harmonize lobster seasons with Guatemala and Honduras

Conch

The total annual conch harvest from southern waters was calculated at about 30,000 lbs and total annual gross landings at $BZ118,000 ($US 59,000) (Figure 14). Although conch are not currently harvested in the quantities they once were, they are still the second highest earner of all fisheries products landed in Southern Belize. Conch fetch $BZ 4 per pound ($US 2/lb) nearly twice the price per pound of many finfish. They are a favored local food throughout the GOH, and are also legally exported internationally by the cooperatives.

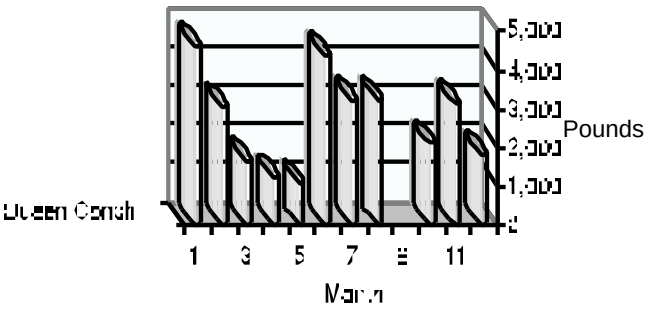


Figure 14. Conch landings in pounds per month

In spite of the closed season for conch between July 1st and September 30th, conch are reported harvested continually through July and August. Fishermen reported that illegal harvest and export of conch to nearby Honduras and Guatemala takes place, where either ever-changing or no specific regulations for conch exist.

Fishermen are well aware of the drastic decline in conch populations and blame the illegal export, overfishing, and undersize and out-of-season harvest. Better management of conch stocks and proactive measures to restore conch populations are required if this lucrative species is to continue supporting the Belizean economy.

Box 5. The queen conch

Queen conch, *Strombus gigas*, are large bottom dwelling snails inhabiting the wider Caribbean from the coastal waters of Brazil, the coast of Central America, the Gulf of Mexico and into the waters of Florida. Conch has been a staple food source for coastal residents throughout its range. Queen conch reproduce through external fertilization, and this is often limited by the availability of individuals close by for mating. Females then lay egg sacks in sandy areas. The egg masses hatch after 5 days, and release approximately 300,000 tiny swimming larvae, each with a tiny shell like that off an adult. These larvae swim in the plankton for about one month and then settle in shallow sea grass beds. Juvenile conch are vulnerable to crabs, octopus, rays, and fish. If they do survive, they require about three and a half years to reach maturity.

By all accounts of surveyed fishermen throughout the Gulf of Honduras, conch populations are under serious pressure and are now considered close to commercially extinct. In fact, the species is listed on Appendix II of the Convention on the International Trade in Endangered Species (CITES). The state of Florida and the Cayman Islands now have total bans on the harvest of any conch, to allow populations to recover.

The fishermen recommend:

- Possible ban on conch fishing throughout the Gulf of Honduras for five years to allow stocks to recover
- Better enforcement of conch closed season and size restrictions

Turtles

Hawksbill, green, and loggerhead turtles all exist in Belizean waters are all listed internationally as threatened or endangered species. Turtle harvests are forbidden in both Guatemala and Honduras to better protect these species from local extinction. Despite fishermen acknowledging that turtles are in a state of decline, turtle harvests are still permitted within Belize primarily for cultural reasons. In consonance with Belize's regional leadership in ecotourism and marine resources management, stronger protection of turtles per the Conventionon International Trade of Endangered Species (CITES) regulations and promoting the species as tourist attractions could far surpass their value on the market floor.

The fishermen recommend:

- Consider a national ban on all marine turtle harvest

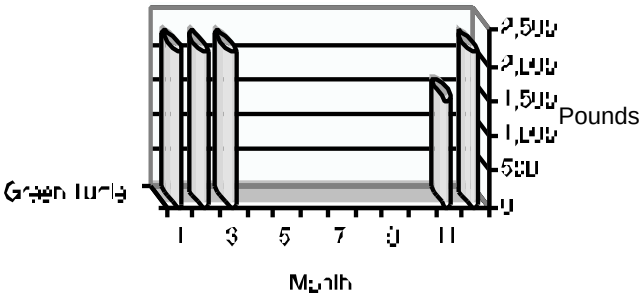


Figure 15. Turtle landings in pounds per month

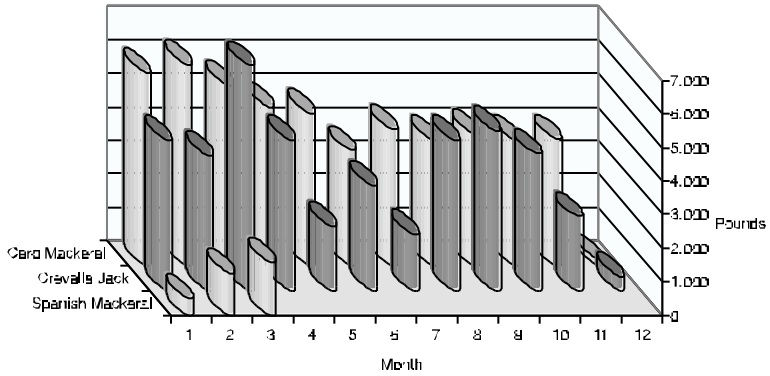


Figure 16. Landings of jacks and mackerels in pounds per month

Jack and mackerel

Jacks and mackerels are consumed in varying quantities locally but Guatemala represents the major market where these species are sold salted and dried known in Spanish as "seco y salado". Crevalle jacks are landed most heavily during March, but are otherwise caught fairly consistently through the year with a annual total landing of 42,000 lbs for a dockside value of $BZ 77,000 ($US 38,000) (Figure 16). These open water fish are caught with handlines and nets.

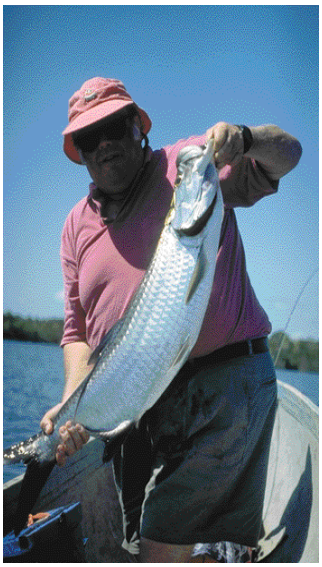
School of crevalle jacks off the Belize Barrier Reef

Landings for cero mackerel and spanish mackerel are highest in the early months of the year, when they are migrating, possibly for reproduction. Demand for salt fish is also high during the months leading up to, and during Lent.

