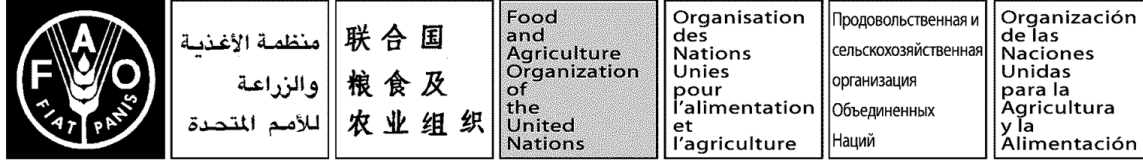


April 2022

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<b>WESTERN CENTRAL ATLANTIC FISHERY COMMISSION (WECAFC)</b>
<b>ELEVENTH (VIRTUAL) SESSION OF THE SCIENTIFIC ADVISORY GROUP (SAG)</b>
<b>25-27 April 2022</b>
<b>Study on “Health and safety in the dive fisheries of key species in the WECAFC region” (Technical report)</b>

## *Table of Contents*

Executive summary .....	5
Introduction.....	8
1. Outline of diving fishing methods used in the Wider Caribbean region .....	9
2. Brief overview of the regional importance of the key species caught in diving in the WECAFC region.....	10
2.1. Statistics of production.....	11
2.2. Exports to the United States of America .....	13
3. International and regional frameworks governing the dive fishing .....	17
3.1. International instruments that guide diving techniques and health safety .....	17
3.1.1. The Code of Conduct of Responsible Fisheries (CCRF).....	17
3.1.2. The SSF Guidelines.....	17
3.1.3. The Reference guidelines to legislate or regulate diving in artisanal or small-scale fishing in the Latin American and Caribbean region.....	19
3.1.4. The International Labour Organization (ILO).....	21

4.	The regional context.....	21
4.1.	OSPESCA .....	22
4.2.	CRFM .....	23
4.3.	CFMC.....	24
5.	Analysis of the current situation of diving in selected countries of the Wider Caribbean .....	25
5.1.	Honduras .....	25
5.2.	Nicaragua.....	34
5.3.	Dominican Republic.....	37
5.4.	Colombia.....	40
5.5.	Mexico .....	43
5.6.	The Bahamas .....	44
5.7.	Jamaica .....	46
5.8.	St. Lucia.....	48
5.9.	The experience of Chile .....	49
6.	Employment generation and gender roles in dive fisheries.....	50
7.	Conclusions and recommendations .....	51
	References.....	54
	Annex 1 - List of key informants.....	58

### ***List of tables***

Table 1 – Production of spiny lobster, 2013–2018 (in tons) .....	11
Table 2 – Production of queen conch, 2013–2018 (in tons) .....	12
Table 3 – Production of sea cucumber, 2013–2018 (tons in dry weight) .....	13
Table 4 – Exports of spiny lobster to the USA from Caribbean countries, January 2016 – July 2020 (in tons).....	14
Table 5 – Exports of queen conch to the USA from Caribbean countries, January 2016 – July 2020 (in tons).....	15
Table 6 – Exports of sea cucumber to the USA from Caribbean countries, January 2016 – July 2020 (tons in dry weight) .....	15
Table 7 - Vessels and fisherfolk in fisheries associated with diving in the OSPESCA region, 2020 .....	16

**List of Figures**

Figure 1 - Map of La Mosquitia in Honduras and Nicaragua..... 26

Figure 2 – Images of industrial vessels with divers in Honduras..... 32

Figure 3 – Maritime boundaries Colombia and Nicaragua, after the ICJ judgement of November 19, 2012..... 41

## *List of acronyms and abbreviations*

AMHBLI	Association of Disabled Honduran Miskitos Divers
APAIB	Association of Indigenous Artisanal Fishers from Brus
APBGADH	Protective Association of Active Divers from Gracias a Dios in Honduras
APICAH	Association of Industrial Fishers of the Atlantic Coast of Honduras
APIN	Association of Native Industrial Fishers from La Mosquitia
AUNAP	National Authority of Aquaculture and Fisheries (Colombia)
CARICOM	Caribbean Community
CARIFIS	Caribbean Fisheries Information System
CCRF	Code of Conduct of Responsible Fisheries
CIAPEB	Interinstitutional Commission for Attention and Prevention of the Problem of Diving Fishing (Honduras)
CODOPESCA	Dominican Council of Fisheries and Aquaculture
CORALINA	Corporation for the Sustainable Development of the Archipelago of San Andrés, Providencia and Santa Catalina
CRFM	Caribbean Regional Fisheries Mechanism
DIGEPESCA	General Directorate of Fisheries and Aquaculture (Honduras)
DINAFROH	Directorate of Indigenous and Afro-Honduran People
IACHR	Inter-American Commission on Human Rights
ICJ	International Court of Justice
ILO	International Labour Organization
INATEC	National Technological Institute (Nicaragua)
INCODER	Colombian Institute of Rural Development
INFOP	National Institute of Professional Training (Honduras)
INPESCA	Nicaraguan Institute of Fisheries and Aquaculture
IUU	Illegal, Unreported and Unregulated fishing
MSC	Marine Stewardship Council
NOAA	National Oceanic and Atmospheric Administration
OSPESCA	Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus
PADI	Professional Association of Diving Instructors

SCUBA	Self-Contained Underwater Breathing Apparatus
SICA	Central American Integration System
SSF Guidelines	Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries
TNC	The Nature Conservancy
WECAFC	Western Central Atlantic Fishery Commission
WWF	World Wildlife Fund for Nature

## Executive summary

Free and autonomous diving are fishing techniques mainly used in the spiny lobster, queen conch and sea cucumber fisheries in the Wider Caribbean. The present study analyzes the situation in eight countries of the WECAFC region (Honduras, Nicaragua, Dominican Republic, Colombia, Mexico, The Bahamas, Jamaica and Saint Lucia), particularly regarding its impact on the health of divers, on their incomes and on fisheries resources as basis for a project proposal for resources mobilization.

To prepare the present paper, key informant interviews were conducted to obtain the most up-to-date information and, secondary sources and statistics were reviewed to recognize the countries where diving has the greatest social, economic and biological impact. The collected information is expected to inform objectives, lines of action and activities for future actions by FAO to improve working conditions and protect the lives of fisherfolk engaged in diving fisheries.

The most important findings of this study are:

- Autonomous diving for fisheries has been practiced for more than 40 years, but the lack of formal training and adoption of safety measures has left thousands of people dead and disabled, due to decompression accidents that cause partial or total disability, either physical (paralysis or loss of upper or lower limbs), motor (failures of the articular, muscular and/or nervous system) and/or sensory (blindness, deafness, muteness or olfactory). Although some countries have forbidden autonomous diving, other countries discourage its practice, and despite the efforts of the national governments to regulate diving and propose new diversification alternatives, many divers refuse to give up, making it necessary to promote safe diving.
- The main reason why fishing through diving and with traps continues to be operated simultaneously is because on one hand, diving trips are more profitable thanks to their high productivity and because divers can access deeper areas compared to those reached by vessels with traps. But on the other hand, and from the perspective of sellers, the results are the opposite: lobster caught with traps is more profitable but less abundant than that generated by dive fishing; lobster caught with traps supply two higher-priced products (live lobster and whole frozen lobster, mainly for Europe and Asia), while when diving, fishers must hit the lobster in the cephalothorax with a harpoon, which damages its quality and presentation. For this reason, SCUBA lobster is used to produce tails that are mainly exported to the United States of America.
- In addition to unsafe diving practices, accidents are aggravated by the lack of immediate medical attention, because the crews on board of fishing boats do not have enough knowledge on first aid, and hyperbaric chambers are not always available in ports near fishing areas. Besides, in most of the countries, usually there are no specialized medical personnel and/or experienced in hyperbaric medicine.
- A new risk has emerged with the global COVID-19 pandemic. The fishing industry recognizes the importance of wearing masks, frequent hand washing and social distancing, but divers are more

concerned about their sources of income than for the risks of contagion, which makes it necessary to implement biosecurity protocols on board. Given that as of October 2020 the pandemic continues to be active, it is possible that these biosecurity measures should remain in force, at least for one more year.

- Most divers do not have access to public health systems, neither do they have formal training, they work with basic equipment (mask, fins and regulator, not always with proper maintenance), not taking control of dive times (using between 8-12 tanks per day), going to depths greater than safety limits and in some cases under the effects of drugs or alcohol.
- SCUBA fishing for spiny lobster and queen conch began in the 1970s, mainly for export. Sea cucumber catches began during the 2000s, exclusively to meet the growing demand in Asia (Hong Kong, Singapore, China, Korea) and also the United States of America, due to the reduction of its populations in the Eastern Pacific Ocean. Sea cucumber has no market in any country in the Wider Caribbean. It appears that there are informal agreements between unauthorized foreign buyers with divers, whose products could be generated by IUU fishing, therefore it is necessary to regulate the fishery, reinforce control and surveillance and to work closely on traceability to recognize if there are illegal activities along the entire value chain.
- Although the problem of unsafe diving practices is common to several fisheries and countries in the Wider Caribbean, there has not been a specific and coordinated approach at national or regional level. Since 2012, OSPESCA and CRFM have defined two joint action plans on various issues of common interest, including the management of spiny lobster based on the OSPESCA Regulation OSP-02-09 of 2009, the CRFM Declaration of St. Georges of 2015, the Regional Fisheries Management Plan for this resource approved by the OSPESCA ministers, as well as by the 17th session of WECAFC in July 2019.

