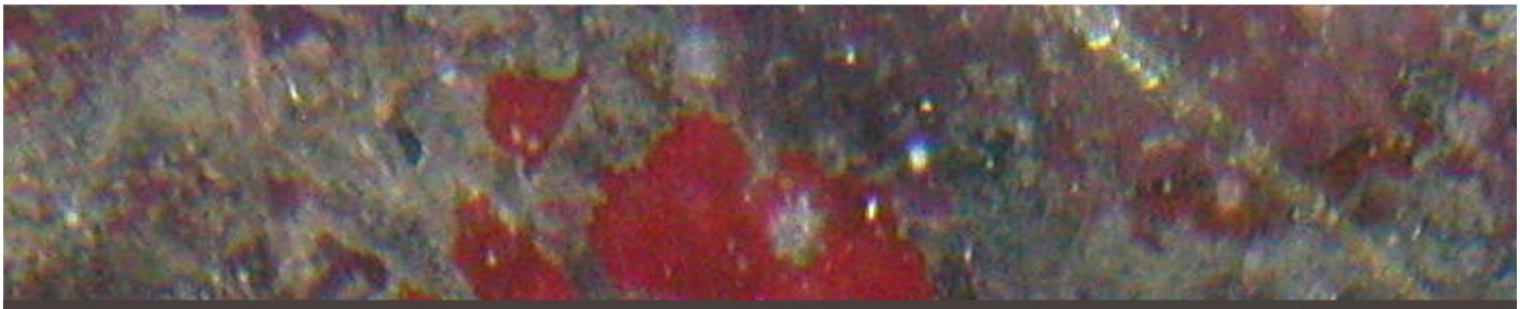

CANARI

JAMAICA CARIBBEAN SPINY LOBSTER VALUE CHAIN ANALYSIS REPORT

MARCH 2021

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CARIBBEAN NATURAL RESOURCES INSTITUTE

JAMAICA CARIBBEAN SPINY LOBSTER VALUE CHAIN ANALYSIS REPORT

Prepared by

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March 2021

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Abbreviations

CRFM	Caribbean Regional Fisheries Mechanism
EU	European Union
FAO	Food and Agricultural Organisations of the United Nations
GDP	Gross Domestic Product
HACCP	Hazard Analysis Critical Control Points
HS	Harmonised System
IUU	Illegal, unreported and unregulated fishing
MoAF	Ministry of Agriculture and Fisheries
MICAF	Ministry of Industry, Commerce, Agriculture and Fisheries
MT	Metric tonnes
NEI	Not elsewhere indicated
NFA	National Fisheries Authority

RADA	Rural Agricultural Development Authority
SCUBA	Self-contained underwater breathing apparatus
SWOT	Strengths, Weaknesses, Opportunities and Threats
VCA	Value Chain Analysis
VSD	Veterinary Services Division

Glossary

This glossary contains definitions of terms used with the Study. These definitions are not all-encompassing but are useful "working definitions" for the concepts outlined herein.

Actors

Persons (producers, wholesalers, processors, retailers) involved in getting the product from fishers to final consumer

Artisanal Processor

Individual or groups of persons who informally engage in processing seafood for local sale

Business service providers

Organisation (policy/regulations, research, extension, credit, market information) whose support enables products to flow from the landing site to the final consumer

Industrial Processor

Processor registered as a seafood processing business who provides for the local and/or export market

Closed Season

This means the period declared by order by the Minister as a closed season in relation to a fishery or species of fish, during which period the fishery or species of fish to which it applies shall not be fished.

Commercial Artisanal Fisher

Small-scale fisher with a Commercial Artisanal Licence

Consumers

Individuals who use the final product at home

Customers

Businesses that buy products from suppliers, and resell products to another business or to consumers

Exchange Rate

The exchange rate is referenced as 1 US dollar ($) = J$151.33

Fish Market

Retail market at a fish landing site that sells varied seafood products

Harmonised System (HS) Codes

The 'Harmonised System' is a standardised numerical method of classifying traded products.

Live weight

The weight of finfish and mammals was the un-gutted weight; the weight of lobsters and echinoderms was the weight of the whole animal

Lobster or Spiny Lobster

This means the Caribbean spiny lobster, *Panulirus argus*, unless otherwise noted

Meat weight

The weight of the lobster, without its shell

Restaurants

Formal or informal eating establishments that serve meals on a regular basis. This includes sit-down eateries and food trucks.

Trap

This means a lobster trap, pot, or other stationary device that may be set on the seafloor and used for the taking or holding of spiny lobster.

Value Chain Analysis (VCA)

Assessing each part of the value chain to identify constraints/opportunities and seeing where improvements can be made, either from a production standpoint or a cost perspective, to improve profitability.

Executive Summary

The artisanal lobster fishery in Jamaica is classified as "overfished". It is under significant threat from illegal, unreported and unregulated fishing (IUU), a volatile global market environment and increasing unsustainable fishing practices by the artisanal fishers. Further, it operates as an open-access fishery due to low monitoring and enforcement of effort. Therefore, fishery profits are much less than can be achieved through more stringent controls of the number of trips and/or traps used. Approximately 25 percent of lobsters landed by the artisanal fisher go to export by large industrial fish processors, who export lobsters as a key part of their product line. The exporters sell lobster in a variety of forms including whole raw, frozen; whole cooked, frozen; live and tails, frozen. In 2019, frozen lobsters were exported mainly to France, United States and Hong Kong, respectively. The main Caribbean markets were Barbados, Trinidad and Tobago, and Antigua and Barbuda, respectively.

Approximately 75 percent of the lobsters landed by the artisanal lobster fishers go to the hotel and restaurant sector, as lobster is most popularly consumed on beaches, as street food (grilled, boiled or fried) and in local restaurants across the island. Lobsters are normally sold as whole, raw lobsters by the artisanal fishers, or as lobster tails.

An excellent new initiative is the introduction of insurance for fishers in March 2021 by Sagicor. This covers group health and life insurance and includes dental, vision, drugs, primary-care, major medical (including surgery) and critical illness. This is a highly-commendable best practice, which reduces income risk and makes fishing a more attractive livelihood option.

Anecdotal evidence suggests that artisanal fishers are increasingly landing undersized lobsters and berried lobsters (with the roe). As a result, some key recommendations are as follows:

Sustainability

a. Train artisanal fishers in Hazard Analysis Critical Control Points (HACCP) and other safe and hygienic fish handling practices to improve access to export markets.

b. Foster the development of artisanal fisher cooperatives, that can better negotiate prices for lobster landings and provide better coordination among fishers.

c. Conduct regular stock assessments and couple this with enhanced monitoring and enforcement to reduce the harvest of undersized and berried lobsters.

d. The licence renewal system should make long-term access possible if sustainable fishing practices are followed and verified through adequate monitoring.

e. The National Fisheries Authority (NFA) should introduce new lobster fishery regulations that have a total allowable catch for the fishery (by both industrial and artisanal) to improve the 'overfished' status of the fishery and allow for sustainable harvests in the long-term. This should be accompanied by fishing licences which limit the catch for each fisher to reduce the race for fish and give fishers rights to land a specific portion of the catch.

f. Replication of projects to improve sustainability and fishing efficiency such as development of lobster casitas and using improved Florida style traps.

Local markets

g. Fisher cooperatives should be empowered to have a greater role in education of their members about sustainable fishing practices. This would allow them to seek out and partner with local

hotels and restaurants that support sustainable suppliers. This would give the artisanal fishers a local niche market, which will have a price premium or can be a strong local area for lobster sales growth as consumers are increasingly seeking 'green' products to consume.

Export markets

h. Artisanal fishers should more closely align with live lobster exporters. With adequate negotiation, the price premium for this product should trickle back along the value chain to provide additional revenue for all actors along this segment of the value chain.

i. Lobster exporters should invest in education, capacity building and handling methods for artisanal fishers and other actors along the value chain. Exporters should provide clear guidelines to artisanal fishers about health and sustainability requirements to access export markets and invest in the capacity of these fishers to meet these requirements to increase availability of higher quality and value export products such as live lobster.

j. A fishery improvement project (FIP) should be developed by the NFA in collaboration with key fisher associations and local agencies with an interest in maintaining fishery livelihoods. This will serve as the first step in obtaining Marine Stewardship Council (MSC) certification to better secure new global markets.

1 Introduction

Fisheries in the Caribbean are considered small-scale and are largely artisanal with limited motorised technology. In addition, many of these fisheries are largely open-access, multi-species complexes with varied regulations, enforcement, and data collection. However, the Caribbean region relies on the fisheries sub-sector either directly or indirectly as a source of protein, employment, and income.

In 2013, countries bordering or located within the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+ region) adopted a 10-year Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+ SAP). The CLME+ SAP aims to contribute to the achievement of the regionally-adopted long-term vision of "a healthy marine environment in the CLME+ that provides benefits and livelihoods for the well-being of the people of the region."

In support of this vision, the United Nations Food and Agriculture Organization (FAO) is implementing the Global Environment Facility (GEF) funded "Developing Organizational Capacity for Ecosystem Stewardship and Livelihoods in Caribbean Small-Scale Fisheries (StewardFish)" project. StewardFish is aimed at implementing the CLME+ SAP within seven Caribbean Regional Fisheries Mechanism (CRFM) Member States (Antigua and Barbuda, Barbados, Belize, Guyana, Jamaica, Saint Lucia, SVG) by empowering fisherfolk throughout fisheries value-chains to engage in resource management, decision -making processes and sustainable livelihoods with strengthened institutional support at all levels.

StewardFish is being executed by five regional partner organisations—the Caribbean Natural Resources Institute (CANARI), Caribbean ICT Programme of the University of the West Indies (UWI-CIRP), Centre for Resource Management and Environmental Studies of the University of the West (UWI-CERMES), the Caribbean Network of Fisherfolk Organisations (CNFO), the Caribbean Regional Fisheries Mechanism (CRFM) - and fisheries authorities (national executing partners) and fisherfolk leaders from the seven project countries.

Food and nutrition security are addressed throughout StewardFish but it is tackled directly in Component 3 of the project which, in part, focuses on the enhancement of fisheries value chains. This incorporates getting better quality seafood to a wider cross-section of the population in each country in the region, through school feeding programmes and other initiatives.

One of the key activities under CANARI's work for StewardFish is to undertake a participatory analysis of fisheries value-chains to map opportunities for additional marketing and distribution of current and new seafood products, especially consistent with childhood nutrition. These analyses were conducted in Barbados, Jamaica, and St. Vincent and the Grenadines for the following fisheries: mahi mahi (Dolphinfish), Caribbean spiny lobster and queen conch, respectively (Refer to methodological framework at Appendix 1 to see how the three value chains were selected). The value chain analyses will contribute to achieving Output 3.1.2 of StewardFish, which is "Use of local fish in healthy diets promoted through public policies and private enterprises".

This report presents the key findings and recommendations of the participatory value chain analysis (VCA) that was conducted for the Caribbean spiny lobster fishery in Jamaica.

1.1 Objectives of the value chain analysis

Fisheries value chains are the full range of activities in commercial capture fisheries. They start from harvesting fish, through adding value by processing and marketing, to delivering seafood to consumers.

Value chain analysis can guide both environmental management and fishery development within the context of the ecosystems approach to fisheries (EAF). In this regard, a participatory value-chain analysis should consider the institutional environment in which fisheries value chains operate (**Figure 1**) and may consequently be enabled or constrained; gender dimensions, particularly the role of women and youth in all levels of fish value chains; and regional and global challenges which are likely to have or are having direct and indirect impacts on developing climate-resilient and sustainable fisheries value chains and on food and nutrition security in the Caribbean.

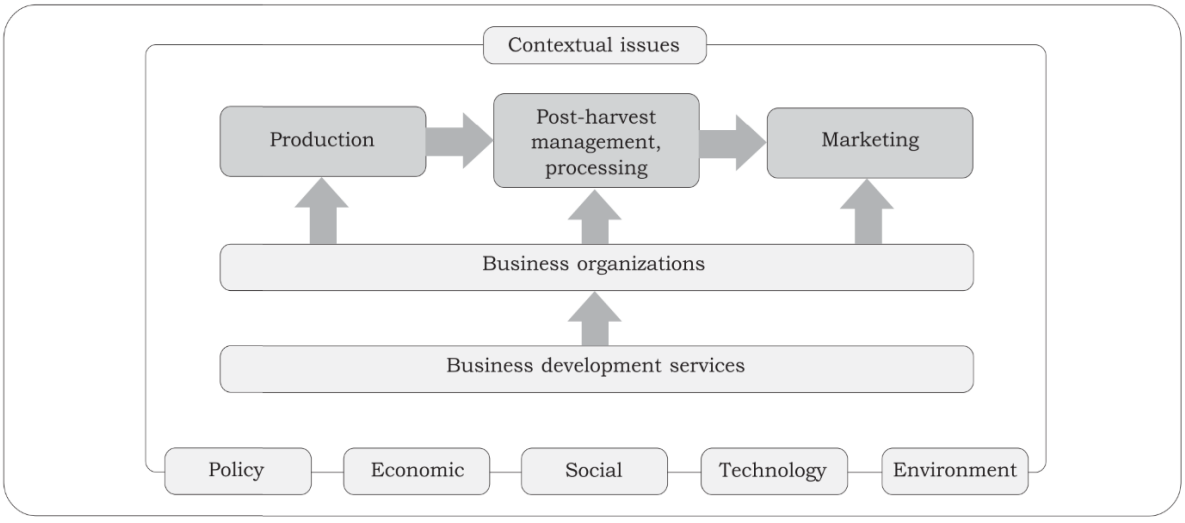


Figure 1: Value Chain and Broad Institutional Support

The ***specific objectives*** of the VCA for Jamaica's Caribbean spiny lobster fishery were**:**

- To conduct a situational analysis of the Caribbean spiny lobster fishery in Jamaica[1].
- To determine the impact of the lobster fishery on artisanal fishers in terms of the level of employment and income potential.
- To identify opportunities for increased value added of lobster via the creation of new products or new markets.
- Provide an overview of the stakeholder perception of the environmental sustainability of the fishery.
- Assess the level of private-sector involvement.
- Assess the socio-economic frameworks that exist in the fishery, especially in terms of the network and role of actor groups.
- To provide policy recommendations to the government, local and regional technical/aid agencies and donors on how the lobster value chain can become more sustainable for all actors.

[1] Thereafter, the term 'lobster' will be used in this report to refer to the Caribbean Spiny Lobster caught in Jamaica.

2 Methodology

This study used a rapid assessment approach. Following the selection of the lobster value chain for Jamaica (refer to Appendix 1 for the detailed methodological framework describing the selection process) the authors conducted a preliminary VCA webinar with key fishing industry stakeholders on August 24, 2020 (refer to Appendix 2 for list of webinar participants). Webinar participants included representatives of fisheries-related state agencies, fisherfolk organisations, private sector (especially manufacturers of fishery value chain products) and academia each with a role or interest in sustainable fisheries value chain development in Jamaica. The specific objectives of the webinar were to

- outline the core concepts of a fishery value chain and how actors can benefit from using a participatory VCA;
- identify common goals for key actors in the lobster value chain in Jamaica;
- review a preliminary value chain for the lobster fishery to verify main actors, links and product flow in this chain;
- identify gaps in the preliminary value chain and suggest new links and actors;
- identify existing and potential value-added products that can be developed for the lobster fishery in Jamaica; and
- discuss and agree on key market limitations and solutions, in achieving common fishery goals.

Following the webinar, additional desk study research, including interviews with some of the webinar participants and other stakeholders, was conducted (refer to Appendix 2 for list of interviewees). Stakeholder interviews were conducted via telephone to gain a deeper insight into how lobster is harvested and sold, together with the marketing routes, marketing arrangements and emerging trends.

The interviews sought to

- identify the actors at each step of the value chain, their task (harvest, trade, processing etc.), product flow and links to other actors;
- assess the resources, skills and capacities of fishery actors related to procurement of inputs and the key outputs produced;
- assess current coordination and institutional arrangements among actors,
- identify the local production and marketing linkages for lobster and assess their relevance, adequacy, strengths and challenges and
- undertake sub-system characterisation:
    - analyse market access and the type of markets for each type of producer and intermediary;
    - analyse the market channels and how the channel choices are determined;
    - analyse which products or services will be delivered to which market;
    - analyse the key characteristics of the product or service that influences purchase behaviour;
    - analyse the number of stages in the channel (for example a fisher can deliver directly to final consumers or through intermediary partners such as wholesalers or processors).

2.1 Value chain analysis

The VCA should show, at each level, the detailed key productive processes around the main products from the provision of inputs to harvest, harvesting, fish landing, marketing via wholesale, transportation, processing and retailing to final consumption. This involves:

- an estimation of costs, income and net margin for each stage of the value chains characterised;

- characterising the nature of value added in the value chain – safety and quality of the product; branding and labelling; social and environment norms, or sustainability standards;
- identifying the key requirements for market access through the value chain, such as bargaining power, market knowledge, technological proficiencies, infrastructure availability, and market orientation;
- identifying opportunities for increased value by forming new relationships, enhancing existing relationships, creating new products or by finding new markets for existing products; and
- analysing possible risks fishers and other fishery actors may face in market and suggesting possible ways to reduce or eliminate these risks.

The value chain approach is orientated towards what customers and consumers want (**Figure 2**). By analysing the value chain, information is obtained that should lead to better decision making by both those involved (including fishers and traders) and those wanting to support the value chain (such as policy makers and donors). This information is expected to result in higher and more sustainable livelihoods for those participating in the chain. Properly identifying the value share and risks of each actor in the chain allows these actors and policy makers to better coordinate activities along the chain, enhance weak links and create links that may be missing. The VCA would allow actors in the value chain to focus their activities on products and services which will reduce costs, increase their income, use their limited resources (skill, money and capital) more effectively and hence provide more sustainable livelihoods. The VCA also allows the actors to better understand the needs of their suppliers and clients in the chain.