Sportfish

Several species are known food and sport fish, including snook, tarpon, and permit. The most heavily caught species is snook at 6,000 lbs/year, followed by permit and tarpon where less than 1,000 lbs/year are caught for each species. Snook are most heavily captured between September and December. Interestingly, October is the peak capture of snook in Honduras and Guatemala.

The coincidence suggests that perhaps October is the peak migration and/or spawning time for this species. This also represents the time when it needs maximum protection. Similarly, permit are most heavily captured during February, March and April, which may also correspond with their period of migration and reproduction, or because they are caught in nets for Lent. Finally, tarpon are almost exclusively captured during November and December in Belize though total catches



A prized tarpon landed in Southern Belize by a sports fisherman

are small. In Guatemala and Honduras, however, tarpon landings have big peaks in July and October. These months may represent the time in these countries when their valuable, but untapped tarpon sport fishery could be promoted. Recognizing that tarpon are migratory, sustaining Belize's sport fishing industry will depend in part on the protection of migratory species throughout the Gulf of Honduras.

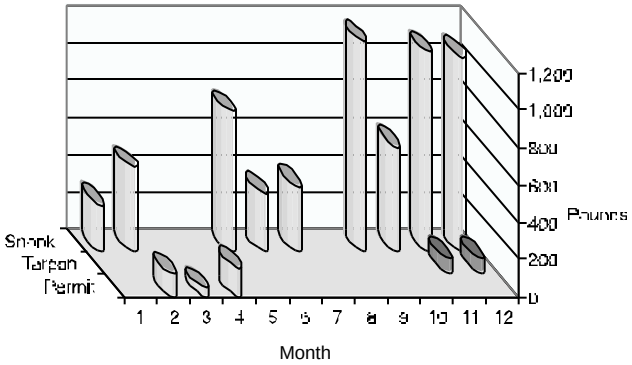


Figure 17. Sportsfish landings in pounds per month

Though tarpon, snook, and permit are valuable as food, they are considered "trophy" species in the sport fishing industry and thus hold a higher value than other target species such as jacks, barracuda, kingfish, mackerel, and snappers. To illustrate this point, the total annual value of the snook fishery (the largest of the sport fish) is $BZ 12,000 ($US 6,000) but a recent flyfishing trip to a coastal village in Belize brought over $BZ 14,000 ($US 7,000) into the community during a seven day period, and left the fish in the water to be caught again.

The fishermen recommend:

- Tarpon and permit should be non-saleable species, like bonefish are presently
- Provide further training for those interested in sport fishing

Fishermen perceptions of the resource

As part of the interview process, fishermen were queried about their perceptions of the state of fisheries resources. No historical information exists on the state of fisheries resources in the Gulf of Honduras. Yet fishermen are on the water every day, year after year, and therefore develop an excellent sense of the status of the fishery resources. Since many of the fishermen have been fishing for over ten years, their historical information is perhaps the best source of information on trends in fishery resources available. Fishermen were queried about the present status of individual species, size and abundance, compared to five years ago. They answered that the species were smaller, bigger or the same as five years ago, and they answered if the average size was smaller, the same, or larger than five years ago. In cases where there was a change, fishermen were asked to explain why they thought the change took place.

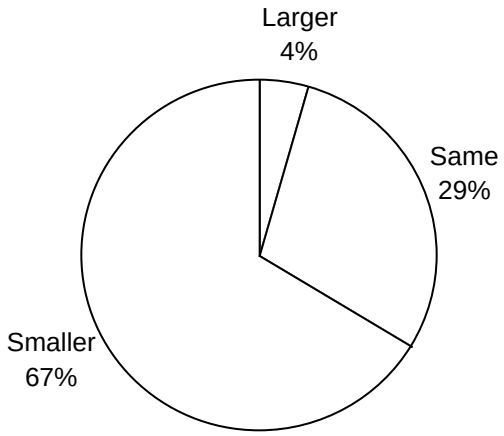


Figure 18. Percent of fisher responses assessing the state of the fisheries resource based on size

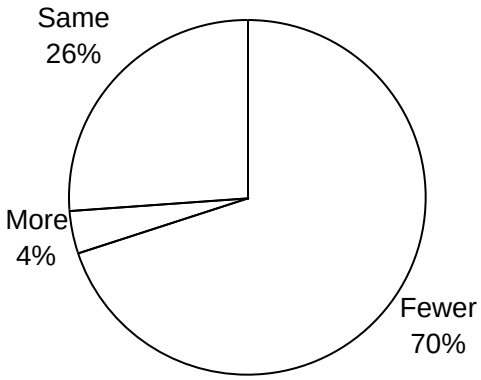


Figure 19. Percent of fisher responses assessing the state of the fisheries resource based on number

According to surveyed fishermen, landed fish are not only getting smaller in size (67% agree, see Figure 18) but have also been drastically reduced in numbers (70% of fishers agree, see Figure 19). As fish resources de-