Some actions to face these issues and help to improve the socio-economic profile of divers could be:

- Design or review, as appropriate, a legal and policy framework recognizing diving as a risky activity, to include divers and their assistants as beneficiaries of labor and occupational safety legislation, but taking into consideration the cultural, social, political and economic particularities of each country. To support this effort, it is convenient to consult the “Reference guidelines to legislate or regulate diving in artisanal or small-scale fishing in the Latin American and Caribbean Region” (FAO, 2017).
- Considering that the SICA/OSPESCA region has the highest accidents rate from autonomous diving, despite being prohibited by the OSPESCA Regional Regulation OSP-02-09, it is recommended to promote awareness-raising and training in safe diving aimed to divers in fisheries without legal restrictions to use this method.
- Design practical guides on safe diving, with drawings and simple and direct language easy to understand by divers and their assistants. Given the high cultural diversity in the WECAFC region, it is recommended to edit them in English, Spanish, French and the most used native languages.
- Considering that audiovisual material is more attractive and easier to understand, it is recommended to design an application for smartphones with safe diving instructions, first aid guides, real-time

location of medical centers with hyperbaric chambers, communication with maritime search and rescue units, etc.

- Negotiate with health authorities, academia and other possible partners, the creation of formal education programs aimed at medical and nursing personnel (postgraduate courses, short or medium-term courses, etc.), particularly for those who work near the largest dive fishing areas.
- To reach changes in divers' decisions and behavior, it is recommended to include professionals in social work who know the culture of communities or social groups, being able to establish effective channels of communication and awareness with divers, their assistants and families. Captains and crew members of the industrial fleet should also participate in training programs, thus exerting a positive influence on divers, discourage them from risking their lives, and knowing how to proceed when accidents occur.



## Introduction

The “Queen Conch Regional Fisheries Management and Conservation Plan”<sup>1</sup> adopted in June 2016 at the Sixteenth session of the Western Central Atlantic Fishery Commission (WECAFC), includes thirteen measures, one of them related to the adoption of stricter regulations on autonomous diving techniques given the dire implications for the safety of fishers, exploring different alternatives, ranging from requirements on: a) a broad dive certification program to in depth safety at sea training for all queen conch fishers as a condition for licensing; b) training in diving equipment and maintenance; c) annual equipment safety inspections of queen conch fishers who SCUBA dive; d) display a dive flag on the dive site; and e) SCUBA divers to dive with a buddy.

There is ample anecdotal evidence of many diving-related accidents in the region, due to inadequate training or even no training whatsoever, improper equipment, poor maintenance, and work under strenuous physical and psychological conditions that contribute to the significant, and most likely underestimated, fatality rate seen across the Caribbean region.

Free and autonomous diving are fishing techniques used in the queen conch, spiny lobster and sea cucumber fisheries, as well as for other marine resources (snappers, groupers, algae, sea urchin and others). Spiny lobster and queen conch are the two most valuable fisheries in the region, mostly aimed to satisfy international markets, also naturally highly interconnected, primarily in those areas where diving represents an important fraction of the fishing effort.

Caribbean spiny lobster fisheries are generally artisanal or small scale, with the exception of Honduras, Nicaragua and Cuba, where these fisheries are largely industrial. Traps and *casitas cubanas* are the main form of fishing devices, while autonomous diving (SCUBA and hookah) and free diving (apnea) are the main fishing methods. Though autonomous diving for spiny lobster catch is prohibited in the OSPESCA sub-region, difficulty remains in enforcing it, principally in Nicaragua, Honduras and the Dominican Republic where this system is used.

At its Seventeenth Session held in July 2019, the WECAFC discussed the need for additional dialogue among Members on the working conditions and safety of fishers participating in the spiny lobster dive fishery, with the aim of developing a recommendation on this issue. The concerns over safe diving featured likewise the Fourth meeting of the Queen Conch Working Group held in December 2019, with a specific recommendation for a regional study in selected countries to review the status of diving techniques in WECAFC region; this would capture the efforts that have been made and actions that have been taken on occupational safety in the region.

Diving may also impose additional threats to the sustainability of the resources under exploitation and have generated socio-cultural conflicts with other fishers capable to transform the traditional lifestyle of small

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<sup>1</sup> FAO. Fisheries and aquaculture technical paper 610. Regional Queen Conch Fisheries Management and Conservation Plan. 2017. <http://www.fao.org/3/a-i7818e.pdf>

fishing communities (Prada *et al.*, 2006). Some interventions have been unfolding in the Wider Caribbean<sup>2</sup> within the overall context of improved occupational safety and health of fishers, especially within the arena of decent work and the implementation of the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines<sup>3</sup>).

However, a more comprehensive approach may be necessary to understand all the diverse angles of the diving operations, both in fishing communities and in relation to the status of natural resources. In the same vein, an integrated approach should consider the implications for fishers of the different alternatives in regional queen conch management plans in terms of access to fisheries, or ensure social protection measures, or diversified employment opportunities to not negatively impact on livelihoods.

To devise sound and more targeted interventions the WECAFC Secretariat joined efforts with the FAO SSF Umbrella Program in commissioning a study to appraise the diving conditions and prepare a funding proposal on: “Health and safety in dive fishing of key species in the WECAFC region”.

This paper contains the technical analysis on the current situation of diving techniques (SCUBA, hookah and free) used in the spiny lobster, queen conch and sea cucumber fisheries in the WECAFC region, and their impact on the health and incomes of divers, capturing the efforts that have been made and actions that have been taken on occupational safety, as well as the impacts on the fisheries resources, based on the situation of selected countries in the Wider Caribbean Region where diving is a concern and one of the most important fishing methods.

## 1. Outline of diving fishing methods used in the Wider Caribbean region

According to FAO<sup>4</sup>, dive fishing method is used in Latin American and Caribbean countries to catch benthic organisms. Diving is carried out using three methods; the choice of which depends on the depth and the target resources. The following definitions on diving methods are taken from consultations in several internet sources<sup>5</sup>:

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<sup>2</sup> The United Nations Environment Program defines the Wider Caribbean Region as the insular and coastal States and Territories with coasts on the Caribbean Sea and Gulf of Mexico, as well as waters of the Atlantic Ocean adjacent to these States and Territories which includes 28 island and continental countries. The combined area of the Caribbean Sea and the Gulf of Mexico is approximately 5.3 million km<sup>2</sup>, and their total population is projected to grow to 149 million by 2020. More than 100 million people who live on or near the coast are supported by the Caribbean Sea’s ocean economy, including tourism, fisheries, shipping and petroleum sectors.

<sup>3</sup> FAO. Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. 2015. <http://www.fao.org/voluntary-guidelines-small-scale-fisheries/en/>

<sup>4</sup> FAO. “El buceo en la pesca y la acuicultura en América Latina y el Caribe – orientaciones operativas, legislativas, institucionales y de política para garantizar condiciones de empleo decente”. 2017. <http://www.fao.org/3/a-i7331s.pdf>.

<sup>5</sup> Wikipedia ([https://es.wikipedia.org/wiki/Apnea\\_\(deporte\)](https://es.wikipedia.org/wiki/Apnea_(deporte))), diversdirect (<https://www.diversdirect.com/c/scuba-gear/hookah-third-lung?limit=all>) and Aquasport Chile (<https://aquasport.cl/2019/09/04/como-funciona-un-tanque-de-buceo/>)

- APNEA or free diving. Is based on the voluntary suspension of breath in the water while descending the water column.
- SCUBA (Self-Contained Underwater Breathing Apparatus), is an autonomous method. It consists in the use of tanks filled with compressed clean air that enables breathing underwater through the use of a mouth-piece regulator.
- HOOKAH, also known as surface supplied air, is another autonomous method. Blends snorkeling with the underwater breathing ability of SCUBA diving. It requires a combustion engine (4.5 to 6 HP), a compressor, a hose of about 100 meters to take air from the surface, and a regulator. Professional as well as often dangerous and unreliable home-made rudimental hookah systems exists and used.

Most of fisherfolk practicing diving in the Wider Caribbean have learned the job by family tradition transmitted from parents to children, although some of them have also ventured on it attracted by the high prices of spiny lobster, queen conch and sea cucumber in international markets, many of them without specific training and/or diving experience, which often leads to serious accidents due to ignorance and performance of dangerously unsafe practices.

## **2. Brief overview of the regional importance of the key species caught in diving in the WECAFC region**

Divers pursue spiny lobster, queen conch and sea cucumber, because these are products of high commercial value, highly demanded by the international markets and for this reason, fishers receive better incomes compared with other fishery products like fish.