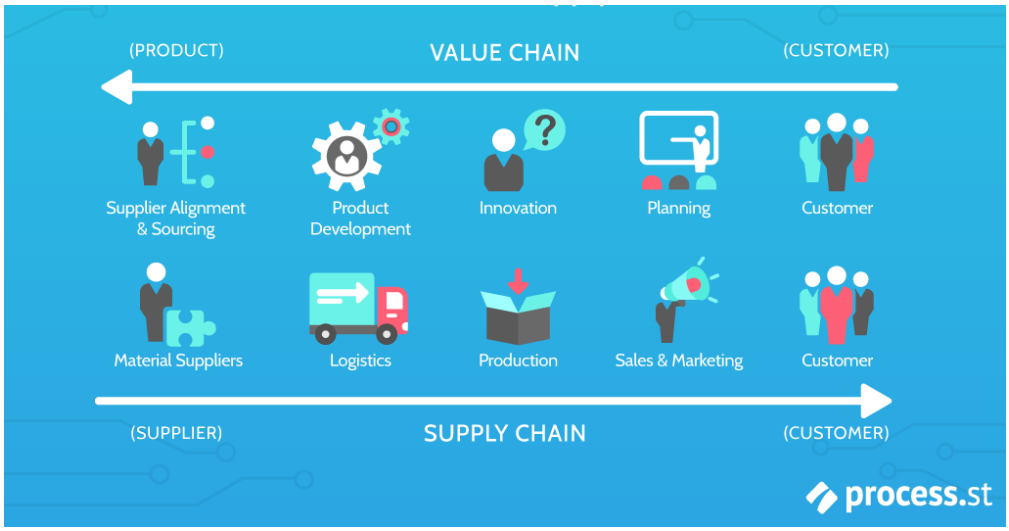


FIGURE 2: VALUE CHAIN VERSUS SUPPLY CHAIN
Source: Peterson (2019)

Livelihoods in the value chain can only thrive and be sustained when the links to consumer wants are clearly established. Effective information flows from the market back to the various value chain actors will allow consumer 'wants' to better match what is supplied by the value chain. Consumers are usually willing to pay more for the added value (product, place, time, convenience) and this increases profitability along the chain. Porter's value chain below (**Figure 3**) shows the division of activities between primary and secondary activities. The strength of each type of activity, together with its interaction with the other activities, help to determine the size of value that firms can create or sustain.

FIGURE 3: PORTER'S VALUE CHAIN
Source: Peterson (2019)

One key way to look at the fishery sector is as a flow of commodities from production (see **Figure 4**) to final consumers. The first stage provides production technologies, inputs, management and information flows for sustained fish production and capture.

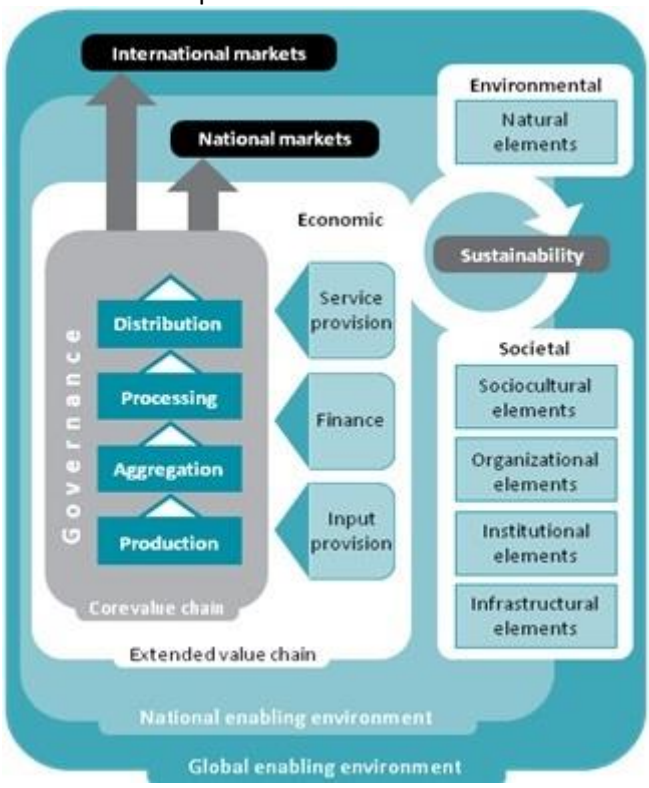


FIGURE 4: THE SUSTAINABLE FOOD VALUE CHAIN FRAMEWORK
Source: Figure 2 in FAO (2014)

Four core functions (links) are distinguished in the chain: production (e.g. farming or fishing), aggregation, processing and distribution (wholesale and retail). "Governance" refers to the nature of the linkages both between actors at particular stages in the chain (horizontal linkages) and within the overall chain (vertical linkages). The value chain requires understanding their complex environment and contains elements such as information exchange, price determination, standards, payment mechanisms, contracts with or without embedded services, market power, lead firms, and wholesale market systems (FAO, 2014).

Promoting value added production also leads to (Russell and Hanoomanjee, 2012)

- higher and more stable profits;
- less consumer price fluctuations and product risk;
- job creation;
- diversification of products and markets;
- more harmonious business operations via the targeted involvement of more secondary actors; and
- a strategic position to maximise overall fishery value.

The key activities in the VCA for Jamaica's lobster fishery included

1. **Mapping the lobster value chain**. This includes identifying all the stages and links in the value chain, the flow of products, services, information and money. Identification of volumes and value. Past and existing value-added products.
2. **Identifying the value chain actors**. This includes the main actors and the supporting actors that actors have in the chain.
3. **Identifying the services provided** by each actor in the value chain.
4. **Quantification of the value chain.** This involves providing information such as how many persons are involved at each step, product logistics, pricing, losses or wastage. The cost of activities (quantitative assessment) is outside the scope of this study.
5. **Qualitative assessment of the contribution** (including the share of value added) and the risks faced by each actor involved.
6. **Analysis of strengths, weaknesses, opportunities and threats (SWOT).** This analysis would identify strengths and weaknesses of the actors or relationships in the value chain. It also identifies opportunities to add value in the chain from the participation of new actors, the development of new products, new markets and/or new institutional arrangements or governance systems to support the activities in the chain. The SWOT analysis identifies existing, emerging or potential threats to the operation of the value chain over the short, medium and long term, and suggests strategies for potentially overcoming these threats.
7. **Market analysis.** This would focus on levels and trends in local and global market participation and growth, including links with other sectors and exports. This report will also focus on the interaction between the artisanal lobster fishery and the industrial lobster fishery, which are intertwined in Jamaica.
8. **Provide recommendations** to improve the value chain**.**

3 Situational analysis

Jamaica is the third largest island in the Caribbean Sea. It is located 898 kilometers south east of Miami, United States of America and 144.6 kilometers south of Cuba. Jamaica is 10 990 km^2 in land area, has a coastline of approximately 1,022 km and an Exclusive Economic Zone (EEZ) of 274, 000 km^2 (**Figure 5**). The island had an estimated population of 2.95 million people in 2019 (The World Bank, 2020). Its gross domestic product (GDP) in 2019 was US$16.458 billion, and in 2015, GDP per capita was US$4,908 (World Bank, 2020). Agriculture (including forestry and fisheries) accounts for less than 10 percent of the total GDP. In 2010, the fishing sector in Jamaica contributed 0.33 percent of GDP. This increased to 0.49 percent of GDP by 2018 (CRFM, 2020, p. 47).

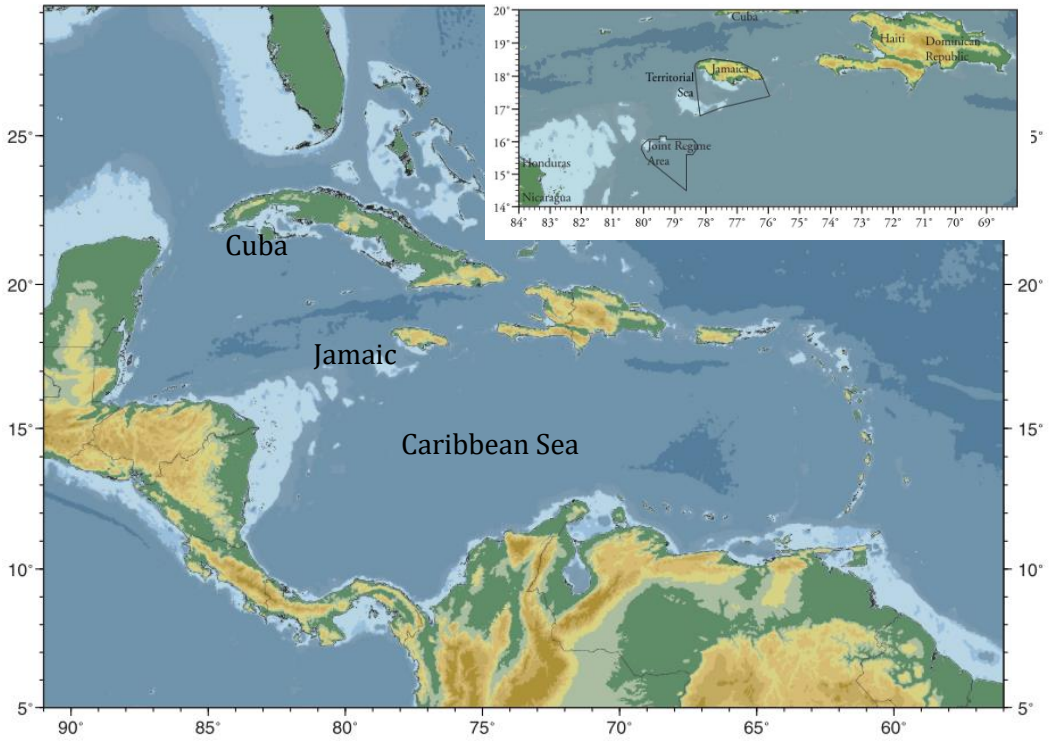


FIGURE 5: LOCATION OF JAMAICA
Source: CFRAMP (2000 4)

The Jamaican fishery comprises aquaculture and marine capture fisheries. The aquaculture fisheries focus on the production of tilapia and more recently, sea cucumber. Aquaculture production shifted out of shrimp production after farmers encountered significant challenges with increasing feed costs. The Ministry of Agriculture and Fisheries (MoAF) has primary responsibility for fisheries mainly through the NFA. Total capture fisheries production varied significantly from year to year, mostly in response to changes in the artisanal finfish catch (see **Table 1**).

In 2018, 126,489 persons were employed in the fishing sector in Jamaica, equivalent to 8.6 percent of the labour force (CRFM, 2020, p. 45). The fishery is comprised of largely artisanal fishers. The lobster fishery, which is mainly exported, is the second most commercially-valuable fishery in Jamaica, after the queen conch (MICAF, 2017a, p. 4).

TABLE 1: JAMAICA SEAFOOD PRODUCTION (TONNES), 2015-2019

		2015	2016	2017	2018	2019
Marine Fish Production (MT)	Artisanal (Finfish)	12,226.66	12,139.85	13,939.13	10,462.99	12,100.47
	Conch (Industrial)	500	500	500	500	[NA]
	Lobster (Industrial)	350	323.44	483.67	239.20	229.00
	Shrimp	0	0			
	Others	0	0	8.62	10	42.77
	Total Marine Fish Production	13,076.66	12,963.29	14,931.42	11,212.19	12,372.24
Aquaculture	Aquaculture (Tilapia) Production	698.00	1,021.00	1,085.00	1,212.63	1,146.45
Total	**TOTAL Fish Production MT**	**13,774.66**	**13,984.29**	**16,016.42**	**12,424.82**	**13,518.69**

Source: Berry, Personal Communication 2020

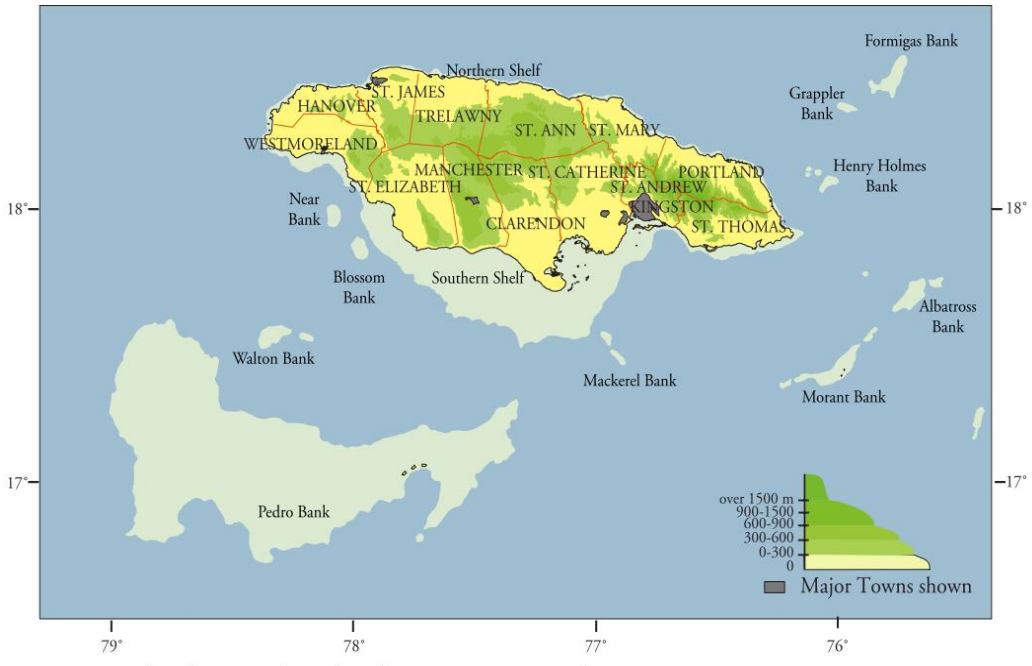


FIGURE 6: KEY FISHING GROUNDS IN JAMAICA – ARTISANAL AND INDUSTRIAL
Source: CFRAMP (2000)

Overall in the Jamaican fishery, there were 26,382 persons directly employed in the marine commercial capture fisheries in 2018, 107 persons employed in aquaculture production and 79,467 persons

employed in other fisheries dependent activities[2] in that year (CRFM, 2020, p. 42). In addition, there was an estimated 8,032 fishing vessels in 2019 operating in the commercial marine capture fishery (CRFM, 2020, p. 22). According to CRFM(2020, p.25), "The fishing fleet consists principally of open glass-fibre reinforced plastic (GFRP) canoes. Categories of vessels include

- Dugout wood canoes and other small open canoes
- Open reinforced fibreglass plastic (FRP) canoes most of which are 8.5 metres, large size wooden boats, locally called *big head*
- Fish trading vessels locally called *packer boats*
- Steel or aluminium hull vessels operating as "mothership(s)" on offshore banks

The canoes are normally made from carved out logs with wooden planks placed on the sides. These are usually no longer than 7 metres, and are now powered by either inboard or outboard engines, and less frequently, by oars. The fibreglass vessels are over 8.4 metres, with a similar layout as the canoes, and also usually powered by outboard engines.

The main fishing grounds for the artisanal fleet are the island shelf and the offshore banks, particularly the Pedro Bank, while the industrial fleet is only licensed to operate on offshore banks. The industrial lobster fishers operate mainly on the Pedro and Morant Banks, but also catch lobster in the Formigas, Henry Holmes and Grappler Banks. The key fishing grounds are shown in **Figure 6**. These banks are submerged plateaus with an average 20–30 m depth, with most of the fishing occurring on its fringes, where the reefs are best developed.

The Jamaican government announced in January 2021 that it will invest millions of Jamaican dollars in upgrading the NFA's Hatchery (Smith, A., 2020) as part of the project 'Promoting Community-based Climate Resilience in the Fisheries Sector'. This project began in 2015 and will go until March 2023. It will include the production of tilapia using aquaculture. This is geared towards expanding and modernising the aquaculture sector (Morris, 2010).

3.1 Overview of the lobster fishery

Globally, the lobster market is very robust. There are more than 50 lobster species traded, but the main ones are the American Lobster (*Homarus spp.*), which originate in Canada and the United States. Demand for lobster grew significantly from the late 1950s, which spurred a steady rise in harvests. From 1957, harvests were at 11,532 tonnes (see **Figure 7** and Appendix 3). Harvest more than tripled by 2016, when it stood at 39,236 tonnes. Even though significant capitalisation took place in the global lobster fishery as a result of heightened demand, the global harvest levels remained relatively constant from levels of the 1990s. The race for lobsters increased pressure of its stock. Fisheries such as the South Florida spiny lobster fishery, which is a multi-species fishery, enacted restrictions on the total catch and the number of traps used annually in the fishery, with the goal of decreasing effort over time to sustainable levels.

[2] Fisheries-dependent activities are those which rely directly or indirectly on fishery harvests.

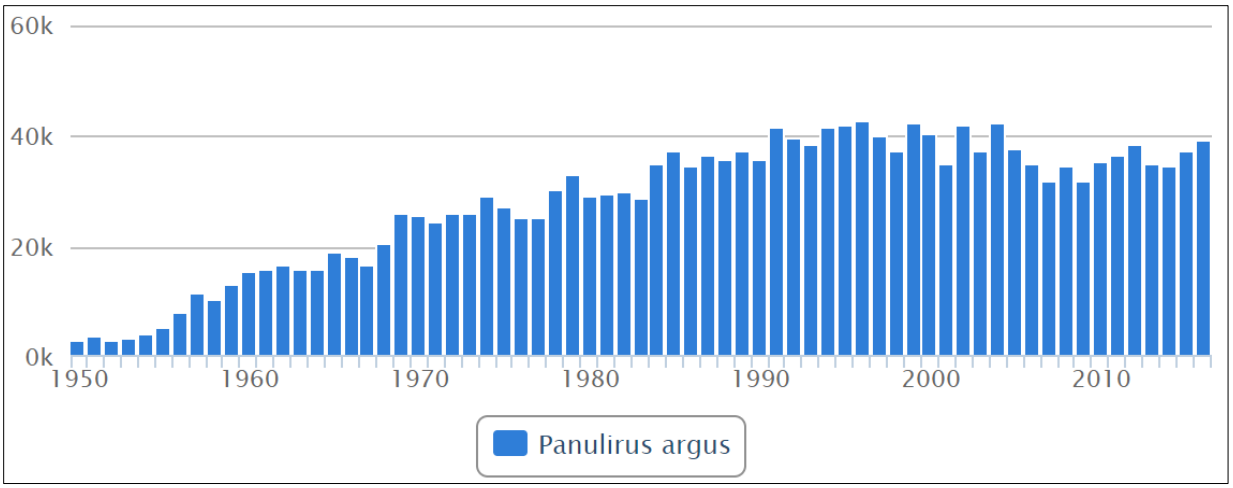


FIGURE 7: SPINY LOBSTER GLOBAL PRODUCTION, 1950-2016

3.2 Caribbean spiny lobster fishing

Spiny lobster is harvested in tropical climates worldwide, using mainly lobster traps of different designs (FishSource, 2020a). In the Caribbean, diving (free lung) and compressor diving [self-contained underwater breathing apparatus (SCUBA) and hookah], and lobster hooks are also used in the artisanal fishery, which targets lobsters on shallow shelves and reefs (CRFM, 2020). In Jamaica, the use of SCUBA and dive compressors for fishing is not allowed, except for specially-licensed industrial fishers in the Pedro Bank. This existing regulation was highlighted in 2020 by the NFA as fishers continued to die due to their unsafe diving practices and lack of training in adequate diving techniques (MoAF, 2021a). Free-lung diving is permitted from 5:00 a.m. to 6:00 p.m. by licensed fishers.

Lobsters are high-valued species wherever they are found in the Caribbean. In 2017, the CRFM Member States together harvested 9,915.8 metric tonnes of lobster (live weight) (see **Table 2**). The leading producer was the Bahamas, which captured 77.7 percent, followed by Belize (9.4 percent) and Jamaica (4.9 percent) with 483.67 tonnes (CRFM, 2020, p. 37). However, Jamaica's total fish exports were 499 tonnes in 2018, of which 251 tonnes were for lobster, the main species exported, compared to 185 tonnes of conch. Jamaica's lobster export contributed 8.3 percent of all lobster exports for all CRFM member states (CRFM, 2020, p. 73).

TABLE 2: LOBSTER PRODUCTION (MEAT WEIGHT IN TONNES) OF THE MARINE CAPTURE FISHERY FOR 2017 FOR CRFM MEMBER STATES

AN	A&B	BAH	BEL	GRE	JAM	SKN	SLU	SVG	T&T	TCI
205.00	277.00	7,709.0	927.89	35.67	483.67	30.00	18.60	54.13	21.32	153.48

Source: Extracted from Table 17, CRFM (2020)

In addition to Jamaica, among the CRFM Member States, lobster is found in Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada and Haiti. Several CRFM Member States use a minimum size and closed seasons as key management tools. Jamaica's closed season is April 1 to June 30. Antigua and Barbuda closes the lobster season from May 1 to June 30 each year; Bahamas from April 1 to July 31; Belize from February 15 to 14 June; and Grenada from May 1 to August 31 each year (CRFM, 2020, p. 17-18). There are also closed seasons in St. Kitts and Nevis (May 1 to August 31); Saint Lucia (April 30 to September 1) St. Vincent and the Grenadines (May 1 to August 31) and the Turks and Caicos Islands (April 1 to July 31) (CRFM, 2018, p. 19–20).

The artisanal lobster fishery uses lobster traps in Jamaica, on open canoe-style vessels. This gear and vessel type are shown in **Figures 8, 9** and **10**.

FIGURE 8: LOBSTER STORED ON BOARD – ARTISANAL TRIP

FIGURE 9: FISHER REMOVING LOBSTER FROM THE TRAP
Source: Pinterest (2021)

FIGURE 10: ARTISANAL FISHER DEPLOYING LOBSTER TRAPS
Source: *Jamaica Observer* (2018)

Unlike the artisanal vessels, the vessels for the industrial fleet in Jamaica are normally decked, as shown in **Figure 11**. Unlike the artisanal fishers, the industrial fishers use Florida lobster traps, which are rectangular boxes with wooden slats. The industrial vessels are also usually outfitted with equipment to

find lobsters, enhanced communication devices, cold storage facilities and living facilities to support very long trips.

FIGURE 11: 80-FOOT INDUSTRIAL VESSEL TO HARVEST LOBSTER
Source: Graham (2016)

The lobster fishery's key regulation in Jamaica is the 'Lobster Fishery Regime for the Management and Sustainable Use of the Caribbean Spiny Lobster (*Panulirus argus*) in Jamaica'. The lobster closed season was enacted as a part of the Fishing Industry Act (1975) and the Fishing Industry Regulations (1976). The goal is to replenish lobster stocks.

The lobster fishery is an important source of income and employment in Jamaica (Morris, 2010). A rapid assessment of the lobster industry was undertaken in 2019, the results of which are provided in **Table 3** below.

TABLE 3: NUMBER OF PERSONS EMPLOYED IN LOBSTER INDUSTRY PRODUCTION – JAMAICA

Industry	Number of Employees
Vendors	265
Artisanal	3,297
Industrial	276
Processing Plants	118
TOTAL	**3,956**

The methodology used for these estimates was: "A total of fifty-five beaches were identified as lobster beaches and four plants as lobster processing plants. Nine Fisheries Instructors were interviewed and they each gave estimates of the number of fishers, boats and vendors that were actively catching lobster on their various beaches. These Instructors interact with fishers across the country to enforce the Fisheries Act. Plant operators were also asked to give an account of the number of personnel who are employed to process spiny lobster." (Cooke-Panton, 2019).

The annual fishery production for Jamaica is shown in **Table 4**, which shows the variability in total marine fishery production since 2007, with values reaching a high of US$53.3 mil. in 2017.

TABLE 4: ANNUAL MARINE CAPTURE FISH PRODUCTION – JAMAICA (MEAT WEIGHT IN TONNES)

Year	Production	Production Value (US$)	Fisheries Contribution to GDP (%)*
2007	11,838		
2008	10,025		
2009	13,205		
2010	12,314		0.33
2011	14,907	~51,940,000	0.36
2012	10,943	~37,700,000	0.36
2013	14,263	50,175,660[#]	0.41
2014	11,256	40,230,778[#]	0.50
2015	13,077	46,739,328.7	0.50
2016	12,990	46,198,911.9	0.52
2017[p]	14,931	53,287,811	0.52
2018[p]	10,883	38,757,510	

Source: [p]=provisional; Table 13 CRFM (2018); *Table 22, CRFM (2017), ** Table 17 CRFM (2015); ***Table 23 CRFM (2015) , [#]CRFM 2014.

3.3 Spiny lobster biology

Lobsters are large marine crustaceans with a hard exoskeleton (CRFM, 2020). The Caribbean has four types of lobsters: Caribbean spiny lobster (*Panulirus argus*)—the main species; Spotted spiny lobster (*Panulirus guttatus*); Sculptured slipper lobster (*Parribacus antarticus*) and the Spanish slipper lobster (*Scyllarides aequinoctialis*). These lobster usually live in crevices in shallow ocean shelves and reefs. Some of these fisheries, when last assessed showed signs of near collapse (Brazil), overfishing or near full exploitation.

Spiny lobsters are prevalent all over the Caribbean, including in The Bahamas, and also Australia, New Zealand, Indonesia, Cuba, Brazil and South Africa—almost anywhere there are warm-water seas, though there are roughly sixty different species. Unlike the North American lobsters (*Homarus americanus*) from New England, spiny lobsters have very long, thick, spiny antennae and lack the big claws on the first four pairs of walking legs (Huffman, 2020a).

The Caribbean spiny lobster ranges from the Gulf of Mexico all the way down the Caribbean to the Brazil-Guiana shelf. The range of the Caribbean spiny lobster is shown below (**Figure 12**), extending from North Carolina in the United States all the way down to Rio de Janeiro in Brazil. It matures to 45cm in total length and may live up to ten years. As adults, they inhabit offshore reefs, but the juveniles are found primarily in coastal mangroves and sea grass beds. These juveniles normally grow from a larval stage, which can be as long as one year, with the larvae drifting in ocean currents. This phenomenon increases the complexity of managing lobster recruitment, as this reflects the multi-jurisdictional nature of its life cycle.

FIGURE 12: SPINY LOBSTER GEOGRAPHICAL RANGE
Source: Butler (2011)

The International Union for Conservation of Nature's (IUCN) 'Red List' lists the fishery as data deficient but highlights a declining trend in the lobster population, based on a December 2009 assessment (Butler, 2011). Based on the joint Central America Fisheries and Aquaculture Organization (OSPESCA)/Western Central Atlantic Fisheries Commission (WECAFC)/CRFM Working Group on Caribbean spiny lobster, Jamaica's lobster fishery is considered overfished (CLME, 2019).

3.4 Lobster regulation

In Jamaica, there are several technical regulations for the lobster fishery. Firstly, there is a minimum size requirement, with lobsters with a carapace length (measurement from the eyes to the back, excluding the tail) less than 3 inches being against the law. Secondly, egg-carrying lobsters (known as 'berried lobsters') are illegal year-round. In addition, lobster can be harvested on a daily basis, except for its closed season, which runs from April 1 to June 30 annually. This law has been in place since April 2009. During this period, harvest, holding (live) or trade in lobster is prohibited, unless the persons with lobsters have a signed declaration that allows them to have possession of the seafood. Being caught with lobster during the closed season, attracts a penalty of six months imprisonment.

The lobster fishery is supported by myriad legislations that include the following:

- Fishing Industry (Spiny Lobster) Amendment Regulations (2020), which provides the conditions under which lobster can be kept or traded during the closed season (UNEP, 2021)
- Fishing Industry Regulation (1976), both of which regulates the licensing and fishing within Jamaica's territorial waters
- Natural Resource Conservation Act (1991)
- United Nations Convention on the Law of the Sea (UNCLOS), which promotes the sustainable use of fishery resources, provides fishery jurisdictions and coordinates foreign policy in the management of fisheries

For the 2017/18 lobster fishing season, the Lobster Fishery Regime (2017) was enacted (MoAF, 2017a). This regulation was implemented in response to increased threats to the fishery from IUU fishing, which has been an ongoing threat over more than a decade. The Regime seeks to more efficiently manage the issuance of licences for the artisanal and the industrial lobster fishers, while making this process more transparent and equitable. The Regime allows for a licence quota to be set for two years, ahead of the opening of the annual lobster fishing season. However, there is also provision for this quota to be

adjusted upward or downward. It is managed by the Licensing Authority. Licences are mainly issued to industrial fishers, commercial artisanal fishers and carrier vessels (see **Table 5**).

Even though commercial licences are issued to promote the lobster fishery as a limited-entry fishery, there are no landings limits for the commercial artisanal lobster fishers (MoAF, 2017a), a sub-group of artisanal fishers. In addition, less than 10 percent of artisanal fishers have this licence. As a result, the artisanal lobster fishery operates as an open-access fishery due to low monitoring and enforcement of effort (primarily through the number of trips and the number of traps used) across the country. This results in economic inefficiency and a policy failure, whereby profitability in the fishery overall is much less than could be achieved with more controlled access to the fishery. This requires enhanced fishery management.

TABLE 5: CATEGORIES OF LOBSTER LICENCES

	Type of Fishing License	Vessel Type	Restriction(s)
1. Category "A"	Industrial	50' decked vessel only	2200 traps
2. Category "B"	Commercial Artisanal	Open decked vessel	Contract with a commercial entity
3. Category "B_1"	Commercial Restricted	Open decked vessel	100 tails limit
4. Category "C"	Carrier	Open decked	Solely receiving, temporary storage, and transportation of lobster.
5. Category "D"	Research/Exploratory	50' decked vessel only	Fishing location, assigned FD Officer

Source: MoAF (2017b, p. 8)

Licences to carrier vessels that are engaged in receiving temporary storage and transportation of lobster are also issued under the Lobster Fishery Regime (2017). Overall, no more than 500 licences combined are to be issued to the commercial fishers (artisanal and restricted) and lobster carriers for each lobster season.

3.5 Fish supply, lobster preparation and nutrition value

For the CRFM Member States, the mean total fish supply per capita is 25 kg for 2017 (CRFM, 2020, p. 78). Among these States, Anguilla leads the per capita supply with 83 kg. Jamaica is in the 12th place of 17 States (tied with Dominica) with 16 kg, with Belize having the lowest supply at 2 kg (CRFM, 2020, p. 78).

Lobster is very low fat, has no carbohydrate or sugars and is very high in protein, as shown in the nutritional label in **Table 6**. It normally has a delicate, sweet flavour from white meat. It is normally baked, boiled, broiled, grilled and steamed, and has no advisory concerns. Children from zero to four years can eat four servings per month, while men and women can eat more than four servings per month.

TABLE 6: LOBSTER NUTRITIONAL VALUE

Nutrition facts	
Serving size: ***100 Grams***	
Amount per serving	
Calories	112.00
Total Fat	2.00g
Cholesterol	70.00mg
Sodium	177.00mg
Carbohydrates	0.00g
Protein	21.00g

Source: FishChoice, Inc 2020a

4 Value chain mapping

Taking a closer look at the actors who own lobster from harvest through to final use by consumers, and their relationships embodies the value chain approach. This view starts with consumer demand, in terms of price consumers pay for the product, lobster form, regional and extra-regional markets and historical changes in market participants globally, changes in regulations and their impacts on the value chain actors. The VCA will identify strengths of the value chain that can be used to further develop the chain. Information is also obtained that would lead to better decision making by both those involved (fishers, processors, fishery managers, etc.) and those wanting to support the value chain (policy makers, donors, etc.).

4.1 Value chain map and actors

The value chain map in **Figure 13** shows distinct stages where value is added. Before the production phase or harvesting, fishers utilise inputs.

Inputs

The key harvest inputs are boats, engines, fuel, motor oil, trammel nets, fish traps, spear guns, lobster hook, ice and containers to store the lobster onboard.

Harvesting

Lobster fishers usually use 28-foot fibreglass vessels with outboard engines and carry ice on board to store the lobsters until they are landed. The artisanal lobster fishers use a variety of gear. They use the Antillean Z-traps (which catch both reef fish and lobsters), trammel nets, lobster hooks (known as 'lobster tickler') and dive free-lung. Some fishers also use compressed air for diving, even though this practice is prohibited. It is estimated that a maximum of 60 percent of the lobster is harvested by artisanal fishers, who then land at any of the 148 fishing beaches around Jamaica, which serve as landing sites, each with varied levels of infrastructure. The trips are normally for one day (from morning to evening of the same day), with each trip having three to four people on board. If the Antillean Z-traps are used, these are normally left to 'soak' for 3 days, at which time the fishers return to retrieve the seafood caught in the traps.

In shallow waters, where the lobsters can be easily seen, some fishers will use trammel nets, but the exact share of fishers who engage in this practice could not be estimated. The nets are set in coastal waters, at about 12–19 feet depth. These are set, left to 'soak' for 24 hours, and retrieved daily. The

lobsters caught by net or spear gun are used for local consumption only. Spear guns are used in a limited way by fishers in villages like Hellshire and Falmouth, where this gear is traditionally used.

All commercial artisanal fishers (whether captain or crew) and owners are required to have a fishing licence. Most of the lobsters harvested are exported as frozen tails. Most of the artisanal lobsters are harvested on the southern side of the island, in the shallow shelves and reef systems, most notably, the Southern Shelf, which extends up to 24 km from the shore. There is minimal bycatch associated with this fishery, as any fish caught is normally of marketable quality and the nets, if used are 4-inch nets, which would allow maximum escape for many juvenile fish species. The lobsters are normally landed live, except where spear guns were used to harvest them.

When fishers land the lobsters, they are normally sold to hotels and restaurants, with no intermediary in this process. Fishers also sell to vendors, who in turn sell the lobsters at the fish landing sites to the processing plants and households. Fishers also sell lobsters directly to the processing plants, but this is less popular than sales through the vendors, which then go to the processing plants. While households also buy lobsters directly from the fishers at these sites, it is more prevalent for the households to purchase from the vendors. Lobsters are sold at different prices, by location. On the north coast, it is usually sold for J$800–J$900/lb; on the south coast—J$400–J$500/lb; east coast—$700/lb and on the north-east coast—J$500/lb. Fishers may also sell directly to local street vendors, who cook the lobster and sell it to tourists and locals, often grilled, jerked or fried and presented as shown in **Figure 14**.

FIGURE 13: LOBSTER SOLD BY STREET VENDORS IN JAMAICA
Source: Melenigma (2021)

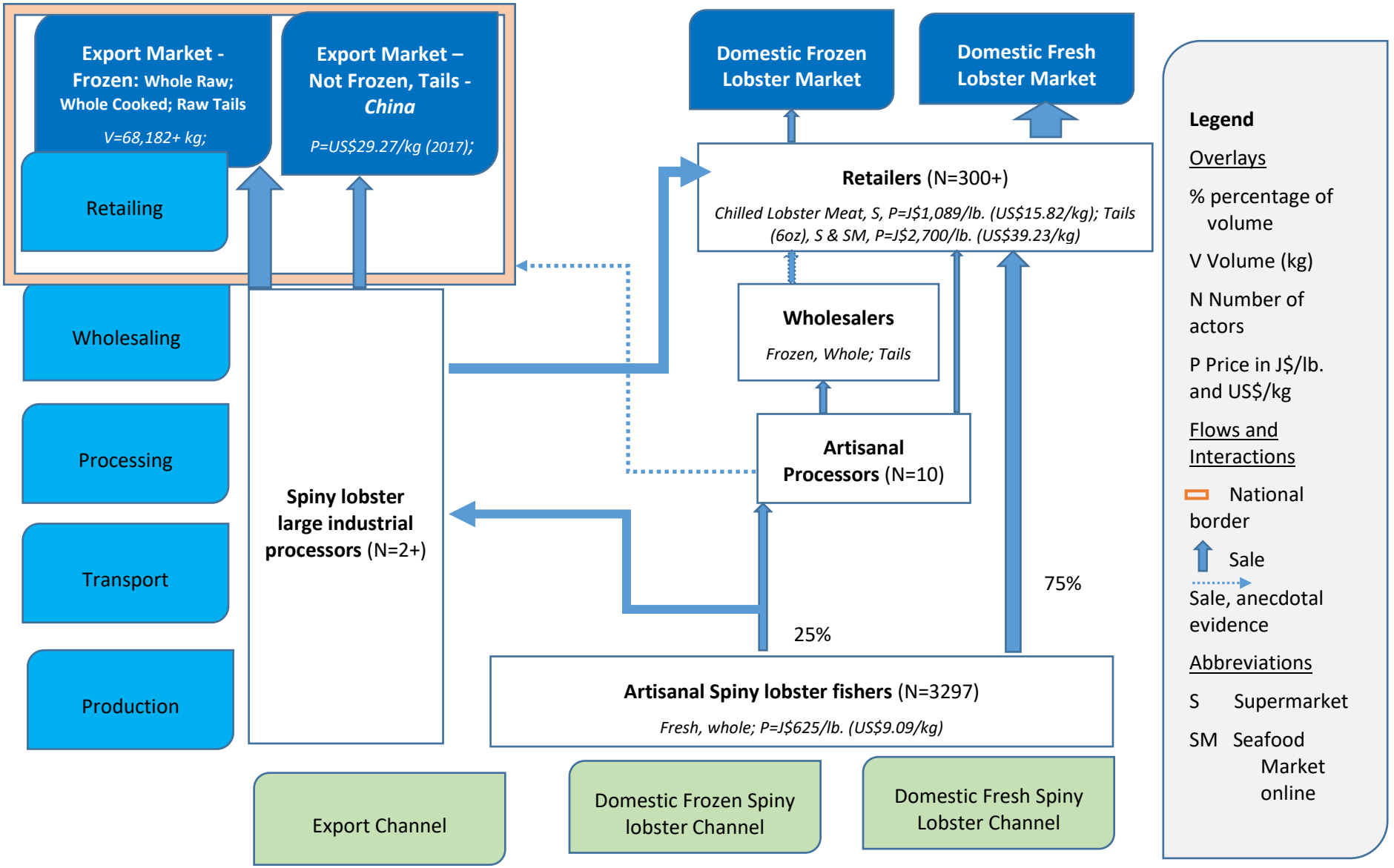


FIGURE 14: JAMAICA SPINY LOBSTER VALUE CHAIN MAP

One of the key challenges with the artisanal lobster fishery is the negative impact a growing industrial fishery is likely to have on it. In the first instance, the licences for the industrial fishers, based on the Spiny Lobster Regime (2017), sets an upper limit of 2,200 traps for each of these fishers, but does not set an upper limit on harvests. As noted earlier, this means, in effect, these fishers act as if it is an open-access fishery. Therefore, in areas such as the Pedro Bank, where artisanal as well as some industrial lobster harvesting occurs, there is likely to be instances of competition among these users. Secondly, the requirement that a commercial artisanal fisher should have a contract with a registered Jamaican company, excludes many artisanal fishers who do not have any written contractual arrangements, but who engage largely in oral agreements and price negotiation. This is a potential equity issue that can reinforce existing power and economic imbalances in the value chain. Thirdly, under the Spiny Lobster Regime (2017), the granting of a licence is for one lobster season for the artisanal fishers and is not guaranteed for subsequent seasons (MoAF, 2017a). Given that the industrial fishers have licences with a longer-term duration, this puts the artisanal fishers at a disadvantage, since they cannot plan investments reliably for more than a single lobster season. This licence uncertainty would therefore contribute to limited investment in gear and other equipment by these fishers. Further, with a limit on access (annual permits), fishers may be incentivised to overfish the resource as they are unsure of future access rites. The licence renewal system should make long-term access possible if sustainable fishing practices are followed and verified through adequate monitoring.

The licence for the industrial fishers requires that they submit daily logs of where the lobsters are caught [i.e. Global Positioning System (GPS) coordinates], the location the lobsters are caught and where they are landed. This is to be done even if the landings from the industrial fishers are sold locally or exported. However, while there may be close monitoring of the industrial fishers due to only about 17 licences being given out each year, there does not appear to have the same level of oversight for the artisanal fishers.

Aggregating and wholesaling

Data isn't readily available to determine the level of aggregation (i.e. where wholesalers buy seafood from several fishers for resale) and wholesaling that takes place for lobster. Where it occurs, at least 70 percent is estimated to go to restaurants, hotels and commercial brick and mortar seafood retailers, that largely cater to the tourist market.

Interviews revealed that at all beaches where lobsters are landed, traders (approximately 70 percent women) buy whole lobsters or tails only from various fishers across Jamaica. The lobsters are then sold to local restaurants (not at hotels). In some cases, a fisher supplies to a single trader and all purchases are done based on verbal arrangements.

Processing and exporting

There are different scales of processing. Some artisanal lobster fishers may take off heads at sea, and retain the tails at sea. Two large licensed commercial processors for lobster were identified— Rainforest Seafoods and B&D Trawling Ltd. B&D Trawling Ltd.'s core function is conch and lobster fishing and processing for export. This vertically-integrated company has been engaged in these activities for more than 30 years. The company processes lobster from its own haul, as well as catch from other licensed fishers, under a contract arrangement. Its processing facility is European Union (EU)/HACCP certified, and primarily exports frozen lobsters to the United States and, since 2018, live lobsters to China (B&D Trawling Ltd, 2020).

Similarly, Rainforest Seafoods, which started in 1995, processes a wide range of fish and seafood, including lobster, for export to the Caribbean and extra-regional markets. This Jamaica-based company

is the largest supplier of premium quality fish and seafood in Jamaica and the wider Caribbean. It uses two large HACCP, United States Food and Drug Administration (FDA) and EU-approved processing plants to support its operation. These plants are located in Kingston (south coast) and Montego Bay (north coast) of Jamaica. They purchase from fisher cooperatives and have arrangements with specific fishers. Rainforest Seafoods supplies overseas distributors, hotels, hypermarkets, and supermarkets.

Lobster caught by artisanal fishers is also sold for export, but these lobsters would have to be managed and kept under adequate cold-storage to maintain the quality needed for the required export standards. The lobster is normally sold in various forms as whole raw, whole cooked; meat only and tails.

Live lobster are exported mainly to China, and other Asian countries. These foreign markets are more attractive price-wise, and foreign consumers have a culture of selecting their seafood for cooking. The live lobster is exported via air and requires putting the lobster in a dormant state for travel by reducing the water temperature down from 80 to 60°F.

There are also approximately 10 artisanal (non-licensed) processors, that sell to the local and international markets, down from a reported 20 such facilities in 2011 (Monnereau and Helmsing 2011).

Losses and Wastes

Since lobster is the most high-valued seafood in Jamaica, there are no reports of lobster being lost due to spoilage or poor quality. Therefore, it is assumed that all lobster caught are landed and all the meat from this activity is processed. As the Spiny lobster does not have large claws like the American lobster, nor does it have large-diameter legs, most of its meat is in its tail. As a result, the shell is discarded. There are no reports of this waste product being used in any local craft or agricultural application.

The meat found in the lobster head is called “Head meat”. Head meat is sold locally and also processed for export. Head meat is normally wasted only when lobster fishers discard the entire head at sea, to avoid prosecution from landing an undersized lobster. This practice also occurs if the fisher is selling to a ‘tails only’ market, as there is no additional incentive to land the lobster head meat.

Lobster processing byproducts, such as the head, liver and shells can be used for a variety of products including, lobster flavours, functional proteins, chitin (a natural biopolymer) and lobster paste. Chitin and its derivatives have potential application in water treatment, agriculture and food processing, while the lobster flavours can be used in crackers and biscuits. The waste lobster meat can be used as a feed additive as lobster paste and in gourmet food products (Nguyen et al, 2017; University de Granada, 2007). Lobster waste from commercial processing can present a pollution issue in large volumes. Despite the many potential value-added products that can be made from lobster byproducts, it generally isn’t considered to be commercially feasible, based on the high cost of recovering these products (Nguyen et al, 2017). There is greater need globally for further research on cost effective methods of extracting value from lobster byproducts in order to maximise income in the value chain, minimise disposal costs for commercial processors, and reduce pollution potential from byproducts.

Retail sales and value-added products

There are very few fish markets in Jamaica. While there are many municipal markets in Jamaica that sell fish, lobster is rarely sold at these venues. There are mobile vans that sell fish around the island, but they do not sell lobsters. Lobsters are a part of Jamaica’s cultural identity and is a popular part of many seafood festivals (see examples in **Figure 15**). These festivals may be annual events done to encourage the use and sales of seafood. Lobster is normally part of the fare and is featured in the advertisements. These festivals are undertaken by fisher groups or church organisations but are increasingly being promoted by local restaurants independently, or in collaboration with government ministries, such as local tourism state agencies.

FIGURE 15: ADVERTISEMENTS FOR FISH FRY AND SEAFOOD FESTIVALS IN JAMAICA

Vendors at the landing sites

In some parishes, the vendors control the catch. The fishers hand over the landings to the vendors, who normally set the price through informal arrangements. There are arguments over the agreed price in some instances, though the extent of this outcome is not clear. These vendors at the landing sites are made up roughly of 50 percent females. Some of the vendors at the landing site walk along the beach daily to ply their trade. An example is shown in **Figure 16**.

FIGURE 16: SALE OF LOBSTER AT THE LANDING SITE
Source: Imgur (2021)

Seafood restaurants

Landing sites also have local street food and beachside restaurants, which offer from casual to upscale indoor or outdoor sit-down dining. Among locals and tourists, most lobsters are consumed at these types of restaurants. In general, many restaurants sell seafood, including lobster. However, in more recent years, new chain restaurants are becoming more popular. A leading chain is the 'Fish Pot Fish Fry Shop' and the 'Seafood Market', both of which are subsidiaries of Rainforest Seafoods and are quick-service restaurants. The Seafood Market serves lobster in a variety of forms, including 'Garlic and Herb Jerk Lobster'; 'Lobster in Garlic Cream'; and 'Herb and Garlic Lobster'. The 'Fry Shop' serves more traditional fare such as 'Escovitch Lobster' (with a side and drink), fried, barbeque, or with garlic butter.

This increases the access of consumers to lobster, and also allows for a more competitive lobster meal price (through economies of scale by the supplier).

Supermarkets, hypermarkets and specialty shops

Out of a random sample of five medium to large supermarkets in the Kingston parish, four do not carry lobster at all, and only frozen tails were sold where it was carried, and this is available for sale during the entire lobster season. These supermarkets all indicated that they sold shrimp and other seafood. This suggests that lobster is not widely available in this parish from supermarket retailers. When lobster is processed, Rainforest Seafoods sells it in different product forms. Examples of these forms are shown in **Figure 17**. There are also seafood specialty shops that sell both locally-sourced and imported seafood. Lobster is typically sold at these establishments similar to what is offered at the supermarkets and hypermarkets such as PriceSmart.

FIGURE 17: RAINFOREST SEAFOODS LOBSTER PRODUCT FORMS
Source Rainforest Seafoods (2020)

Impact of COVID-19 on artisanal vendors

During April and May 2020, most fishers were unable to go to sea, due to the COVID-19 lockdown measures in Jamaica. As a result, some fishers reported losing traps that could not be attended to and also suffered severe loss of revenue. It is expected that approximately 4,740 small-scale trap, line and net fishers will receive grants of J$15,000 each to obtain mesh wire and other fishing equipment, through their Member of Parliament offices or via the NFA (Linton, 2020; JIS, 2020).

4.2 Value chain actors

The roles of main and supporting actors are presented in **Table 7** and

Table 8. The 'Main Actors' are those that actually own the lobster at some point along the value chain. So, for example, if someone provided storage facilities for frozen lobster, that actor would be a service provider or a 'Supporting Actor' because they do not actually own the lobster.

TABLE 7: ROLES OF MAIN ACTORS

Stage	Main Actors	Role
Harvesting	Fishers – artisanal	Catch and land lobster, maintain lobster quality, and bring it to the market
Wholesale	Wholesalers	Intermediaries between fishers and retailers
	Traders	Buy from fishers and sell mainly to restaurants
Processing	Commercial processors (main processors)	Clean, process and package for local and export market
	Artisanal processors	Clean, process and package for local and export market
Retail	Supermarkets	Sell to households
	Beach vendors	Sells to households, tourists, hotels and restaurants
	Street food vendors	Sell cooked lobster to households and tourists
	Speciality shops	Sell a range of local and imported seafood
	Restaurants/Hotels (Main local retailers)	Budget/moderate/upscale
Consumers	Households	End buyers in the value chain

TABLE 8: ROLE OF SUPPORTING ACTORS

Stage	Supporting Actors	Role
Input supply	Fishing materials, machinery and equipment importers	Supply equipment/parts for boat building, engines
Harvesting	Institutional support –	Data collectors, health inspectors managers
	Institutional support –NFA	Market manager Sets regulations for gear, fishing practices, minimum sizes and fishing areas
	Fishing Cooperatives, NGOs, Training Institutions	Operating vessels, safety at sea, fish handling and limited fish processing
	Financial Institutions	Provide loans
Wholesale	Packaging suppliers	
Processing	Fishing cooperatives	Advocate for grants, disaster relief, training
Transport	Van operators	Transfer of lobster from fish landing site to processor, retailer and/or consumer.

Producer associations

Key producer associations are the All-Island Fisheries Development Alliance and the Jamaica Lobster Harvesters Association.

Ministry of Agriculture and Fisheries

The MoAF has been charged with the responsibility of driving the integration of the production of primary agricultural produce along all the stages of the supply chain through to value added and facilitating full commercialisation of outputs of the agriculture, manufacturing, and service sectors (MoAF, 2021a). The mission of the MoAF is (MoAF, 2021a) is to

- develop sustainable food systems by driving local production of primary agricultural produce, livestock and fisheries to widen the supply chain, integrate production up the value chain and foster youth in agriculture and agro-entrepreneurship;
- promote a lucrative Agribusiness sector that drives productivity and job creation for all regardless of sex, age, socio-economic status or ability; and
- regulate towards a modern and efficient agricultural sector.

More specifically for spiny lobster, by 2017, the MoAF added three new Special Fishery Conservation Areas (SFCAs) to bring the total to 17. They also finalised the Draft Fisheries Bill, established the Spiny Lobster Licensing Regime and collected landings data for all industrial spiny lobster fishers in 2016 (MoAF ,2017, p. 46). The latter was also accompanied by the preparation of a report on the industrial fishing season.

Within this broad mission, the Ministry supports the lobster fishery via a number of services which include the following:

- The Veterinary Diagnostic/Analytic Laboratory, which is part of the Veterinary Services Division (VSD), analyses residues for bio-toxins, antibiotics and pesticides in fish, conch and lobster (*MAF Annual Report 2016-2017* p37). It also tests for food-borne diseases in conch and lobster. These tests are done to ensure that locally-produced food is safe for consumption.
- The VSD also undertook 84 inspections of lobster from 2016–2017 on fishing vessels at approved landing sites. These sites were Westmoreland, St. Andrew, St. Elizabeth, Kingston and St. Catherine.
- Veterinary Inspection and Certification for Export, by the VSD. In 2016 and 2017, the VSD inspected 10 fishery processing plants, 28 freezer/carrier vessels, which were primarily involved in harvesting, processing and exporting these products to the EU and United States (MoAF, 2017, p.37). The fishery-processing plants were located in the parishes of Clarendon, Westmoreland, St. Elizabeth, St. Thomas, Kingston and St. Catherine. From 2016 to 2017, 146 Veterinary Health Certificates were prepared for 300,140.40 kg of lobster (MoAF, 2017, p.38). The inspections took place at the point of harvesting at sea (Pedro Banks), when the lobster is landed and at the export processing plants.
- The Agricultural Credit Board (ACB). This Board, which operates under the MoAF, monitors the provision of credit by Agricultural Loan Societies and the National People's Cooperative Bank to support the expansion of agricultural activities and livelihoods in rural areas.

Rural Agricultural Development Authority

The Rural Agricultural Development Authority (RADA) is a statutory body under the MoAF. Since 1990, it has been the main agricultural extension agency and is a key driver of rural innovation

through the provision of technical advice, supplemental social services, farmer training and assistance in the execution of rural development projects. RADA has the potential to support the fisheries and agriculture sector through one relatively new project, the 'Second Rural Economic Development Initiative (REDI II)' project. This US$40 mil. loan from the World Bank (*Jamaica Observer*, 2020) was signed in March 2020 and aims to promote agriculture and fisheries linkages. Under agriculture, it specifically lists 'fisheries development' and 'value added production' as examples of Component 1 initiatives. The project will focus on strengthening value chains and the development of tourism clusters, with an emphasis on the linkages between producers/service providers and buyers to improve economies of scale for small agricultural and tourism enterprises; mainstreaming climate resilience and facilitating the strengthening of the supply chain linkages between the agricultural sector and end users in processing, the tourism sector, fast food chains, restaurants and supermarkets (JSIF, 2021). This includes (JSIF, 2021):

- Supporting the development of community-based tourism as a viable option and opportunity for economic investment.
- Strengthening the capacity of rural groups to be able to plan and implement income-generating projects.
- Ensuring greater sustainability of rural development through inter agency collaboration.

The National Fisheries Authority (formerly the Fisheries Division)

The NFA, established in 2018, assists in coordinating fisherfolk organisations to improve their participation in fisheries governance and management and provides monitoring and enforcement, education and training, licensing and registration, data collection and outreach. They also conduct stakeholder consultations, undertake stock assessments, promote sustainable use of all fish stock, and develop fishery legislation to foster growth in the fisheries sector.

Jamaica Agricultural Society

This agency is a conglomerate of various associations and agricultural commodity boards, including the Jamaica Fishermen Cooperative Union (JFCU). This agency lobbies for technical and other economic assistance, encourages the adoption of new production technologies, disseminates information to promote growth, including the areas of agri-business management and marketing.

Jamaica National Small Business Loans Limited

The Jamaica National Small Business Loans Limited supported the Adaptation Programme and Finance Mechanism for the Pilot Programme for Climate Resilience.

Insurance providers

In February 2021, the NFA announced the AgriCare Programme, the provision of group health and life insurance for farmers and fishers by the Sagicor Insurance Company. Coverage starts at J$5,400 on a quarterly basis. This will come into effect on March 1, 2021, as a partnership between the Government of Jamaica and Sagicor Life Insurance Company (Linton 2021). This programme will be available to fishers registered with the NFA. The fishers and their dependents will have access to five plans under AgriCare, as highlighted in **Box 1**[3].

[3] Source: https://www.moa.gov.jm/content/agricare-insurance-plan-established-farmers-and-fisherfolk

Box 1: New health and life insurance coverage for fishers

In terms of the benefits, the Group Major Medical Plan covers surgery and hospitalization as well as chemotherapy, radiation and dialysis.

The Full House Plan provides funds that can be utilised to purchase certain primary-care benefits, including drugs, dental and vision, doctors' visits and consultations.

The Group Critical Illness Plan provides lump-sum coverage in the event members are diagnosed for certain critical illnesses; the Group Personal Accident Plan provides the insured member, or their dependents, with certain benefits arising from an accident; while the Group Life provides coverage in the event of an insured member's death.

Mr. Green (Minister of Agriculture and Fisheries) explained that for a monthly premium of only $217.08, a farmer or fisherfolk could have personal accident coverage of $1 million. "A Critical Illness Bundle has coverage of $500,000 with a monthly premium of just $284.10, and for $965.95 you can get up to $1 million for the Group Life Plan—that is life insurance coverage of $1 million for less than $1,000 per month, inclusive of General Consumption Tax," he further outlined.

The Minister added that the programme "has been crafted in ways that are affordable and manageable" while pointing out that "Sagicor will facilitate premium payments, in either four equal quarterly payments or twice per year".

(Source: moa.gov.jm)

Marine Police

Provide surveillance of ocean and coastal areas.

Coast Guard

Provide surveillance of ocean and coastal areas.

Food for the Poor Jamaica

Provides boats, gear, cold-storage equipment and training in fish technology.

Consumers

Households normally purchase lobsters directly from vendors at the landing site but may buy from fishers directly if they know in advance when the fisher will be landing the lobsters. Households also consume lobsters from local and beachside restaurants, but most of lobsters sold at restaurants and hotels are sold to tourists. An example of lobster being grilled outdoors is shown in **Figure 18**.

FIGURE 18: GRILLED LOBSTER SOLD ON THE BEACH AT A HOTEL
Source: The Boardwalk Village (2020)

4.3 Value chain overview

Based on the value chain map**,** several value chains are identified for the artisanal lobster fishery, in order of relative importance:

1. Channel I: Fisher → Retailer (mainly Hotel/Restaurant/Supermarket) → Consumer
2. Channel II: Fisher → Consumer
3. Channel III: Fisher → Industrial Processor → Foreign Consumer (live market)
4. Channel IV: Fisher → Industrial Processor → Foreign Consumer (frozen market)
5. Channel V: Fisher → Artisanal Processor → Consumer
6. Channel VI: Fisher → Artisanal Processor → Wholesaler →Consumer
7. Channel VII: Fisher → Commercial Processor → Retailer (Hotel/Restaurant/Supermarket) → Consumer

4.4 Stakeholder perspective

Stakeholders expressed an interest in obtaining technical assessments of the impacts of environmental on their livelihoods. Further, they would like fishers to have more livelihood options. One key challenge in the fishery is the catch of berried lobsters (lobsters with eggs attached). In these cases, artisanal fishers may simply brush off the eggs and keep the lobster. This is a detrimental practice, as it does not support the development of the lobster eggs and therefore, this practice undermines the sustainability of the fishery.

Individual goals

It is important to understand the perspectives of the various stakeholders who participate in the lobster fishery. Participants, who are stakeholders in the fishery with varying roles including fishery management and exporting, were asked in a webinar held in August 2020, to list the most important goals they would like the artisanal lobster fishery to address. These goals, not listed in any order of priority, are as follows:

1. More education for fishers, to promote conservation while allowing for lobster harvest

2. More sales in seafood, relative to other protein sources like poultry
3. Better marketing strategies for new or existing products

Group goals

Based on feedback from key stakeholders, the top three key group goals that should be commonly held by the fishery actors were ranked as

1. Proper management of the lobster fishery
2. Development of sustainable livelihoods
3. Stakeholder engagement

The identification of these group goals is very important because once key stakeholders have the same outlook in terms of what is most important to be achieved in the fishery, then individual actors can better tailor their short, medium and long term activities to ensure that these activities are contributing to the group goals. Otherwise, it is possible to have individual, short-run gains, which can undermine the fishery value.

The main limitation in achieving the group goals is IUU fishing, in and outside the closed season, due to poor monitoring and enforcement. More resources therefore need to be applied in this area to have more marine police and coast guard vessels in place. Further, the relationship among stakeholders should be strengthened via more engagement, awareness and education on the various sustainable practices that fishers should utilise.

5 National, regional and international trade and trends

5.1 Jamaica's lobster production and export

Lobster production in Jamaica shows a tumultuous history. Harvests started at 200 tonnes in 1990 and rose to a high of 738 tonnes by 2005 (**Figure 19**). Its catch fluctuated widely between 1996 and 2006, within which time the harvest plummeted sharply to a low over the entire period of 98 tonnes in 2006. However, since 2006, lobster landings have shown a general upward trend, with a downturn in 2018.

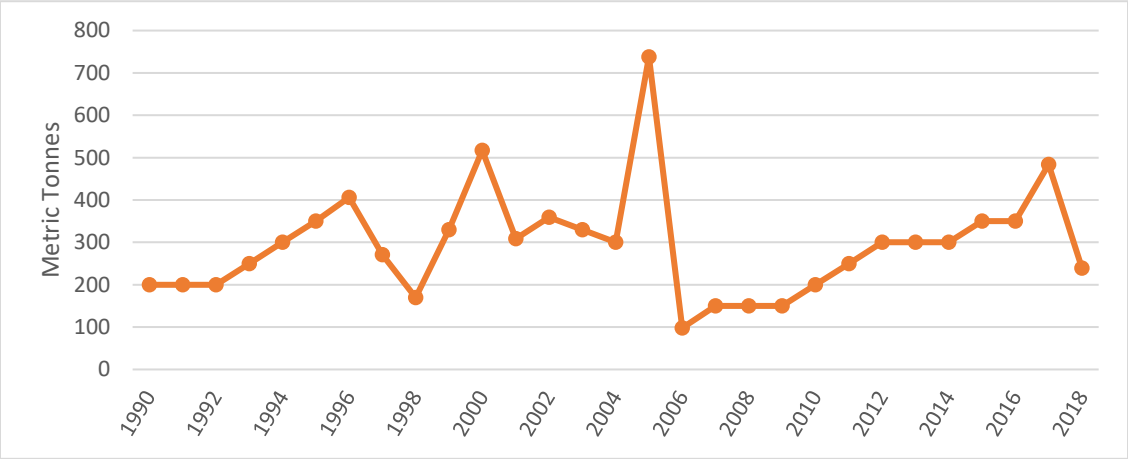


FIGURE 19: LOBSTER HARVEST FOR JAMAICA, 1990-2018 (TONNES)
Source: FAO (2020).

The reason for the large drop in production between 2017 and 2018 is unclear, but is a cause for concern, as it represents a 51 percent reduction from the 2017 level of 484 tonnes. This has a direct effect on not only how much lobster is available locally, but also how much is available for export.

Lobster export

The lobster export market has been experiencing strong growth since 2014. The export of frozen lobster dominated the export trade (see **Figure 20** and Appendix 4), accounting for 88 percent of the combined exports for frozen and 'not frozen' lobster products (**Figure 22**) from Jamaica in 2015, and 92 percent of this market by 2017. The strong growth in the export market was accompanied by a 51 percent rise in the export price for frozen lobster from US$18.32/kg in 2015 to US$27.63/kg in 2019 (**Figure 21**). The unit price for the 'not frozen' exported lobster fluctuated widely from a high of US$30.98/kg in 2015, down to US$18.98/kg in 2016 and back up to US$29.27/kg in 2017 (not shown). This, therefore, shows that in general, this market is more lucrative, based on unit sales. Data on the export of live lobster [Harmonised System (HS) code 30631[4]] was only available for 2018 at 3,398 kg with market value of US$119,336, (or US$35.12/kg). This data is likely to be incomplete given the market shift to export more live lobster in that year. It was expected that live lobster prices should show a wider price spread, above frozen products. Overall then, what can be noted is that despite the reliance on frozen lobster exports and a new reliance on live lobsters for export, if the volatility in live lobster prices persists, it could be a less attractive segment for exporters. Steps should be taken to reduce this occurrence.

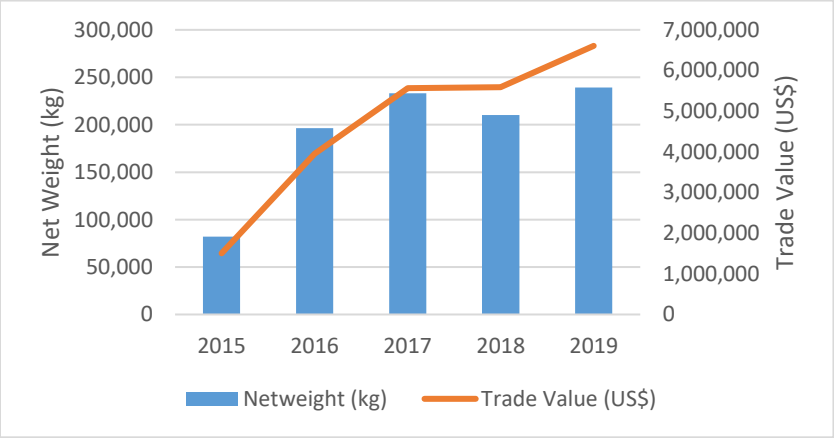


FIGURE 20: LOBSTER EXPORT, FROZEN - JAMAICA, 2015 – 2019 (HS CODE 030611[5])
Source: UNCOMTRADE (2021)

[4] HS code 030631 = Crustaceans; live, fresh or chilled, rock lobsters and other sea crawfish (*Palinurus* spp., *Panulirus* spp., Jasus spp.), in shell or not

[5] HS code 030611 = Crustaceans; frozen, rock lobsters and other sea crawfish (*Palinurus* spp., *Panulirus* spp., *Jasus* spp.), in shell or not, smoked, cooked or not before or during smoking; in shell, cooked by steaming or by boiling in water

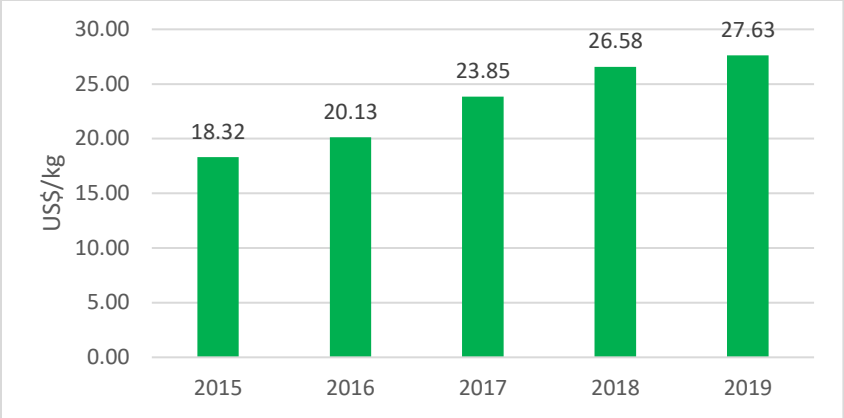


FIGURE 21: LOBSTER EXPORT PRICE, FROZEN - JAMAICA, 2015 – 2019 (HS CODE 030611[6])
Source: UNCOMTRADE (2021)

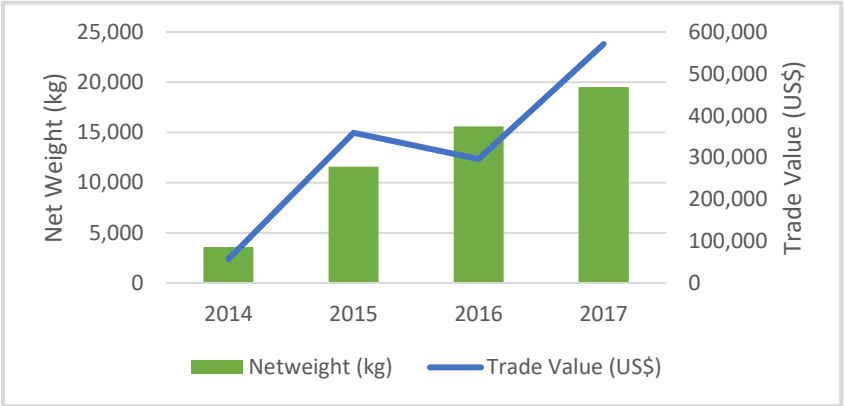


FIGURE 22: LOBSTER EXPORT, NOT FROZEN - JAMAICA, 2014 – 2017 (HS CODE 030621[7])
Source: UNCOMTRADE (2021)

An example of lobster exported by Jamaica is shown in **Figure 23** below. This highlights the marketing emphasis on catch from a sustainable, managed fishery, as well as adherence to leading industry standards, such as HACCP.

[6] HS Code 030611 = Crustaceans; frozen, rock lobsters and other sea crawfish (Palinurus spp., Panulirus spp., Jasus spp.), in shell or not, smoked, cooked or not before or during smoking; in shell, cooked by steaming or by boiling in water

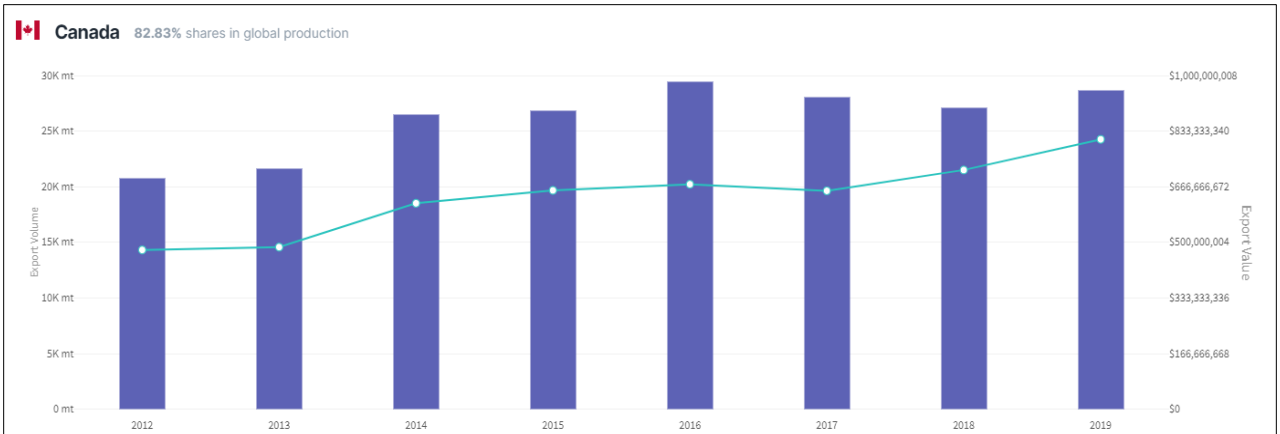
[7] HS Code 30621 = Crustaceans; not frozen, rock lobsters and other sea crawfish (*Palinurus* spp., *Panulirus* spp., *Jasus* spp.), in shell or not, smoked, cooked or not before or during smoking; in shell, cooked by steaming or boiling in water; edible flours, meals, pellets

FIGURE 23: LOBSTER EXPORT, FROZEN - JAMAICA, 2014 – 2017 (HS CODE 030611)
Source: Wild Oceans (2020)

5.2 Global market trends

The global market for lobsters (HS code 030612-*Homarus* spp.) was US$976.18 mil in 2019. It is dominated by the American lobster (*Homarus americanus*) and the European lobster (*Homarus gammarus*). It experienced very strong increases in growth in the previous five years: +11.28 percent (2018–2019); +12.87% (2016–2019); and +18.71 percent (2014–2019). Spiny lobster, due to its relatively small amounts on the global market, may be reported in this category, even though it has its own HS classification: 030611 (Crustaceans, frozen—*Panilurus spp* etc.); 030621 (Crustaceans, not frozen—*Panilurus spp* etc.); and 030631 (Crustaceans, live, fresh or chilled—*Panilurus spp* etc.).

Worldwide, lobster export increased significantly in the last two decades. The leading exporter is Canada, followed by the United States and the United Arab Emirates (**Figures 24** to **26**). Canada's export volume and value showed a steady increase from 2012 to 2019. Over this time, its exports rose by 38.2 percent, while the value of these exports rose by 69.4 percent. This shows that lobsters attracted a significantly higher market price over this time period, fueled primarily by stronger demand in the Far East. Over this period, lobster prices for Canadian exports rose from US$22.98/kg to US$28.17/kg, a 22.6 percent increase. In 2019, the United States was the largest importer, with 31.6 percent of global lobster imports (FAO Globefish, 2021).

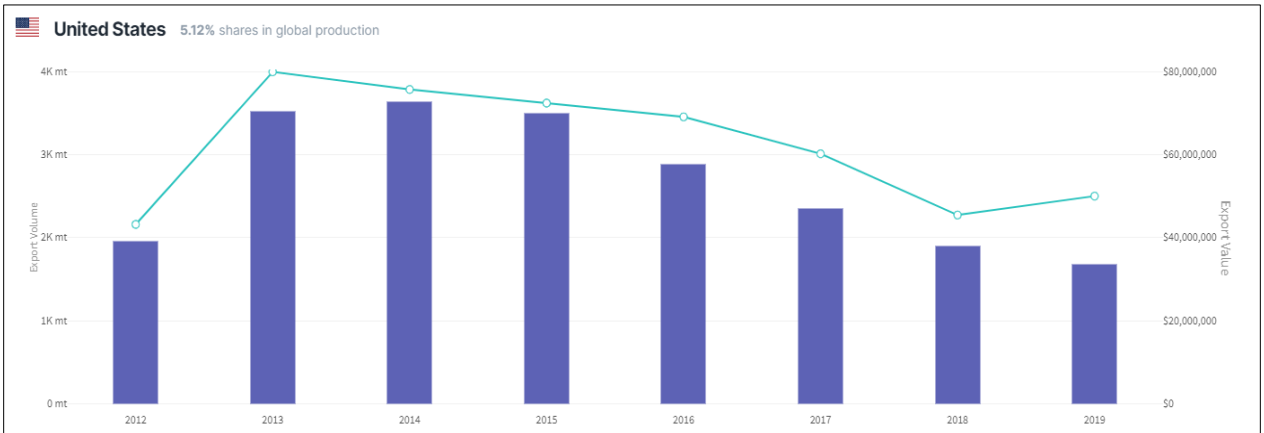


Type	Unit	2012	2013	2014	2015	2016	2017	2018	2019
Export Value	USD	477.29M	485.77M	617.01M	655.73M	674.11M	654.34M	716.79M	808.59M
Export Volume	Metric Ton	20.77K	21.69K	26.56K	26.85K	29.48K	28.07K	27.11K	28.71K
Export Unit Price	USD / Metric Ton	22.98K	22.39K	23.23K	24.43K	22.87K	23.31K	26.44K	28.17K

FIGURE 24: CANADA - LOBSTER EXPORT, 2012 – 2019

Source: Tridge (2020)

Unlike Canada, the United States' production of lobster was in decline from 2014 to 2019, accompanied by declining value of exports, in general. However, the unit price increased steadily since 2015, rising from US$20.64/kg to US$29.66/kg in 2019.



Type	Unit	2012	2013	2014	2015	2016	2017	2018	2019
Export Value	USD	43.18M	79.89M	75.65M	72.37M	69.06M	60.18M	45.44M	50.00M
Export Volume	Metric Ton	1.96K	3.52K	3.64K	3.51K	2.88K	2.36K	1.90K	1.69K
Export Unit Price	USD / Metric Ton	21.99K	22.68K	20.77K	20.64K	23.94K	25.50K	23.91K	29.66K

FIGURE 25: UNITED STATES - LOBSTER EXPORT, 2012 – 2019

Source: Tridge (2020)

The United Arab Emirates suffered significant decline in its lobster export after 2012, but exports tripled between 2017 and 2019, with an associated tripling in export value as well.

Type	Unit	2012	2013	2014	2015	2016	2017	2018	2019
Export Value	USD	3.62M	3.85M	4.37M	5.32M	4.40M	4.22M	12.90M	18.06M
Export Volume	Metric Ton	830.66	477.32	437.81	500.08	314.79	306.63	709.98	1.10K
Export Unit Price	USD / Metric Ton	4.35K	8.07K	9.98K	10.63K	13.99K	13.77K	18.17K	16.36K

FIGURE 26: UNITED ARAB EMIRATES LOBSTER EXPORT, 2012 – 2019
Source: Tridge (2020)

Export prices for lobster are varied, by exporter, as shown in **Figure 27** below. With the exception of Egypt, export prices generally rose by US$3/kg - US$15/kg between 2012 and 2019, for the top exporters.

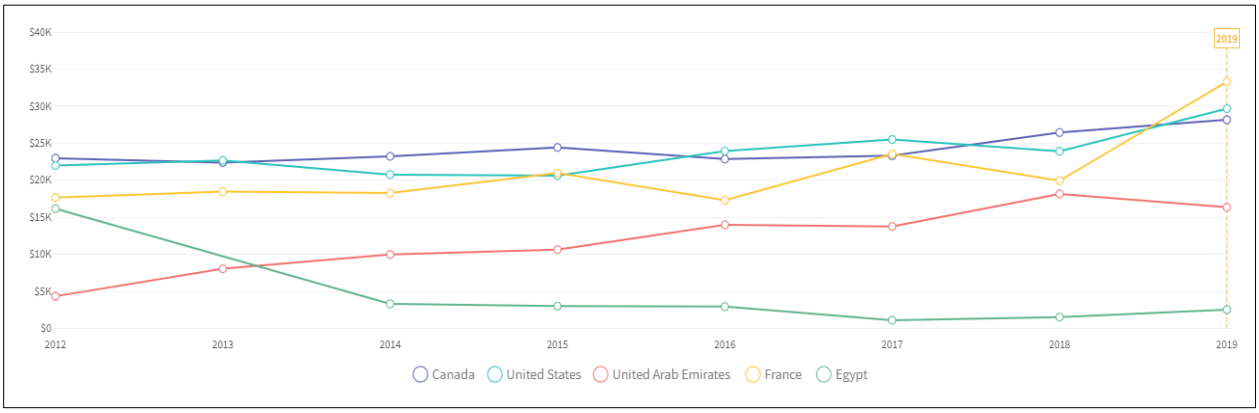


FIGURE 27: EXPORT PRICES FOR TOP FIVE LOBSTER EXPORTERS, 2012 – 2019 (US$'000/TON)
Source: Tridge (2020)

Most of Canada's export is going to South Korea, followed by China, Japan and Hong Kong (**Table 9**). Canada's trading routes' relative importance changed significantly from 2014 to 2019. This was largely due to the effects of the United States-China trade dispute which is explored in greater detail below. Over that five-year period, the value of lobster export from Canada to South Korea increased by 1,696 percent, while trade to China rose by 338 percent over the same period. These significant changes in export values reflect the importance of South Korea and China in the global lobster market, as importers.

TABLE 9: TOP LOBSTER EXPORT FLOWS

Trade Flow	Share in Export %	Export Value USD	1-Year Growth in Value %	3-Year Growth in Value %	5-Year Growth in Value %
Canada to United States	60%	585.67M	+10.94%	+28.45%	+20.43%
Canada to South Korea	4.43%	43.29M	+29.39%	+161.25%	+1695.56%
Canada to China	3.79%	36.99M	+20.37%	+107.1%	+338.9%
Canada to Japan	3.29%	32.13M	+50.21%	-14.31%	+21.03%
United States to Canada	1.85%	18.10M	+110.71%	-16.65%	+24.14%
Canada to Spain	1.72%	16.84M	+4.36%	-16.24%	+69.15%
Canada to Hong Kong	1.72%	16.78M	+29.03%	+37.69%	+231.16%
Canada to Belgium	1.27%	12.43M	+3.53%	-16.77%	+35.93%
Canada to Canada	1.27%	12.17M	+63.17%	-27.34%	+30.78%
Canada to France	1.06%	10.37M	+5.41%	-17.72%	-26.74%

Source: Tridge (2021)

The high global market prices for lobster was also experienced by the Bahamas, the Caribbean's top lobster exporter. Bahamas obtained the Caribbean's first MSC Certification in August 2018, and so is able to export lobster globally. This MSC certification was as a result of a FIP led by the lobster fisher association and the World Wildlife Foundation (WWF). It focused on research to understand how the fishery works, enhanced regulation of IUU fishing, agreement among stakeholders to avoid undersized catch and enhanced data collection (Smith 2018). It also means that the Bahamian lobster is competing side by side with the MSC certified Canadian lobsters. The United States lobster fishery lost its MSC certification in August 2020 for violation of the United States Endangered Species Act (Huffman, 2020b). The United States' Maine lobster fishery, which held the MSC certification since 2013, is now engaged in regaining this status. The MSC label and a lobster product using this label are shown in **Figure 28** below.

FIGURE 28: MARINE STEWARDSHIP COUNCIL CERTIFICATE LABEL AND ON LOBSTER PACKAGE
Source: MSC (2021); Gidney Fisheries (2021)

In 2019, one local expert from the Bahamas Commercial Fishers Alliance indicated that lobster prices were the highest ever experienced for 35 years, at US$30.80–US$33.00/kg (US$14-$15/lb.). The thrust has been to get into the Chinese market and not depend only on the United States and European markets. For the United States market, an export quota of 5 million pounds of lobster exists, and Caribbean exports are estimated at approximately 6 million pounds annually (Kearns 2019). This means that growth in

lobster exports from Jamaica must come from non-United States markets. The outlook for the lobster fishery suggests market opportunities in the United States and Asia and anticipates increases in market prices for North American lobster species which will create market space for Caribbean spiny lobster producers:

> *"There is growing demand for lobster on world markets, especially in Asia. At the same time, the North Atlantic lobster industry is facing declining landings, and the supply outlook for the next 5–10 years appears to be rather bleak. Consequently, North American lobster prices will certainly go up. However, this may leave markets for other species, such as the Australian rock lobster and various spiny lobsters. The University of Maine recently released two studies on the effects of climate change on the Maine lobster industry. The main conclusion is that landings in the Gulf of Maine are expected to fall to historically low levels over the next decade. It is also expected that there will be no recovery in the south of New England.*
>
> *The Maine lobster boom, which started in 1990 and reached its peak in 2016 with 60,000 tonnes, is predicted to end in the next five years. Prior to 1990, annual catches of about 9, 071 tonnes were the norm, but since 2010, catches of more than 45,360 tonnes have been recorded. The study predicts that over the next five years, landings will return to average levels."* (FAO Globefish, 2021)

5.3 Market conflict and COVID-19

In 2020, COVID-19 had a significantly-negative impact on the global lobster market. As restaurants and hotels closed their doors or reduced business due to the pandemic health measures, lobster demand plummeted worldwide. In 2017, the EU and Canada signed a trade agreement, the Comprehensive Economic Trade Agreement (CETA) (Huffman 2020), which exempted Canada from paying the normal 8 percent tariff on lobsters exported to this market. This, therefore, gave Canada an advantage over other countries and declared it as a 'Most Favoured Nation' (MFN). The United States was able to counter this agreement with a bilateral treaty with the EU in August 2020, which allowed them to get the same tax break as Canada. This has important implications for Jamaica, because prior to this, the EU charged a 12.5 percent tariff on United States lobsters, while there was no tariffs for lobsters from the Caribbean or Latin America. This new deal now increases lobster export competition with the United States (and Canada) to the EU market (Huffman, 2020).

In addition, former United States president Donald Trump started a trade war with China, which resulted in up to 25 percent tariff for United States lobster exports in July 2018. This resulted in a 37 percent tariff paid by Chinese importers, after all tariffs were accounted for, and affected exports of the American lobster (*Homarus spp*.) as well as spiny lobsters from Florida (*Panulirus argus*) and from California (*Panulirus interruptus*) (Huffman, 2021). This severely damaged United States exports, relative to Canada, whose lobster exports only attracted a 7 percent tariff. Lobster exports from the United States in 2019 was the industry's lowest level for 11 years (since 2008), where export volumes fell by 14 percent from their 2019 levels and value fell by 18 percent from the previous year (Huffman, 2021). In 2019, United States live lobster exports to China fell to 32.8 percent of its 2018 volume of 8,635 tonnes. However, China's import of fresh, live lobster from the United States surged in November and December 2020, leading to China purchasing more than twice its 2019 live lobster purchase from the United States, at 7,944 tonnes in 2020, with a price of US$15.93/kg in December 2020.

5.4 Global lobster prices, by form

In general, lobster can be sold in a variety of forms and cuts, as well as processing methods (see **Table 10**). However, since spiny lobsters do not have large claws, forms and cuts that include claws and knuckles do not apply to this species.

TABLE 10: KEY LOBSTER PRODUCT FORMS AND PROCESSING STYLES

Form and Cut			Processed style		
Meat	CK (Claws & Knuckles)	In-shell	Fresh	Frozen – Raw Frozen	Dried-Semi Dried
EZP (Easy Peel)	TCK (Tails & Claws & Knuckles)	Minced	Frozen	Blanched	Ground
Whole	CKL (Claws & Knuckles & Legs)	Knuckles only	Cooked (Not Frozen)	Frozen – IQF	Seasoned - Marinated
Tails only	Split Whole	Split tail	Live	Frozen – HPP (High Pressure Processed)	Frozen - Superfrozen
Claws only	Body	TC (Tail & Claws)	Frozen – Cooked Frozen	Smoked	Frozen – Block Frozen
Leg only			Frozen – Semi IQF	Dried	Salted

Source: Tridge (2020)

Spiny lobster is sold globally through online seafood specialty stores, as well as through popular wholesalers, such as Alibaba.com. At the latter site, the Caribbean spiny lobster is oftentimes sold alongside the Australian rock lobster and other spiny lobster species. Over thirty types of lobsters are usually traded in the lobster market.

The price range is fairly wide, and is influenced by the source and the product quality as well as by the volume of sales and product form (**Figure 29**), for example:

- Caribbean Spiny Lobster, Live: US$30.00–31.00/kg (300kg minimum order) at Alibaba.com. This online price compares favourably with the market price for Canadian live, fresh lobster (*Homarus spp*.) in November 2020, which was US$15.23/kg (Huffman, 2021), but also highlights the product price diversity.
- Caribbean Spiny Lobster, Tail only**:** US$15.90/kg at Seattle Fish Company.

Source: Alibaba.com

Source: Seattle Fish Company (2021)

FIGURE 29: LOBSTER ONLINE SALES

5.5 Export to China

Jamaica is China's largest trade partner in the Caribbean, and fisheries trade is seen as an integral part of that trade relationship. By September 2019, the governments of China and Jamaica signed a protocol on sanitary and phytosanitary measures needed to support the export of frozen lobster from Jamaica to China.

Jamaica began trade in live lobster to China in August 2018, as part of a memorandum of understanding between the governments of both countries, signed in 2017, which supports the export of lobster and conch to China, in the first instance, with expansion to other seafood products. This was to boost exports (James-Sawyers 2018), which amounted to over 23,700 kg of exports to China in 2018 (Patterson, 2019). This programme was designed to benefit industrial and small-scale lobster fishers. It was anticipated that with the lobsters landing in China within 24 hours of processing (placing in chilled water), these fishers would have received two to three times greater revenue. However, two large processors—Rainforest Seafoods and B&D Trawling Limited—were expected to be the first two companies to export under this agreement (Morris, 2017).

Rainforest Seafood announced preparation for this export initiative of live lobsters to China since February 2015, when it began construction of its lobster facility in Montego Bay to accommodate 250,000 pounds of lobster for export. This was done in response to the significant increase in demand for seafood by China, and especially for live lobster from about 2009 (Post Online Media, 2015).

Rainforest Seafood sent its first shipment of 2,000 live lobsters to China in August 2018. The company was aiming to ship 1 tonne of live lobster weekly, but indicated that it was critical to meet food-safety standards, which requires strong stakeholder collaboration, training on the science required to store and ship the lobsters, and improved equipment to facilitate better lobster handling (Silvera, 2018).

B&D Trawling started exporting live lobsters to Australia and Hong Kong in 2016 and introduced export to mainland China in September 2018, which the company indicated needed to be in excellent quality, which may not be well understood by artisanal fishers. The company shifted from conch and frozen lobster, to live lobster, which was a more lucrative market. The company cited high export taxes for conch, excess fishing licences and unfair competition from having to pay hefty local fuel taxes, which increases the cost of production (Collinder, 2018). An example of B&D Trawling Limited's export products is shown in **Figure 30**.

FIGURE 30: LOBSTER PACKAGED FOR EXPORT BY B&D TRAWLING COMPANY, JAMAICA
Source: Collinder (2018)

5.6 Sustainability measures

Sustainability of the fisheries sector has been articulated by the Government of Jamaica. In May 2018, the then Minister of Industry, Commerce, Agriculture and Fisheries, Honourable Minister Audley Shaw emphasised the need for a long-term view and enhanced promotion of the fisheries sector:

"Let me stress that we will not seek to enhance production at the expense of the sustainability of our industry. I am, therefore, putting those who trade in the product on warning, that while we improve and bolster the industry, sustainability is paramount" (Morris, 2018).

In 2009, the lobster stock in Jamaica was "…*in decline due to over fishing and degradation of special habitats"* (JIS, 2009). In addition to the closed season, various projects have been implemented to increase lobster supply. In 2008, nine fish sanctuaries were established in Jamaica island-wide, which added to the two sanctuaries that were already implemented at the Bowden Inner Harbour in St. Catherine and the Bogue Island Lagoon in Montego Bay (JIS, 2009). For example, the Lobster Casita Project placed artificial lobster shelters or condominiums on the sea floor to encourage the survivability of juvenile lobsters, and enhance the livelihood of small-scale lobster fishers. They were made of a set of sixteen concrete blocks, in two levels. This project was implemented in response to an overall global decline in lobster catches that the Fisheries Division recognised, in addition to the significant amount of undersized lobsters that were being brought to market. The lobster fishery was also experiencing

negative impacts from pollution and hurricanes, so sustainability measures were endorsed. These condominiums were successfully implemented at the Bowden Fish Sanctuary in St. Thomas, which began in 2006 with 25–30 concrete blocks (JIS, 2009).

In 2017, the government sought to increase the number of licence holders, increase investment and employment, and have a higher use of the Pedro Bank in the lobster fishery, by extending the length of fisher licences from two to four years, and by re-classifying these licences in the following categories: Category A—Industrial Fishing; Category B—Artisanal Fishing; Category C—Carriers/Transportation of Lobsters; and Category D—Research and Scientific (Nanton, 2017).

Additionally, in 2020, Jamaica completed a lobster survey. The NFA will be using the outcomes from this survey to tailor the management of this species.

5.7 Buying guides

More and more, consumers are looking for sustainability recommendations on seafood. These include recommendations from 'Seafood Watch' (SFW); Ocean Wise (OW) and Good Fish Guide (GFG), which score fisheries by gear type. An excerpt of such sustainability ratings are shown below in **Table 11**.

TABLE 11: LOBSTER BUYING GUIDES

Origin	Harvest Method	Sustainability Ratings	FIP Source
Bahamas (MSC)	Diving	SFW ✓ OW ✓ GFG N/A	
Bahamas (MSC)	Pot/Trap	SFW ✓ OW ✓ GFG N/A	
Belize	Diving	SFW ✗ OW ✗ GFG N/A	
Belize	Pot/Trap	SFW ✗ OW ✗ GFG N/A	
Belize (FIP)	Diving	SFW ✗ OW ✗ GFG N/A	FIP
Belize (FIP)	Casitas	SFW N/A OW N/A GFG N/A	FIP
Belize (FIP)	Pot/Trap	SFW ✗ OW ✗ GFG N/A	FIP
Brazil	Pot/Trap	SFW ✗ OW ✗ GFG N/A	
Brazil (FIP)	Pot/Trap	SFW ✗ OW ✗ GFG N/A	FIP
Honduras	Diving	SFW ✗ OW ✗ GFG N/A	
Honduras	Pot/Trap	SFW ✗ OW ✗ GFG N/A	
Honduras (FIP)	Pot/Trap	SFW ✗ OW ✗ GFG N/A	FIP

SFW ✓	Best Choice	*Species is abundant, well managed and caught or farmed in environmentally friendly ways.*	**Wild Fisheries:** Final score > 3.2 and no individual criterion scores of "Red" or "Critical" **Aquaculture:** Final score between 6.666 and 10, and no Red criteria, and no Critical scores
SFW ✓	Good Alternative	*Species is still a good option, but there are concerns with how they're caught or farmed - or with the health of their habitat due to other human impacts.*	**Wild Fisheries:** Final score > 2.2 and neither Management factor scores (3.1 & 3.2) are Red (<= 2.2) and no more than one criterion score of Red and no Critical scores, and doesn't meet criteria for "Best Choice." **Aquaculture:** Final score between 3.333 and 6.666, and/or one Red criterion, and no Critical scores
SFW ✓	Eco-Certification Recognized	*Products come from certifications have been benchmarked against the Seafood Watch criteria for farmed and wild seafood as equivalent to at least a Seafood Watch 'Good Alternative' recommendation.*	**Wild Fisheries:** Marine Stewardship Council (MSC) where current Seafood Watch ratings don't exist **Aquaculture:** Species dependent: for tra/swai (pangasius/catfish)- Aquaculture Stewardship Council (ASC) and Best Aquaculture Practices (BAP) 2-star, 3-star, and 4-star; for whiteleg shrimp- Aquaculture Stewardship Council (ASC) and Best Aquaculture Practices (BAP) 2-star, 3-star, and 4-star; and Naturland
SFW ✗	Avoid	*Species may be overfished, there may be unacceptably high levels of bycatch, and/or the fish is caught or farmed in ways that have deleterious impacts on affected ecosystems.*	**Wild Fisheries:** Final Score <=2.2, or one/both Management factor scores (3.1 & 3.2) are Red (<= 2.2), or two or more criteria score Red, or one or more Critical criteria scores. **Aquaculture:** Final score between 0 and 3.333, or more than one Red criterion, or one or more Critical scores

Source: Fish Choice 2020b

6 SWOT and risk assessment of lobster production

Based on the total assessment of primary and secondary data and information from various industry stakeholders, a SWOT analysis is shown for the lobster industry in Jamaica in **An assessment** of the artisanal lobster fishery cannot be done without reference to the industrial fishers and processors because the export market is the main driver of the entire fishery.

Table 12 and

Table 13. An assessment of the artisanal lobster fishery cannot be done without reference to the industrial fishers and processors because the export market is the main driver of the entire fishery.

TABLE 12*:* SWOT ANALYSIS – STRENGTHS AND OPPORTUNITIES

STRENGTHS	OPPORTUNITIES
Production	***Production***
▪ Long tradition and experience in harvesting lobster ▪ Large number of artisanal fishers to support to fully exploit the fishery ▪ The MoAF is improving the governance structure in fisheries management over time e.g. the recent launch of the NFA in 2019 and the introduction of the Spiny Lobster Management Regime in 2017. ▪ The NFA is closely aligned with its VSD to adequately inspect lobster for export. ▪ The introduction of insurance for fishers, which covers group health and life insurance is a highly commendable best practice, as it reduces income risk for fishers, their families and communities.	▪ Artisanal fishers can command a higher price if they strengthen their cooperative and negotiate the sale price for their landings. ▪ With a growth in the global demand for lobster (frozen and live) artisanal fishers should partner with the industrial processors to enter this more lucrative export market. ▪ If industrial processors can maintain or grow their export of live lobsters, and get a price premium for this product (relative to frozen products) then there is potential for the artisanal fishers who work with them to supply this market to get higher revenue. ▪ Training, and investment in capacity of small-scale fishers to supply lobster of sufficient quality for the live export market ▪ Investment in Florida style traps for small-scale fishers to improve efficiency (combined with phasing out of Trammel nets)
Processing	***Processing***
▪ The industrial lobster processors, who also export, have vertically-integrated businesses (from harvest to export) or demonstrate strong business relationships with foreign distributors and support services and infrastructure. ▪ HACCP and EU certification that are in use by industrial processors provide an excellent platform for industry growth. ▪ Adequate processing capacity and technology to meet all local and increasing export thrust needs	▪ Jamaican exporters can collaborate with other regional lobster exporters, such as Belize, which are also in the live lobster market, to learn more of the science and management needed for this relatively new market. This can be done via the OSPESCA/WECAFC/CRFM Working Group on Caribbean spiny lobster.
	Marketing/Trade

STRENGTHS	OPPORTUNITIES
▪ Provision of a wide range of product forms, both raw and cooked ***Marketing/Trade*** ▪ Increased use of lobster in quick-service restaurants that serve seafood ▪ Increasing number of seafood restaurants in Jamaica ▪ Increasing number of seafood festivals (fisher, non-governmental organisation or corporate-driven), which increases consumers; access to purchase lobster ***Consumption*** ▪ Robust local demand for lobster by householders ▪ Vibrant hotel and restaurant sector boosts market demand for lobster by tourists. ▪ Global lobster demand is increasing steadily, despite the relative stability of the global landings.	▪ Given that lobster landings in the United States are declining, there is a narrow window for more Jamaican exports to this market in the medium term, but most export potential for lobster exports, especially live lobsters, are to Asia and other markets that the United States and Canada cannot easily enter. ▪ Artisanal fishers can partner with specific hotels/ restaurants, especially in the tourism sector, to meet locally agreed-upon sustainable fishing practices, and brand their harvests as sustainable for these local niche markets. This will also allow them the opportunity to develop their technical skills in meeting sustainable practices for new markets, both local and foreign. ▪ An increasing tourism market in all Caribbean countries (especially Barbados), including countries outside of the Caribbean Community (CARICOM), should be explored. ▪ Increasing exports to existing and new regional markets to satisfy an increasing demand for gourmet seafood should also be explored. This is particularly important as consumer incomes are expected to rebound in the medium to long-term, after economies have regained economic activities lost from the COVID-19 pandemic. This is especially so for emerging economies such as Guyana. ***Consumption*** ▪ There could be more sustainably harvested lobster available for local consumers and tourists, if artisanal fishers adopt sustainable fishing practices. ▪ Lobster quality will increase if artisanal fishers and processors are trained in HACCP and other health standards.

TABLE 13: SWOT ANALYSIS – WEAKNESSES AND THREATS

WEAKNESSES	THREATS
Production	***Production***

WEAKNESSES

- The Jamaican lobster fishery is classified as overfished; therefore effort should be reduced to increase profits.
- The licensing regime puts limits on the number of industrial licences, but there is no limit on catch.
- The artisanal lobster fishery operates as an open-access fishery due to low monitoring and enforcement of effort.
- There is increasing anecdotal evidence that artisanal fishers are landing more and more undersized and berried lobsters.
- Very weak monitoring and enforcement in both the artisanal and industrial fishing fleets
- The use of multi-species gear, such as Trammel nets and Antillean fish traps to harvest lobster, leads to effort inefficiency (lower catch per unit effort), relative to the Florida lobster traps used by the industrial fishers.
- Lobster fisher cooperative roles and functions are not clear in terms of their benefits to ownership of the thrust to sustain the fishery.

Processing

- Artisanal processors are usually unlicensed, which may have a negative impact on the quality of their products.
- There is limited opportunity for the use of lobster processing byproducts, such as the shell, for pharmaceuticals and as a growth stimulant in seed production. This is due to the fact that extensive research and development is still needed for these applications to be commercially viable.

Marketing/ Trade

- Very limited formal contract arrangements are in place between fishers and their buyers.
- There is poor data dissemination for the lobster fishery effort and harvest.

THREATS

- IUU fishing can further reduce stocks and lessen available lobster for both artisanal and industrial fishers in the Banks.
- Lobsters enter the available stock from the flow of lobster larvae in ocean currents in the Caribbean Sea. Any global change in these ocean currents, such as possibly due to climate change, could have negative impacts on lobster recruitment to the fishery. The NFA therefore needs to regularly assess the availability of juvenile lobsters, which are needed to sustain future harvests.

Processing

- Exporters globally use the MSC certification label as the gold standard to access markets. If Jamaica does not pursue MSC certification, it will have limited trade options in the long run, as existing lobster exporters are seeking this certification in order to command a price premium. Not having the MSC label also means that the lobster exporters will not only be able to trade with fewer partners, but will also be forced to accept a lower market price.

Marketing/ Trade

- The global lobster trade is extremely volatile, as trade regulations are subject to change rapidly, as major exporters and importers seek to exert dominance and control of the market. These market changes can either hinder or help Jamaica's ability to export to traditional markets or find new ones.

WEAKNESSES	THREATS
▪ Power is concentrated with the vendors and industrial processors who set prices. This leads fishers to have limited incentives to engage in more sustainable fishing practices, as they seek to maximise profit in the short run. **Consumption** • Local lobster sales are heavily dependent on the tourism sector. If this local sector shows weak demand, then the local lobster market will be depressed, leading to lower prices and less returns to fishers and other local actors in that value chain. • The demand for lobster by locals is limited because it is a high-priced commodity relative to other seafood, and income growth in Jamaica is low.	

7 Conclusions and recommendations

The artisanal lobster fishery in Jamaica is classified as "overfished". It is under significant threat from IUU fishers, a volatile global market environment, and increasing unsustainable fishing practices by the artisanal fishers. Further, it operates as an open-access fishery due to low monitoring and enforcement of effort. This represents a policy failure, resulting in economic inefficiency. Therefore, fishery profits are much less than can be achieved through more stringent controls of the number of trips and/or traps used.

Given that the industrial fishers have licences with a longer-term duration, this puts the artisanal fishers at a disadvantage and contributes to their limited investment in gear and other equipment. Further, with a limit on access (annual permits), fishers may be incentivised to overfish the resource as they are unsure of future access rites.

Approximately 75 percent of the lobsters landed by the artisanal lobster fishers go to the hotel and restaurant sector as lobster is most popularly consumed on beaches as street food (grilled, boiled or fried) and in local restaurants across the island. Most of the lobster going to these actors are sold directly by the artisanal with little intermediary involvement.

The approximately 25 percent of lobsters landed by the artisanal fisher go to export by large industrial fish processors, who export lobsters as a key part of their product line. Lobsters are normally sold as whole raw lobsters by the artisanal fishers or as lobster tails. The exporters sell lobster in a variety of forms: whole raw, frozen; whole cooked, frozen; live and tails, frozen. In 2019, frozen lobsters were exported mainly to France, United States and Hong Kong, respectively. The main Caribbean markets were Barbados, Trinidad and Tobago, and Antigua and Barbuda, respectively.

When fishers sell to vendors, they are normally the price takers, as the vendors usually set the price. Processors normally buy from existing suppliers and each processor has separate suppliers. This reduces

competition in the sale of lobster to these processors, but it also allows the fishers and fishers' cooperatives an opportunity to develop deep business relationships with a specific processor.

An excellent new initiative, which was introduced in March 2021, was insurance for fishers. This was done by Sagicor. Fishers can now benefit from group health plans and life insurance. They can also be covered for dental, vision, drugs, primary-care, major medical (including surgery) and critical illness. This is a highly-commendable best practice, as it reduces income risk for fishers, their families and communities. This will support existing livelihoods and make fishing a more attractive alternative for youth.

The lobster export market has been experiencing strong growth since 2014. The export of frozen lobster dominated the export trade accounting for 88 percent of the combined exports for frozen and 'not frozen' lobster products from Jamaica in 2015 and 92 percent of this market by 2017. The strong growths in the export market was accompanied by a 51 percent rise in export price for frozen lobster from US$18.32/kg in 2015 to US$27.63 in 2019. The unit price for the 'Not frozen' exported lobster fluctuated widely, being higher or lower than the frozen product price. This market was therefore not operating as expected, where live lobster prices should show a clear price spread above frozen products. Overall then, what can be noted is that despite the reliance on frozen lobster exports and a new reliance on live lobsters for export, if the volatility in live lobster prices persists, it could be a less attractive segment for exporters. Steps should be taken to reduce this occurrence.

Artisanal fishers should be trained in the adoption of sustainable and improved-fishing practices to allow them to not only secure their livelihoods, but also to improve the quality of their landings, brand their landings and market to niche restaurants and hotels who may have already adopted a 'green label' or are supporting sustainable market chains. This is urgently needed as anecdotal evidence suggests that artisanal fishers are increasingly landing undersized lobsters, and berried lobsters (with roe). As a result, key recommendations are suggested below.

7.1 Recommendations

Sustainability

a. Train artisanal fishers in HACCP and other safe and hygienic fish handling practices to improve access to export markets.

b. Foster the development of artisanal fisher cooperatives, that can better negotiate prices for lobster landings and provide better coordination among fishers.

c. Conduct stock assessments regularly (formal or informal) to ensure that recruitment of lobster larvae into the fishery is not being negatively affected by changes in ocean conditions.

d. The NFA should not provide any additional industrial fishing licences in coming years, until the health of the lobster stock is closely monitored and IUU fishing pressure is reduced. This should be combined with improved monitoring and regulation of licensed and small-scale fishing with a focus on preventing juvenile harvest and harvest of lobsters with roe (berried).

e. The NFA should introduce new lobster fishery regulation to have a total allowable catch for the fishery (by both industrial and artisanal), to improve the 'overfished' status of the fishery and allow for sustainable harvests in the long term. This should be accompanied by fishing licences which limit the catch for each fisher, to reduce the race for fish, and give fishers rights to land a specific portion of the catch.

f. The licence renewal system should make long-term access possible if sustainable fishing practices are followed and verified through adequate monitoring.

g. There should be replication of projects to improve sustainability and fishing efficiency such as development of lobster casitas and using improved Florida style traps.

Local markets

a. Fisher cooperatives should be empowered to play a greater role in educating their members about sustainable fishing practices. This would allow them to seek out and partner with local hotels and restaurants that support sustainable suppliers. This would give the artisanal fishers a local niche market, which will have a price premium, as consumers are increasingly seeking to consume 'green' products.

b. Preventing the sale of tail-only lobsters at landings sites would ensure that lobsters meeting the minimum size are landed (with enhanced monitoring). This would also allow buyers along the value chain to be assured of sustainable fishing practices and be able to offer 'green' or sustainable market products.

Export markets

a. Artisanal fishers should more closely align with live lobster exporters. With adequate negotiation, the price premium for this product should trickle back along the vale chain, to provide additional revenue for all actors along this segment of the value chain.

b. Lobster exporters should invest in education, capacity building and handling methods of artisanal fishers and other actors along the value chain. Exporters should provide clear guidelines to artisanal fishers of health and sustainability requirements to access export markets and invest in the capacity of these fishers to meet these requirements to increase availability of higher quality and higher value export products such as live lobster.

c. Industrial exporters need to be proactive in obtaining market information on planned, implemented or changing trade regulations in key lobster markets worldwide. This is important as changes in tariff structures or new trade deals can have large negative impacts on small lobster exporters such as Jamaica.

d. A FIP should be developed by the NFA, in collaboration with key fisher associations and local agencies with an interest in maintaining fishery livelihoods. This will serve as the first step in obtaining MSC certification to better secure new global markets.

It is clear that there are spaces for new and existing entrepreneurs in the Jamaica lobster market to seek additional value, but the resource management for lobster has to be significantly strengthened to improve livelihoods for all actors in this value chain in the long term. Strong global demand for lobster products combined with high capacity exporters (with significant processing capacity and demonstrated ability to export products to distant markets) means that the Jamaican lobster value chain has significant potential to increase income for all actors. However, there needs to be further investment in monitoring and enforcement of existing legislation, the collection of data related to fishery sustainability and in the technical and capital capacity of small scale fishers for value to be truly maximised in the long term. With these investments and the implementation of other recommendations above lobster fishers, and

the numerous supporting actors in the value chain, can see meaningful improvements in ecological sustainability, livelihoods and human well-being.

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Appendix 1 - Methodological framework and identification of fishery value chains for focused Analysis

Methodology

This section outlines the process for the participatory selection and analysis of three fisheries value chains from the seven StewardFish target countries. The key steps of this methodology are as follows:

1. Identification of value chains for consideration
2. Development of selection criteria
3. Desk research and interviews within country experts
4. Scoring and value chain selections
5. Development of preliminary value chains with a focus on primary actors
6. Participatory Webinar with key industry stakeholders in each country, where the key objectives are as follows:
    a. Outline the core concepts of a fishery value chain and how actors can benefit from using this approach
    b. Develop common goals for key actors
    c. Identify key primary market actors, their roles and risks
    d. Discuss and agree on key market limitations and solutions, in achieving common industry goals
7. Develop the description and identification of primary and secondary actors in each fishery, via online survey or online/telephone interviews

   Solicit estimates of volumes and prices of selected species from key industry stakeholders, via online/telephone interviews
8. Preparation of final value chain analysis report

Identification of Value chains for consideration

Each of the seven countries was asked to identify three species that require value chain development, based on their country objectives. Representatives (Focal points) from the departments of fisheries from the participating countries were contacted and asked to provide information on three value chains that they believed had high potential for value chain development under the project. Departments of fisheries were asked to provide any background documentation on the state of the fishery, state of the value chain, current catch levels and information on potential markets for the species/value chain products identified. Each of the seven countries was asked to identify three species that require value chain development, based on their country objectives. All countries provided three species/species groups, except for St. Lucia, who provided two species groups. It should be noted that while countries were asked to identify three species, value chains considered are not limited to specific species, but also can relate to specific products[8] within the value chain and catch methods[9].

Development of selection criteria

[8] For example, by-products of flying fish

[9] For example, Pelagic FAD fisheries

A literature review was conducted on methods for prioritisation of value chains for development[10], participatory methods for value chain analysis of smallholders/artisanal fisheries[11] and gender-based methods of value chain analysis[12]. Based on this global literature review, a number of potential selection criteria were identified by the primary researcher (Appendix 1). Potential selection criteria were discussed (with the technical Consultant leading the analysis, the technical CANARI team and the FAO Regional Coordinator for StewardFish) and a final set of criteria was agreed upon. The criteria for prioritisation of value chains for further development were as follows:

1. **Scale of positive impact on artisanal fisherfolk (numbers, employment and income).** How significant is potential impact of developing this value chain on artisanal fisherfolk who are the primary beneficiaries of this project?
2. **Potential for market development.** What is the potential of this species for market development based on end-consumer demand and other factors?
3. **Environmental sustainability.** How well established is sustainability within this value chain/ species? Considering the catch methods used, health of species stock, established sustainability practices, does the development of this value chain reduce or increase impacts on the ecosystem?
4. **Level of private sector involvement.** To what extent is the private sector, beyond artisanal fisherfolk, involved in this value chain? How interested is the private sector in investing/participating in this value chain?
5. **Socio-economic and institutional frameworks.** How strong are institutional frameworks to support the long-term development of this value chain? How equitable are existing socio-economic frameworks?

Desk research and interviews with local experts

A detailed desk review of available peer reviewed literature, grey literature and government reports was conducted to gather information on the state and potential of the identified value chains per country. Seven interviews were conducted with Department of Fisheries representatives. Interviews were multipurpose as they were used to gather additional data on value chains identified and to validate earlier desk research findings. All interviews conducted were virtual and/or telephone based.

Scoring of value chains and shortlisting

The value chains identified were then scored using the criteria in Table 1. Each criterion could be scored on a rating scale from a minimum of 1 to a maximum of 5. The logic of the rating scale for each criterion is detailed in Table 1. Each criterion was assigned a weight based on its relative importance to value chain development, based on the literature review. Scores for each value chain under each criterion were assigned based on a combined analysis of the gathered data and the local expert interviews. Scores assigned by the technical consultant were discussed in detail with the CANARI and FAO representatives before finalisation to provide a final level of expert validation and ensure all available information on the value chains was considered. Scores for each value chain were then summed and a total score assigned. The Consultant, along with the CANARI and FAO representatives, decided that with limited resources to

[10] http://pubs.iclarm.net/resource_centre/AAS-2015-02.pdf

[11] https://www.crs.org/sites/default/files/tools-research/participatory-market-chain-analysis-for-smallholder-producers.pdf

[12] https://www.oecd.org/derec/denmark/45670567.pdf

conduct three value chain analyses overall, the approach would be to undertake one per country for three of the seven countries, using a set of criteria to decide on the species for each analysis. The three value chains selected were thus those with the highest total score, with the caveat that one value chain per country could be selected and the same species should not be selected for more than one country. Based on this system, the final selected value chains for development under this consultancy were as follows:

1. Queen Conch—St. Vincent and the Grenadines (score of 5 out of 5)
2. Spiny Lobster—Jamaica (score of 4.5 out of 5)
3. Dolphinfish—Barbados (score of 4.5 out of 5)

For full details on scoring please refer to Table 1 below.

Table 1: Value Chain Ranking (Value chains selected for further development highlighted)

	Criteria	Positive Impact on artisanal fishers (numbers, employment and income)	Potential for market development	Environmental sustainability	Level of private sector involvement	Socio Economic and Institutional Framework	TOTAL
	Criteria Weight	0.25	0.25	0.15	0.1	0.25	1.0
Country		5=Very significant engagement 4= significant engagement 3=Fair engagement 2=Poor engagement 1=Very poor engagement	5=Very significant market potential 4= significant market potential 3=Fair market potential 2=Poor market potential 1=Very poor market potential	5=Highly established sustainability 4= Well established sustainability 3=Fairly established sustainability 2=Poorly established sustainability 1=Very poorly established sustainability	5=Very significant engagement 4= significant engagement 3=Fair engagement 2=Poor engagement 1=Very poor engagement	5=Excellent frameworks 4= Good frameworks 3=Fair frameworks 2=Poor frameworks 1=Very poor frameworks	
Antigua and Barbuda	Pelagic (Specifically FAD fishery) - mainly Dolphinfish, Yellowfin tuna and Blackfin tuna, Wahoo	4	2	4	4	4	3.5
	Diamond Back Squid	2	4	5	3	2	3.1
	Demersal Fish	5	4	4	3	4	4.2
Barbados	Flying fish, inclusive of byproducts	4	4	3	3	4	3.8
	Jacks (related to Sargassum)	5	3	3	3	4	3.8
	Dolphinfish (*Mahi mahi*)	5	5	4	4	4	4.5
Belize	Lobster Fishery	5	3	4	4	5	4.3
	Conch Fishery	5	3	4	4	5	4.3
	Finfish Fishery	4	3	4	4	3	3.5
Guyana	Artisanal Fishery (Bangamary)	5	4	4	4	3	4.0

	Artisanal Fishery (Siluriforms) - catfish	5	3	5	2	3	3.7
	Artisanal Fishery (Butter fish and Sea Trout)	5	3	4	2	3	3.6
Jamaica	Queen Conch	4	5	5	5	4	4.5
	Spiny Lobster	5	4	5	4	4	4.4
	Blackfin tuna	5	4	5	3	4	4.3
Saint Lucia	Lobster Fishery	3	3	4	4	3	3.3
	Pot Fish Fishery	5	4	4	3	4	4.2
St Vincent and the Grenadines	Queen Conch (*Strombus gigas*)	5	5	5	5	5	5.0
	Robin (*Decapterus macarellus*)	5	4	4	3	5	4.4
	Jacks (*Selar crumenophthalmus*)	5	4	4	3	5	4.4

Appendix 2- List of webinar participants and interviewees

STEWARDFISH JAMAICA VCA AUGUST 24, 2020 - FINAL PARTICIPANT LIST			
No.	**NAME**	**ORGANISATION**	**JOB TITLE**
1	Ms. Shellene Berry	National Fisheries Authority (NFA)	Fisheries Officer/StewardFish focal point
2	Mr. Leon Morris Benet	NFA	Fisheries Officer
3	Ms. Keisha Russel-Brown	NFA	
4	Mr. Keino Garvin	NFA – Aquaculture Unit	Fisheries Officer
5	Ms. Mishka Stennet	Ministry of Industry, Commerce, Agriculture and Fisheries - Veterinary Services Division	Senior Veterinary Officer
6	Mr. Sherron Barker	Food for the Poor JA	Fishery Manager
7	Mr. Andrews Lewis	Rainforest Seafood	-
8	Ms. Monique Curtis	National Environment and Planning Agency (NEPA)	-
9	Prof Mona Webber	Centre for Marine Sciences, of the University of the West Indies, Mona, Jamaica	Director
10	Mrs. Selena Ledgister-Kellier	Ministry of Industry, Commerce, Agriculture and Fisheries -Promoting Community Base Fisheries Sector project	Project Manager
11	Mr. Courtney Shaw	Department of Cooperatives and Friendly Societies	Regional Manager
Partners			
12	Dr. Patrick McConney	Centre for Resource Management and Environmental Studies of the University of the West Indies (UWI-CERMES), Cave Hill, Barbados	Director
13	Dr. Lisa Soares	UWI-CERMES	Social/Political Scientist
14	Ms. Maria Pena	UWI-CERMES	Project Officer
15	Dr. Shelly-Ann Cox	UWI-CERMES	Project Officer
16	Dr. Maren Headley	Caribbean Regional Fisheries Mechanism (CRFM) Secretariat	Programme Manager – Fisheries Management and Development
17	Mr. Terrence Phillips	Food and Agriculture Organization of the United Nations (FAO)	Regional Coordinator- StewardFish
18	Ms. Tracy Phillips	FAO	Administrative and Operational Assistant - StewardFish
19	Ms. Neema Ramlogan	Caribbean Natural Resources Institute (CANARI)	Technical Officer
Facilitators			
20	Dr. Sharon Hutchinson	UWI, St. Augustine, Trinidad and Tobago	Food and Resource Economist

21	Mr. Alexander Girvan	CANARI	Senior Technical Officer/Environmental Economist
22	Ms. Melanie Andrews	CANARI	Technical Officer

List of interviewees

Name	**Job Title**
Ms. Shellene Berry	Fisheries Officer, National Fisheries Authority, Ministry of Agriculture and Fisheries 2c Newport East, Kingston 11 Jamaica
Ms. Keisha Brown	Lobster Vendor, Portmore, St. Catherine
Staff of	Fish Pot Fish Fry Shop
Staff of	General Food Supermarket, Kingston
Staff of	Mr. Carly's Supermarket, Windsor Castle
Staff of	Hi-Lo Food Stores, Pavillion Mall, Kingston
Staff of	Sovereign Supermarket
Staff of	Super Valu Supermarket, Kingston
Overall Data	
Ms. June Masters	Statistics and Information Analyst, CRFM Secretariat, St. Vincent and the Grenadines

Appendix 3: Global Caribbean Spiny Lobster Landings, 1950-2016 (tonnes)[13]

2016	39 236
2015	37 317
2014	34 331
2013	34 936
2012	38 471
2011	36 530
2010	35 235
2009	31 720
2008	34 278
2007	31 853
2006	34 750
2005	37 595
2004	42 288
2003	37 134
2002	41 999
2001	34 921
2000	40 491
1999	42 121
1998	37 205
1997	39 944
1996	42 519
1995	42 055
1994	41 378
1993	38 296
1992	39 511
1991	41 516
1990	35 549
1989	37 306
1988	35 793
1987	36 283
1986	34 637
1985	36 994
1984	34 820
1983	28 704
82	29 655
1981	29 353
1980	29 165
1979	32 855
1978	30 020
1977	25 090
1976	25 226
1975	26 880
1974	29 113
1973	25 700
1972	25 900
1971	24 500
1970	25 400
1969	26 039
1968	20 297
1967	16 702
1966	18 227
1965	19 058
1964	15 747
1963	15 826
1962	16 724
1961	15 622
1960	15 342
1959	13 192
1958	10 190
1957	11 532
1956	7 812
1955	5 341
1954	4 083
1953	3 205
1952	3 081
1951	3 705
1950	3 057

[13] FAO. 2020. Fishery and Aquaculture Statistics. Global production by production source 1950-2018 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2020. www.fao.org/fishery/statistics/software/fishstatj/en

Appendix 4: Frozen Lobster Exports from Jamaica, by Partner, 2016-2018 (tonnes)

Year	Trade Flow	Partner	Partner ISO	Net weight (kg)	Trade Value (US$)
2019	**Import**	**World**	**WLD**	**674**	**15,802**
2019	**Export**	**World**	**WLD**	**239114**	**6,606,683**
2019	Re-Export	World	WLD	454	15523
2019	Export	Antigua and Barbuda	ATG	2414	104624
2019	Import	Barbados	BRB	674	15802
2019	Export	Barbados	BRB	3904	155869
2019	Export	Cayman Islands	CYM	45	897
2019	Export	China	CHN	14922	376056
2019	Export	Dominica	DMA	99	3461
2019	Export	France	FRA	103394	2168165
2019	Export	Greece	GRC	17026	347004
2019	Export	Guyana	GUY	1188	43588
2019	Export	China, Hong Kong SAR	HKG	31921	1197941
2019	Export	Italy	ITA	7200	130800
2019	Export	Aruba	ABW	8328	324155
2019	Export	Saint Lucia	LCA	1524	36969
2019	Export	Trinidad and Tobago	TTO	2676	92906
2019	Re-Export	Trinidad and Tobago	TTO	454	15523
2019	Export	United Arab Emirates	ARE	10498	191989
2019	Export	USA	USA	33970	1432251
2018	**Export**	**World**	**WLD**	**210203**	**5,586,338**
2018	Export	Antigua and Barbuda	ATG	471	18380
2018	Export	Barbados	BRB	11350	394887
2018	Export	China	CHN	5960	208467
2018	Export	France	FRA	63257	1292995
2018	Export	Greece	GRC	16140	313699
2018	Export	Guyana	GUY	208	5922

2018	Export	China, Hong Kong SAR	HKG	18563	664768
2018	Export	Italy	ITA	7200	137260
2018	Export	Aruba	ABW	5343	200596
2018	Export	Saint Kitts and Nevis	KNA	45	859
2018	Export	Saint Lucia	LCA	2520	65634
2018	Export	Spain	ESP	16620	322434
2018	Export	Trinidad and Tobago	TTO	889	25020
2018	Export	USA	USA	61633	1935410
2017	**Export**	**World**	**WLD**	**233296**	**5,564,893**
2017	Re-Export	World	WLD	7200	124887
2017	Export	Barbados	BRB	4066	135129
2017	Export	Dominica	DMA	54	2065
2017	Export	France	FRA	118463	2477041
2017	Export	Greece	GRC	21600	399485
2017	Re-Export	Greece	GRC	7200	124887
2017	Export	China, Hong Kong SAR	HKG	3291	78081
2017	Export	Saint Lucia	LCA	2122	58788
2017	Export	Viet Nam	VNM	13200	242711
2017	Export	Spain	ESP	7256	252192
2017	Export	Trinidad and Tobago	TTO	5738	191420
2017	Export	United Arab Emirates	ARE	11814	246739
2017	Export	USA	USA	45689	1481238
2016	**Export**	**World**	**WLD**	**196,342**	**3,952,057**
2016	Re-Export	World	WLD	907	31524
2016	Export	Barbados	BRB	1452	50166
2016	Re-Export	Barbados	BRB	907	31524
2016	Export	Dominica	DMA	109	2097
2016	Export	France	FRA	162962	3197784
2016	Export	Germany	DEU	7219	174930
2016	Export	Other Asia, nes		6600	142813
2016	Export	Saint Lucia	LCA	636	16795
2016	Export	Viet Nam	VNM	11000	193929

2016	Export	Trinidad and Tobago	TTO	2722	91702
2016	Export	USA	USA	3643	81841
2015	**Export**	**World**	**WLD**	**82,072**	**1,503,616**
2015	Export	Barbados	BRB	261	9954
2015	Export	France	FRA	78016	1349889
2015	Export	Grenada	GRD	73	875
2015	Export	Saint Lucia	LCA	871	28451
2015	Export	Trinidad and Tobago	TTO	1488	42436
2015	Export	USA	USA	1363	72010

SOURCE: UNCOMTRADE