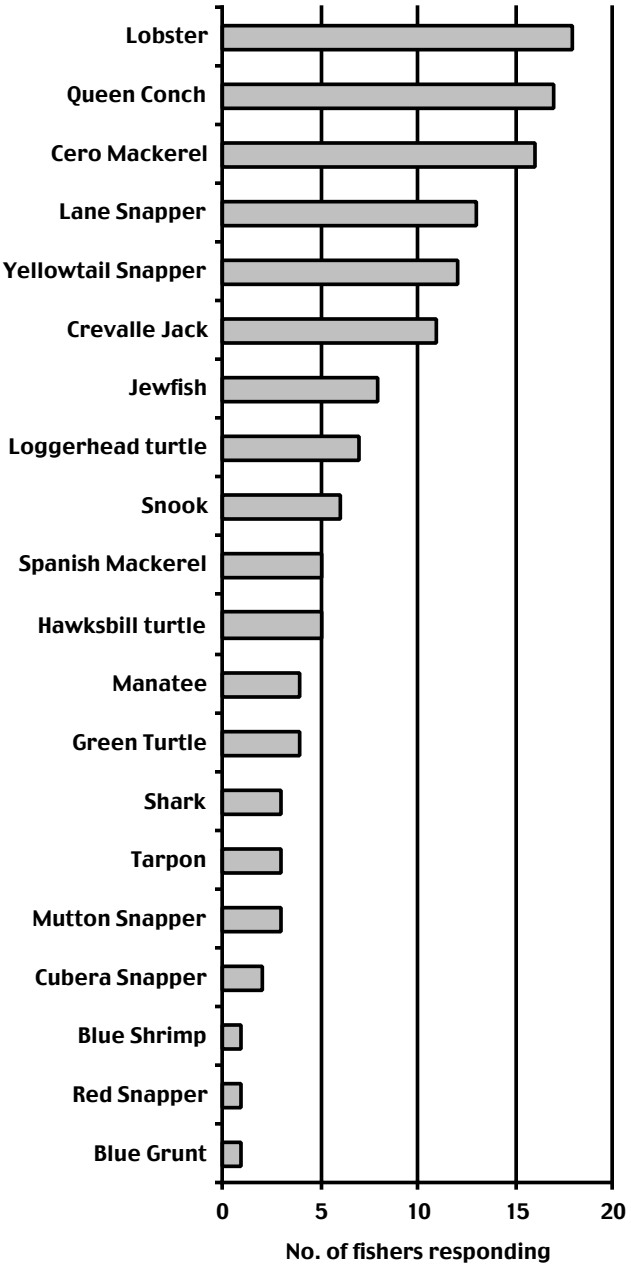


Figure 20. Number of fishers seeing a decline in fish populations by species

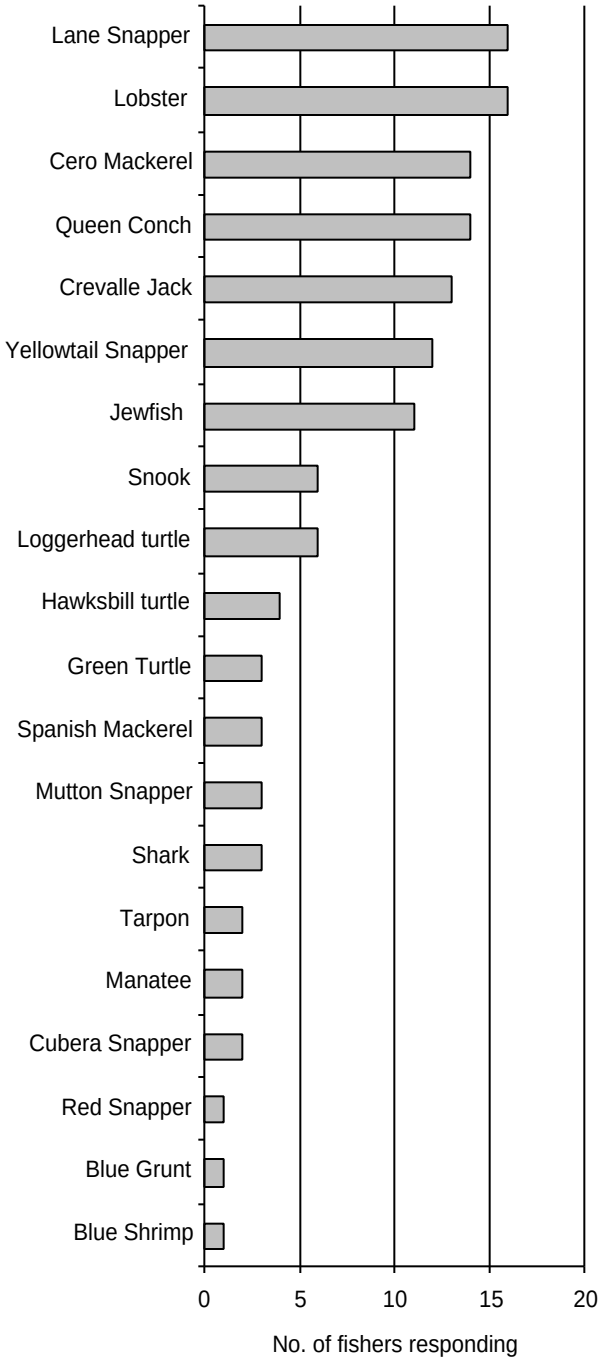


Figure 21. Number of fishers assessing each species as being smaller

cline, fishermen are bringing in smaller and smaller fishes, some of which are juveniles that have not had time to reproduce and repopulate the area. In other fisheries such as Jamaica, similar signs of stress on the fishery were followed by a severe drop in catch, ending in a near total collapse of the fishery. Local fishers have been complaining about this noticeable decline in fish number and sizes for over a decade.

Population decrease of marine organisms

There is very wide agreement among fishers that a majority of the commercially harvested species are in some state of decline. Of particular concern are species such as lobster, conch, yellow-tail snapper, lane "silk" snapper, and crevalle jack. In addition, many fishers agree that the numbers of snook, spanish mackerel, jewfish, and turtles have declined in the last five years. According to fishermen, species caught for both local consumption and export are facing rapid decline in stocks.

Size decrease

Figure 21 further indicates that a majority of the species are smaller at capture than they were five years ago. Several species have not only declined in population number, but also in average size. At least 10 captains mentioned that the average size at capture has decreased for crevalle jack, jewfish, lane snapper, conch, lobster, cero mackerel, and yellowtail snapper, all of which are key commercial species.

Since larger fish actually produce much more eggs than smaller ones, the fishermen indicate that there might be longer term effects on the fisheries due to a decrease in the reproductive population.

Reasons for change

Fishers broadly agree that fish have decreased in size and abundance. There is further agreement that overfishing–including juveniles and females with roe, smuggling and cross-boarder fishing, and the use of destructive nets are all contributing to decreasing fish stocks. In addition, law enforcement is considered insufficient to protect fisheries resources. Finally, fish migration and habitat disruption are linked with fisheries decline.

The smuggling of Belizean marine products to Guatemala and Honduras is an issue raised by Belizean fishers. Only a small market exists in Belize for fisheries

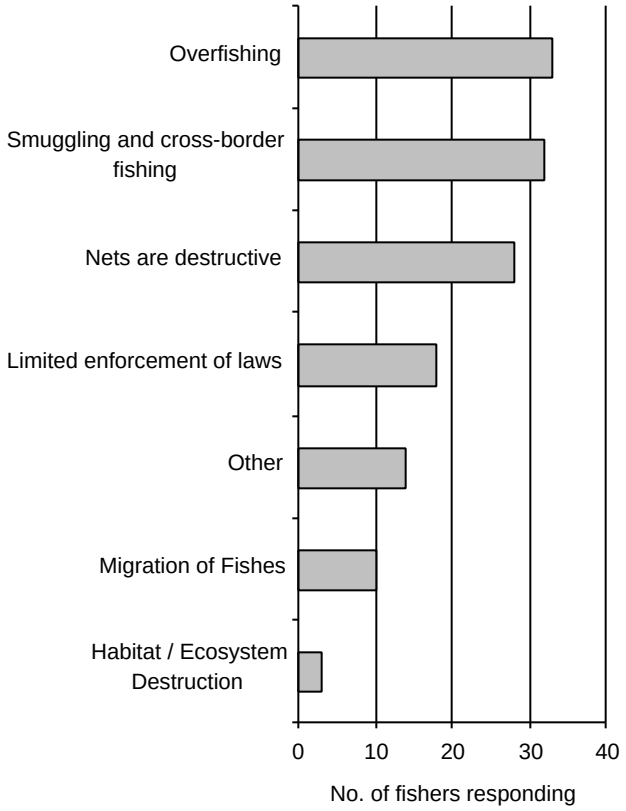


Figure 22. Reasons given by the fishers for the decline of fish stocks in the GOH

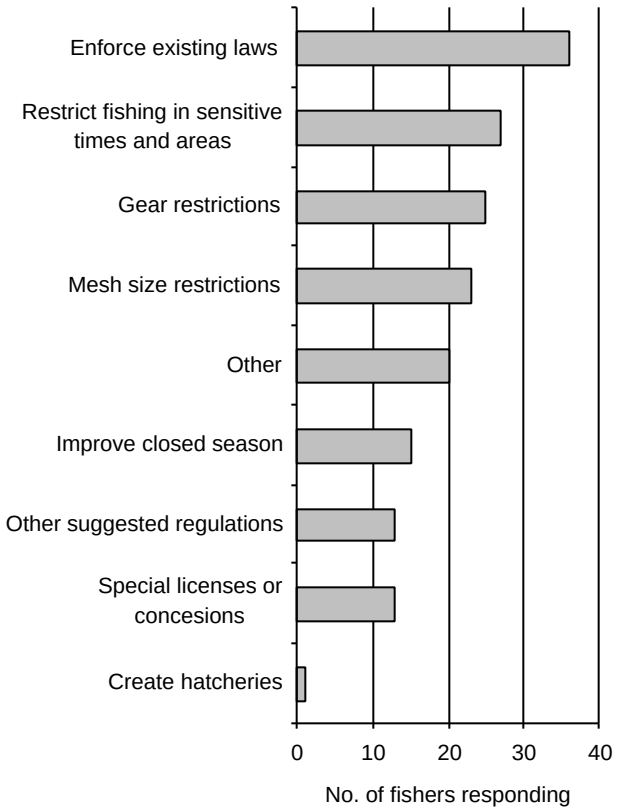


Figure 23. Fishermen's suggestions on how to improve fisheries managment and increase fish stocks in the GOH

products due to the small population size relative to that of the neighboring countries. Unfortunately, prices paid in the neighboring countries are generally lower than those in Belize for similar products are becoming competitive with those in Belize.

Suggestions for improving fisheries management

The fishermen's greatest concern is the lack of enforcement of existing laws. Fisheries Department is having difficulties with enforcement due to a lack of boats, fuel, lack of communication with local fishermen, fear of reproach by individuals engaged in illegal activities, and a lack of firearm protection. As a result, patrols are infrequent.

Better coordination and collaboration between fishermen, NGOs and law enforcement agencies including Fisheries Department, Belize Defense Force's Maritime Wing, Forestry Department, and the local police, should lead to better enforcement and more successfully managed fisheries resources.

Importantly, co-management of marine reserves may provide fishermen with an excellent tool to help manage valuable fisheries resources. Port Honduras Marine Reserve is now being managed by TIDE and local communities in partnership with the Belize Department of Fisheries. If similar management is applied to the Sapodilla Cayes, Gladden Spit, and Laughing Bird Caye, fish species in southern waters will have several linked refuges covering many habitat types, and stocks could be expected to increase. Research undertaken in Belize (e.g., Hol Chan Marine Reserve), the Caribbean (e.g., St. Lucia), or the world (e.g., Apo Island, Philippines) has shown that fish stocks increase if well protected within a marine reserve.

At the multinational level, better harmonization of laws would help to curtail smuggling. For example, while

Belize and Honduras have a closed season on lobster and conch, Guatemala does not. This creates a natural market for lobster and conch to Guatemala while landings are prohibited in Belize and Honduras. Similarly, turtle harvest is restricted in Honduras and Guatemala but still permitted in Belize.

The fishermen recommend:

- Harmonize GOH fishery policy for species such as conch, lobster, snook.
- Increase enforcement
- Restrict fishing at sensitive times and areas
- Restrict destructive fishing gear
- Expand and implement the protected areas system in all countries
- Co-management of marine reserves with local access fishing rights.

Conclusions and Recommendations

The fishing population in coastal Southern Belize includes about **200 active fishermen from a total coastal population of about 4,510 persons**. The Southern Belizean population and artisanal fishing fleet is tiny compared to the Atlantic coasts of neighboring Guatemala (1,415 active fishermen and 100,655 coastal residents) and Honduras (647 fishermen and 184,430 inhabitants). Fishermen from the Belizean portion of the Gulf of Honduras interviewed for this study have a great deal of fishing experience with **over 70% having fished more than 10 years,** so their opinions and information are critical for the proper management of the fisheries resources.

Landings from the entire GOH total about 14,305,000 pounds and represent a $US 11,375,000 industry at harvest. Belize only reaps 4% of the total pounds landed (575,000 per year) and 8% of the value, $BZ 2,002,000 (about $US 1 million) per year. This "million-dollar" fishery serves as an important base of the economy in Southern Belize. According to surveyed fishermen, however, the fishery is declining at an alarming rate.

"No more 200 300 pound jewfish...

Fisherman's comment

Surveyed Belizean fishermen note a decline in both sizes (67% agree) and numbers (70% of fishers agree) of most fishery products. **Fishermen are particularly concerned about the decline in lobster, conch, lane snapper, jack crevalle, and yellowtail snapper.** Thus, there is general agreement in decline in all of the most economically important fishery species. Fishermen from Honduras and Guatemala concur that their fisheries are also in a state of decline.

Fishermen believe that the main causes of decline include:

- Overfishing
- Disruption of fish life cycles
- Smuggling
- The use of destructive gear such as gill nets
- Limited enforcement of existing regulations.

Fishermen therefore suggest:

- Better enforcement of existing regulations
- Better harmonization of laws with neighboring countries
- Restrictions on destructive gear such as gill nets and shrimp trawlers
- Restriction of fishing in sensitive times and places such as spawning and nursery areas
- Using marine reserves for fish stock protection and management, and allowing limited access, traditional fishing rights
- Revisions in fishing license procedures
- Increased education about fisheries laws and fishery biology
- Better protection for sport fish species to include a ban on the sale of tarpon, and permit
- Training in higher value-added products
- Training and promotion of sports fishing, especially fly fishing

With the assistance of TIDE, many local fishers have received training in guiding, fly-fishing and kayak guiding, and are beginning to see the economic benefits of these industries. Fishermen have an increasing desire to participate in the developing ecotourism and sport fishing industries, and recognize the links between healthy fish stocks, marine reserves, and the success of these industries in the future.

In order to manage the Gulf of Honduras fisheries sustainably, coordination with the fishermen and authorities of Guatemala and Honduras is needed. Policies that harmonize laws around the Gulf, and good enforcement of those laws, might curb the decline in the resources, and lead to a sustainable harvest for the benefit of local fishers.

Tri-national conclusions and recommendations

A group of technical experts, including some fishermen from the region, have examined the three "Voice of the Fishermen" documents and puts forward the following specific recommendations, aimed at improving fisheries management throughout the Gulf of Honduras. This section has been used to compile fishermen suggestions and add regional recommendations for use by all three countries. Recommendations have been divided into sections for clarity.

Species closures: Some species within the Gulf of Honduras have come under extreme pressure and are now threatened by over-exploitation and possible stock collapse. Meanwhile, tourism could surpass fishing as an economic alternative with more promotion and development. Some particularly charismatic and endangered marine species living in the GOH draw tourists and can therefore be more valuable, alive in the water, than dead at the market.

1. Total protection for the manatee – and increased and harmonized fines for infractions equal to that of México or US$ 37,000.
2. Total protection for sea turtles within the GOH – with harmonized increased fines for infractions.
3. Promote sport fishing throughout the GOH by creating ban on sales of permit, tarpon, and bonefish (emulating an existing law for bonefish in Belize).
4. Increase the protection for manjua, small pelagic schooling fry that are crucial for the health of the pelagic fisheries food chain.
5. Develop a harmonized management plan for the protection of jewfish and snook. Jewfish are presently listed by IUCN as an endangered species.

Zoning: Various areas of the marine environment are particularly sensitive to fishing since these areas are used for reproduction of a variety of fish species. Overfishing and/or fishing with some damaging gear types in sensitive times and locations could be regulated more closely and thus provide benefits to the fishery as a whole.

1. Secure artisanal fishing rights for specific coastal fishing areas
2. Promote the declaration and management of a Trinational system of marine protected areas including promoting the declaration of areas such as Punta de Manabique and Bahía la Graciosa and Sarstoon in Guatemala and Punta Izopo in Honduras.
3. No fishing in the mouths of rivers (300m) as is presently law in Honduras.
4. Close reef fish spawning aggregation sites as needed.

Gear Types: Fishermen argue that the decline in marine resources is due in part to the use of unsustainable gear types, and the waste associated with these gears.

1. Prohibit the use of gill nets in rivers and river mouths, reefs, and within coastal lagoons, and if possible, discontinue their use throughout the region.
2. Prohibit the use of trawlers in coastal areas (3 miles) where they disrupt the early life stages of other commercially viable species.
3. Regulate the sale and importation of illegal fishing gear, e.g., small mesh nets, at the level of wholesalers and retailers of this equipment.

Seasons: Fishermen recognize declines in resources, and recommend the harmonization of fishing laws in many cases.

1. Moratorium on harvest of queen conch for 5 years.
2. Harmonize the closed season for lobster, and other species, to ensure that the reproductive period is included in the closed season.
3. Promote a closed season for snook in October/November, the time when these fish are caught most heavily and appear to be breeding.
4. Promote a regional closed season for nassau grouper in December and January when these fish aggregate for spawning. Grouper is presently listed by IUCN as an endangered species.

Information/Outreach/Involvement: Fishermen complain about the lack of involvement and participation in fisheries management and planning. They request better access to information.

1. Increase the flow of information to fishermen about marine biology, existing laws, and their rationale, such that fishermen will become more involved in developing and supporting new legislation.
2. Promote marine environmental education in and outside of schools, especially at the primary level.

3. Work with fishermen to develop sustainable economic alternatives that do not harm the environment and value added fisheries products.
4. Promote hand line fishing, which fishermen agree is the most sustainable gear to use in the region.
5. Promote co-management of marine reserves that involve fisheries authorities, NGOs and local fishermen.

Research and Monitoring:

1. Conduct an analysis of the social and economic relationships between industrial fisheries, artisanal fisheries, and industrial aquaculture.
2. Identify, characterize, and evaluate reef fish spawning aggregation and nursery sites.
3. Improve system to quantify artisanal landings within each country of the GOH.
4. Promote studies that link upland agricultural and urban development and runoff to the health of estuarine and coastal water quality and to commercial fish populations.

Marketing and Processing: In many cases, fishermen are not receiving the maximum value for landed fisheries products. Improved marketing and processing can reduce waste and increase revenue to fishermen and illegal markets could be better regulated. Regional demands for seafood products could be better linked with their supplies.

1. Promote and support organization and market links for artisanal fishermen.
2. Develop additional markets for fresh seafood and value-added fisheries products.
3. Promote improved post-harvest processing and handling including better access to ice for fishermen and buyers.
4. Promote legal import/export markets for seafood within the GOH. For example: lobster fetches higher prices in Belize, and could be sold through the Belize Fisheries Cooperative System. Guatemala has a high demand for salt fish (seco salado) and conch – and these could be supported by legal export from Belize. Guatemala has impressive shrimp harvests and could sell jumbo shrimp to the restaurant market in northern Belize, where demand from tourism is high.

Fisheries Enhancement: In some areas, relatively inexpensive structures have been used to enhance tropical fisheries production. In Cuba for example, lobster casitas (artificial habitat) have been very successful in helping to increase production of lobster by increasing available substrate. In the Turks and Caicos Islands, low-cost penned enclosures for conch have been used as "egg farms" and have fostered the production of conch egg masses. These masses hatch and can dramatically increase the larval pool of conch for recruitment. If placed appropriately and well-managed, a system of such pens might help increase wild stocks. Marine reserves, which create a safe haven for marine life, have also been shown to increase fishery harvests nearby.

1. Promote research, development and use of lobster casitas.
2. Foster the development and use of conch egg farms.
3. Site and establish artificial reefs and fish aggregating divices to increase habitat for finfish.
4. Promote turtle nest management and protection.
5. Promote the declaration and management marine reserves.

In conclusion, the GOH fishermen understand the issues and the declines in marine resources and are willing to participate in fisheries management at the national and regional levels. Improved national and regional management should improve fish stocks for fishermen around the GOH, providing artisanal fishermen are involved in the decision making and management process. This document represents the "Voice of the Fishermen" of Southern Belize. Along with its sister documents from Honduras and Guatemala, and the TRIGOH working group recommendations for policy harmonization, fishermen can work together with national governments to improve fisheries management in the GOH for the benefit of all involved. This represents one of the first steps of a long and delicate process of interaction, collaboration and communication towards regional concensus on marine resources. Yet these efforts are very worthwhile considering what is at stake: fisheries resources in the Gulf of Honduras.

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Appendix 1. Value-Added Fisheries Products & Economic Alternatives for Fishermen

The FACTS

- Fisheries resources are in a global state of decline
- Fishermen are working harder and landing less fish
- Marine environments are being degraded by upland pollution, destructive fishing gears, anchor impact, and increasing coastal development
- Prices of gasoline, boats, and fishing gears are increasing

HOW CAN A FISHERMAN SURVIVE?

Economic alternatives for fishermen: To survive on the water, fishermen have to develop and master a great diversity of skills. They are generally highly skilled as mechanics, excellent natural observers, good boat handlers and usually have other skills such as carpentry, metal work, farming, cooking, etc. In an era of declining fisheries resources, fishermen should think seriously about pursuing alternative sources of income.

Near the Hol Chan Marine Reserve, and in the Toledo District, Belize, many fishermen have become sport-fishing guides. They have found that they can maintain their skills and lifestyle as fishermen but make more money guiding sport fishermen. Since most of this fishing is "catch and release"– the industry is largely sustainable. The fish are worth more to the fishermen in the water than in the ice cooler. Fishermen can also branch into specialized tourism guiding, such as kayaking, diving, snorkeling, bird-watching, and manatee watching. Marine skills further open the doors to jobs in aquaculture, marinas, research, boat mechanic shops, and marine construction.

Value added fisheries products: Fishermen are best placed to understand the value of fresh fisheries products. Would you pay more for fresh fish than frozen fish? How about for a cleaned fish than one with guts? Would you pay more for filet? And would you pay more for a fish in a restaurant than on the dock? The answer to all of these questions is probably yes. All of these simple answers are included in the definition of value-added fisheries products. The definition goes further to include finished products such as smoked fish, or ready-made soups or salads. Each of these requires prep-work but raises the product price. By delegating the labor, and distributing the income, the fishery product provides more jobs, and more total income for the fishermen and their families.

Live lobster: Many US restaurants specializing in seafood will display live lobsters in tanks. The client can point to and choose their meal and be assured of freshness and quality. To provide live lobster for the restaurant market requires a small investment in flow-through seawater tanks and an aquarium, and appropriate handling between the trap and the restaurant. Lobsters can be maintained super-fresh for several days, and provide guests with a view

under the sea, which adds to their appreciation of the meal, and the environment. This method has the added advantage of promoting traps instead of hooks (so females with eggs are not taken). Worldwide, live lobster command a higher price than frozen tails or recently prepared lobster.

Lobster bisque: One of the finest gourmet soups in the world is made from the lobster "heads". Many recipes exist but essentially all require that the gills be removed and the heads boiled to remove the essence. This concentrated broth is mixed with fresh herbs, heavy cream and topped with a shot of brandy. The broth (without additives) can be frozen and stored in small volumes, thus capturing the value from the heads which currently are thrown away.

Fresh grilled fish: There is nothing quite like the taste of a fish, freshly landed from the sea, and grilled on an outdoor barbecue. Tourists and locals alike will appreciate the taste and quality of such fish, especially if they are well handled, stored on ice, and served only fresh. If fishermen can establish direct links with restaurants, and provide meal-sized, well-handled super fresh fish, the restaurants could charge more for them, and thus would be willing to pay more for them. Alternatively, the fishermen and family might set up a "fresh fish thatch" and become known for serving only the freshest of fish, with a view of the sea. Restaurants like this are very popular and common on the Yucatan coast of Mexico and are usually with a sand floor, a thatch roof, bench seats, a barbecue grill nearby, and a cooler of very cold beer within reach.

Conch ceviche: Probably the best way to eat conch is in a simple conch salad or "ceviche". Very popular in Mexico, Guatemala, and Honduras conch ceviche is easy to make and highly sought by tourists and locals alike. Fishermen can catch and clean the conch and prepare a conch salad, package it neatly for sale to local restaurants or sell in a thatch setting mentioned in the previous paragraph.

Smoked fish: In Europe and the US, smoked fish commands very high prices. Smoked salmon, a perennial favorite, can sell at over $US 20/lb. Several of the local fishes can be smoked and sold to restaurants and to the export market. Lower priced fishes such as jacks and mackerels are actually best for smoking (due to their high oil content) and can command a price far above the fresh fish sale price. They can be served as finger foods or "bocas", and as restaurant appetizers. The strong flavor and intense smoke and salting allow the product to be stored for over a month when vacuum-packed, and small portions are often sufficient to satisfy the customer. One smoked fish can go a long way and greatly add more value to each fish harvested.

VALUE-ADDED FISHERIES PRODUCTS
HELP TO CONSERVE FISHERIES RESOURCES

Appendix 2. Materials and Methods

This study surveyed a representative sample of fishing boat captains in each of the three countries bordering the Gulf of Honduras, using a standardized survey form. The surveys were administered by TIDE in Belize, FUNDAECO in Guatemala, and PROLANSATE in Honduras between March and June of 1998.

The survey addresses four major issues:

1. What are the demographic profiles of the fishermen?
2. What are the fishermen catching, and how and when are they catching it?
3. How do the fishermen perceive the state of the resource, and how can it be improved?
4. Are the fishermen interested in economic alternatives to commercial fishing?

In each country a representative sample of fishing boat captains from each major fishing port were interviewed. Each interview began with a standardized introduction, and where possible, the captains were interviewed alone, so as not to influence the answers of other captains. A complete copy of the introduction can be found in Appendix 3.

Once the data were collected, they were entered into a relational database. The database and its interface were designed for use in both English and Spanish to facilitate tri-national analysis. The database provided a number of automated error reduction and error checking procedures to reduce data entry errors, and catch inconsistency in collected data.

Landings data (answers to question 2 above) should be examined with caution, as they are self-reported, and can be inaccurate due to deliberate mis-reporting, misunderstanding of how the estimates should be made, or simply poor estimation. In spite of these potential problems, these data were used to extrapolate estimates of the total catch for each community, and thus for each country, and the region as a whole. These estimates are based on estimated numbers of fishermen of different types in each community. Estimates for the numbers of fishermen are derived from conversations with local fishermen, first-hand observation by those administering the survey, and data from local fisheries departments. There is little or no existing data on the artisanal fisheries of this area to use as a comparison, so this study provides a rough estimate of landings.

The complete data set is currently available from the participating NGOs in each country. We encourage any policy-makers, scientists, or educators in the region to investigate the data further.

Estimation of landings: Fishery landings for all of Southern Belize were estimated by interviewing a subset of the fishermen on their catch, scaling their catch to account for how it was processed, and then extrapolating out to the total number of fishermen. This process is described in more detail as follows. First, fishermen were asked to estimate their landings

(or their sales in pounds) whichever was easier for them to remember. These were recorded as pounds landed by species, per month. A series of scalars were then used to standardize the values of total pounds of fish actually landed. For example, if 10 pounds of filet were reported as sold, we multiplied that by 1.67 to say that the landed fish weighed 16.7 pounds to start with. Similarly, if 10 pounds of dried fish were reported as sold, then we estimated that 14.3 pounds of fish were landed. The scalars are reported in the table to the right. Once the landings could were standardized, the average monthly landings were estimated for species, month and type of fishermen.

How fish is sold	Scalar
Dried	1.43
Filet	1.67
Tail	1.5
Salted	1.67
Fresh and entire	1
Fresh and gutted	1.25
Not sold	1

To help in the analysis, fishermen were classified into types. For example fishermen who primarily catch lobster were classified as "Lobster", while fishermen who primarily use nets are classified as "Net". Note that "aggregation" type fishermen refers to fisherman who live outside the study area, but who fish the Gladden Spit spawning aggregation – an area within the study region. Landings of each type of interviewed fishermen were averaged to generate an average set of landings, by fishermen type, for each month. Separately, via interviews with fishermen, data from the Fisheries Department in Punta Gorda, and local knowledge of who is who, the total number of fishermen of each type was estimated for each community. Then, by multiplying the number of fishermen of each type, by the landings for each type, and summing them, estimates of the total fishery were calculated. These are reported annually by species and monthly by subsets of species.

Appendix 3. Guidelines for Surveying Fishermen

Introduction: Introduce yourself and your organization to the fisherman in the context of this study.

Who is doing the interview:

- TIDE in Belize
- PROLANSATE in Honduras
- FUNDAECO in Guatemala

Objective of the interview: The interview is undertaken to understand the personal opinions of the fishermen of the Gulf of Honduras (show map) about the actual fishing situation in the Gulf. The interview will allow you to present your view of the problems related to fisheries resources and management, and the possible solutions and alternatives you, the fishermen, recommend to improve the situation. After all the information is collected, it will be included in a document that shows the opinions of all the GOH fishermen, and shows what you collectively recommend to improve the situation.

Scale of the study: The Gulf of Honduras is a small marine area that includes the waters of three countries - Belize, Guatemala and Honduras linked by currents. Most of the species that you catch use the reefs, mangroves, sea grasses, and estuaries, and open ocean to complete their life cycle. For example, a mutton snapper spawns off the reef, the larvae float in the plankton, settle in the mangroves and seagrass close to the shore, and migrate back out to the reef as adults. We are looking at the regional scale because the fish and manatees don't know where the country borders are.

Principles:

1. Only interview the captains of each vessel.
2. Note how many boats and how many fisherman are fishing from each community.
3. Don't lead the interview by suggesting answers.
4. Carefully write the entire response made by each fisherman during the interview.
5. Immediately after each interview, review the questionaire to be sure that each answer is complete and clear.
6. If any doubts arise during the revision, ask the fisherman to clarify immediately.
7. Be sure to note side comments clearly in the margins of the interview form.

Appendix 4. Members of the TRIGOH Technical Group

Experts in the technical area who assisted in the document revision process and provided recommendations for trinational fisheries management:

- Alejandro Andino, Honduras
- Georgina Bustamante , Cuba & USA
- Eloy Cuevas , Belize
- Lindsay Garbutt, Belize
- Juan Carlos Godoy, Guatemala
- Hugh Govan, Scotland & Costa Rica
- Rachel Graham, Belize & UK
- Will Heyman, Belize & US
- Wil Maheia, Belize
- Rafael Sambulá, Honduras
- Giovanni Zamora, Guatemala

Appendix 5. Dockside Value of Fishes in the GOH (1998)

Honduras prices			Belize Prices			Guatemala Prices		
Species	**Value (Lempiras)**	**Value ($US) 12L=$1US**	**Species**	**Value ($Belize)**	**Value ($US) 2BZ=$1US**	**Species**	**Value (Quetzales)**	**Value ($US) 6.3Q=$1US**
Arnillo	12.38	$1.03	Barracuda	2.12	$1.06	Bacalao	8.00	$1.27
Atún	7.05	$0.59	Black Grouper	2.50	$1.25	Barracuda	0.50	$0.08
Bacalao	6.50	$0.54	Blue Crab	1.00	$0.50	Calamar	3.33	$0.53
Barbón	6.68	$0.56	Blue Grunt	1.88	$0.94	Camaron	16.34	$2.59
Barracuda	8.85	$0.74	Bonito	2.33	$1.17	Colorado	4.83	$0.77
Cabo de Año	6.78	$0.57	Cero Mackerel	2.10	$1.05	Cubera	3.10	$0.49
Caguacha	9.44	$0.79	Crevalle Jack	1.81	$0.91	Jurel	3.09	$0.49
Camarón	8.00	$0.67	Cubera Snapper	1.97	$0.99	Manjua Canche	1.89	$0.30
Camaroncillo	6.50	$0.54	Dog Snapper	2.23	$1.12	Mojarra	1.99	$0.32
Corbina	8.18	$0.68	Green Turtle	2.00	$1.00	Palometa	2.08	$0.33
Cubera	11.32	$0.94	Grouper	2.06	$1.03	Pargo criollo	6.00	$0.95
Dorado	11.67	$0.97	Jewfish	2.81	$1.41	Raya	4.00	$0.63
Guajo	8.38	$0.70	Kingfish	2.00	$1.00	Robalo	10.29	$1.63
Guangara	4.95	$0.41	Lane Snapper	2.09	$1.05	Sabalo	3.67	$0.58
Huachinango	10.32	$0.86	Lobster	13.27	$6.64	Sierra	4.95	$0.79
Jurel	6.91	$0.58	Manatee	2.00	$1.00	Vaca	5.52	$0.88
King Fish	10.88	$0.91	Mutton Snapper	3.50	$1.75	Yerno/Wasa	3.56	$0.57
Langosta	20.00	$1.67	Permit	1.67	$0.84			
Lisa	8.88	$0.74	Queen Conch	3.96	$1.98			
Macarela	9.13	$0.76	Red Snapper	2.09	$1.05			
Machete	5.10	$0.43	Rock Hind	2.00	$1.00			
Macabí	5.00	$0.42	Snook	2.03	$1.02			
Mero	11.62	$0.97	Spanish Mackerel	1.25	$0.63			
Palometa	5.50	$0.46	Tarpon	1.50	$0.75			
Pámpano	13.00	$1.08	Yellowtail Snapper	2.17	$1.09			
Pargo	11.76	$0.98						
Payaso	11.67	$0.97						
Pez Loro	12.00	$1.00						
Pez Vela	6.00	$0.50						
Robalo	10.77	$0.90						
Ronco	7.06	$0.59						
Runio, Rabirubia	11.78	$0.98						
Sábalo	8.86	$0.74						
Salmón	6.92	$0.58						
Tiburón	10.41	$0.87						
Tilapia	8.60	$0.72						
Vieja	11.44	$0.95						
Yarano	5.80	$0.48						
Yerno/Wasa	15.00	$1.25						

Appendix 6. Multilingual Guide to Fishes in the GOH

Fish type	Scientific name	Belize/English	Guatemala	Honduras	Garifuna	Creole
Lutjanidae	*Lutjanus buccanella*	Blackfin snapper	Calau/Colorado	Cubera aleta negra	Jiyaba fanatii	Black fin snapper
Snappers	*Lutjanus cyanopterus*	Cubera snapper	Cubera	Cubera	Jiyau auiriti	Black snapper
	Lutjanus jocu	Dog snapper	Pargo colorado	Pargo colorado	Galalp & Gauganague	Dog teeth
	Lutjanus griseus	Gray snapper	Cubera sacatal	Cubera de mangle	Jiyau sagadiraguña	Black snapper
	Lutjanus synagris	Lane snapper	Calau	Galale	Galali	Silk snapper
	Ocyurus chrysurus	Yellowtail snapper	Xalatil	Yalatel	Galali	Yelatil
	Lutjanus analis	Mutton snapper	Pargo criollo	Botisnapa	Gagubanagui grilliyu	Mutton snapper
	Lutjanus campechanus	Red snapper	Cubera	Corruncha ojo rojo	Gagubanagai &Jiyaba funatii	Deep water silk
Haemulonidae	*Haemulon sciurus*	Blue striped grunt	—	Ronco sargento	Colaborü, Sisa guibü & Guwego quequru	—
Grunts	*Haemulon plumieri*	White grunt	Ronco negro	Ronco de piedra	Gureigurü guirity	—
Serranidae	*Mycteroperca bonaci*	Black grouper		Mero	Abadejo/Waga'nut Nugui guchanalü	Rockfish
Groupers	*Epinephelus guttatus*	Red hind	Cabrilla	—	—	Jimmy hind
	Epinephelus itajara	Jewfish	Yerno/Wasa	Yerno/Wasa	Inegü	Jewfish
	Epinephelus striatus	Nassau grouper	Wasa	Grupamanchada	Inegü yugülü	Groupa
	Epinephelus morio	Red grouper	Mero	Grupa roja	Kurupa & Inegü	—
	Mycteroperca venenosa	Yellowfin grouper	Mero	Payaso	Inegü dumarí	Yellow wing
	Mycteroperca interstitialis	Yellowmouth grouper	Mero de profundidad	Grupa boca amarilla	Inegü lasa dulilü	—
	Mycteroperca tigris	Tiger grouper	Mero	Mero tigre	Inegü guegusii	Fringy tail
	Epinephelus fulvus	Coney	Mero de arrecife de pantiel	Mero mantequilla	Nagsi	Butterfish
	Epinephelus adscensionis	Rock hind	Mero	Quimijay	Nagei	Jimmy hind
Scombridae	*Scomberomorous maculatus*	Spanish mackerel	Sierra	Sierra macarela	Wuarubi wubi	Mackerel
Mackerels & tunas	*Scomberomorous regalis*	Cero mackerel	—	—	Aguabi	Mackerel
	Scomberomorous cavalla	Kingfish	Kinfish	Macarela grande	Baganujabu	Kingfish
	Sarda sarda	Bonito	Bonito	Bonito	Bunigu	Bonito
	Katsuwomus pelamis	Skipjack	—	—	—	—
	Thunnus obesus	Big eye	—	—	—	—
	Thunnus atlanticus	Black fin	—	—	—	—

Fish type	Scientific name	Belize/English	Guatemala	Honduras	Garifuna	Creole
	Euthynnus alletteratus	Little tunny	—	—	—	—
	Acanthocybium solandri	Wahoo	—	—	—	—
Carangidae	*Caranx hippos*	Crevalle jack	Jurel	Jurel	Yawariga	Crebally
Jacks	*Caranx ruber*	Bar jack	Jurel bajo el arrecife	—	Masuouy	—
	Caranx crysos	Blue runner	Quinoa	Cabo de año	Gülilagaii	—
	Seriola fasciata	Amberjack	Jurel ojudo	Cabo de año grande	Gülilayüai & guenbure	—
	Trachinotus falcatus	Permit	Pampano	Palometa	Jauarawiia & jabaraba Jabawa	Pompus jack
	Trachinotus goodei	Palometa	—	—	—	—
Hemiramphidae	*Hemiramphus brasiliensis*	Ballyhoo	Aguja	Aguja	Guisaba & Gonbirii babougute	Bally
Sphyraenidae	*Sphyraena picudilla*	Great barracuda	Barracuda	Picuda	Yamura	Barra
Rachycentridae	*Rachycentron canadum*	Cobia	Bacalao	—	Lamuoy	Kabea
Albulidae	*Albula vulpes*	Bonefish	Macabi	Macaui	Macimasi & Ruguma gapeichanu	Bony fish
Elopidae	*Megalops atlanticus*	Tarpon	Sabalo	Sabalo	Java	Tarpon
Engraulidae	*Anchovia macrolepidota*	Big scale anchovy	Sardina escamuda	—	Viví	Escamuda
Mugilidae	*Mugil cephalus*	Striped mullet	Lisa curia	Lisa	Barasiguyemelu	Mullet
Centropomidae	*Centropomus undecimalis*	Common snook	Robalo	Robalo	Brüitouba	Snook
Istiophoridae	*Istiophorus platypterus*	Sailfish	—	—	—	—
	Makaira nigricans	Blue marlin	—	—	—	—
Scaridae	*Scarus vetula*	Queen parrotfish	Pez loro	Pez loro	Gurebegui uduroü	Gillybore
Balistidae	*Balistes vetula*	Queen triggerfish	Pez chucho	Cochino	Janaü	—
Ariidae	*Ariopsis assimilis*	Catfish	Fuilin	Bagre chunte	Kisskidy & Bagri	Old guy
Shrimp	*Penaeus brevirostros*	Mexican brown shrimp	Camarón de noche o café	Camarontiti	Isarii	Shrimp
	Penaeus occidentalis	Central american white shrimp	Camarón	Camarón blanco	Jarutii	Shrimp
	Penaeus vannamei	West coast white shrimp	Camarón de día	—	Gueyouguna	Shrimp
	Penaeus stylirostris	West coast white shrimp	Camarón pata blanco	—	IsuruJary tugudi	Shrimp
Conch	*Strombus gigas*	Queen conch	Caracol real	Caracol grande	Guadabü & bralife	Conch
Lobster	*Panulirus argus*	Spiny lobster	*Palinuridae*	*Palinuridae*	Wujagüaga & Jugabarü	Lobster

Notes

Notes