For instance, the study "Impacts of rising cost factors in fishing operations in the CRFM Member States"<sup>6</sup> (Caribbean Regional Fisheries Mechanism - CRFM, 2017) conducted in Belize, Barbados, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname and Colombia, indicates that captains and crew members doing 7 – 12 trips per month. catching finfish, earn on average USD 1 343/month, while those traveling 14 – 18 days, catching spiny lobster, queen conch and finfish, earn USD 2 659/month. During the fieldwork done for that study, fishers did not complain about low incomes, but they mentioned the high cost of supplies, engine parts and maintenance, and the reduction of fish landed prices out of the tourism season (November-April).

Considering the need to find similar parameters of comparison in the Wider Caribbean Region to recognize the countries where the mentioned fisheries are more important, and based on this, identify in which of them there is a greater use of autonomous diving as fishing method, two databases have been consulted:

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<sup>6</sup> CRFM. CRFM. Impacts of rising cost factors in fishing operations in the CRFM Member States. 2017. Press release available at: [https://www.crfm.int/index.php?option=com\\_k2&view=item&id=553:cost-of-fishing-study-concluded-for-caribbean-states&Itemid=179](https://www.crfm.int/index.php?option=com_k2&view=item&id=553:cost-of-fishing-study-concluded-for-caribbean-states&Itemid=179)

- Production statistics compiled by FAO (FISHSTATJ<sup>7</sup>).
- Import statistics of products derived from these fisheries in the United States of America for being one of the most important markets for the Caribbean, compiled by the National Oceanic and Atmospheric Administration (NOAA).

## 2.1. Statistics of production

According to FAO, just five Caribbean countries capture spiny lobster, queen conch and sea cucumber, other 17 countries capture spiny lobster and queen conch. Four countries fish just spiny lobster and another four countries just queen conch.

**Table 1 – Production of spiny lobster, 2013–2018 (in tons)**

Country	2013	2014	2015	2016	2017	2018	Average
Anguilla	140	134	207	290	205	205	<b>197</b>
Antigua & Barbuda	106	170	277	277	277	277	<b>231</b>
Bahamas	6 088	6 569	6 526	8 482	7 709	5 824	<b>6 866</b>
Belize	652	650	855	774	774	395	<b>683</b>
Bermuda	31	38	35	30	26	24	<b>31</b>
Bonaire/S.Eustatius/Saba	45	54	70	100	128	11	<b>68</b>
British Virgin Islands	40	40	40	40	40	40	<b>40</b>
Colombia	97	6	3	30	150	20	<b>51</b>
Costa Rica	6	9	9	4	4	4	<b>6</b>
Cuba	4 621	4 371	4 035	4 634	4 147	4 540	<b>4 391</b>
Dominican Republic	2 542	2 454	1 282	1 562	1 677	2 024	<b>1 924</b>
Grenada	23	31	30	30	30	30	<b>29</b>
Guatemala	0	0	0	0	0	0	<b>0</b>
Haiti	250	250	250	250	250	250	<b>250</b>
Honduras	4 972	4 502	6 156	6 100	6 100	6 100	<b>5 655</b>
Jamaica	300	300	350	350	484	239	<b>337</b>
Martinique	40	33	34	35	35	35	<b>35</b>
Mexico	934	778	780	822	866	921	<b>850</b>
Nicaragua	4 278	4 724	6 473	5 567	5 031	4 335	<b>5 068</b>
Puerto Rico	98	171	192	118	69	129	<b>130</b>
Saint Kitts y Nevis	15	14	22	18	30	37	<b>23</b>
St Vincent/Grenadines	29	56	56	30	54	63	<b>48</b>
Trinidad & Tobago	21	21	21	21	21	21	<b>21</b>
Turks and Caicos Islands	180	203	218	260	218	154	<b>206</b>
United States of America	2 760	2 532	2 690	2 453	1 743	2 813	<b>2 499</b>

<sup>7</sup> FISHSTATJ. Software for Fishery and Aquaculture Statistical Time Series.  
<http://www.fao.org/fishery/statistics/software/fishstatj/en>

Venezuela	90	97	635	103	105	105	<b>189</b>
Virgin Islands (USA)	72	56	57	69	70	44	<b>61</b>
<b>Total</b>	<b>28 430</b>	<b>28 263</b>	<b>31 303</b>	<b>32 449</b>	<b>30 243</b>	<b>28 640</b>	<b>29 888</b>

Source: FAO (FishstatJ). [www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

According to Table 1, the largest producers of spiny lobster in descending order, from 2013 to 2018 are: Bahamas, Honduras, Nicaragua, Cuba, United States of America and Dominican Republic. Three of these countries (Honduras, Nicaragua and Dominican Republic) have a notable production of spiny lobster caught by autonomous diving (SCUBA and hookah).

**Table 2 – Production of queen conch, 2013–2018 (in tons)**

Country	2013	2014	2015	2016	2017	2018	Average
Anguilla	164	154	100	42	80	80	<b>103</b>
Antigua & Barbuda	3 349	1 648	1 583	1 583	1 583	1 583	<b>1 888</b>
Bahamas	5 642	4 178	4 045	2 696	3 289	4 027	<b>3 980</b>
Belize	3 060	2 152	2 349	2 776	1 780	2 380	<b>2 416</b>
Bonaire/S.Eustatius/Saba	26	26	13	13	13	26	<b>20</b>
British Virgin Islands	5	5	5	5	5	5	<b>5</b>
Colombia	0	0	0	0	15	0	<b>3</b>
Cuba	558	493	525	477	405	475	<b>489</b>
Curaçao	26	26	26	26	26	26	<b>26</b>
Dominican Republic	2 218	1 842	1 447	1 634	1 755	1 691	<b>1 765</b>
Grenada	39	27	26	26	26	26	<b>28</b>
Guadeloupe	130	115	100	115	115	115	<b>115</b>
Haiti	200	200	200	200	200	50	<b>175</b>
Honduras	1 575	0	842	800	800	800	<b>803</b>
Jamaica	3 750	3 750	3 750	3 750	3 750	3 750	<b>3 750</b>
Martinique	2	2	2	2	2	2	<b>2</b>
Mexico	0	285	4 342	1 132	4 820	1 268	<b>1 975</b>
Nicaragua	9 857	11 994	11 161	9 260	11 020	12 395	<b>10 948</b>
Puerto Rico	1 426	1 135	1 188	1 069	944	1 085	<b>1 141</b>
St Vincent/Grenadines	336	435	267	330	213	310	<b>315</b>
St. Kitts & Nevis	1 512	471	537	648	561	529	<b>710</b>
St. Lucia	435	382	514	488	525	398	<b>457</b>
St. Maarten	13	13	13	13	13	13	<b>13</b>
Turks and Caicos Islands	2 143	1 236	1 257	1 493	1 857	2 047	<b>1 672</b>
Venezuela	10	5	0	2	2	2	<b>4</b>
Virgin Islands (USA)	160	140	94	196	121	91	<b>134</b>
<b>Total</b>	<b>36 636</b>	<b>30 714</b>	<b>34 386</b>	<b>28 776</b>	<b>33 920</b>	<b>33 174</b>	<b>32 934</b>

Source: FAO (FishstatJ). [www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

Table 2 shows that the largest producers of queen conch, in descending order during the referred period are: Mexico, Bahamas, Belize, Antigua and Barbuda, Nicaragua and Dominican Republic. It is also important to note that free and autonomous diving are the main methods of fishing for this resource.

**Table 3 – Production of sea cucumber, 2013–2018 (tons in dry weight)**

Country	2013	2014	2015	2016	2017	2018	Average
Belize	587	476	98	18	18	0	<b>200</b>
Haiti	20	20	20	20	20	20	<b>20</b>
Honduras	996	189	100	100	100	100	<b>264</b>
Mexico	2 649	1 200	643	1 887	714	2 113	<b>1 534</b>
Nicaragua	690	1 191	1 965	4 724	5 758	8, 030	<b>3 726</b>
United States of America	0	8	0	0	0	4	<b>2</b>
<b>Total</b>	<b>4 942</b>	<b>3 084</b>	<b>2 826</b>	<b>6 749</b>	<b>6 610</b>	<b>10 267</b>	<b>5 746</b>

Source: FAO (FishstatJ). [www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

According to Table 3, Nicaragua and Mexico are the largest producers of sea cucumber. Although not included in this table, based on NOAA statistics and the interviews conducted for this study, Dominican Republic, Jamaica, Bahamas, Antigua and Barbuda, and Colombia, also fish or have fished this resource.

Besides these statistics, it is important to note that sea cucumbers are basically fished throughout the Wider Caribbean region; much is carried out illegally and hence data goes unreported. More information about this matter can be found in item 5.3 of this report.

## 2.2. Exports to the United States of America

Based on NOAA statistics, the largest exporters, in descending order according to the volume of exports between January 2016 – July 2020 are:

- Spiny lobster (*Panulirus argus*): The Bahamas, Honduras, Brazil, Nicaragua, Belize, Dominican Republic, Jamaica and Colombia. It is important to note that, according to FAO statistics, Cuba is one of the largest producers of spiny lobster. However, given that the United States of America and Cuba do not have commercial relations, this last country is not included in this list of exporters.
- Queen conch (*Strombus gigas*): Nicaragua, Bahamas, Honduras, Belize, St. Vincent & The Grenadines, Mexico, St. Kitts & Nevis.
- Sea cucumber (*Holothuria mexicana*, *Isostichopus badionotus*): Mexico, Honduras, Nicaragua, Haiti, Jamaica, Colombia (until 2017), Dominican Republic, The Bahamas (until 2018) and Belize (until 2016).

Due to foreign trade databases of NOAA or any other country do not differentiate the fishing methods with which fisheries resources are caught<sup>8</sup>, these statistics do not allow to know precisely the proportion that comes from diving, but as reported by FAO (2014)<sup>9</sup> and the interview with OSPESCA for this study, it is possible to identify, for example, that in countries exporting lobster tails where diving is used, it is likely that a significant proportion of these products come from free diving (e.g. in Belize) or autonomous (in Honduras, Nicaragua and the Dominican Republic, among others).

**Table 4 – Exports of spiny lobster to the USA from Caribbean countries, January 2016 – July 2020 (in tons)**

	2016	2017	2018	2019	Until July 2020	Total 2016-2020
<b>SICA Countries</b>						
Dominican Republic	185	151	274	79	15	<b>704</b>
Honduras	1 360	1 278	1 360	1 088	474	<b>5 561</b>
Nicaragua	822	820	929	900	459	<b>3 931</b>
<b>CARICOM Countries</b>						
Antigua & Barbuda	0	3	2	1	0	<b>7</b>
Bahamas	1 179	1 778	1 361	1 127	456	<b>5 901</b>
Belize*	183	264	232	230	143	<b>1 053</b>
Grenada	0	0	2	0	0	<b>2</b>
Haiti	9	17	11	24	2	<b>63</b>
Jamaica	39	79	79	78	60	<b>335</b>
St. Vincent & the Grenadines	0	3	30	29	6	<b>69</b>
Trinidad & Tobago	10	37	22	18	3	<b>89</b>
<b>Other countries</b>						
Brazil	883	1 204	1 377	1 517	333	<b>5 314</b>
Colombia	72	28	56	118	50	<b>324</b>
Mexico	8	28	48	53	25	<b>161</b>
Venezuela	0	45	89	59	25	<b>218</b>
<b>TOTAL</b>	<b>4 751</b>	<b>5 736</b>	<b>5 872</b>	<b>5 322</b>	<b>2 053</b>	<b>23 734</b>

Source: NOAA Fisheries. Foreign trade statistics. <https://foss.nmfs.noaa.gov/apexfoss/f?p=215:2>

\* Belize is a CARICOM and a SICA country

<sup>8</sup> Even more, in the case of products originated in fisheries and aquaculture (e.g. shrimp), foreign trade statistics in most countries do not have specific tariff positions for each production method, so it is necessary to make inferences based on knowledge and experience.

<sup>9</sup> FAO. "Contribución de la pesca y la acuicultura a la seguridad alimentaria y el ingreso familiar en Centroamérica". 2014. <http://www.fao.org/documents/card/en/c/caaff2db-fb93-4c12-a344-80c01bee99f2/>

**Table 5 – Exports of queen conch to the USA from Caribbean countries, January 2016 – July 2020 (in tons)**

	2016	2017	2018	2019	Until July 2020	Total
<b>SICA Countries</b>						
Honduras	200	197	220	369	150	<b>1 136</b>
Nicaragua	278	476	493	493	329	<b>2 069</b>
<b>CARICOM Countries</b>						
Bahamas	201	302	386	267	86	<b>1 242</b>
Belize*	0	203	262	352	101	<b>918</b>
St. Kitts & Nevis	10	8	11	5	0	<b>34</b>
St. Vincent & the Grenadines	0	1	176	192	102	<b>470</b>
<b>Other countries</b>						
Mexico	3	34	15	18	0	<b>69</b>
<b>TOTAL</b>	<b>692</b>	<b>1 220</b>	<b>1 563</b>	<b>1 697</b>	<b>768</b>	<b>5 939</b>

Source: NOAA Fisheries. Foreign trade statistics. <https://foss.nmfs.noaa.gov/apexfoss/f?p=215:2>

\* Belize is a CARICOM and a SICA country

**Table 6 – Exports of sea cucumber to the USA from Caribbean countries, January 2016 – July 2020 (tons in dry weight)**

	2016	2017	2018	2019	Until July 2020	Total
<b>SICA Countries</b>						
Dominican Republic	5	0	2	2	1	<b>10</b>
Honduras	228	181	77	68	31	<b>585</b>
Nicaragua	152	175	40	12	10	<b>389</b>
<b>CARICOM Countries</b>						
Antigua & Barbuda	0	0	0	0	0	<b>0</b>
Bahamas	6	0	1	0	0	<b>6</b>
Belize*	4	0	0	0	0	<b>4</b>
Haiti	61	32	16	10	3	<b>122</b>
Jamaica	4	26	16	7	8	<b>61</b>
<b>Other countries</b>						
Colombia	11	2	0	0	0	<b>12</b>
Mexico	210	350	189	127	66	<b>942</b>
<b>TOTAL</b>	<b>681</b>	<b>765</b>	<b>342</b>	<b>226</b>	<b>120</b>	<b>2 133</b>

Source: NOAA Fisheries. Foreign trade statistics. <https://foss.nmfs.noaa.gov/apexfoss/f?p=215:2>

\* Belize is a CARICOM and a SICA country

During the interviews conducted for this study, it was identified that although the most important buyers of sea cucumber are located in Asia (China, Hong Kong, Singapore and South Korea, among others), United



States of America is also an important buyer to satisfy the demand of consumers of Asiatic origin in San Francisco and Canada (Vancouver), but mainly to re-export to Asia. It is important to note that a greater analysis of sea cucumber exports will be made in the case studies of the Dominican Republic and Honduras.

On the other hand, the information available on the fleet and number of active divers in the three fisheries associated with autonomous diving is not available for all the countries of the Wider Caribbean. For this reason, in the following table is registered the collected information for this report:

**Table 7 - Vessels and fisherfolk in fisheries associated with diving in the OSPESCA region, 2020**

	OSPESCA region, 2020	
	Vessels	Divers & companions
<b>Fishery: Spiny lobster</b>		
Industrial fleet - Diving	42	6 319
Small-scale fleet - Diving	126	630
<b>Fishery: Queen conch</b>		
industrial fleet	24	1 698
Small-scale fleet	N/A	275
<b>Fishery: Sea cucumber</b>		
industrial fleet	9	390
Small-scale fleet	32	2 605
<b>TOTAL (Diving)</b>	<b>233</b>	<b>11 917</b>

Source: OSPESCA

**Box 1 – Industrial fleet and small-scale fleet**

It is important to note that the formal definition of industrial fleet and small-scale fleet is not the same for all Caribbean countries since these definitions are specifically stipulated in the laws and fisheries regulations of each country. However, there is a general description widely understood by actors and authorities of the fisheries sector, as follows<sup>10</sup>:

- **Industrial fleet:** vessels in naval steel or fiberglass, from 16 to 24 meters in length, load capacity from 25 to 150 tons and diesel engines of 325, 425, 450 and 540 HP.
- **Small-scale fleet:** Fiberglass or wood boats, from 20 to 38 feet in length, most with 25, 40, 60 and 75 HP outboard motors.

<sup>10</sup> OSPESCA-Proyecto CLME+ (PNUD/FMAM), Subproyecto ECOLANGOSTA+. Plan regional de manejo de la pesquería de la langosta espinosa del Caribe (*Panulirus argus*). 2018. [https://www.sica.int/documentos/plan-marplesca-espanol\\_1\\_119895.html](https://www.sica.int/documentos/plan-marplesca-espanol_1_119895.html)

### **3. International and regional frameworks governing the dive fishing**

In order to recognize the international framework designed to protect the life and health of divers, as well as the conditions of work, it is necessary to highlight the most relevant instruments globally and regionally applicable.

#### **3.1. International instruments that guide diving techniques and health safety**

At global level, the Code of Conduct of Responsible Fisheries (CCRF, 1995), the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines, 2015), and more recently the “Reference guidelines to legislate or regulate diving in artisanal or small-scale fishing in the Latin American and Caribbean region” (2020), are three instruments produced by FAO which address, among others, issues of decent work and human rights. For this reason, these instruments provide technical and social guidance related to diving techniques and health safety. Also, the recommendations and rules elaborated by the International Labour Organization (ILO) complement this framework.

##### **3.1.1. The Code of Conduct of Responsible Fisheries (CCRF)**

The articles of the Code applicable to the general problem of diving are the following:

- General Principle 6.17 – States should ensure that fishing facilities and equipment as well as all fisheries activities allow for safe, healthy and fair working and living conditions and meet internationally agreed standards adopted by relevant international organizations.
- General Principle 6.13 – States should, to the extent permitted by national laws and regulations, ensure that decision making processes are transparent and achieve timely solutions to urgent matters. States, in accordance with appropriate procedures, should facilitate consultation and the effective participation of industry, fish workers, environmental and other interested organizations in decision making with respect to the development of laws and policies related to fisheries management, development, international lending and aid.

##### **3.1.2. The SSF Guidelines**

These Guidelines are based on the CCRF and are voluntary, global in scope and focused on the needs of developing countries. Its objective 1.1.b. is “to contribute to the equitable development of small-scale fishing communities and poverty eradication and to improve the socio-economic situation of fishers and fish workers within the context of sustainable fisheries management”.

Although the SSF Guidelines do not have specific principles directly focusing on dive fishing practices, there are principles related to health and safety of the fishers, as follows:

- Principle 6.2 – States should promote investment in human resource development such as health, education, literacy, digital inclusion and other skills of a technical nature that generate added value to the fisheries resources as well as awareness raising. States should take steps with a view to progressively ensure that members of small-scale fishing communities have affordable access to these and other essential services through national and subnational actions, including adequate housing, basic sanitation that is safe and hygienic, safe drinking-water for personal and domestic uses, and sources of energy. Preferential treatment of women, indigenous peoples, and vulnerable and marginalized groups – in providing services and giving effect to non-discrimination and other human rights – should be accepted and promoted where it is required to ensure equitable benefits.
- Principle 6.3 – States should promote social security protection for workers in small-scale fisheries. They should take into account the characteristics of small-scale fisheries and apply security schemes to the entire value chain.
- Principle 6.4 – States should support the development of and access to other services that are appropriate for small-scale fishing communities with regard to, for example, savings, credit and insurance schemes, with special emphasis on ensuring the access of women to such services.
- Principle 6.5 - States should recognize as economic and professional operations the full range of activities along the small-scale fisheries value chain – both pre- and post-harvest; whether in an aquatic environment or on land; undertaken by men or by women. All activities should be considered: part-time, occasional and/or for subsistence. Professional and organizational development opportunities should be promoted, in particular for more vulnerable groups of post-harvest fish workers and women in small-scale fisheries.
- Principle 6.6 – States should promote decent work for all small-scale fisheries workers, including both the formal and informal sectors. States should create the appropriate conditions to ensure that fisheries activities in both the formal and informal sectors are taken into account in order to ensure the sustainability of small-scale fisheries in accordance with national law.
- Principle 6.17 – States should recognize that improved sea safety, which includes occupational health and safety, in small-scale fisheries (inland and marine) will best be achieved through the development and implementation of coherent and integrated national strategies, with the active participation of the fishers themselves and with elements of regional coordination, as appropriate. In addition, safety at sea of small-scale fishers should also be integrated into the general management of fisheries. States should provide support to, among other things, maintenance of national accident reporting, provision of sea safety awareness programs and introduction of appropriate legislation for sea safety in small-scale fisheries. The role of existing institutions and community-based structures for increasing compliance, data collection, training and awareness, and search and rescue operations should be recognized in this process. States should promote access to information and to emergency location systems for rescue at sea for small-scale vessels.

### 3.1.3. The Reference guidelines to legislate or regulate diving in artisanal or small-scale fishing in the Latin American and Caribbean region

The "Reference guidelines to legislate or regulate diving in artisanal or small-scale fishing in the Latin American and Caribbean region"<sup>11</sup> were developed by FAO (Panama, 2020) attending the request of several Latin American and Caribbean countries of technical assistance to address the growing problem of fatal accidents in artisanal dive fishing. The main purpose of these guidelines is to provide legal elements that help to sensitize to fishing communities about the importance of complying with the rules, and also create inter-institutional articulation mechanisms for the application of those rules.

These guidelines are based on the analysis of the real situation in several countries of the region and taking into account the recommendations of the CCRF (FAO, 1995) and the SSF Guidelines (FAO, 2018). Some concepts considered relevant are extracted and adapted to formulate strategic actions in the WECAFC region, under which it would be necessary to include divers practicing artisanal fishing and those who are part of the crews of the industrial fleet:

- Cooperation and coordination among the competent authorities and institutions should be encouraged to promote safe diving, in particular to provide training in diving techniques, control and surveillance of fishing operations, accident prevention and recovery of health in case of accidents, as well as productive promotion to diversify with other activities within or outside the fisheries sector.
- Labor legislation should expressly include diving fishing as a risk activity, to ensure occupational safety conditions through employment contracts for divers and their assistants, being consistent with international recommendations on decent work.
- Regulations should take into account the need to reduce the risks inherent to diving, assessing those that cannot be avoided, developing strategies to mitigate them and manage them.
- International decent employment criteria require that people practicing diving should have a contract when appropriate, access to the social security system and particularly on health (extended to their primary family nuclei, i.e. spouses, children and parents), including life and disability insurance.
- Indigenous communities practicing diving should be part of the decision-making processes regarding the measures that should be taken to solve the serious problems of human health and fisheries sustainability associated with autonomous diving, as well as actively participate in the implementation of the activities on safe diving in their respective territories.
- The legal measures that are taken should have an adequate gradualness allowing to progressively adopt the necessary changes to protect the lives of divers and the sustainability of the fisheries resources caught by diving.
- Experience has shown the need to limit access to fisheries as a basic element of management to ensure the sustainability of fishery resources. Although the States should recognize territorial rights (often with exclusive fishing use of the communities, particularly when they are native peoples settled in coastal

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<sup>11</sup> FAO. Lineamientos referenciales para legislar o regular el buceo en la pesca artesanal o de pequeña escala en la Región de América Latina y el Caribe. 2020. <http://www.fao.org/3/cb0693es/CB0693ES.pdf>

territories), access to fishing resources should be sustained within the limits established by their own biological capacity. Management decisions should be based on the best available scientific information and management measures should be taken with the informed participation of the communities involved.

- Diver registrations should be granted (in artisanal and industrial fishing) requiring periodic validation and conditioning the obtaining of the respective fishing permits to the validity of that registration. In order to obtain the diver registration, candidates should have certifications issued by competent authorities on the following basic criteria:
  - Ability to develop diving with physical tests including swimming, autonomous vertical buoyancy, free diving tests, and apnea endurance.
  - The diver's medical condition, certified by doctors authorized by the competent authority and validated by physical examinations on respiratory capacity, electrocardiogram, neuropsychological and speech-language risk evaluations. Each diver should have a medical history that, in addition to the aforementioned tests, also includes risk habits such as drug or alcohol consumption that could be incompatible with safe diving practices. This implies that if the physical or mental conditions of the diver or his assistant represent a risk to their own safety and to the crew, it would be reason enough to disallow the registration.
  - The functional and safety conditions of diving equipment, verifying that such equipment guarantees adequate air quality (absence of oil and carbon monoxide), adequate conditions and functionality of the air supply hoses and regulators, pressure gauge hose and pressure tests of air cylinders (SCUBA) and compressors for the hookah system. In the same way, it is pertinent to check that the boat where the diver and his assistant work has a minimum safety equipment in good conditions (life jackets, first aid kit and communications equipment).
- In addition to the requirements described to obtain a diver license, the States should take the following measures:
  - Set maximum diving depth limits.
  - Set the conditions for granting ships sails indicating the number of daily dives allowed by diver, maximum immersion, and minimum recovery post-dive times.
  - Set the minimum age limits in accordance with ILO<sup>12</sup> Convention 112 of 1959 on the minimum age (fishermen) therefore, minors under 15 years of age cannot provide services on board, although they may occasionally participate during school holidays, if it is not harmful to their health or normal development, if do not affect their attendance at school or if not having commercial benefits.
  - The States Fisheries Registries should include divers and their assistants, including basic socio-cultural information (age, sex, level of education and belonging to indigenous ethnic groups), who for this purpose must have the respective diver registration and valid fishing permits. On the other hand, their inscription in the Registry should also be prevented if it is verified that the applicant has carried out illegal, unreported and unregulated fishing activities.

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<sup>12</sup> ILO. Convention 112 on the minimum age (fishermen). 1959. [https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100\\_ILO\\_CODE:C112](https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C112)

- The maximum number of divers allowed per fishery should also be defined, based on the maximum production volumes that could be annually authorized by diving, to ensure the sustainability of fishery resources.
- Diving fishing should not be authorized if there are no functional hyperbaric chambers in the ports or towns near fishing areas to provide prompt attention in the event of decompression accidents.
- The incorporation of hyperbaric medicine as an area of knowledge within university medicine programs should be promoted in order to have specialized professionals, particularly in countries with high incidence of spearfishing.

### 3.1.4. The International Labour Organization (ILO)

Given the complex problem of inadequate labor conditions and unsafe practices in the dive fisheries of the Miskito indigenous people in Honduras and Nicaragua, the ILO has analyzed these specific cases. Although the references review carried out for this study did not find express recommendations on diving fishing in general terms, it is important to note that ILO has been based on the following international agreements and legal instruments:

- Regarding Honduras, the basis of the intervention is the ILO Convention 169 on Indigenous and Tribal Peoples of 1989, referring to the protection of the rights of the Miskito people and particularly, the conditions of employment, social security and health of Miskito divers. The Report of the Committee of Experts on the Application of Conventions and Recommendations in the 102nd Meeting of the International Labor Commission in 2013, revised again at the 105th and 106th meetings of that Commission in 2016 and 2017 respectively, considered the reports of the Government of Honduras on the progress made in the design and application of measures to improve the protection and working conditions of divers and the way to consult the Miskito people in this regard.
- In Nicaragua, the ILO carried out in 2002 the study "Labor conditions of Miskito divers on the Atlantic coast of Nicaragua"<sup>13</sup>. It is also based on the ILO Convention 169 on Indigenous and Tribal Peoples of 1989, and the national legal framework on labor, rights of indigenous peoples, human rights, rights of persons with disabilities and rights of children and adolescents.

## 4. The regional context

After reviewing the diving situation in selected countries of the Wider Caribbean, a review of the regional context is carried out, considering the measures taken by the two intergovernmental organizations operating in the region (OSPESCA and CRFM) that jointly cover 24 countries.

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<sup>13</sup> ILO. "Condiciones laborales de los buzos Miskitos en Nicaragua". 2002.  
[https://www.paho.org/nic/index.php?option=com\\_docman&view=document&layout=default&alias=250-condiciones-laborales-de-los-buzos-miskitos-en-nicaragua-oit&category\\_slug=desarrollo-sostenible-y-salud-ambiental&Itemid=235](https://www.paho.org/nic/index.php?option=com_docman&view=document&layout=default&alias=250-condiciones-laborales-de-los-buzos-miskitos-en-nicaragua-oit&category_slug=desarrollo-sostenible-y-salud-ambiental&Itemid=235)

#### 4.1. OSPESCA

The major spiny lobster producer countries in the OSPESCA region are: Honduras, Nicaragua, Belize and the Dominican Republic; of these, Belize is the only country where SCUBA diving is not practiced. Article 13 of the "Regulation OSP-02-09 for the regional management of the Caribbean lobster fishery (*Panulirus argus*)", which is binding for all its member countries, establishes the culmination of autonomous diving in this fishery by the year 2011.

Despite the efforts made by the authorities and the private sector, that date was reached without achieving the necessary conditions to suspend diving. For that reason, the Council of Ministers of OSPESCA approved the Addendum 1 to the regulation extending the term until July 1, 2013, but when this second term expired, the appropriate conditions for fisheries management nor the implementation of economic diversification alternatives for divers were not achieved, so a second Addendum was approved for another two years.

The complexity of diving problems led to the approval of a third Addendum in March 2015 that welcomed Nicaragua's request to move forward based on an action plan including the prohibition of granting new lobster fishing permits through autonomous diving. Four months later (July 2015), Addendum 4 was approved, granting to Honduras the same conditions already granted to Nicaragua.

The last revision to the regional regulation of spiny lobster undertaken by the Council of Ministers was in December 2019, when the article 13 was modified, as follows: *"The Member States shall take the necessary measures to prohibit autonomous diving in lobster fishing in accordance with national plans for that purpose. The Member States will present an annual progress report on the implementation of this measure to the Executive Committee of OSPESCA, at least two months before its ordinary meeting, which will submit its recommendations to the Council of Ministers"*.

The Regional Director of OSPESCA, interviewed for this study, considers that there are three central problems: 1) if unsafe diving practices continue, the efforts made to improve medical services will not be enough, as there could be always a proportion of fishers suffering decompression accidents; 2) the overcrowding of fishers on board of industrial vessels, creates problems that goes against the principles of decent work and crew safety; 3) although the countries have proposed and continue working on the identification and promotion of alternatives for economic diversification, they do not satisfy the economic expectations of SCUBA divers. For these reasons, OSPESCA considers that the following actions should be promoted:

- Maintain the measure of not granting new fishing permits for autonomous diving (SCUBA and hookah).
- Punish ship-owners and captains for not taking the necessary measures of their competence (equipment in poor condition, lack of promotion of preventive measures, exceeding the hours of work on board allowable for diving, etc.) to avoid the occurrence of accidents in fishing trips.
- Sensitize and train fishers about the serious consequences of unsafe diving practices.

Although the problem of unsafe autonomous diving practices is common to several fisheries and many countries in the Wider Caribbean, there has not been a specific and coordinated approach at national or regional level. Since 2012, OSPESCA and CRFM have defined two joint action plans on various issues of common interest, including the management of spiny lobster based on the OSPESCA Regulation OSP-02-09 of 2009, the CRFM Declaration of St. Georges of 2015, the Regional Fisheries Management Plan for this resource approved by the OSPESCA ministers, as well as by the 17th session of WECAFC in July 2019.

OSPESCA has accompanied FAO in the analysis of alternatives to protect the lives of fisherfolk and promote safe diving, however, the actions promoted by OSPESCA are governed by the decisions of its superior authorities (national governments of Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama) and to date, the Regulation OSP-02-09 maintains the prohibition of autonomous diving due to bad practices threatening the lives of fishers who use it.

## **4.2. CRFM**

The main Caribbean countries where autonomous diving is used as a method of fishing for spiny lobster, queen conch and/or sea cucumber are: Jamaica, The Bahamas, Haiti, St. Lucia, Grenada, St. Vincent and The Grenadines, St Kitts and Nevis, Antigua and Barbuda. In the West Indies, the use of SCUBA diving is more frequent than hookah.

In an interview conducted for this study with the Executive Director of the CRFM it was established that autonomous diving has not represented major problems of mortality and disability in most countries of the CRFM region. Divers have occasionally disappeared or had decompression accidents, but these are isolated cases. In some countries, regulations have been issued to discourage diving and in other cases, restrictions have been imposed such as the need to obtain diving permits, upon compliance with some requirements, as will be explained below.

The case of Jamaica is excepted, where there have been decompression accidents, although most of them are not Jamaican but divers from the Dominican Republic and Honduras, who motivated by the high incomes they can obtain, have been hired by the industrial fleet since the 90s because they are considered as more productive and risk-takers fishermen, compared to Jamaican divers. The country has developed training programs in safe diving techniques, which has made it possible to reduce accident rates in fishing.

In order to implement solutions to the complex problem linked to autonomous dive fishing, the Executive Director of CRFM proposes to encourage the practice of safe diving in all target fisheries (spiny lobster, queen conch, sea cucumber, groupers and snappers) rather than forbidden it, considering that for economic and technical reasons, divers are not willing to leave this fishing method. With this strategy, fishers and boat-owners can be encouraged to work closely with the competent authorities to improve their diving techniques and to participate in the implementation of regulation measures. To this end, it would be convenient to define minimum safe diving standards that can be applied in all Caribbean countries.



The Executive Director of CRFM added that the strategic alliances already formally established by CRFM and OSPESCA could be used in coordination with FAO and WECAFC to achieve the needed coordination with other countries of the Wider Caribbean not members of these two organizations, to undertake a joint effort to define and harmonize the minimum standards for safe diving, and even establish restrictions to dive for fisherfolk who do not have the respective authorizations.

This initiative could even be complemented with the design of a certification or joint training scheme on safe diving practices between CRFM and OSPESCA, even more considering that some fishers from the OSPESCA region work in the CRFM region, for which it would be necessary to count on the participation of the competent authorities of their member countries such as health, fisheries and naval authorities, as well as national institutions in charge of professional and vocational training for work. The training courses should also involve the crews of the fishing fleet and divers' families, as well as undertake awareness sessions on this matter aimed to their communities.

Sea cucumber fishing is not a widespread problem in the countries of the CRFM region, except in Belize, Jamaica and Haiti, where in recent years it has been known that there are buyers possibly originating from Asia who discreetly and informally negotiate with fisherfolk, which eventually could be IUU fishing since there is not possible to establish the traceability of these products.

#### **4.3. CFMC**

The Caribbean Fishery Management Council (CFMC) is the intergovernmental organization with jurisdiction in the federal waters of the United States of America and the territorial seas of the Commonwealth of Puerto Rico and the territory of the U.S. Virgin Islands.

CFMC in cooperation with the National Marine Fisheries Service of the USA, has implemented several management regulations for its most important fisheries resources (closed seasons, closed areas and annual catch limits, among others). In the specific case of spiny lobster and queen conch fisheries, there are implemented management plans.

- The spiny lobster management plan<sup>14</sup> was approved in 1981 and implemented in 1985 in Puerto Rico and the U.S. Virgin Islands. The Plan provides regulatory controls about the sex and size of lobster to be harvested, gear restrictions, data collection and the establishment of certain sanctuaries. In 1990 was amended to add a scientifically measurable definition of overfishing, and to include an action plan

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<sup>14</sup> CFMC/NMFS. Spiny lobster management plan and its amendments of 1990 and 2005. <https://www.caribbeanfmc.com/images/pdf-files/SL%20FMP.pdf>; <https://www.caribbeanfmc.com/images/pdf-files/SL%20Amend%201.pdf>; [http://www.caribbeanfmc.com/fmp%20sfa/Caribbean\\_SFA\\_Final%20May%202005%20Text/SECTION%201-3.pdf](http://www.caribbeanfmc.com/fmp%20sfa/Caribbean_SFA_Final%20May%202005%20Text/SECTION%201-3.pdf)

to arrest overfishing. In 2005 there was another amendment to comply with several provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) related to establishing biological reference points and stock status determination criteria, preventing overfishing and rebuilding overfished fisheries, and assessing and minimizing to the extent practicable bycatch.

Regarding gear restrictions, the objective of the Plan is to reduce the loss of lobsters associated to ghost or drowned traps due to ships traffic, pilfering, thievery, displacement by currents, and other reasons. Specifically on diving, the Plan does not include measures, so it is understood this is not an issue in the US territorial waters. The diagnostic of the fishery included in the original version of the Plan refers that in 1981, there was an unreported recreational-commercial catch by divers who used spears and hooks in Puerto Rico, but such gear was unlawful for taking lobsters in the Virgin Islands where hand held snares were used. SCUBA gear became a replace for free-diving methods.

- The queen conch management plan<sup>15</sup> was formulated in 1996 and covers the Caribbean Sea and the Atlantic Ocean northward to Bermuda. Contains provisions for total or areal closures but favors effort reduction as the socio-economic impacts are less severe: 1) impose a minimum size limit of queen conch; (2) require that all species be landed in the shell, prohibit the sale of undersized queen conch and its shells; (3) establish bag limits for recreational fishers and for licensed commercial fishers; (4) define the period of time of the yearly closure, coincident with the peak spawning period; and (5) prohibit harvest of queen conch by HOOKAH gear in the Economic Exclusive Zone to protect deep-water spawning stocks.

As well as spiny lobster, this plan was amended in 2005 to comply with several provisions of the Magnuson-Stevens Fishery Conservation and Management Act related to establishing biological reference points and stock status determination criteria, preventing overfishing and rebuilding overfished fisheries, and assessing and minimizing to the extent practicable bycatch.

## **5. Analysis of the current situation of diving in selected countries of the Wider Caribbean**

To recognize the current context and status of the diving situation, nine country case-studies from the Latin American and Caribbean region are presented below. The information was obtained from the above-mentioned FAO (2017a) paper, through other secondary sources and from direct interviews of key informants from throughout the Region, as detailed in Annex 1.

### **5.1. Honduras**

There are different versions about the origin of the Miskito ethnic group, being the most accepted that they come from the Chibcha indigenous group of the northern South America. During the colonization period of the 16th century, they established contacts with French, Dutch and British pirates, as well as with Africans

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<sup>15</sup> CFMC. Fishery management plan for the queen conch resources of Puerto Rico and the U.S. Virgin Islands. 1996. <https://repository.library.noaa.gov/view/noaa/18391>

who were escaping slavery<sup>16</sup>. It is estimated that there are currently about 150 000 Miskitos in Nicaragua and another 30 000 in Honduras.

Most divers in Honduras and Nicaragua are Miskitos; their ages range between 15 and 60 years. They work as independent fishermen or as crew members (divers) of the industrial fleet<sup>17</sup> in the keys and reefs of La Mosquitia, near the maritime border between the two countries. Fishing is its main economic activity and although a large part of the catches of spiny lobster, queen conch, sea cucumber and some fish (snappers and groupers) are made on board of the industrial fleet, divers lack access to the social security system, training on safe diving practices and often dive using equipment in poor maintenance conditions (basic equipment includes tanks, pressure gauges, dive computers, life jackets, wetsuits, masks and fins).

**Figure 1 - Map of La Mosquitia in Honduras and Nicaragua**



Source: Sitasatlas.com

Autonomous diving in fishing has been practiced for more than 40 years, but the lack of formal training and adoption of safety measures has left more than 3 000 people dead and disabled in Honduras and Nicaragua<sup>18</sup>, due to decompression accidents that cause death or partial/total disability either physical (paralysis or loss of upper or lower limbs), motor (failures of the articular, muscular and/or nervous system) and/or sensory (blindness, deafness, muteness or olfactory).

In the specific case of Honduras, although a census on the number of people linked to diving has not been conducted, the Ministry of Labor and Social Security reports that there are about 9 000 divers, of which 1 600 (18%) suffer some disability, and 400 (4%) have died. Only since 2017 there have been six deaths with

<sup>16</sup> PUEBLOS ORIGINARIOS.COM. Historia Miskita.

<https://pueblosoriginarios.com/centro/confluencia/miskito/historia.html>

<sup>17</sup> Please refer to Box 1 - Industrial fleet and small-scale fleet, to recognize the characteristics of the lobster fleet.

<sup>18</sup> OSPESCA. Perfil de proyecto “Desarrollo de alternativas de diversificación económica y reincorporación socio-laboral a buzos discapacitados y sus cuidadores en la Mosquitia hondureña y nicaragüense”. 2008.

accumulated compensation of USD 61 000 and 29 work accidents with compensation of USD 204 000. On the other hand, the Ministry of Health issued in 2016 the "Protocol for the prevention and care of people with decompression sickness"<sup>19</sup>.

A new risk has emerged with the global COVID-19 pandemic. The fishing industry recognizes the importance of wearing masks, frequent hand washing and social distancing, but Miskito divers have argued that the need for money forces them to expose themselves to contagion and minimize risks under the belief that their ancestors protect them. It should be noted that the Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus (OSPESCA), issued in June 2020 a biosecurity protocol for the fishing fleet entitled "Guidelines for biosecurity in fishing vessels against Covid-19 in SICA countries"<sup>20</sup>.

Despite the efforts of the National Government to regulate dive fishing activities for about 20 years, this fishing method continues being the main source of work in La Mosquitia. Due to a complaint against the State of Honduras filed in 2004 by the Association of Disabled Honduran Miskitos Divers (AMHBLI), the Association of Miskitos Indigenous Women (MIMAT) and the Almuq Nani Asla Takanka Council of Elders, at the Inter-American Commission on Human Rights (IACHR), stating that *"the State has failed to supervise the working conditions of persons who have been and are employed in underwater fishing in the department of Gracias a Dios, who are subject to labor exploitation, which has caused a situation of such proportions and gravity that it endangers the integrity of the Miskitu people, as thousands have suffered multiple and irreversible physical disabilities, and many have died"*<sup>21</sup>, the Presidency of the Republic created by an Executive Decree of January 2012, the Interinstitutional Commission for Attention and Prevention of the problem of Diving Fishing (CIAPEB), where 12 State institutions belong, besides the Attorney General's Office of the Republic and FAO are invited; its objective is to ensure strict compliance with national regulations to provide a comprehensive and coordinated response to the problem of dive fishing and its effects on the family and social environment.

As the above-mentioned FAO paper (2017a) indicates, it is estimated that around 5 000 families in La Mosquitia are linked to diving. Due to the high impact of diving on the health of fishers and their families, as well as in the socio-political context of the country, the communities, the fishing industry and artisanal fisherfolk have been organized into five guilds, as follows:

- AMHBLI (Association of Disabled Honduran Miskito Divers), representing disable fishers of spiny lobster and queen conch by SCUBA diving.

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<sup>19</sup> Gobierno de la República de Honduras – Secretaría de Salud "Protocolo de prevención y atención a las personas con enfermedad por descompresión". <http://www.salud.gob.hn/site/index.php/component/edocman/protocolo-de-prevencio-n-y-atencio-n-a-las-personas-con-enfermedad-por-descompresio-n>

<sup>20</sup> OSPESCA. Lineamientos para la bioseguridad en embarcaciones pesqueras ante la Covid-19 en los países del SICA. <https://www.sica.int/busqueda/Noticias.aspx?IDItem=123044&IDCat=3&IdEnt=47&Idm=1&IdmStyle=1>

<sup>21</sup> IACHR. Report 121/09, Petition 1186-04. Admissibility. Opario Lemoth Morris et al. (Miskitu divers) Honduras. November 12, 2009. <https://www.cidh.oas.org/annualrep/2009eng/Honduras1186.04eng.htm>

- APBGADH (Protective Association of Active Divers from Gracias a Dios in Honduras), representing active SCUBA divers of spiny lobster and queen conch.
- APICAH (Association of Industrial Fishers of the Atlantic Coast of Honduras), representing the ship-owners of autonomous diving industrial fleet of spiny lobster and queen conch.
- APIN (Association of Native Industrial Fishers from La Mosquitia), representing hookah divers of the industrial fleet catching sea cucumber.
- APAIB (Association of Indigenous Artisanal Fishers from Brus), representing artisanal hookah divers catching sea cucumber.

It is important to note that on May 30, 2001, three years before the complaint filed by the Miskitos against the Honduran State at the IACHR, the Ministry of Labor and Social Security issued the "Regulation for the occupational safety and health of underwater fishing"<sup>22</sup> (Executive Agreement STSS-116-01), which is the national rule for diving; it is periodically reviewed by the CIAPEB to improve it. Although these regulations exist for diving in the spiny lobster fishery, legal gaps persist to address the increasing number of divers in the queen conch and sea cucumber fisheries, with the specific characteristics of each one of them.

From the perspective of decent work and looking for improve the working conditions of divers, the CIAPEB made it mandatory to sign employment contracts to clarify the duties and rights of ship-owners, divers and their assistants (known in Honduras and Nicaragua as "*cayuqueros*"), as established in the above-mentioned "Regulation for the occupational safety and health of underwater fishing". Since approximately 2011, the lobster industry has been signing temporary employment contracts, with the following main stipulations:

- The working day is eight hours (6 AM - 2 PM), respecting the immersion times defined in the dive table included in the Article 50 of the "*Regulation for the occupational safety and health of underwater fishing*". The worker who infringes this provision by his own will and without authorization from the captain, will act under his own responsibility and risk.
- The price per pound of lobster recognized to the diver includes the salary of his assistant (*cayuquero*). Payments will be made on board, or immediately at the end of the trip.
- Diver's obligations are: to prevent the spread of COVID-19 through a rapid test and isolation of 15 days before starting the trip. Notify the captain if having pre-existing illnesses and/or COVID-19 symptoms. Verify the good condition of the diving equipment and report any damage they may have. Comply the "*Regulation for the occupational safety and health of underwater fishing*", and do not work under the influence of drugs or alcohol. Failure or false testimony about the measures related to COVID-19 and diving under the effect of stimulants, terminates the contract and exonerates the employer from responsibilities, based on the provisions of the Labor Code.

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<sup>22</sup> Secretaría de Trabajo y Seguridad Social de Honduras. "Reglamento de seguridad y salud ocupacional de la pesca submarina". <http://extwprlegs1.fao.org/docs/pdf/hon33886.pdf>

- Employers' obligations are: to strictly comply with the terms of Labor Code (Chapter V) and the "*Regulation for the occupational safety and health of underwater fishing*". The captain should verify that divers check equipment prior to the first dive and provide rapid COVID-19 tests prior to set sail.
- Cover medical costs caused by diseases suffered by the diver and attributed to the fishing trip, while professional risks and work accidents are governed by the obligations of the employer defined in Chapter V of the Labor Code and the law of Social Security.
- Before starting the trip, the diver must present to the employer a medical certificate of fitness for work; every six months the employer must submit divers to a medical examination to verify if they are fit to dive.

Although these contracts seek to improve working conditions on board, the real situation continues to be highly risky, with high rates of disability and death due to failures in the responsibility of each one of the parties involved: divers continue without access to the health system of the State, most of them do not have formal training, dive with basic equipment not always with proper maintenance (mask, fins and regulator), not taking control of dive times (using between 8-12 tanks per day), going to depths greater than safety limits and often under the effects of marijuana.

There is also little or no presence of the authorities in the fishing areas for control and surveillance; the vessels have high risks of shipwreck due to overcrowding, as happened, e.g. on July 3, 2019 when shipwrecked a lobster vessel with capacity for 56 people but carried 91; 27 died, there were 9 missing and 55 rescued. That same day and in the same area, another lobster vessel with a capacity for 32 people was also wrecked, carrying 49. Fortunately, all were rescued<sup>23</sup>.

Even though the CIAPEB included in its Strategic Plan 2013-2017, the need to establish a training and certification system for divers, the real situation has not changed. Other proposed actions are: create the "Hyperbaric Medical Corridor"; a social security program; a census of divers in situation of disability and fatal incidents, as well as reforms to the "*Regulation for the occupational safety and health of underwater fishing*".

In addition to unsafe diving practices and lack of discipline on board, accidents are aggravated by the lack of immediate medical attention, because hyperbaric chambers are installed in ports far from the fishing areas (these ports are: La Ceiba, Roatán and Puerto Lempira).

When a diver gets sick or has an accident, the captain does not stop the trip to attend him (unless the fishing goals have been met), so the captain send him to land in another fishing or cargo boat, which also continue working, assuming lower responsibilities for the diver, so it's probably too late when the diver finally arrives to the decompression chamber. The time that should elapse between the moment of the accident and

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<sup>23</sup> See press releases: "Fishing boat sinks near Honduras, at least 27 killed", <https://www.dw.com/en/fishing-boat-sinks-near-honduras-at-least-27-killed/a-49464662>, and "Overloading, one of the possible causes of the wreck in La Mosquitia" (in Spanish), <https://www.laprensa.hn/honduras/1298787-410/exceso-carga-causas-naufragio-la-mosquitia-muertos-pescadores->

entering the decompression chamber should be a maximum of 24 hours, but some take more than 48 hours, reducing their chances of recovery or survival.

As a country member of the Central American Integration System (SICA), Honduras complies with the regional regulations issued within the framework of OSPESCA. Among them, the “Regulation OSP-02-09 for the Regional Management of the Caribbean Lobster Fishery (*Panulirus argus*)<sup>24</sup>” of July 1, 2009, establishes binding measures to harmonize the management of this fishery in Central America and the Dominican Republic. Among other measures, autonomous diving is prohibited, but the aforementioned difficulties made it necessary to extend the term of the prohibition and finally authorize the countries to apply the measures they deem necessary, and report annually on their progress to OSPESCA.

SCUBA diving for spiny lobster and queen conch began in the 1970s, mainly to export their products to the United States of America, leaving a small proportion in the domestic market. Sea cucumber catches began in 2009 exclusively to meet its growing demand in Asia due to the reduction of its populations in the Eastern Pacific Ocean (Hong Kong, Singapore, China, Korea and also in the United States of America); sea cucumber has no market in Honduras nor any other country in the Wider Caribbean.

The three diving fishing methods applied to each fishery in Honduras are summarized as follows:

	<b>SCUBA</b>	<b>Hookah</b>	<b>Apnea/free diving</b>
<b>Spiny lobster</b>	X		
<b>Queen conch</b>	X		X
<b>Sea cucumber</b>		X	X

*Source: FAO, 2017a*

During the first four years of sea cucumber catches (2009-2013), the industrial diving fleet were fitted with stoves to cook it. To regulate the effort and pressure on the resource, the National Government issued in 2014 the SAG-DIGEPESCA Agreement 544-14 "Protocol of research and evaluation of the sea cucumber fishery", which, among other measures, authorizes the use of vessels up to 5 tons of gross capacity docking at the ports of La Ceiba and Roatan. There are currently five licensed industrial vessels for this fishery plus some 200 artisanal hookah fishing boats.

Interviews carried out for this study indicate that given the high export interest of sea cucumber, in the main marine areas where the resource inhabits, "bases or fishing camps" have been formed where there are permanently Miskito divers, aggravating overexploitation and catch of individuals under the legal minimum sizes, despite not being purchased by processing plants. In those areas there are also spiny lobster and queen conch, and even some fishers who used to catch finfish, already have permission for sea cucumber.

<sup>24</sup> OSPESCA. Reglamento OSP-02-09 para el Ordenamiento Regional de la Pesquería de la Langosta del Caribe (*Panulirus argus*). <https://www.sica.int/busqueda/secciones.aspx?IdItem=79762&IdCat=48&IdEnt=47>



During several interviews conducted for this study, it was established that usually there are buyers possibly from China in these camps, who negotiate directly with fishers, but it is not clear whether they sell the production to processing plants or whether they export them directly. Although some processing plants have permits to process and export the sea cucumber caught in the vessels authorized for this purpose, there have also been some cases where doubts arise about the authenticity of their export documents.

Though the presence of the State for control and surveillance is very limited, with the support of the Naval Force, some seizures of sea cucumbers that do not meet the minimum sizes have been made, but when these events occur, the Miskitos use to complaint to the Directorate of Indigenous and Afro-Honduran People (DINAFROH) that generally order to return them the confiscated products.

Regarding the fleet and based on information of the General Directorate of Fisheries and Aquaculture (DIGEPESCA), during the decade 2009-2018 the spiny lobster and queen conch fleet with divers was reduced from 30 to 28 vessels. Each vessel should carry up to 30 divers and 30 *cayuqueros*, but actually, the total population of divers in 2020 is about 3 500 people, in addition to 5 – 7 crew members per vessel, adding another 170 people to the fleet. When adding artisanal fishers for spiny lobster, queen conch and sea cucumber, FAO (2017a) based on DIGEPESCA, estimates that the total population of active divers is about 4 020 men, in addition to the 3 720 disabled divers identified only until 2011.

The main reason why the fleets of divers and traps continue operating simultaneously is because diving trips are more profitable thanks to their high productivity and because divers can access deeper areas compared to those reached by vessels with traps. The divers fleet docks at La Ceiba (327 km away to Puerto Lempira - La Mosquitia) and at the island of Guanaja (262 km away to Puerto Lempira), from where vessels set sail with the proper documentation and the basic crew of seven people, but divers and their assistants embark in Puerto Lempira (Cabo Gracias a Dios, some 74 km away from the fishing grounds) and at other locations along La Mosquitia, which goes generating overcrowding on board.



Figure 2 – Images of industrial vessels with divers in Honduras



Source: El Heraldo, 2014

The "sacabuzos" is the intermediary between the captains of the industrial fleet and the Miskitos. He is a controversial but fundamental figure because he is the one who knows the divers, speaks their language and is in charge of hiring them. