

# MARKET-BASED INCENTIVES FOR RESPONSIBLE FISHING

*Market study on local consumption of finfish  
in Caye Caulker and San Pedro*



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**Inter-American Development Bank Project (BL-T1123)**

**Oceana, Inc (Executing Agency)**

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*This Market Report provides the baseline study for the **Shellcatch Diagnostics Report** which builds on the data revealed by this study and presents the strategic framework for the implementation of the technology.*

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## ACRONYMS AND NOTES

- **F.R.E.R** = Fish Right Eat Right
- All dollar amount is Belize dollars
- **Seafood Retailers** refer to any person that purchases seafood from a fisher and resells on the local market to restaurants or households.
- The data presented in this report is data prior to COVID-19.

## 1. INTRODUCTION

Belize's small-scale fisheries sector has been a significant contributor to the economy, with focus on Queen Conch (*Strombus gigas*) and Spiny Lobster (*Panulirus argus*) as the primary exported species. Only an estimated 10% of conch and lobster produced in Belize remains on the local market; the other 90% is sold directly to foreign export markets, mostly in the United States (FAO, 2019). Finfish, however, is mostly sold to the local market. In recent years Fishing Cooperatives, such as the National Fishermen Producers Cooperative Society (NFPCS) exported primarily grouper (Serranidae) and snapper (Lutjanidae) species to the United States; however, due to high shipping cost they have not exported finfish for the past eight years. (Eden Leon, pers. comm., NFPCS). Seafood Companies have now started to export seafood, including finfish.

The Belize Fisheries Department, under the Blue Economy and Civil Aviation Ministry, is responsible for the management of Belize's fisheries resources. The fisheries sector currently supports approximately 2600 commercial fishers (BFD, 2020). There has been much progress made in the management of fisheries resources such as established Marine Protected Areas with management zones, gear and species restrictions; and in 2016 the implementation of the Managed Access Program, a transition from an open access fishery. The Managed Access Program introduced nine fishing areas in the waters of Belize, eight closed fishing areas and a ninth open area focused on deep slope fishing. Fishers who meet criteria can select two of the eight closed areas for fishing (Figure 1).

There are currently closed seasons and size limits in place for the two main commercial species, queen conch and spiny lobster. The closed season for conch is July 1 – September 30; and size limits include conch shell length > 7 inches, unprocessed conch weight > 7.5 ounces, market clean weight > 3 ounces, fillet weight > 2.75 ounces. There is also an annual national quota set for the queen conch by the Belize Fisheries Department. The closed season for lobster is February 15 – June 14; and size limits include carapace length > 3 inches and tail weight > 4 ounces. The Nassau grouper (*Epinephelus straitus*) is the only finfish with a closed season and size limits. The closed season is December 1 – March 31; and Nassau groupers must be landed whole with a minimum and maximum length of 20 and 30 inches, respectively.

While the queen conch and lobster fishery are consistently managed, finfish is still caught in an ad hoc manner. There are no set landing sites where data can be collected for finfish which creates challenges in considering finfish size limits and species quotas.

The tourism industry in Belize has grown rapidly over the last few decades with the peak tourism season running from late November to mid-April. As the tourism industry has grown so has the demand for seafood. While Belizeans enjoy seafood as one of the key sources of protein, especially in coastal communities, seafood is getting scarce and expensive as tourism destinations often get first purchase preference since fishers are able to fetch higher prices per pound of seafood.

Still there are many times where restaurants have difficulty sourcing finfish and have to default to fish such as local or imported tilapia (*Oreochromis niloticus*) and imported swai (*Pangasius Spp.*), fish native to Africa and Southeast Asia, respectively.

In 2017, Oceana Belize in partnership with the Belize Fisheries Department, Belize Tourism Industry Association, Wildlife Conservation Society, and Belize Tourism Board established the Fish Right Eat Right program aimed at encouraging and highlighting restaurants that sell sustainably harvested seafood.

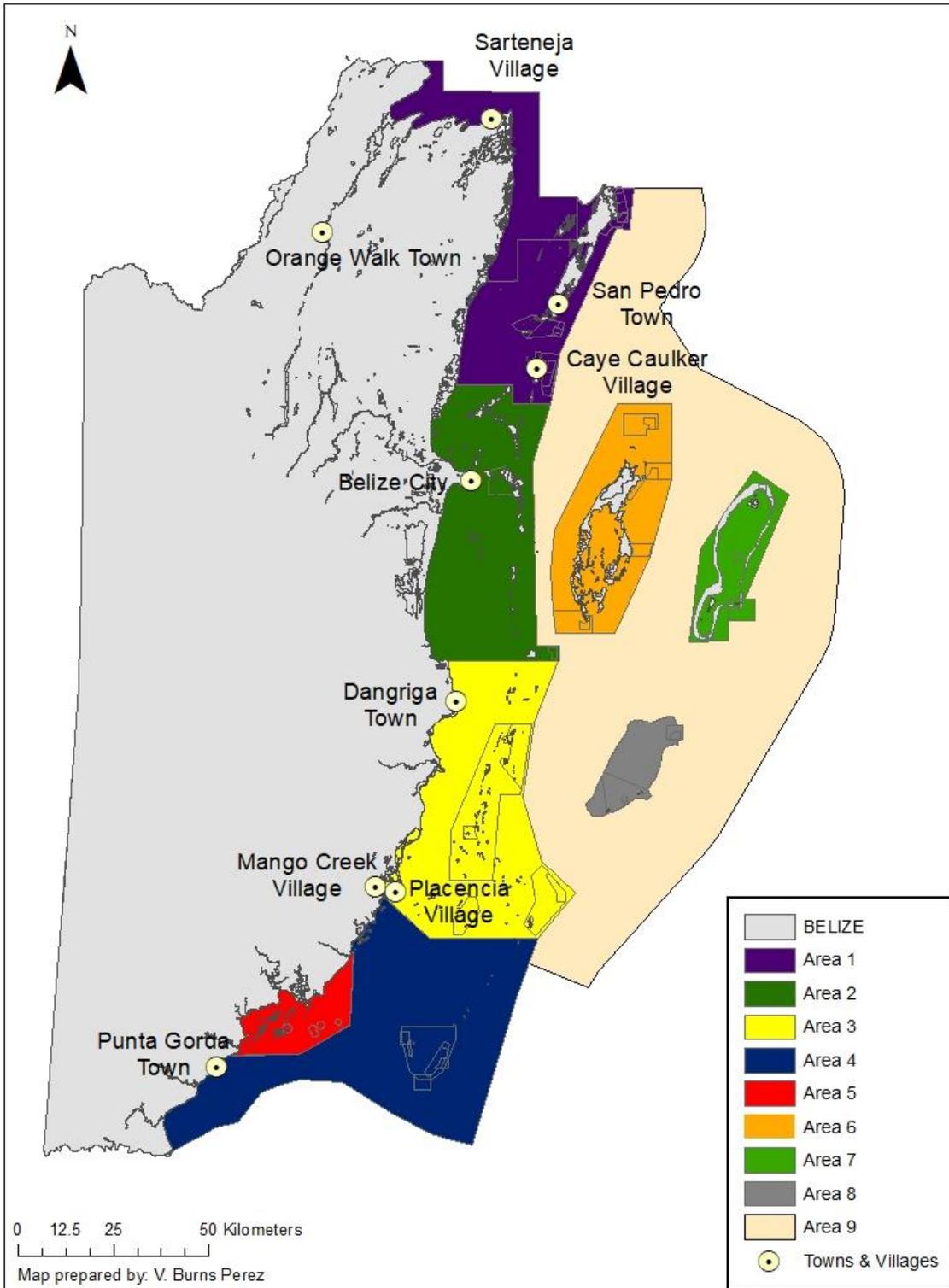
In 2020,

### **Corona Virus Disease (COVID-19)**

In March 2020, the World Health Organization declared the Corona Virus Disease (COVID-19) a pandemic. Due to a series of restrictions imposed by the Government of Belize because of COVID-19, the tourism sector in particular has been severely affected. With many restaurants on the island of San Pedro and Caye Caulker closed the demand for finfish was non-existent. After the international airport opened in October 2020, restaurants had to meet criteria for the Gold Standard Certification to be able to operate their business.

During the time of restrictions, some restaurants offered take-out service with a modified menu with affordable meals for local customers. Modified menus did not include seafood such as finfish since the aim was to offer meals at reduced prices to locals.

The surveys conducted for this study were based on data prior to COVID-19.



**Figure 1: Map of Managed Access Zones and major towns and villages based on the Belize Fisheries Department Manage Access Areas and B.E.R.D.S shapefiles.**

## 1.1 STUDY OBJECTIVES

This market study is a component of the “Market-Based Incentives For Responsible Fishing” project which aims to preserve the livelihood of Belizean fishers by improving their income potential and also aims to encourage local restaurants to serve responsibly caught seafood.

The aim of the Market Study is to identify the current and potential demand for responsibly harvested finfish by Caye Caulker and San Pedro restaurants; and to map the fishers that supply these restaurants with finfish. Through this study finfish species, quantity, sizes, and price will be determined.

## 2. METHODOLOGY

There were a couple sources of information considered in determining the total restaurants for Caye Caulker and San Pedro. Trade license lists for both Caye Caulker Village and San Pedro Town were obtained from the municipal government. A business tax list from the Belize Tax Service was also reviewed for current restaurants operating in Caye Caulker and San Pedro. After reviewing all information the trade license list for both Caye Caulker and San Pedro were deemed most accurate.

Two questionnaires developed by the consultant, based on the objectives of the project were used to secure responses and input from restaurateurs and fishers. The questionnaires focused on demographics, finfish preference, finfish catch, and awareness of Belize’s fisheries regulations (Annex 1 & 2).

Restaurants were contacted first and after receiving information on their finfish supplier, a list of fishers was compiled and contacted.

Two 1-week field surveys were conducted in June and July 2020 in both San Pedro and Caye Caulker, respectively. Due to the increased cases of COVID-19 and restricted movement to San Pedro and Caye Caulker, interviews were completed via telephone from July to October 2020.

Interviews did not exceed 15 minutes to avoid survey fatigue and to be sensitive to interviewees.

### 2.1 Limitations of the Market Study Interviews

In-person interviews were limited due to COVID-19 restrictions. Participants’ responses via telephone were less forthcoming with information compared to responses received during in-person interviews. This is not to say the content of their responses were not accurate or truthful, but it limited the interaction.

During the survey period, many business owners experienced significant financial loss and expressed their heightened level of stress with the consultant, which made it difficult in some instances to carry on a full interview as the consultant approached interviews with sensitivity.

Many restaurateurs did not know the formal names of the fishers they purchased finfish from and in many instances; there were no telephone numbers available since most fishers brought fish directly to restaurants.

Although during the survey period, fishers were fishing less it was still challenging to contact them by telephone.

Fishers were also less forthcoming with information as they thought the data would be used against them. A few fishers shared that whenever they answer questions about their seafood catch the information is used against them in the future by fishing restrictions.

### 3. MARKET STUDY RESULTS

#### 3.1 Caye Caulker Restaurants

##### Restaurant Overview

The Caye Caulker Village Council’s Trade License list included 60 businesses registered as either a Restaurant or Publican category. The list included 20 restaurants and 40 publicans. A Publican classification being the type of license assigned to restaurants/bars, which sell alcohol. For the purposes of the survey, Restaurants and Publicans were all considered restaurants. Interviews were conducted with restaurant owners or managers during July and August 2020. 30% of the interviews were conducted in person while the remainder was done via telephone due to COVID-19 restrictions. Overall, 55% of businesses contacted participated in a survey. Of the 45% that did not participate, 10% of the restaurants were permanently closed for business prior to 2020; 10% of the businesses were hotels which did not have a restaurant at the time of the survey. 15% did not sell finfish, there was no contact with 8% of restaurants on the list and one restaurateur could not participate in an interview due language limitations.

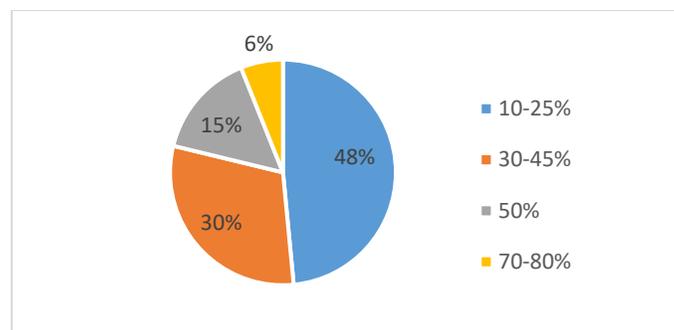
**Table 1: Survey participation**

Restaurants (12) & Bars (21) interviewed	33	55%
Permanently closed prior to 2020	6	10%
No restaurant	6	10%
Does not sell finfish	9	15%
No contact	5	8%
Does not speak English nor Spanish	1	2%

<b>Total Restaurants &amp; Bars on Trade License List</b>	60	100%
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Caye Caulker restaurants have been in business from 6 months to 15 years; only 4 restaurants have been in operation for 15 years.

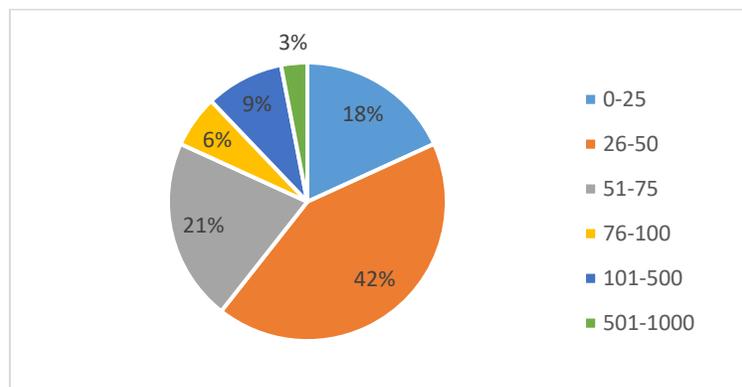
In terms of the quantity of finfish served at restaurants, 48% of restaurateurs stated that 10 – 25% of their menu is finfish. 30% of restaurateurs said 30-45% of their menu was finfish. Only 6% of restaurateurs said that 70-80% of their menu was finfish.



**Figure 2: Percentage of finfish on menu**

Restaurant sizes vary and seating capacity can range from 25-1000 seats per restaurant. 42% of restaurants range from 26-50 person seating capacity. Only one restaurant reported a 1000 person seating capacity.

The Tourism High Season in Belize, which is between the months of November to April, has an impact on the number of customers restaurants serve. Based on anecdotal responses, Caye Caulker restaurants see an average of 65% decline in customers during the off-season from May to October as compared to the high season.



**Figure 3: Restaurant capacity**

### BOX 1: COVID-19 OBSERVATION

During the COVID-19 lockdown/restrictions, 55% of restaurants surveyed closed indefinitely and lost all staff. 45% of restaurants managed to remain open while retaining 50% of their staff. These restaurants offered take-out meals at reduced prices and did not have finfish on their menu.

### Restaurants and Technology

All restaurateurs reported having access to internet. Restaurateurs were considered Advanced User of smartphones if they had an email address and at least one social media account; Intermediate User if they had an email address and Basic User if they had no email address. 76% of restaurants were considered advance users of smart phones, 9% intermediate and 15% basic.

79% of respondents responded with a “Yes” to willingness to using a virtual marketplace application to purchase finfish for their restaurants. They were interested to access finfish at competitive prices.

18% of respondents responded with a “maybe” to using the app. Respondents were concerned about freshness of finfish, finfish handling and storage from fisher to the time they received the finfish. Pricing was also a concern, as respondents did not think they would be able to get a more competitive price than what their loyal fisher was already offering them.

Only 1 respondent said they would not use the virtual marketplace app. since they conduct their own fishing for their restaurant.

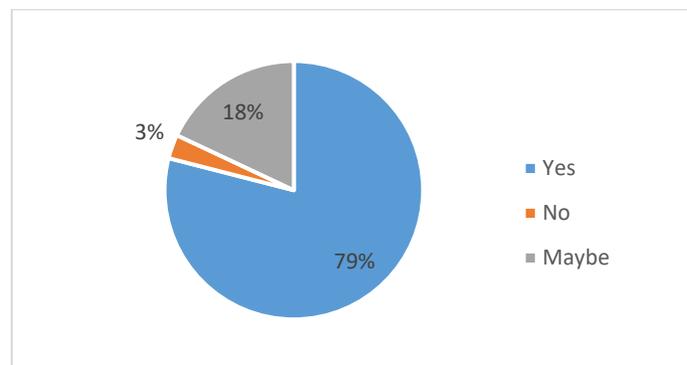


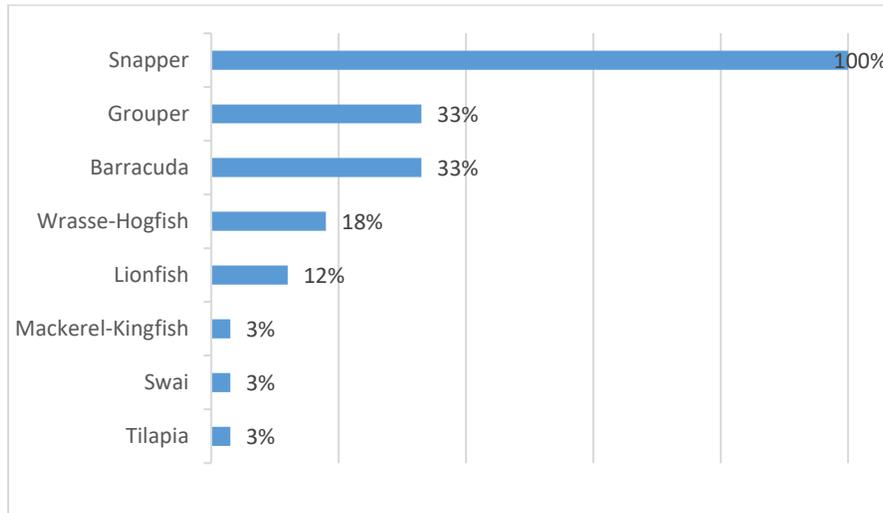
Figure 4: Interest in Virtual Market Place

### Finfish Preference

All Restaurateurs reported that the most desirable finfish is any species of snapper followed by any grouper species and then barracuda. Other types of fish preference include hogfish, lionfish, kingfish, swai and tilapia. Swai and tilapia are imported fish native to Southeast Asia and Africa,

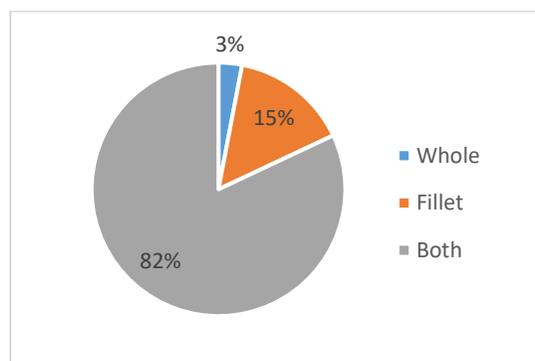
respectively. Tilapia is also farmed in Belize. Restaurants purchase both local and imported tilapia.

Only one restaurant reported tilapia as a preferred fish; a larger restaurant that purchases approximately 175 pounds of both whole and fillet fish on a weekly basis. The restaurant that prefers swai fish purchases one 25 pound box of swai weekly in both high and low tourism season.



**Figure 5: Caye Caulker Restaurants Finfish Preference (Respondents were allowed to select more than one choice)**

82% of restaurants prefer both whole and fillet finfish. Some restaurateurs prefer to fillet their own finfish. 15% of restaurants only serve fillet. Restaurateurs stated that tourist prefer fillet to whole finfish.



**Figure 6: Whole vs. Fillet Preference**

### Whole and fillet finfish preferred size

79% of restaurants prefer 0.5-3lbs whole fish. Respondents said that a “plate sized” fish ranging from 1-1.5lbs was the preferred fish for a one-person meal. Larger whole fish do not sell easily and are mostly consumed by groups of four.

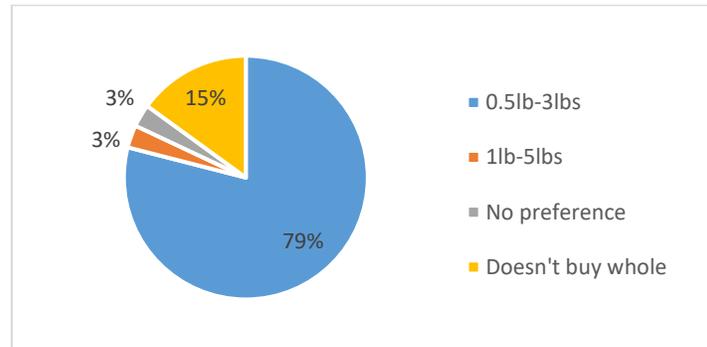


Figure 7: Preferred whole finfish size

67% restaurants prefer 4oz – 1lb fillet. 30% of respondents said they had no preference in fillet size.

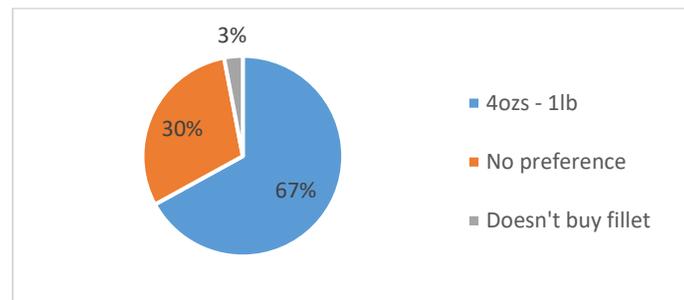


Figure 8: Preferred finfish fillet size

### Experience identifying fish

94% of Restaurateurs said they were comfortable identifying both whole finfish and fish fillet; however, they still rely on help from fishers in identifying fillet. Respondents shared that they would be interested in learning how to better identify fillet.

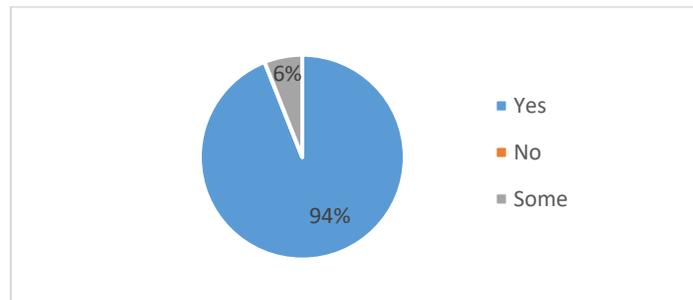


Figure 9: Experience identifying finfish

### Where is the finfish coming from?

Restaurateurs were asked if they were aware of the fishing areas the finfish were caught and to list all fishing areas. 70% of restaurateurs surveyed believed that the finfish they purchased were coming from Area 1, around Caye Caulker. 15% of restaurateurs stated that their fish came from Turneffe Atoll Marine Reserve, Area 6. 12% of respondents stated that they purchased fish from the Belize City Seafood Market. 18% of restaurateurs responded that they had no knowledge of where their purchased finfish was caught. Respondents were allowed to select more than one choice.

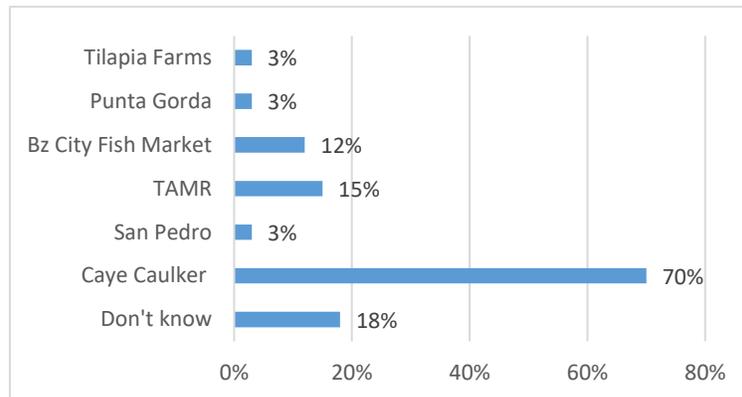


Figure 10: Where respondents believe finfish is caught

Restaurateurs were asked who supplied them with finfish. 64% of restaurateurs responded that they purchased finfish directly from fishers in Caye Caulker. 30% of Restaurateurs said they purchased finfish opportunistically from any fisher with available finfish. In many instances, restaurateurs were unable to share name and contact information of their finfish supplier because fishers usually bring finfish directly to the restaurants. Respondents were allowed to select more than one choice.

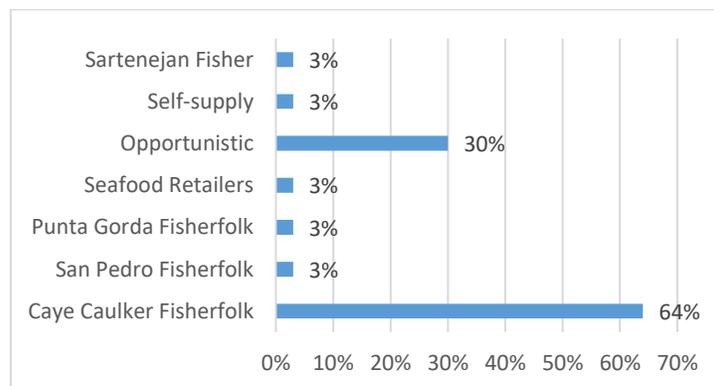


Figure 11: Caye Caulker finfish suppliers

### Finfish prices

Pre-COVID-19 prices for whole finfish ranged from \$7-\$10 for 70% of the restaurateurs. While 15% of restaurateurs said, they paid between \$11-\$14 per pound of whole finfish. 15% of restaurants did not include whole finfish on the menu.

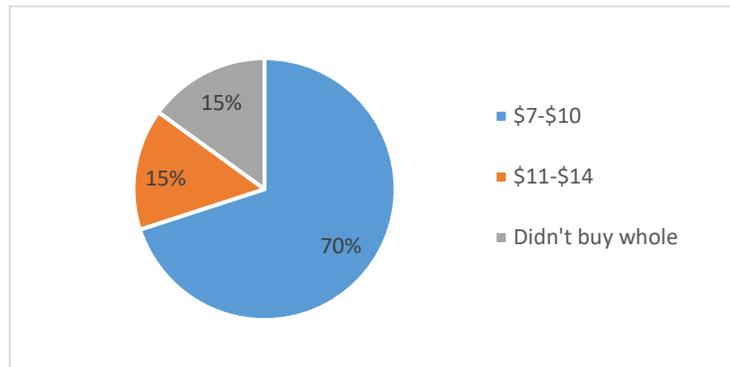


Figure 12: Whole finfish price

67% of restaurateurs paid between \$11-\$15 per pound of fillet pre-Covid-19. 3% of restaurateurs did not buy fillet because it was too expensive.

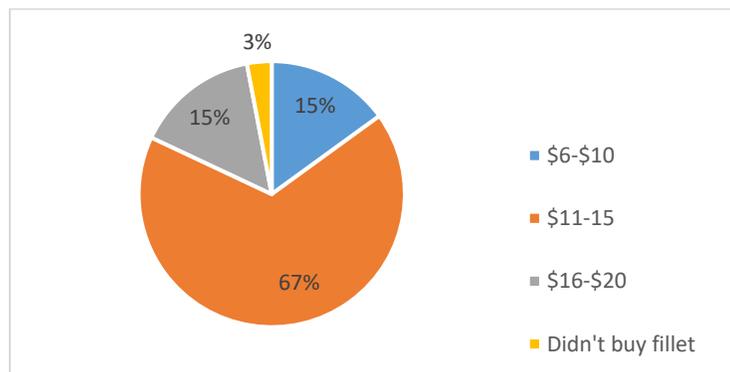
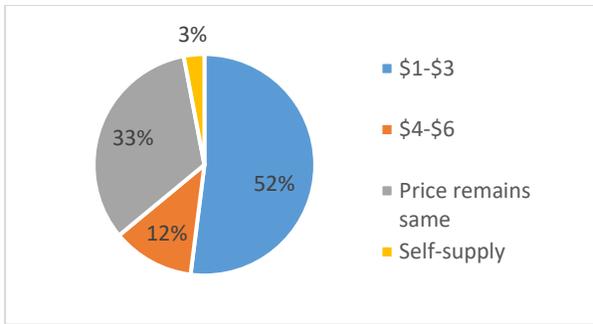


Figure 13: Fillet price

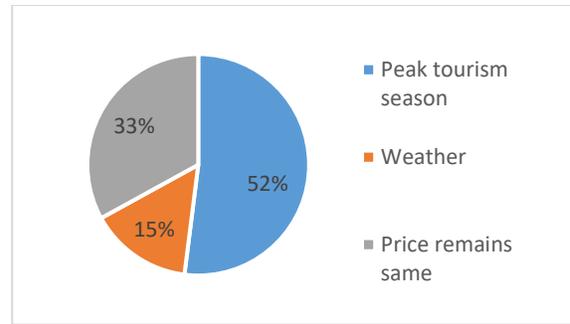
### Price fluctuations and factors affecting price

When asked about finfish price fluctuation, 52% of restaurateurs responded that they usually experience a price increase of \$1-\$3 per pound of fish. 12% of restaurateurs said the price of finfish increased by \$4-\$6 per pound. 33% of the restaurateurs did not experience any price changes due to the loyal relationship they had with their finfish providers.

The main factor affecting price fluctuations is the high demand for finfish during the high tourism season. Weather was also a common factor for price increase as fishers often times had to use more fuel during rough fishing trips and there was a higher risk to fishing.



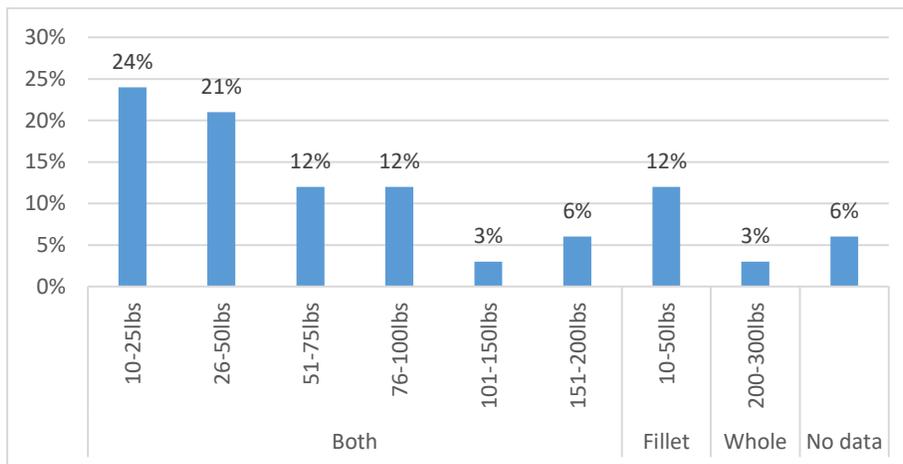
**Figure 14: Price fluctuations**



**Figure 15: Factors affecting finfish price**

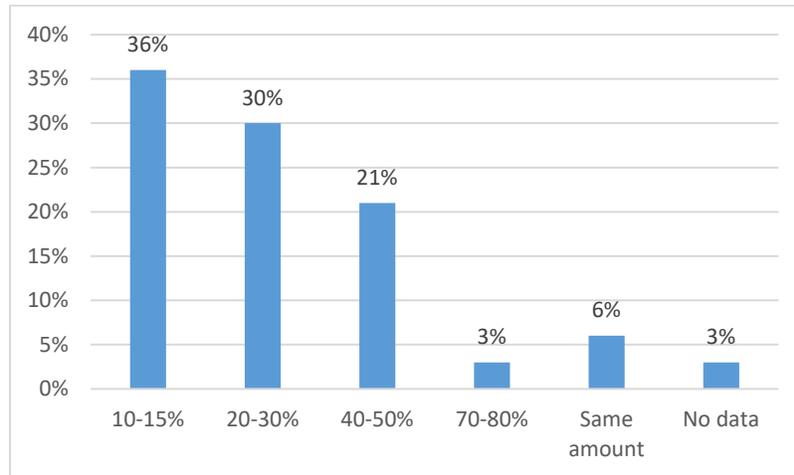
### Quantity of purchased fish

Restaurateurs were asked about the quantity of finfish they purchased for their restaurants weekly during the high tourism season. Approximately 78% of restaurants purchased both whole and fillet finfish weekly: 24% of these restaurants purchased 10-25lbs of combined whole and fillet finfish while 6% of restaurants purchased 151-200lbs of combined whole and fillet. 12% of restaurants purchased between 10-50lbs of only fillet. 3% of restaurants purchased 200-300lbs of only whole finfish weekly.



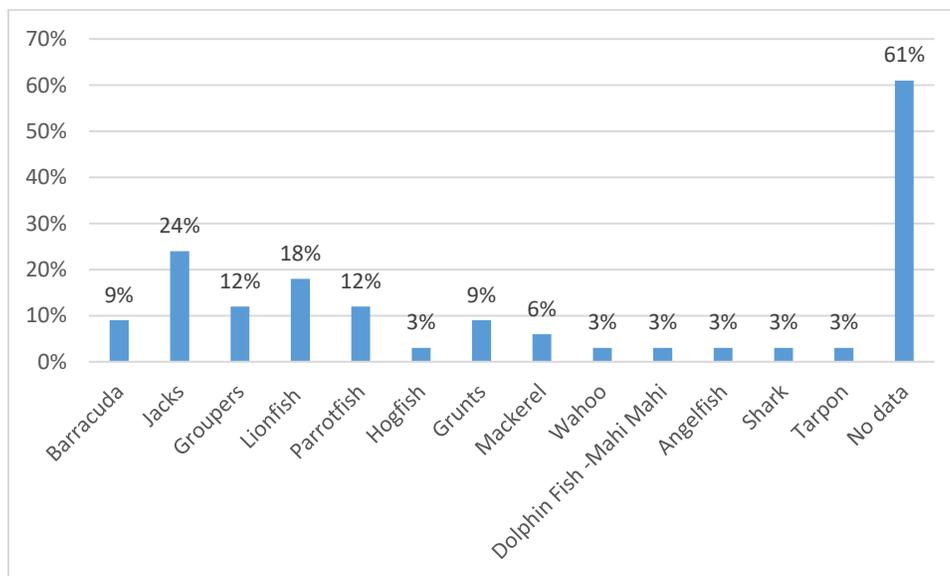
**Figure 16: Quantity of whole and fillet finfish purchased during high tourism season**

Restaurateurs were asked the quantity of finfish they purchased during a conch or lobster season. 36% of restaurateurs said they sold 10 – 15% less finfish, 30% of restaurants sold 20-30% less finfish and 21% of restaurants sold 40-50% less finfish during a conch and lobster season.



**Figure 17: Decline in finfish sales during lobster and conch season**

Restaurateurs were asked about other types of finfish offered to them that they did not purchase. 61% of respondents did not share this information. However, 12% of respondents said they were offered parrotfish regularly, and 3% of respondents said they were regularly offered angelfish and tarpon, all 3 species are protected in Belize. Respondents were allowed to select more than one choice.



**Figure 18: Other finfish available for purchase**

## BOX 2: COVID-19 OBSERVATION

Restaurateurs were asked if they knew the current price for whole finfish. 21% of the restaurateurs said finfish was selling for \$5-\$8 per pound. 61% of the restaurants were closed during this time and 12% were open for take-out but did not serve any finfish on their menu.

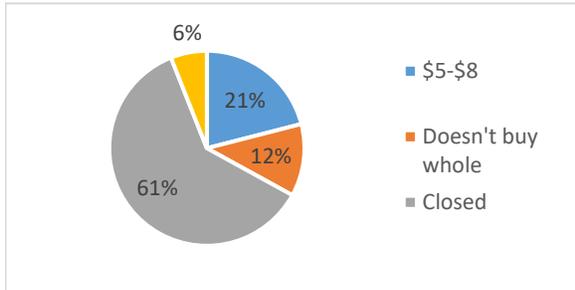


Figure 19: Current Whole Price

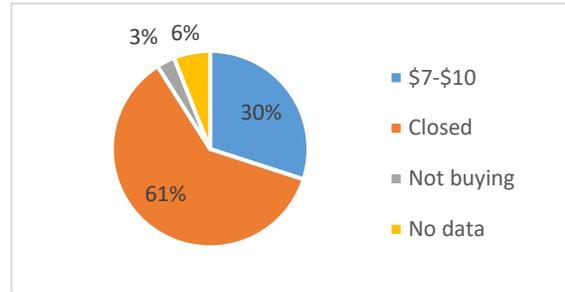
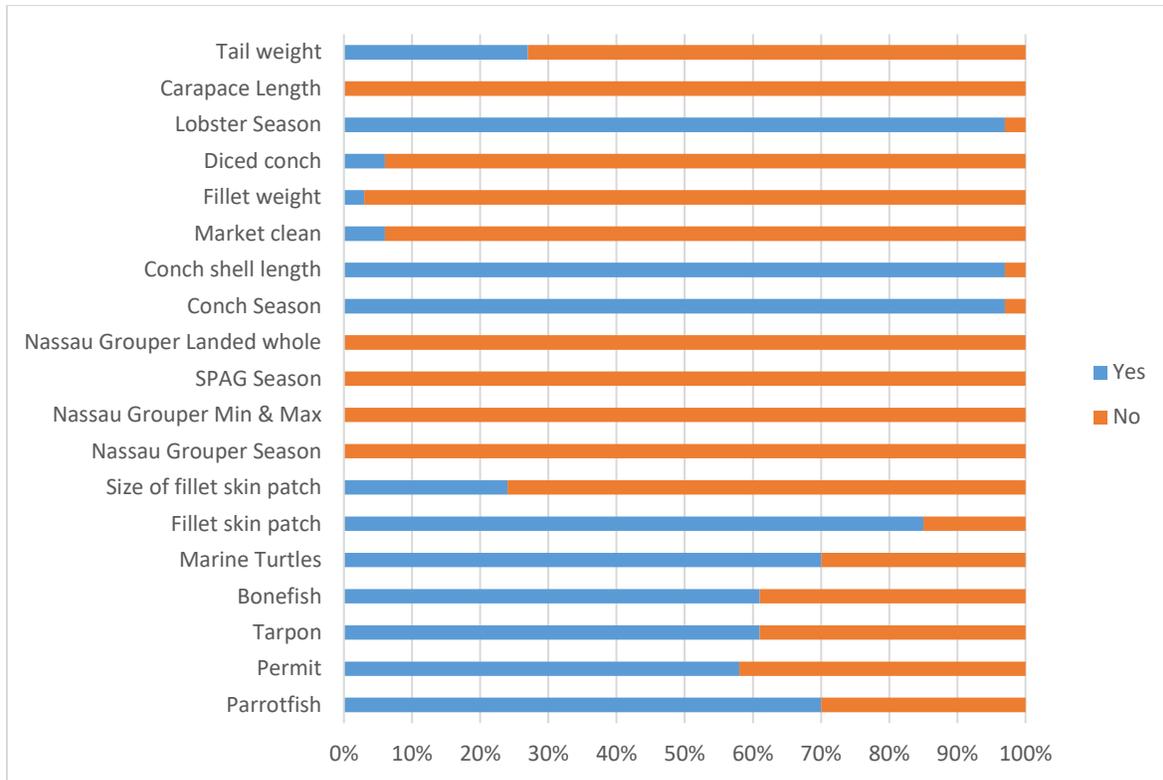


Figure 20: Current Fillet Price

## Caye Caulker Restaurateurs awareness of fisheries regulations

Restaurateurs were asked a series of questions to gauge their awareness of some of the more common fisheries regulations in Belize.



**Figure 21: Restaurateurs awareness of Fisheries Regulations**

**Table 2: Caye Caulker restaurateur’s awareness of fisheries regulations**

<b>Lobster</b>	<ul style="list-style-type: none"> <li>• 97% of restaurateurs were aware of the lobster season.</li> <li>• 27% of restaurateurs knew the legal lobster tail weight is &gt; 4 ounces</li> <li>• None of the restaurateurs knew the legal carapace length, this is more than likely because they mostly purchase lobster tails.</li> </ul>
<b>Conch</b>	<ul style="list-style-type: none"> <li>• 97% of restaurateurs were aware of the opening of the conch season but expressed confusion on the early closures of the season. They felt that the dates of early conch season closure was not always broadcasted publicly.</li> <li>• 97% of respondents knew that the legal conch shell length is &gt; 7 inches</li> <li>• 6% of respondents were aware of the legal Market Clean weight &gt;3 ounces and that it was illegal to purchase diced conch</li> <li>• 3% of respondents knew that conch fillet should weigh 2.75 ounces and more.</li> </ul>

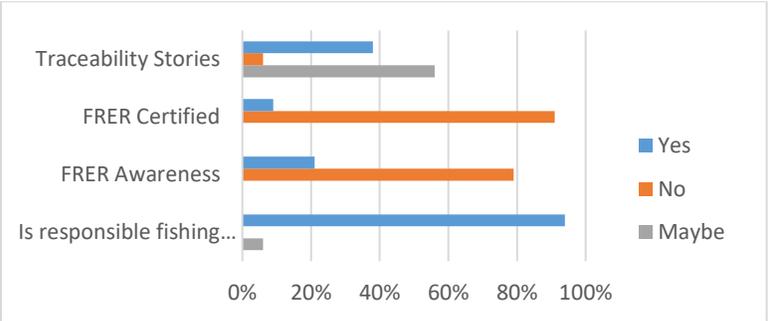
<b>Nassau Grouper</b>	<ul style="list-style-type: none"> <li>No restaurateur knew any of the rules regarding Nassau grouper. This may be because they believe Nassau grouper is a fully protected fish.</li> </ul>
<b>Finfish fillet</b>	<ul style="list-style-type: none"> <li>85% of respondents were aware that finfish fillet should have a skin patch.</li> <li>24% of respondents knew that the skin patch on the fillet should be 2 inches by 1 inch in size or larger.</li> </ul>
<b>Protected Species</b>	<ul style="list-style-type: none"> <li>70% of respondents were aware that marine turtles are protected</li> <li>61% of respondents were aware that bonefish and tarpon were catch and release only</li> <li>58% of respondents were aware that permit was catch and release only</li> <li>70% of respondents were aware that parrotfish were fully protected.</li> </ul>

**Finfish traceability and willingness to share with customers**

Restaurateurs were asked if they were interested in learning where the finfish they served in their restaurant was coming from and if they would be interested in learning how to share those traceability stories with their customers. 38% of respondents said that they do want to know where the finfish they purchase is coming from and would like to learn more about sharing traceability stories with customers. 56% said “Maybe” in response to this question with some comments that they would need more information on how this would benefit their business.

9% of the restaurants surveyed were already signed on to the Fish Right Eat Right program. 79% of respondents said they had never heard of the FRER program.

When asked if responsible fishing was important to them, 94% of restaurateurs responded that responsible fishing was important to them and they tried their best to operate in a sustainable manner.



**Figure 22: Traceability and FRER**

## 3.2 Caye Caulker Fishers

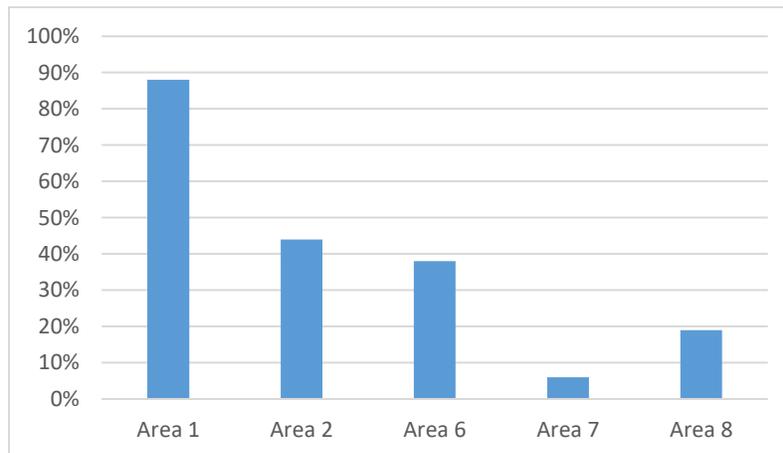
### Caye Caulker Fisher Overview

Based on the surveys done with restaurateurs, 16 fishers were interviewed for this project. Fisher's ages ranged from 23 – 61 years old. 81% of the fishers live in Caye Caulker, 1 in Orange Walk Town, and 2 in Sarteneja Village.

50% of fishers reported having primary school education only, 31% having secondary education, one fisher had tertiary level education, and 2 fishers reported having no formal education.

All fishers had a Commercial Fishing License and have been fishing from 3 - 43 years (9 fishers have been fishing less than 20 years while 7 fishers have been fishing for more than 20 years).

The Fishing Areas that these fisher have license to fish under the Managed Access Program are Fishing Area 1, 2, 6, 7, 8. 81% of the fishers interviewed fish in Fishing Area 1. Respondents were allowed to select more than one choice.



**Figure 23: Fishing Areas fished by surveyed fishers**

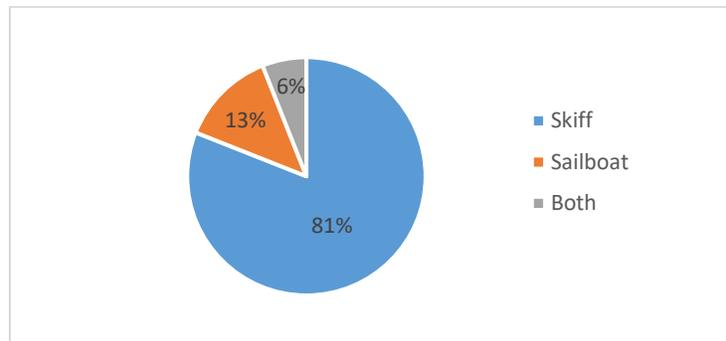
56% of fishers are part-time fishers; other jobs mostly included tour guiding.

75% of fishers interviewed are members of the Northern Fisherman Cooperative whereas only 13% belonged to a fishing association, Sarteneja Fishermen Association.

All fishers reported that Caye Caulker was their first landing site/point of sale. Finfish would be delivered to San Pedro only by special order. Sailboat fishers who fish at Glover's Reef Marine Reserve, Area 8, stated that while they also deliver seafood to the Northern Fisherman Cooperative in Mango Creek and sometimes Belize City, most of their finfish is sold locally.

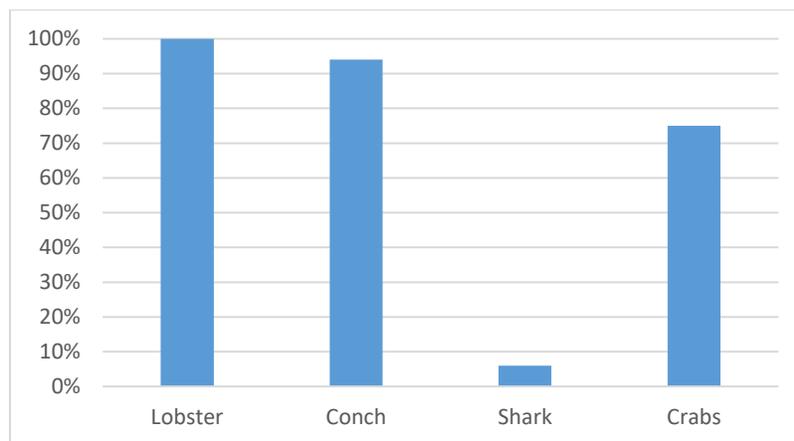
Caye Caulker fishers mostly use spearguns and handlines and only 3 fishers reported having deep sea gear such as attached winch to handlines. Speargun fishers fish approximately 10-65 feet depth, while handline fishers range from 10- 80ft, and deep-sea gear fishers fish 100-1000ft.

81% of fishers are skiff users with a crew ranging from 1 - 4 fishers, 13% are sailboat fishers with crews of 8 – 10 fishers and only 6% use both skiffs and sailboats. Fishers that use skiffs mostly fish near Caye Caulker and Sailboat fishers focus efforts at the Atolls.



**Figure 24: Type of vessel used by Caye Caulker fisher**

Fishers engaged in other types of fishery. All interviewed fishers also fish lobster, 94% of fishers fish conch, 75% engage in crab fishery for both stone crab and spider crab and 6% of fishers catch sharks. Respondents were allowed to select more than one choice.



**Figure 25: Other types of fisheries**

### Caye Caulker Fisher and Technology

Since this project is geared toward using a virtual marketplace application, fisher were asked about their experience with smartphones. Fishers were considered Advanced Users of smartphones if they had an email address and at least one social media account; Intermediate User if they had an email address and Basic User if they had no email address. 38% of fishers were deemed Advance Users of smartphones and 25% were considered intermediate users while 38% were considered basic users with very limited knowledge of smartphones.

81% of fishers reported that they have access to private internet while 19% accessed internet publicly.

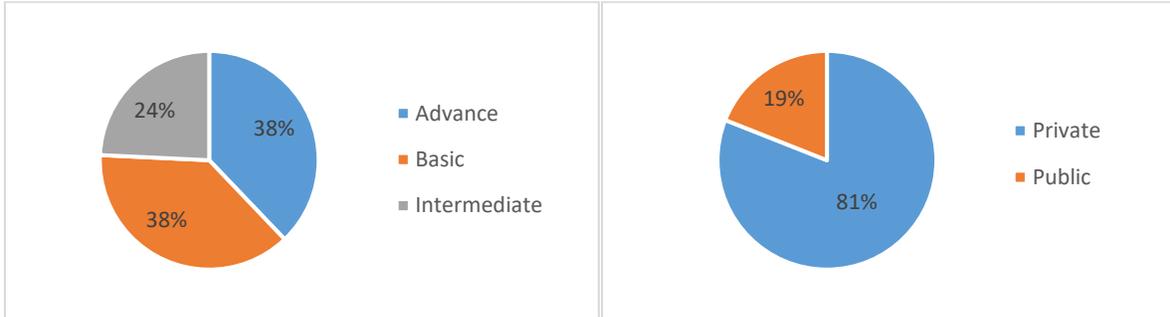


Figure 26: Experience using smartphone

Figure 27: Access to internet

88% of fishers stated their interest in the virtual marketplace app, they believe they can benefit significantly. None of the fishers said no to using the app but 13% or 2 fishers said maybe to the app. Primary reason for being unsure about using the app is that 1 fisher supplies his own restaurant while the other fisher said he maintains a good and loyal relationship with his customers.

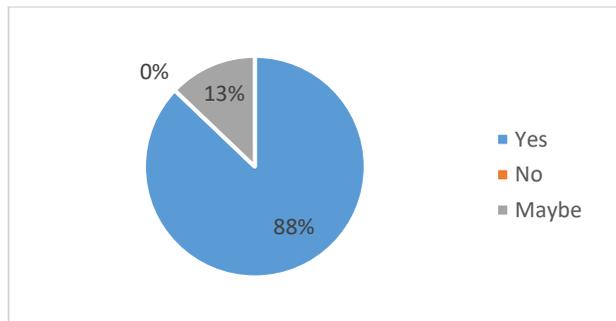
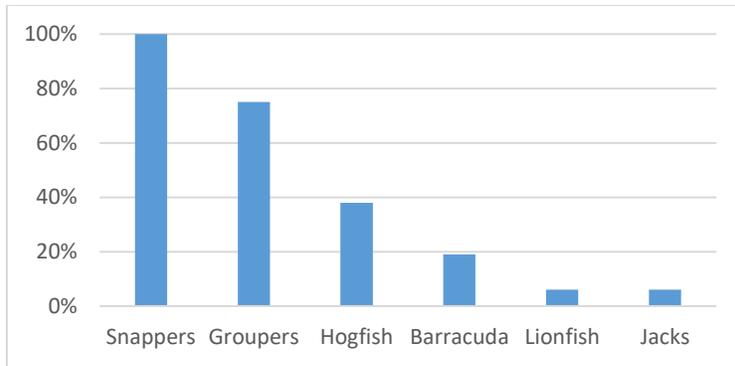


Figure 28: Interest in using a Virtual Marketplace Application

## Finfish

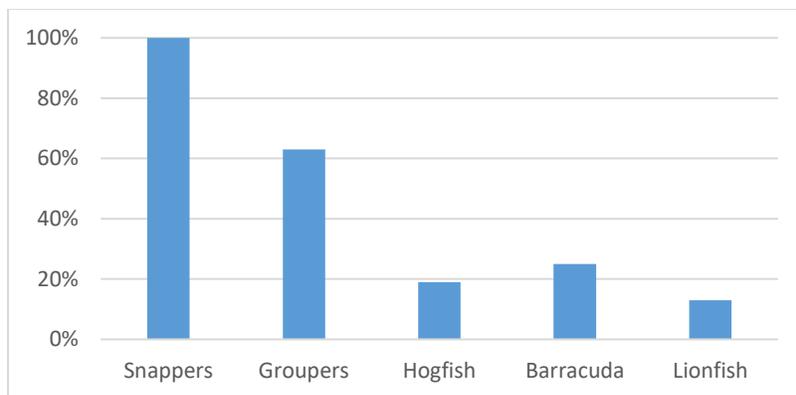
### Finfish Catch

Caye Caulker fisher were asked to list the most common species of finfish caught. While fisher answered generally about groupers and snappers, they did not answer to species level. All fishers reported snappers as their most popular catch, while 75% caught Groupers, 38% caught barracuda and 19% hogfish. 6% of fishers reported catching lionfish and jacks. Respondents were allowed to select more than one choice.



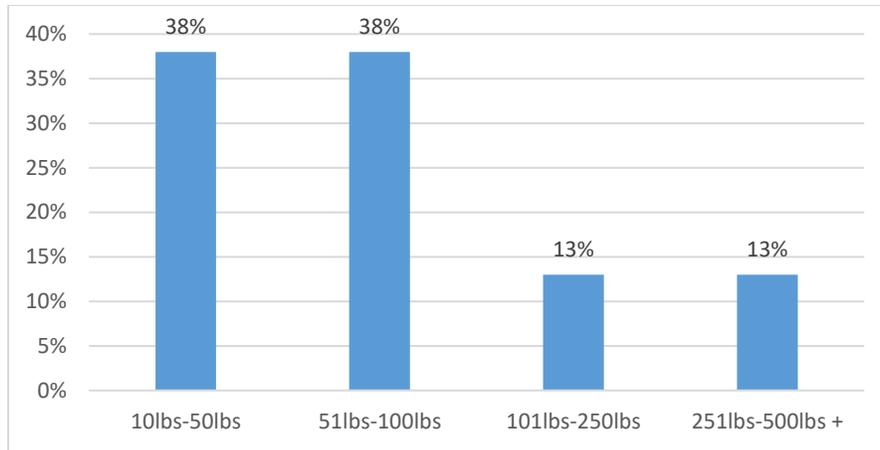
**Figure 29: Common caught finfish**

Fisher were also asked what were the most requested finfish by restaurants. All fisher said restaurants requested any species of snapper first, followed by groupers, barracuda, hogfish and lionfish. Respondents were allowed to select more than one choice.



**Figure 30: Finfish most requested**

Fishers were asked about finfish catch per fishing trip, 38% of fishers catch between 10-50 lbs. of finfish, and another 38% of fishers said they catch between 51-100 lbs. per fishing trip. Fishing trips occur in one day. Fisher who fish at the atolls can spend 2 – 7 days fishing.



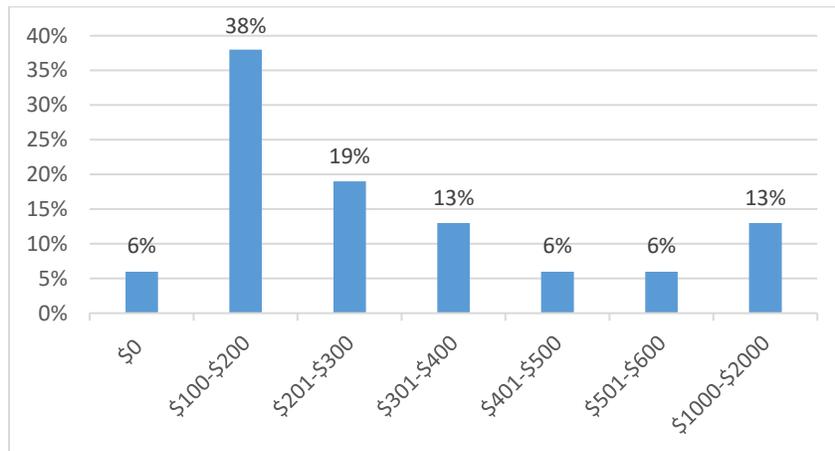
**Figure 31: Finfish catch per fishing trip pre-COVID-19**

Fishers reported that their common bycatch included triggerfish, reef shark and lionfish; of these, only lionfish is kept.

### Finfish prices and fisher income

Fishers sold whole finfish for \$7-\$12 per pound and fillet for \$12-\$18 per pound prior to COVID-19. The prices of finfish varies depending on species and time of year, fishers are able to get a higher price per pound during Easter or the peak tourism season when finfish is in high demand.

38% of Caye Caulker fisher reported earning \$100-\$200 per week from only finfish while 13% stated they typically earn \$1000-\$2000 per week from finfish. These incomes from finfish are prior to COVID-19.



**Figure 32: Caye Caulker fisher income from finfish**

### Finfish catch during a conch and lobster season

Fisher were asked about their finfish catch during a conch and lobster season. 63% of interviewed fishers reported only 15-30% of their catch is finfish during the opening of conch and lobster

seasons while 25% said that finfish was 40-50% of their catch, 1 fisher said that he continued to catch finfish at the same rate during a conch and lobster season.

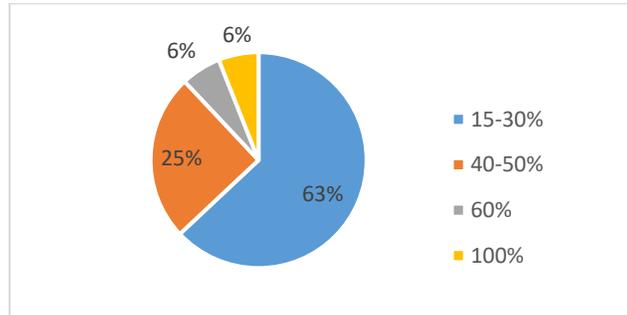


Figure X: Percentage of finfish catch during a conch and lobster season

### **BOX 3: COVID-19 Observations**

At the time of the interviews, many restaurants were closed due to COVID-19 restrictions, so there was no demand for finfish. 13 of the 16 fishers or 81% were not fishing because it was too costly i.e. expensive fuel and finfish prices were low.

During the survey months of July and August 2020, whole finfish was selling for \$5-\$7 and fillet for \$8-\$9

None of the fishers was earning any income at the time of these surveys; the few that were fishing were fishing for subsistence.

## Fisher awareness of fisheries regulations

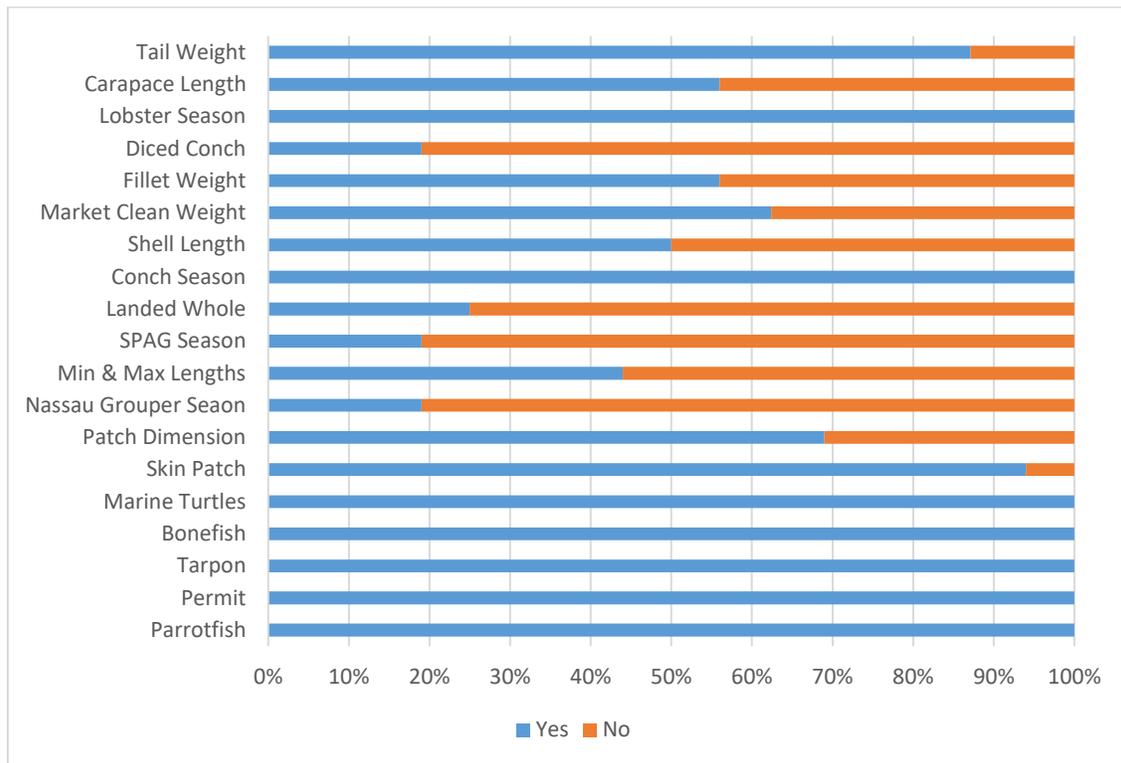


Figure x: Caye Caulker fisher fisheries regulations awareness

Table 3: Caye Caulker fisher fisheries regulations awareness

<b>Lobster</b>	<ul style="list-style-type: none"> <li>• 100% of fishers were aware of the lobster season</li> <li>• 88% of fishers knew the legal lobster tail weight is &gt; 4 ounces</li> <li>• 56% of fishers knew the legal carapace length &gt;3 inches</li> </ul>
<b>Conch</b>	<ul style="list-style-type: none"> <li>• 100% of fishers were aware of the opening of the conch season</li> <li>• 50% of respondents knew that the legal conch shell length is &gt; 7 inches</li> <li>• 63% of respondents were aware of the legal Market Clean weight &gt;3 ounces and that it was illegal to sell diced conch</li> <li>• 56% of respondents knew that conch fillet should weigh 2.75 ounces and more.</li> </ul>
<b>Nassau Grouper</b>	<ul style="list-style-type: none"> <li>• 19% of fishers knew the Nassau grouper season as well as the spawning season.</li> <li>• 25% knew that Nassau grouper must be landed whole</li> <li>• 44% of respondents were aware of the minimum and maximum lengths, 20-30 inches</li> </ul>

<b>Finfish fillet</b>	<ul style="list-style-type: none"> <li>• 94% of respondents were aware that finfish fillet should have a skin patch.</li> <li>• 69% of respondents knew that the skin patch on the fillet should be 2 inches by 1 inch in size or larger.</li> </ul>
<b>Protected Species</b>	<ul style="list-style-type: none"> <li>• 100% of respondents were aware that marine turtles are protected</li> <li>• 100% of respondents were aware that bonefish, tarpon and permit were catch and release only</li> <li>• 100% of respondents were aware that parrotfish were fully protected.</li> </ul>

Caye Caulker fisher were asked if responsible fishing is important to them. 94% of fishers said that they fish in a responsible manner because it is important to them. 1 fisher responded “maybe” responsible fishing is important to him.

### 3.3 San Pedro Restaurants

#### San Pedro Restaurant Overview

There were a 132 restaurants listed on the San Pedro Trade License List. Some were listed under the restaurant's name and most were listed under the business owner's name, which made it challenging to locate alternative numbers to the restaurant since the consultant did not know the name of the restaurant. Contact was made with 62 (47%) of the 132 restaurants. Of the 62 restaurants, a successful interview was completed with 37 or 60% of the restaurants. 26% restaurateurs informed us they were temporarily closed and did not want to participate in an interview at the time; 5% restaurants were now permanently closed due to COVID-19 limitations; 8% were not interested in the project and 2% said they did not have finfish on their menu.

One field visit occurred in June 2020 and all other interviews were conducted by telephone. Most of the phone numbers available where the actual restaurant phone numbers and since many restaurants were closed it was impossible to make contact, even after several attempts.

This was mostly due to both COVID-19 lockdowns that were in place during the months of March and August 2020. There were some instances where the consultant did make contact but restaurateurs were too distraught to participate in an interview.

**Table 4: Survey Participation**

Restaurants interviewed	37	60%
Permanently closed	3	5%
Temporarily closed	16	26%
Does not sell finfish	1	2%
Not interested in project	5	8%
<b>Total attempts</b>	62	100%

62% of surveyed restaurants have been in business for 10 years or less. 22% of restaurants have been in business for 10-20 years and 16% of the restaurants have been in business for 21-45 years.

In terms of the quantity of finfish served at restaurants, 43% of restaurateurs had 5 - 25% of finfish on their menu. 35% of restaurants had 30-45% finfish on their menu. Only 5% of restaurateurs said that 75-95% of their menu was finfish.

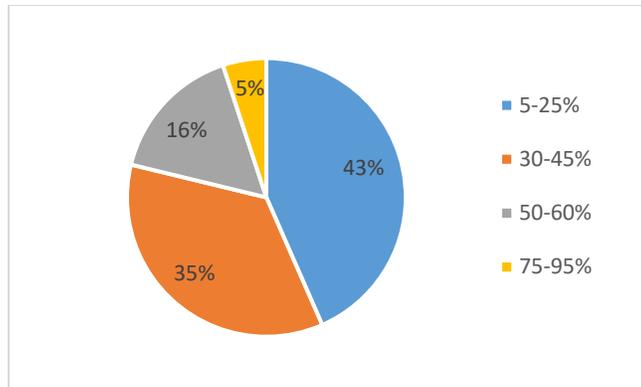


Figure x: Percentage of finfish on menu

San Pedro’s Restaurants vary in sizes with about 79% of surveyed restaurants falling in the 0-100 seats category and 21% falling in the 101-300 seats.

Restaurants in San Pedro see high numbers of customers per day during the high tourism season. 40% of restaurants serve 100-300 customers per day. 19% of restaurant serve 1000-2000 customers per day.

During low tourism season majority of restaurants, customer numbers decline by 25-50%.

**BOX 4: COVID-19 OBSERVATION**

During the COVID-19 lockdown/restrictions, 32% of surveyed restaurants lost all staff with the remainder maintaining less than 50% of all staff.

During the months when this survey was conducted, June – October 2020, many restaurateurs who participated in the survey were still closed, and few were serving take-out meals at reduced prices that did not include finfish.

## Restaurants and technology

All restaurants responded that they were experienced using SMART phones and they had private access to internet.

When asked about interest in using the virtual market place, 92% of respondents were interested in using the app as they thought that it would be very useful in sourcing sustainably harvested finfish and other seafood. 8% of respondents answered maybe because they were concerned about finfish price since they already have a good relationship with their supplier. One respondent said they prefer the personal relationship with their fish supplier and that the fishers clean fish by their dock for all tourist to see and experience.

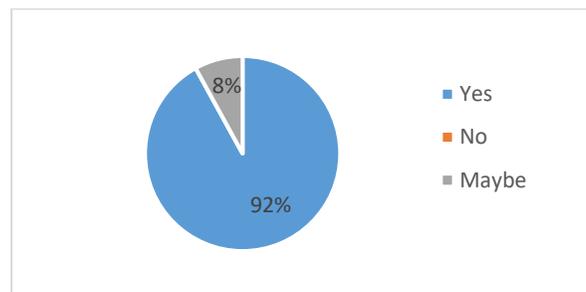


Figure x: Interest in Virtual Market Place

## Finfish Preference

95% of restaurateurs reported that their finfish preference is any species of snapper followed by any grouper species and hogfish. Other types of fish preference include barracuda, lionfish, kingfish, swai, tilapia, and snook.

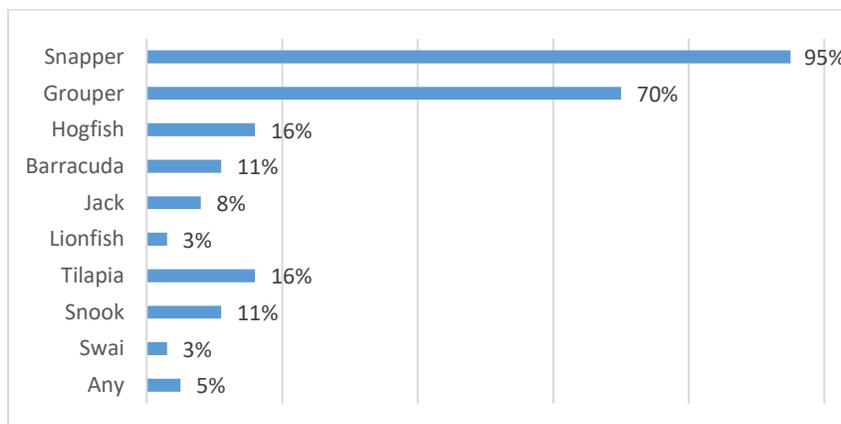
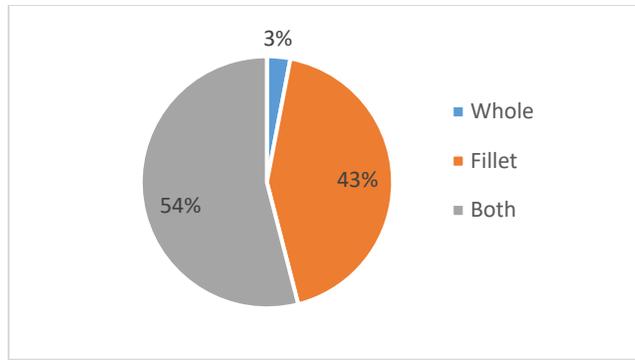


Figure x: San Pedro Restaurants Finfish Preference

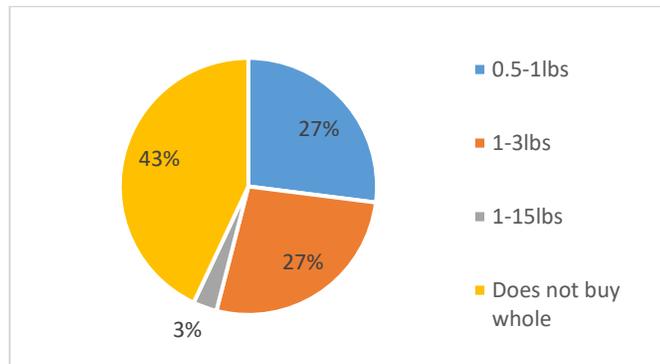
43% of restaurateurs demand only fillet, compared to 3% who demand only whole finfish. 54% buy both whole and fillet.



**Figure X: Whole vs. Fillet Preference**

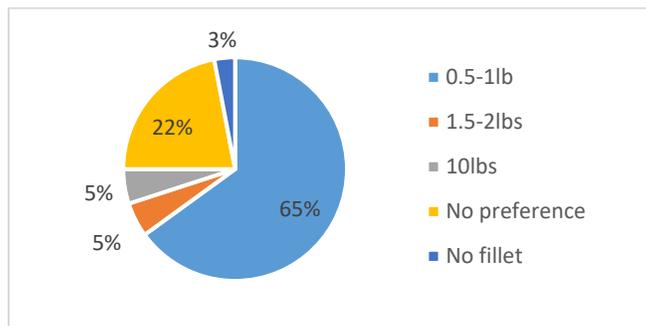
### Whole and fillet finfish preferred size

43% of respondents do not purchase whole fish. 27% of respondents prefer 0.5 – 1lb whole fish, 27% also preferred 1-3lbs whole fish. One respondent said they preferred whole fish as big as 15lbs because they offer group platters to their customers.



**Figure x: Preferred whole finfish size**

65% of respondents prefer a 0.5 – 1 lb size of fillet and 22% had no fillet size preference. 3% of respondents did not purchase fillet.



**Figure x: Preferred finfish fillet size**

### Experience identifying fish

78% of restaurateurs felt comfortable in identifying finfish species in either whole or fillet formats. 19% were somewhat comfortable and 3% were not comfortable at all in identifying whole or fillet finfish.

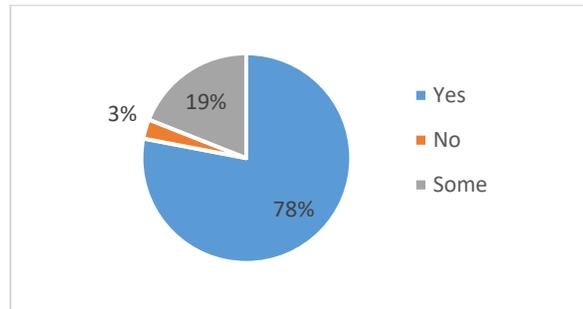


Figure x: Comfortable identifying finfish

### Where is the fish coming from?

Restaurateurs were asked if they were aware of the fishing areas the finfish were caught and to list all fishing areas. 43% of restaurateurs surveyed believed that the finfish they purchased were coming from Area 1, around San Pedro. 41% of Restaurateurs stated that their fish came from Turneffe Atoll Marine Reserve, Area 6. 11% of respondents said fish was from beach trap fishers in San Pedro; and 27% of respondents said they did not know where their finfish was caught. Respondents were allowed to select more than one choice. 3% knew that the fish they purchased were directly from the Feincatch tilapia farm.

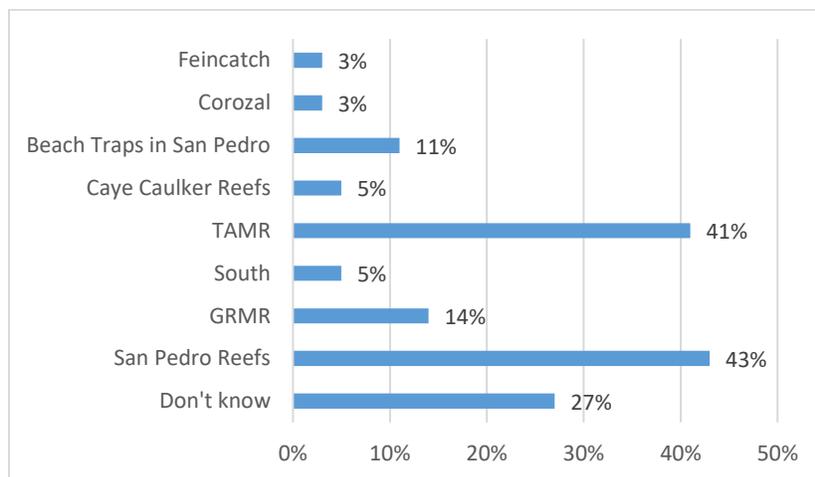
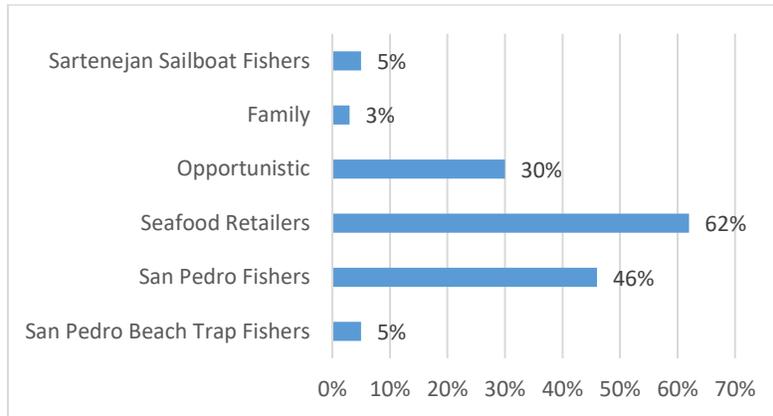


Figure x: Where the respondents believe finfish is caught

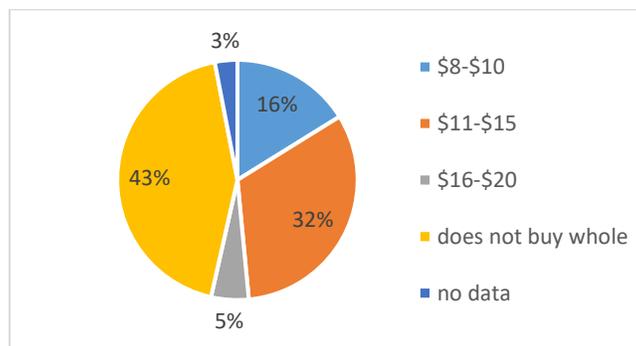
Restaurateurs were asked who their finfish supplier was. 62% of restaurateurs responded that they purchase finfish from seafood retailers. 46% of respondents purchased finfish directly from San Pedro fishers. 30% of respondents said they purchased fish opportunistically. In many instances, Restaurateurs were unable to share name and contact information of their fish supplier because fishers usually bring the fish directly to the restaurant. Respondents were allowed to select more than one choice.



**Figure x: San Pedro finfish suppliers**

### Finfish price

Prior to COVID-19, 16% of restaurateurs paid \$8-\$10 per pound of whole finfish. 32% of restaurateurs paid \$11-\$15 per pound of whole fish and 5% said they paid \$16-\$20. 43% of restaurants did not purchase whole fish.



**Figure x: Whole finfish price**

35% of restaurateurs paid \$12-\$15 per pound of fillet while 59% paid between \$16-\$20 per pound of fillet. 3% of restaurants did not buy fillet because it was too expensive.

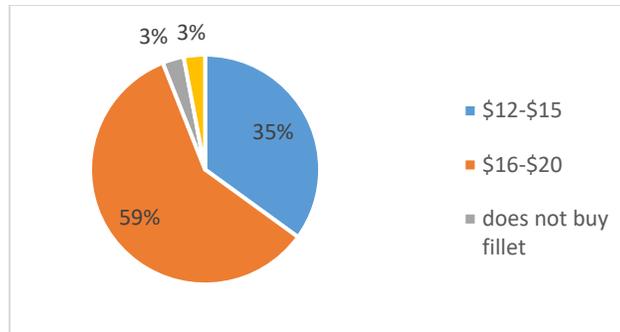


Figure x: Fillet price

### Price fluctuations and factors affecting price

When asked about finfish price fluctuation, 61% of restaurateurs responded that they usually experience a price increase of \$1-\$3 per pound of fish. 19% of restaurateurs said the price of finfish increased by \$4-\$6 per pound. 14% of the restaurateurs did not experience any price changes due to the loyal relationship they had with their finfish providers.

The main factor affecting price fluctuations is the high demand for finfish during the high tourism season. Weather was also a common factor for price increase as fishers often times had to use more fuel during rough fishing trips and there was a higher risk to fishing. 8% of respondents said that during a lobster or conch season it is difficult to purchase finfish because fishers are focused on lobster and conch.

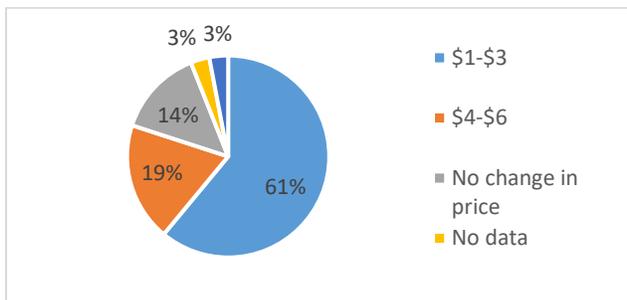


Figure x: Price fluctuation

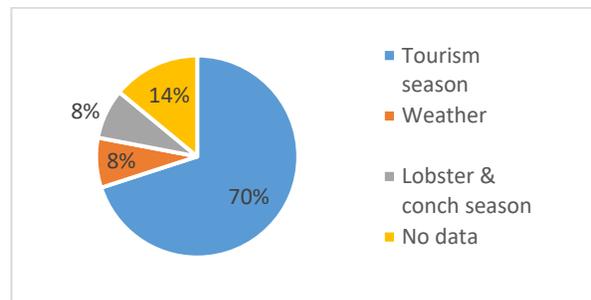
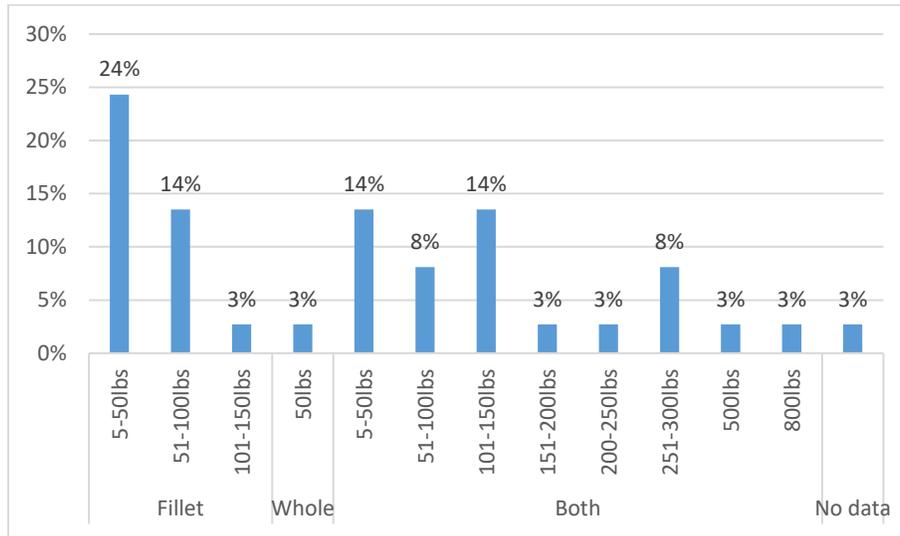


Figure X: Factors affecting finfish price

### Quantity of purchased fish

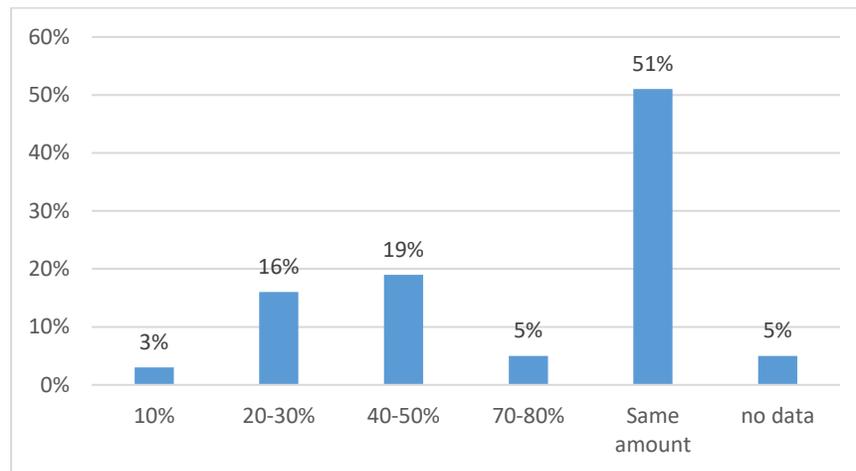
Restaurateurs were asked about the quantity of finfish they purchased for their restaurant weekly during the high tourism season. 24% of restaurants that purchased only fillet bought 5-50 lbs per week. One restaurant bought only whole fish and purchased 50lbs weekly. Most

restaurants purchase both whole and fillet finfish in a wide range of pounds per week with 14% purchasing 5-50lbs and another 14% purchasing 101-150lbs.



**Figure X: Quantity of whole and fillet finfish purchased during high tourism season**

Restaurateurs were asked the quantity of finfish they purchased during a conch or lobster season. 51% of respondents said they continue to purchase the same amount of finfish, 19% of respondents purchased 40-50% less finfish



**Figure x: Decline in finfish sales during lobster and conch season**

### Other types of fish offered to restaurants

Restaurateurs were asked about other types of finfish offered to them that they did not purchase. Although 65% of respondents did not offer any data to this question, parrotfish and sharks were on the list of other types of fish offered to restaurants. Respondents were allowed to select more than one choice.

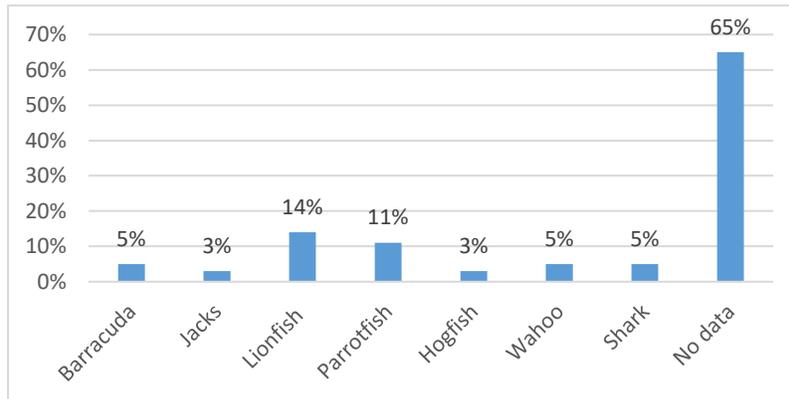


Figure x: Finfish available for purchase

### Awareness of Fisheries regulations

Restaurateurs were asked a series of questions to gauge their awareness of some of the more common fisheries regulations in Belize.

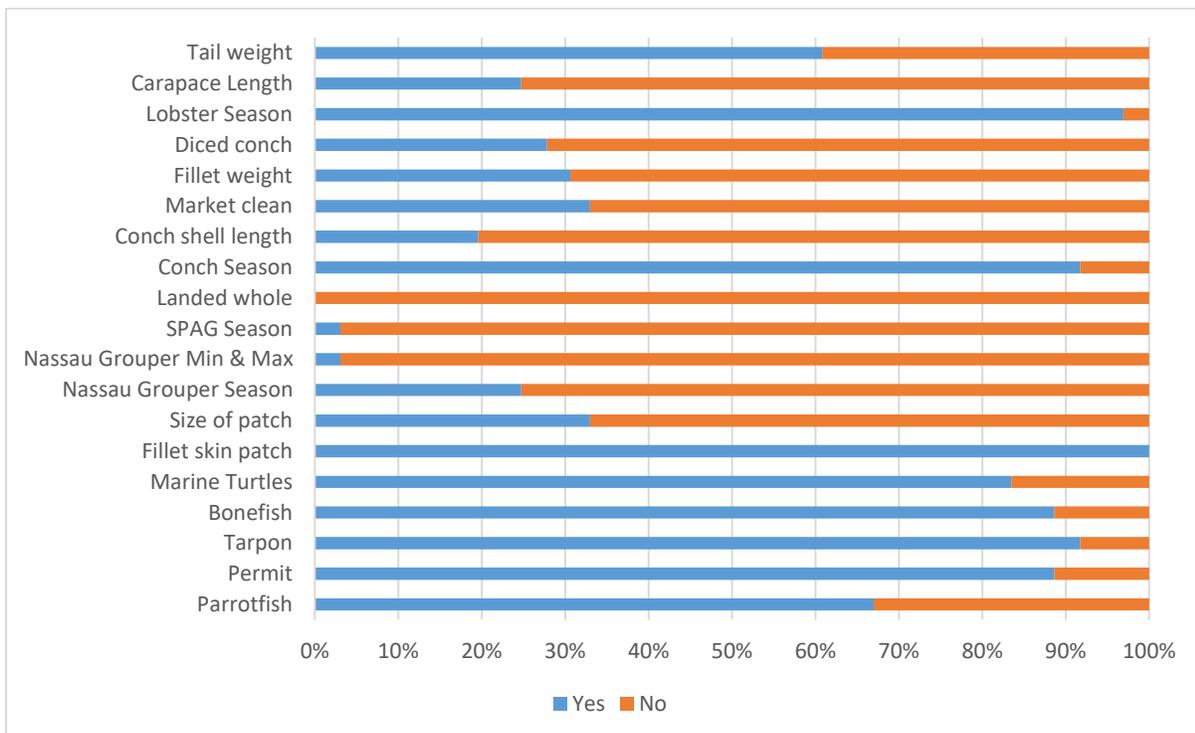


Figure x: Restaurateurs awareness of Fisheries Regulations

**Table 5: San Pedro restaurateur’s awareness of fisheries regulations**

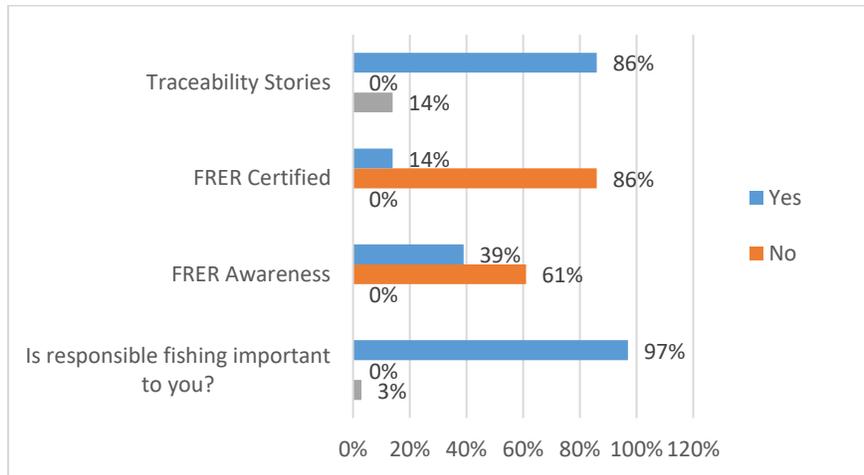
<b>Lobster</b>	<ul style="list-style-type: none"> <li>• 95% of restaurateurs were aware of the lobster season.</li> <li>• 59% of Restaurateurs knew the legal lobster tail weight is &gt; 4 ounces</li> <li>• 24% of restaurateurs knew the legal carapace length</li> </ul>
<b>Conch</b>	<ul style="list-style-type: none"> <li>• 89% of restaurateurs were aware of the opening of the conch season but expressed confusion on the early closures of the season. They felt that the dates of early conch season closure was not always broadcasted publicly.</li> <li>• 19% of respondents knew that the legal conch shell length is &gt; 7 inches</li> <li>• 32% of respondents were aware of the legal Market Clean weight &gt;3 ounces and that it was illegal to purchase diced conch</li> <li>• 30% of respondents knew that conch fillet should weigh 2.75 ounces and more.</li> </ul>
<b>Nassau Grouper</b>	<ul style="list-style-type: none"> <li>• 24% of respondents knew the Nassau grouper season</li> <li>• 3% knew the spawning season.</li> <li>• 0% knew that Nassau grouper must be landed whole</li> <li>• 3% of respondents were aware of the minimum and maximum lengths, 20-30 inches</li> </ul>
<b>Finfish fillet</b>	<ul style="list-style-type: none"> <li>• 97% of respondents were aware that finfish fillet should have a skin patch.</li> <li>• 32% of respondents knew that the skin patch on the fillet should be 2 inches by 1 inch in size or larger.</li> </ul>
<b>Protected Species</b>	<ul style="list-style-type: none"> <li>• 81% of respondents were aware that marine turtles are protected</li> <li>• 86% of respondents were aware that bonefish and permit were catch and release only</li> <li>• 89% of respondents were aware that permit was catch and release only</li> <li>• 65% of respondents were aware that parrotfish were fully protected.</li> </ul>

### Finfish traceability and willingness to share with customers

Restaurateurs were asked if they were interested in learning where the finfish they served in their restaurant was coming from and if they would be interested in learning how to share those traceability stories with their customers. 86% of Restaurateurs responded that they do want to know where the finfish they purchase is coming from and would like to learn more about sharing traceability stories with customers. 14% said “Maybe”, these restaurateurs were not sure if traceability stories would be suitable for their restaurant.

14% of the restaurants surveyed were already signed on to the Fish Right Eat Right program. 39% of respondents said they had heard of FRER before and expressed interest in signing up. 61% of respondents said they had never heard of the FRER program.

When asked if responsible fishing was important to them, 97% of restaurateurs responded that responsible fishing was important to them and they tried their best to operate within the limits of the law.



### 3.4 San Pedro Fishers

#### San Pedro Fisher Overview

From the surveys completed with San Pedro restaurateurs, 35 fishers were identified as key finfish suppliers. Unfortunately, due to restaurateurs inability to provide formal names or telephone numbers, only 8 fishers and 6 full-time seafood retailers could be reached for an interview.

Fisher’s ranged from 22 – 51 years old. 6 of the fishers live in San Pedro while the other 2 live in Orange Walk Town and Sarteneja Village.

5 of the fishers reported having primary school level education and the other 3, highschool education.

All fishers have a commercial fishing licence and most have been fishing for more than 10 years. 1 fisher has been fishing for 40 years.

The Fishing Areas that these fishers have license to fish under the Managed Access Program are Fishing Area 1, 2, 3, 6, 7, 8 and 9.

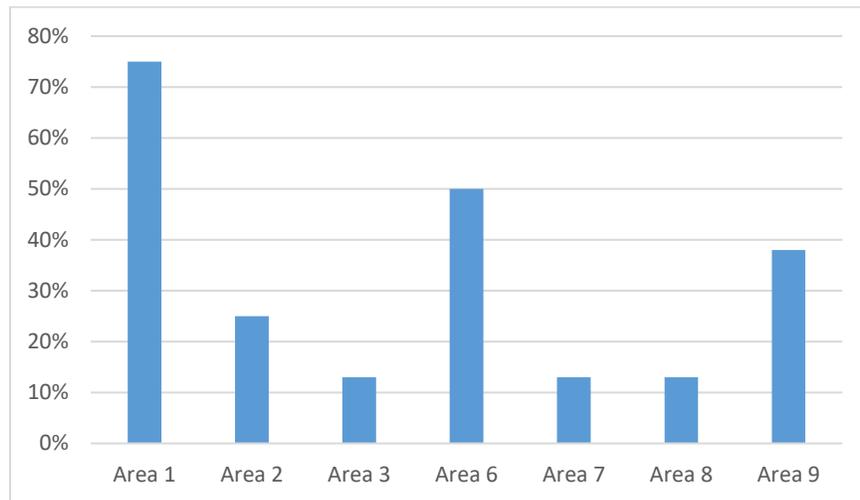


Figure X: Fishing Area fished by San Pedro fisher

Of the 8 fishers interviewed only 38% were full time fishers. 63% of the fishers were part time fishers. 50% of fishers other jobs are in tourism, in particular tour guides. 2 of the 8 fishers were also seafood retailers.

88% of interviewed fishers operate using a skiff with a crew ranging from 1-4 fishers. While 1 sailboat fisher had a crew of 8.

All San Pedro fishers reported that San Pedro is the first landing site for them. Caye Caulker, Placencia and Belize City were also secondary landing sites usually by special orders.

None of the San Pedro fishers are members of a cooperative. Only 1 fisher reported being part of the Belize Game Fish Association.

Fishers reported using spearguns, handline and deep sea gear (handline and winch). One fisher was strictly a beach trap fisher.

San Pedro fishers reported that speargun fishing depths range from 5-70ft, handline depths ranges from 16-120ft, deep sea gear depth ranges 400-1500ft. The one beach trap fisher said his traps were set at a depth of 7ft.

88% of fishers are skiff user while only 1 interviewed fisher reported using a sailboat.

All interviewed fishers engage in lobster fishery, 63% of fishers engage in conch fishery and 38% of fishers engage in crab fishery.

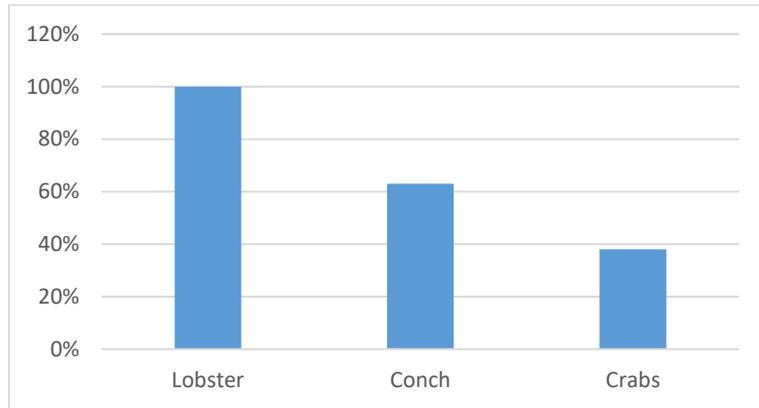


Figure x: Other types of fisheries

### 3.4.2 San Pedro Fisher and Technology

Fishers were asked about their experience using smartphones. Fishers were considered Advanced Users of smartphones if they had an email address and at least one social media account; Intermediate User if they had an email address and Basic User if they had no email address. 38% of fishers are considered Advanced Users, 13% Intermediate Users and 24% Basic Users of smartphones.

63% of San Pedro fishers stated that they have access to private internet while 25% accessed internet publicly.

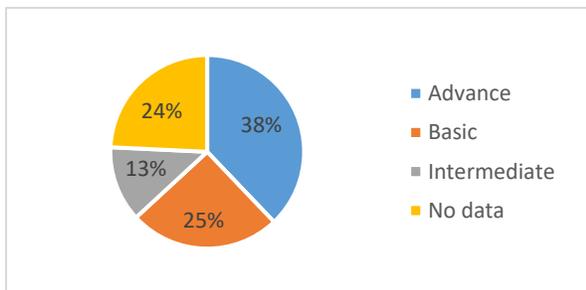


Figure x: Experience using smartphone

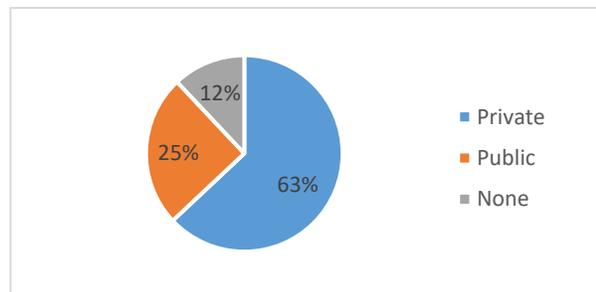


Figure x: Access to internet

All fishers expressed interest in using the virtual marketplace app; they thought that it would help them to better market their seafood products.

### 3.4.3 Finfish

San Pedro fisher were asked to list the most common species of finfish caught. All fishers stated snapper was the most caught finfish, followed by grouper, hogfish and barracuda.

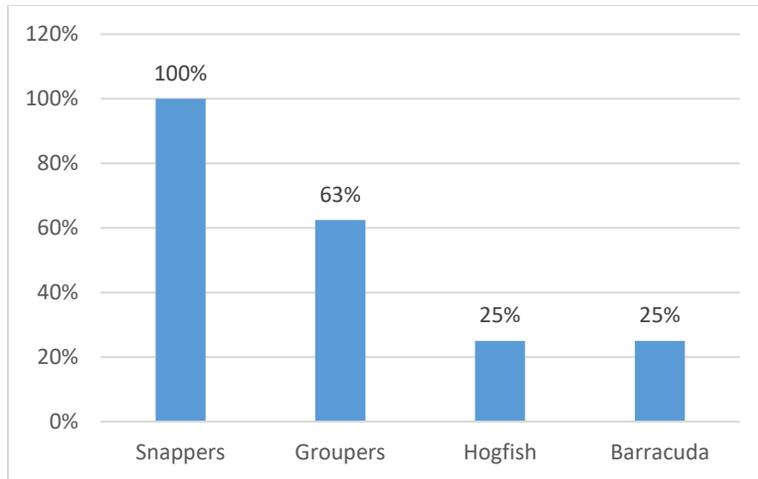


Figure x: Common caught finfish

When asked what was the most common type of fish requested by restaurants, fishers responded snappers, followed by groupers, lionfish and barracuda.

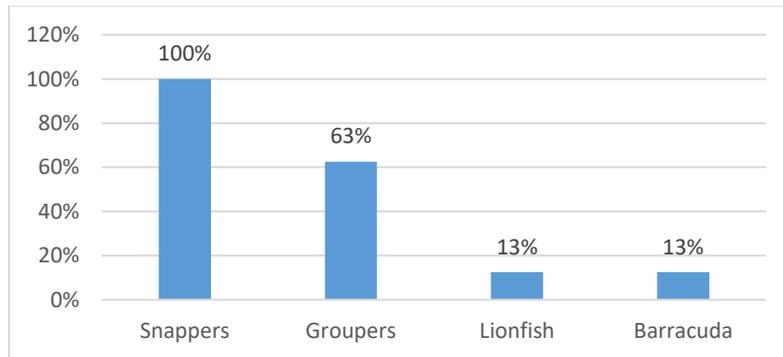


Figure x: Finfish most requested

Fishers were asked about their finfish catch per fishing trip, 38% of fishers said they usually catch between 100 – 200 lbs of finfish per trip, 25% of fishers said their finfish catch ranges from 500 – 1000lbs.

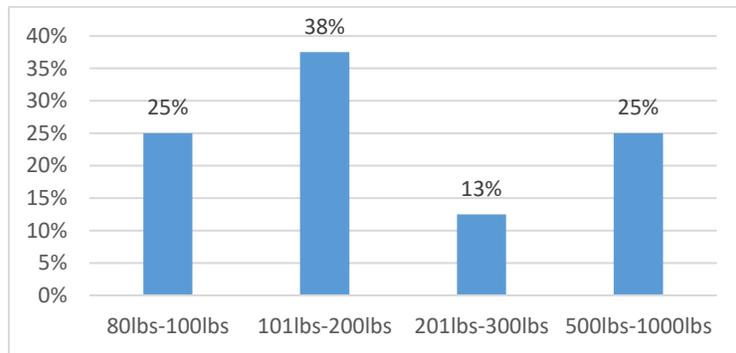


Figure x: Finfish catch per fishing trip pre-COVID-19

Fishers reported that their common bycatch included nurse shark, reef shark, sting ray, wahoo, eels, permit, bonefish, lionfish. Fishers admitted to releasing all bycatch except lionfish.

### Finfish prices and fisher income

When asked about finfish prices, fishers said that they sold whole finfish for \$7-\$14 per pound and fillet for \$14-\$20. The prices vary depending on species and time of year. Fishers are able to fetch a higher price around Easter and the peak tourism season when fish is in high demand.

50% of the interviewed fishers said they earned between \$250 - \$500 per week from finfish fishing while 13% said they earned \$5000 per week. These incomes from finfish are prior to COVID-19.

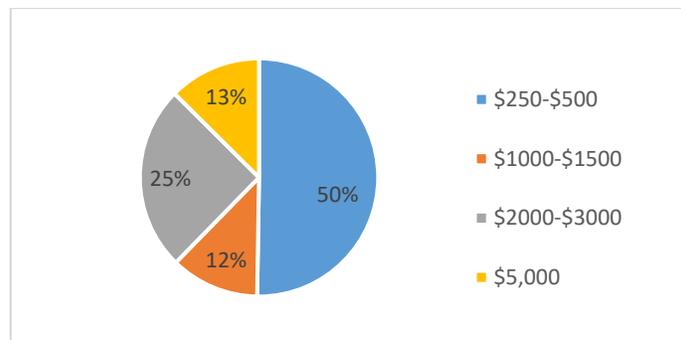


Figure x: San Pedro fisher income from finfish

### Finfish catch during a conch and lobster season

Fisher were asked about their finfish catch during a conch and lobster season. 25% of fishers said that during a conch and lobster season they do not catch finfish, while 38% of fishers said 70-75% of their catch is finfish.

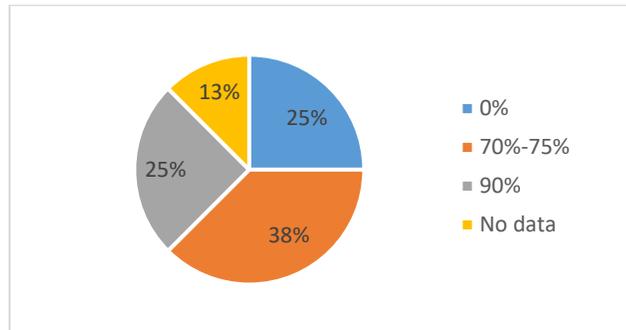


Figure x : Percentage of finfish catch during conch and lobster season

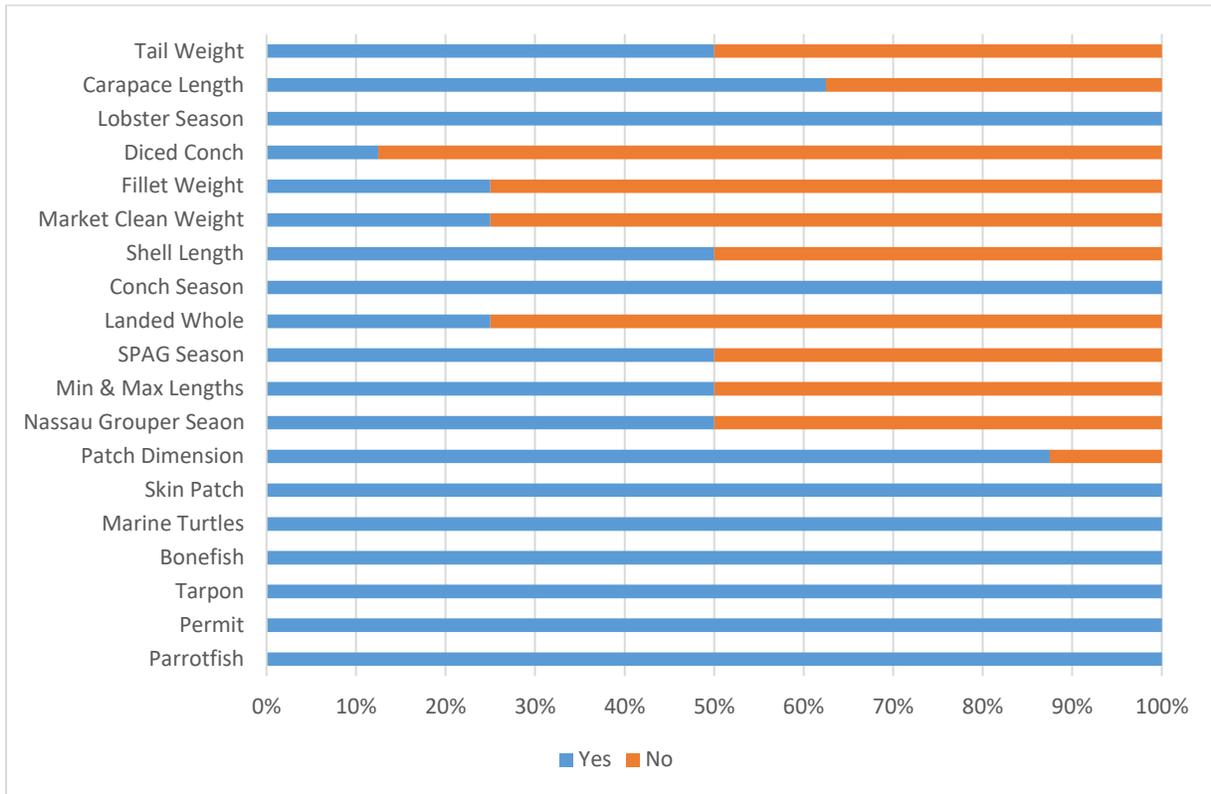
#### **COVID-19 OBSERVATION**

5 of the 8 fishers interviewed said they were not catching finfish during the month of June – September because many restaurants were closed or not purchasing finfish.

Whole fish price declined to \$5-\$8 and fillet price decline to \$9

The few restaurants that were opened only provided take-out service and did not have finfish on the menu.

### 3.4.4 Fisher awareness of fisheries regulations



**Figure x: San Pedro fisher fisheries regulations awareness**

**Table 6: San Pedro fisher fisheries regulations awareness**

<b>Lobster</b>	<ul style="list-style-type: none"> <li>• 100% of fisher were aware of the lobster season</li> <li>• 50% of fisher knew the legal lobster tail weight is &gt; 4 ounces</li> <li>• 63% of fisher knew the legal carapace length &gt;3 inches</li> </ul>
<b>Conch</b>	<ul style="list-style-type: none"> <li>• 100% of fisher were aware of the opening of the conch season</li> <li>• 50% of respondents knew that the legal conch shell length is &gt; 7 inches</li> <li>• 25% of respondents were aware of the legal Market Clean weight &gt;3 ounces and that it was illegal to sell diced conch</li> <li>• 25% of respondents knew that conch fillet should weigh 2.75 ounces and more.</li> </ul>
<b>Nassau Grouper</b>	<ul style="list-style-type: none"> <li>• 50% of fishers knew the Nassau grouper season as well as the spawning season.</li> <li>• 25% knew that Nassau grouper must be landed whole</li> <li>• 50% of respondents were aware of the minimum and maximum lengths, 20-30 inches</li> </ul>
<b>Finfish fillet</b>	<ul style="list-style-type: none"> <li>• 100% of respondents were aware that finfish fillet should have a skin patch.</li> </ul>

	<ul style="list-style-type: none"> <li>• 87.5% of respondents knew that the skin patch on the fillet should be 2 inches by 1 inch in size or larger.</li> </ul>
<b>Protected Species</b>	<ul style="list-style-type: none"> <li>• 100% of respondents were aware that marine turtles are protected</li> <li>• 100% of respondents were aware that bonefish, tarpon and permit were catch and release only</li> <li>• 100% of respondents were aware that parrotfish were fully protected.</li> </ul>

All interviewed San Pedro fishers said that responsible fishing was important to them.

### Seafood Retailers

**6 Seafood market vendors were also interviewed but they did not participate in fisheries awareness regulations portion.**

#### Seafood Retailers

Lino’s Seafood Market only sells imported Swai and Tilapia fish. Reported that many restaurants on San Pedro purchases 100lbs at a time during the high tourism season and around 20lbs during slow tourism season. Swai retails at \$15.50/lb and Tilapia at \$12/lb.

All other seafood retailers reported that they mostly sell snappers and groupers to restaurants.

#### Fish from coop

National Fisherman Cooperative was the only coop exporting Fresh-Frozen fish to NY. They haven’t exported in 7-8 years because the shipping was too costly. They were buying snappers and groupers for \$5-\$6 per pound plus cost of export. They have not renewed their permit to export, but would consider exporting again if they get a buyer.

They still purchase snapper and grouper fillet from local fishers to sell to the local market. They purchase fish at \$8/lb. They last purchased 500lbs for the month of August 2020 and have stopped purchasing until further notice.

Pre-covid19 Restaurant mostly from San Pedro use to purchase 50-100lbs of fillet at a time from the coop.

Restaurants prefer to purchase fresh-scraped fish directly from local fishers instead of fresh-frozen from the coop. (personal communication, Eden Leon, National Fishermen Cooperative)

## 4. DISCUSSION

- 4.1 While restaurants in Caye Caulker and San Pedro range in size and style, all restaurants surveyed shared a preference for any species of snapper and grouper followed by barracuda and hogfish. Unfortunately, the snapper species and grouper species could not be determined since restaurateurs accepted any species of snapper and grouper. In addition, although 94% of Caye Caulker restaurateurs and 78% of San Pedro restaurateurs claimed they were comfortable identifying fillet and whole finfish, they all admitted that they depended on their fish supplier to assist them with finfish identification. 82% of the Caye Caulker restaurants and 78% of San Pedro restaurants purchased both whole and fillet finfish. Most restaurants preferred to have their chef fillet whole fish due to experiences with fish fraud. Restaurateurs shared stories of receiving tilapia, parrotfish, and angelfish fillet, (among others) as snapper or grouper fillet; they shared that fishers most times packed these types of fillet in between snappers and grouper fillet. Due to these experiences, restaurants only purchase finfish from fishers they trust. There were a few restaurants that shared they sold tilapia and swai fillet on their menu as it was the easiest fish to purchase especially during times of fresh finfish scarcity. 79% of Caye Caulker restaurants prefer 0.5-3 lbs. whole fish and 54% of the San Pedro restaurants also shared they preferred the same size of whole fish. When it came to fillet sizes, 67% of Caye Caulker restaurants preferred a 4oz. – 1 lb. fillet size and 65% of San Pedro restaurants preferred a 0.5 – 1lb. fillet. There were some restaurants in both Caye Caulker (30%) and San Pedro (22%) that had no preference in fillet size.
- 4.2 Restaurateurs were asked if they knew where the finfish they purchased came from in terms of fishing areas. 70% of Caye Caulker respondents believed that the finfish they purchased came from Area 1, around Caye Caulker. 15% of respondents believed the finfish they purchased came from Turneffe Atoll Marine Reserve (TAMR), Area 6. Among the responses were Tilapia farms, Punta Gorda, and the San Pedro area. San Pedro respondents believed that the finfish they purchase are from the San Pedro reefs - Area 1, TAMR – Area 6, Glovers Reef Marine Reserve – Area 8.
- 4.3 Both the Caye Caulker and San Pedro restaurateurs purchase finfish from different sources. In the case of Caye Caulker, 64% of restaurateurs purchase finfish from local Caye Caulker fishers while 30% of restaurateurs said they purchase finfish opportunistically, any person offering available finfish. Restaurateurs gave more than one source. Other finfish suppliers included San Pedro fishers, Punta Gorda fishers, Sartenejan fishers, and Seafood Retailers – people who purchased finfish from fishers and sold to restaurants for a profit. 62% of San Pedro restaurateurs stated that they source finfish from Seafood Retailers located on San Pedro and other districts. 46% of San Pedro restaurateurs purchased finfish from San Pedro fishers. Other fish suppliers for San Pedro restaurant included Sartenejan fishers.
- 4.4 Pre-COVID-19 finfish prices ranged among restaurateurs. 70% of Caye Caulker restaurateurs shared that prior to COVID-19 they paid \$7-\$10 per pound of whole finfish and 15% of restaurateurs said they paid \$11-\$14 per pound. 67% of these restaurateurs said they paid \$11-\$15 per pound of fillet. In San Pedro the price for whole finfish ranged, 32% of

restaurateurs paid \$11- \$15 per pound, 16% of restaurateurs paid \$8-\$10 per pound and 5% of restaurateurs paid \$16 - \$20 per pound. 35% of the San Pedro restaurants paid \$12-\$15 per pound of fillet and 59% of respondents paid \$16-\$20 for fillet. Based on the data the restaurants in San Pedro are paying more for finfish and also purchasing finfish from Seafood Retailers located in other districts such as Orange Walk. When fish are purchased from these seafood retailers such as Carlo Kay Seafood or Neto's Seafood Market the fish is transported by Tropic Air, a local airline, on a direct flight from Orange Walk to San Pedro; so there is also an additional transportation cost to the fish price.

- 4.5 The main factor for finfish price fluctuations is the busy tourism season when the demand for seafood is high. 52% of Caye Caulker restaurateurs shared that they pay an additional \$1-\$3 per pound for finfish, 12% said they pay \$4-\$6 more but there were 33% of restaurateurs who said their price remained the same all year due to the relationship with their finfish supplier. In San Pedro, 61% of the restaurateurs shared that they experience \$1-\$3 price increase, 19% said they usually experience \$4-\$6 price increase and only 14% of restaurateurs said their price remained the same all year.
- 4.6 Restaurants mostly purchase finfish weekly and the quantities range. During the busy tourism season, 45% of the restaurants in Caye Caulker said they purchased up to 50 lbs. of both whole and fillet finfish weekly, 12% of restaurants bought up to 50lbs. of only fillet weekly and 3% or 1 restaurant purchased 200-300lbs. of only whole finfish weekly. The quantity of finfish purchased by San Pedro restaurants ranged widely, there were 24% of restaurateurs that shared they purchased up to 50lbs of fish per week and a few restaurants that purchased 100lbs. of fish weekly. There was one restaurant that reported purchased 800lbs of both whole and fillet finfish weekly.

## 5. Recommendations for optimal fishing practices in Belize

Based on the results of the market study, Oceana issues the following recommendations to the Belizean Government:

- Finalize and implement minimum size limits for key finfish species such as snapper and grouper based on the best-available, publicly available, and peer-reviewed science, in consultation with academic, NGO, and community stakeholders.
- Initiate a working group composed of academic, NGO, and community stakeholders to develop and implement quotas for key finfish species with a clear and near-term deadline for drafting the regulations.
- Prioritize designating landing sites and implementing finfish landing data collection.

This market study, albeit limited in scope, highlights a number of important points relative to the sustainable management of Belizean fisheries. First is that snapper and grouper are by far the most preferred species of finfish purchased by restaurants and therefore should be prioritized for management. Second, the majority of restaurants surveyed buy both whole fish and fillets. Some even prefer whole fish, indicating that restaurants could voluntarily enforce size-limit recommendations for finfish. Third, most restaurants prefer to purchase fish, whether whole or fillet, within a specified weight range. Therefore, any size limit recommendations will need to be accompanied by education and outreach to fishers, chefs, and restaurateurs regarding the importance of the size limits for the long-term sustainability of the fisheries of Belize.

With the second largest barrier reef in the world, Belize is rich in marine biodiversity and represents one of the important fisheries economies in Central America. The main commercial fisheries in Belize are lobster and conch, which is where most of the fishing regulations in Belize are focused (McDonald et al., 2017; Zeller et al., 2011). Finfish species have been increasingly harvested and exported yet remain largely unregulated (and the regulations that do exist are poorly enforced) and limited data exists on catch rates (Babcock et al., 2013; Zeller et al., 2011). As a result, it is likely that many species are being overexploited and may also be overfished.

Management measures for finfish, particularly snapper and grouper, are urgently needed to prevent the collapse of these fisheries and the devastating socioeconomic consequences that would follow. Commonly used management measures generally fall into two categories – input controls and output controls. Input controls regulate fishing effort and gear types and include seasonal and area-based closures. Output controls regulate the amount, type, and size of fish caught through catch limits, size limits, and species restrictions. While some input controls are used in Belize, output controls are largely lacking, especially for finfish. Without output controls the health of these fish populations is at risk, jeopardizing the livelihoods of not only fishers, but also restaurant owners and workers that rely on serving fish to tourists and locals alike.

One of the simplest regulations to implement is size limits. Size limits help protect juveniles and give fish the chance to reproduce before being caught, therefore contributing to the long-term

sustainability of the population. The Belize Fisheries Department has been working since at least 2016 to determine minimum fish lengths for 21 fish species in Belize (Ramon Carcamo, personal communication). There are ample data and substantial evidence to support the implementation of finfish size limits in Belize and no excuse for continued delay of these regulations. In 2016, Oceana compiled available data on finfish size recommendations, which could be used by the Fisheries Department or through a voluntary program such as Fish Right, Eat Right to promote the catch and purchase of mature fish (see Appendix 3 of the State of Belize Fisheries Report for more details and specific size limit recommendations).

Although size limits are relatively easy to determine, implementation and enforcement will likely remain a challenge. The results of the market survey showed that while restaurateurs and fishers were very familiar with closed seasons, they were much less familiar with size and weight-related regulations. Any size limit regulations will need to be accompanied by substantial education and outreach to be effective. In addition, chefs and restaurateurs often prefer “plate-sized” fish, or single-serving size fish, which are often smaller than recommended sizes that protect juveniles.<sup>1</sup> Regulations will therefore need to be accompanied by outreach and education to chefs and servers, to make sure they understand and are willing to comply with the regulations and can promote these sustainability measures to their customers. Lastly, some common fishing gears, such as spear guns, are challenging with size regulations because there is no catch-and-release option. Although spear guns are highly selective from a species perspective, fishers will need to be aware of the regulations prior to fishing and be able to target appropriately sized fish. There will also need to be a mechanism to handle the inadvertent bycatch of undersized fish.

Though more difficult to develop, quotas or catch limits are also an effective, and sometimes necessary tool for preventing overfishing and rebuilding fish stocks. While data are limited, available information suggests that many of Belize’s fish stocks are depleted or at risk of becoming depleted in the near future (Babcock et al. 2013). Research suggests that rebuilding plans, along with catch limits, are one of the surest ways to rebuild fish populations and ensure their long-term sustainability (Garcia et al., eds., 2018; Melnychuk et al. 2021). While difficult to estimate in data-poor situations such as Belize, it is nonetheless possible to develop precautionary reference points and guidelines for quota setting.<sup>2,3</sup> We recommend that the Belize Fisheries Department initiate a working group to develop and implement quotas for key finfish species, particularly the top-landed snapper and grouper species, with a clear near-term deadline for drafting the regulations.

Both recommendations require monitoring, control, and enforcement, which are currently lacking in Belize. For these management measures to be most effective, the Fisheries Department needs to prioritize designating landing sites and implementing finfish landing data collection.

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<sup>1</sup> <https://www.npr.org/sections/thesalt/2019/03/19/704516649/why-restaurant-demand-for-smaller-fish-fillets-is-bad-news-for-oceans>

<sup>2</sup> <http://fishe.edf.org/about-fishe>

<sup>3</sup> <https://www.datalimitedtoolkit.org/overview/>

While size limits, to some degree, can be voluntarily enforced by restaurants, many restaurants purchase fillets rather than whole fish and so monitoring and enforcement needs to happen when the fish is first landed. And any regulation requiring quotas must be preceded by a landings data collection system. In theory this is being developed under the Managed Access program, such as through the requirement for catch logbooks, but so far this has been ineffective and lacks transparency and the ability for the public to access and verify this information (Wade et al. 2019). The Belize Fisheries Department has the information and tools to develop precautionary management measures, such as size limits and catch limits for key finfish species and should do so immediately to prevent the collapse of these fish stocks and the devastating consequences to the people and businesses that rely on them.

## 6. ANNEXES - ANNEX 1: RESTAURANT QUESTIONNAIRE

### RESTAURANT INTERVIEW

Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_

Restaurant Name: \_\_\_\_\_

Owner/Manager: \_\_\_\_\_

Address: \_\_\_\_\_

Years in Business: \_\_\_\_\_

No. of staff: \_\_\_\_\_

Restaurant Capacity: \_\_\_\_\_

Avg. customers per week/month (Pre-COVID-19 & present) \_\_\_\_\_

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Questions	Pre-COVID-19		Current
	High Season	Low Season	
What is your preferred finfish spp. to purchase?			
Whole or fillet?			
Can you identify fillet and whole fish?			

RESTAURANT INTERVIEW

Questions	Pre-COVID-19		Current
	High Season	Low Season	
Do you know where purchased finfish comes from? (Fishing Areas 1-9, MPA, other districts, imported)			
Do you have a preferred finfish size? lbs (plate size etc.)			
What is the price per lb by spp.? (whole or fillet)			
How many lbs of finfish do you purchase weekly/monthly? (total pounds or by spp.)			
Who is your finfish supplier?  Do you have a contact number for them?  How long have they been supplying your finfish?			
What other finfish spp. are commonly available for purchase? (legal or illegal)  Do you know where these finfish come from?			

RESTAURANT INTERVIEW

Questions	Pre-COVID-19		Current
	High Season	Low Season	
What percentage of your purchased seafood is finfish during the conch and lobster season?			
Does finfish price fluctuate during: <ul style="list-style-type: none"> <li>• Easter</li> <li>• lobster &amp; conch season</li> <li>• peak tourism season</li> </ul> By how much?			
What percentage of finfish meals sells at your restaurant compared to chicken, pork and beef meals?			
What is the average cost of a finfish dish at your restaurant?			



## ANNEX 2: FISHER QUESTIONNAIRE

### FISHERFOLK INTERVIEW

Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_

Fisher: \_\_\_\_\_

Gender: Male or Female Age: \_\_\_\_\_

Address & Contact No.: \_\_\_\_\_

Education Level: None Primary Secondary Other: \_\_\_\_\_

Type of Fishing License: \_\_\_\_\_ Fishing License No: \_\_\_\_\_

Years Fishing: \_\_\_\_\_

Fishing Zones: 1 2 3 4 5 6 7 8 9 MPA: \_\_\_\_\_

Full-time Fisher or Part-Time (other jobs): \_\_\_\_\_

Crew: Size: \_\_\_\_\_ Licensed Fishers: Yes or No

Primary Role of fishing crew? (E.g. Fishing, cleaning, gear repair or other in the value chain) \_\_\_\_\_

Landing Sites (San Pedro, Caye Caulker, Belize City etc.): \_\_\_\_\_

Point of Sale (where is finfish sold? Restaurants etc): \_\_\_\_\_

Cooperative and/or Fishing Association Member: \_\_\_\_\_

FINFISH CATCH	Pre-COVID-19	Current
What is the most common spp. caught?		
Do you fish by migration season?		

FISHERFOLK INTERVIEW

FINFISH CATCH	Pre-COVID-19	Current
What is the most common spp. sold?		
What is the most common spp. requested?		
What is your Avg catch (lbs & spp) per day /trip?		
What is the average lengths of the most common spp. caught?		
Price per pound per spp.		

FISHERFOLK INTERVIEW

FINFISH CATCH	Pre-COVID-19	Current
Bycatch (kept/discarded)		
Is there any fish on the Fish ID that you <b>do not</b> catch? (see laminated fish ID)		
Income from finfish (monthly/weekly)		

**GEAR TYPE:** Fish traps    Spear gun    Nets    Hook Line    Deep Sea Fishing Gear

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**DEPTH RANGE (ft):** 5 – 15    16 – 25    26 – 35    36 – 45    46 – 55    56 – 65    66 – 75    76 – 85    86 – 95    96 – 105    106 +

**FISHING SCHEDULE:** Weekly    Bi-weekly    Monthly    Other: \_\_\_\_\_

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**VESSEL:** Sailboat    Skiff    Camps/Traps off Island

**Other Fishery:** Lobster    Conch    Sea Cucumber    Shark    Crabs    Wheiks    Other: \_\_\_\_\_

What percentage of your catch is finfish during conch season and/or lobster season? \_\_\_\_\_

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**ANNEX 3: LIST OF SURVEYED RESTAURANTS IN CAYE CAULKER**

<b>NO.</b>	<b>RESTAURANT NAME</b>	<b>OWNER/MANAGER</b>
1	Koko King	Davina Retreage
2	Little Kitchen Restaurant	Elba Martinez
3	Brisas Del Mar	David Lawrence
4	Pelican Sunset Bar	Edwardo Arceo
5	Lazy Lizard	James Lynskey, Terrylee Gonzalez
6	Caye of Flavors	Jessencia Depaz
7	Food Republic	Marielos Chan
8	Happy Lobster	Elsa Moran
9	Maggie's Sunset Kitchen	Margarita Koh
10	Fantasy Dining	Keisha Sutherland
11	Dee N D's Waterside Grill	Dianela Gabourel
12	Louise's Oceanfront Suites	Roberto Jose Cruz
13	Swings Bar & Restaurant	Yong Ming He
14	China Town Palace	Joseph Cheng
15	El Dorado Splash Bar & Grill	Rosalba Mireya Sandoval
16	Hibisca Ltd.	Darren Wade Casson
17	Lotus by Habanero	Darren Wade Casson
18	Island Magic Beach Resort & Bar	Alina Saldivar
19	Island Queen Restaurant & Bar	Juan Interiano
20	Taco Bar Express	Roy A. Hinks
21	Roy's Blue Water Deli	Roy A. Hinks
22	Bamboozee Beach Bar & Grill	Sergio Estevan Alamina
23	Rainbow Grill & Bar	Noeli Kuylen
24	Wish Willy Bar & Grill Restaurant	Erlin Moore
25	Enjoy Bar & Restaurant	Angie Kwok
26	Royal Orchid Bar & Grill	Ronulfo Palomo
27	Reina's Pastries, Pizza & Fast Food	Elvis Patt
28	Caribbean Fusion Brewing	Lorne Thornbrue
29	La Cubana	Diana Perez
30	Il Baretto	Elita Sam
31	Sip N'Dip Beach Bar	Karissa Alamina
32	Tapper's Dive Bar	Vanessa Dawson
33	D1 & Only Belizean Flava	Alicia Sedacy

#### ANNEX 4: LIST OF FISHERS SUPPLYING FINFISH TO CAYE CAULKER RESTAURANTS

NO.	FISHER	ADDRESS
1	Eleuterio Jordani Lopez	Caye Caulker
2	Israel Badillo	Caye Caulker
3	Jorge Requena	Caye Caulker
4	Elston "Nelson" Orellano	Orange Walk
5	Juan Interiano	Caye Caulker
6	Ramiro Aldana	Caye Caulker
7	Trey Magana	Caye Caulker
8	Manuel Magana	Caye Caulker
9	Carlos Aguilar	Caye Caulker
10	Joseph Williams	Caye Caulker
11	Adrian Perez	Caye Caulker
12	Valentin Verde	Caye Caulker
13	Rejino Guzman	Caye Caulker
14	Esley "Leko" Allen	Sarteneja
15	Cesar Munoz	Sarteneja
16	Joey Pacheco	Caye Caulker

**ANNEX 5: LIST OF SURVEYED RESTAURANTS IN SAN PEDRO**

<b>NO.</b>	<b>RESTAURANT NAME</b>	<b>OWNER/MANAGER</b>
1	PUR Boutique Cabanas & Taco Bar	Josh Reimer
2	Fidos Bar & Grill	Helen Perez
3	Stella Sunset	Kelly Brace
4	Crazy Cannucks	Rob Burrows
5	Sandy Toes	Ismael Lisbey/Dennis Cab
6	Sandbar Hostel & Restaurant	Margarita Murrillos
7	Pour House	William Lemus
8	Playa Bar & Grill	Brian Marin
9	Palapa Bar & Grill	Jodie Harnish
10	Pineapples, Ramon's Village	Ronnie Kie
11	El Fogon	Olive Dominguez
12	Caliente	Melly Sanchez
13	303 Belize	Lyzanie Reyes
14	Lily's Treasure Chest	Nelly Brown
15	Pier 366, Banyan Bay Suites	Alex Casteneda
16	Elvi's Kitchen	Jennie Staines
17	Croc's Sunset Sports Bar	Ivan Luna
18	Sushi/Ramen Lifeline	Toshiya Toshimoto
19	Portofino Beach	Lorraine Reid
20	Amber Beach Bar & Grill	Monica Gamez
21	Tipsy Grill	Byron Duarte
22	La Divina Providencia	Susana Flores
23	Wild Mangos	Amy Knox
24	Hidden Treasure Restaurant Ltd.	Ruben Munoz
25	Brianna's Food Place	Ofel Guerrero
26	Angler's Restaurant Bar	Jordani Pech
27	Rain Restaurant & Rooftop Terrace, Grand Caribe	Melissa Calderon
28	La Palmilla, Victoria House Resort & Spa	Janet Woollam, Edgar Najarro
29	Aji Tapa Lounge & Restaurant	Manner Cucul
30	Estel's Dine By The Sea	Irenie Gonzalez
31	Carambas	Rene Reyes
32	Captain Morgan's Retreat	Roger Navarro
33	Blue Bayou Bar & Restaurant	Tracy Powell
34	Red Ginger	Ozzie Palmer
35	Blue Water Grill	Ozzie Palmer
36	Carlo & Ernie's Runway Bar	Carlo Segura
37	Capricorn Restaurant	Chris Lara

**ANNEX 6: LIST OF FISHERS SUPPLYING FINFISH TO SAN PEDRO RESTAURANTS**

<b>NO.</b>	<b>FISHER</b>	<b>ADDRESS</b>
1	Gilbert "Hillyboo" Lara	San Pedro
2	Jody Leslie	San Pedro
3	Enrique Marin Jr.	San Pedro
4	Samuel Ayala	San Pedro
5	Edwin Lima	San Pedro
6	Mario Ramirez	San Pedro
7	Eduardo Arceo	Caye Caulker
8	Arodie Solis	Orange Walk
9	Ricardo Torres	Sarteneja
10	Joshua Marin	San Pedro
11	Vincent Chavez	Corozal
12	Carlo Kay Seafood Market	Orange Walk
13	Neto's Seafood Market - Kathleen Urbina	Orange Walk
14	Lino's Meat Market	San Pedro

## 7. REFERENCES

- Babcock EA, Coleman R, Karnauskas M and Gibson J (2013) Length-based indicators of fishery and ecosystem status: Glover's Reef Marine Reserve, Belize. *Fisheries Research* 147: 434–445. doi: [10.1016/j.fishres.2013.03.011](https://doi.org/10.1016/j.fishres.2013.03.011)
- Garcia SM ed. (2018) Rebuilding of marine fisheries - Part 1: Global review. FAO Fisheries Technical Paper 630. Rome, Italy: FAO.
- Froese, R. and D. Pauly. Editors. (2019). FishBase. World Wide Web electronic publication. [www.fishbase.org](http://www.fishbase.org), version (12/2019)
- McDonald G, Harford B, Arrivillaga A, *et al.* (2017) An indicator-based adaptive management framework and its development for data-limited fisheries in Belize. *Marine Policy* 76: 28–37. doi: [10.1016/j.marpol.2016.11.027](https://doi.org/10.1016/j.marpol.2016.11.027)
- Meerman, J. and Clabaugh, J. (2017). Biodiversity and Environmental Resource Data System of Belize. Online. <http://www.biodiversity.bz>
- Melnychuk MC, Kurota H, Mace PM, *et al.* (2021) Identifying management actions that promote sustainable fisheries. *Nature Sustainability* doi: [10.1038/s41893-020-00668-1](https://doi.org/10.1038/s41893-020-00668-1)
- Wade E, Spalding AK and Biedenweg K (2019) Integrating property rights into fisheries management: The case of Belize's journey to managed access. *Marine Policy* 108: 103631. doi: [10.1016/j.marpol.2019.103631](https://doi.org/10.1016/j.marpol.2019.103631)
- Zeller D, Graham R and Harper S (2011) Reconstruction of total marine fisheries catches for Belize, 1950-2008. In: Palomares MLD, Pauly D, editors In: *Too Precious to Drill: the Marine Biodiversity of Belize*. Fisheries Centre, University of British Columbia.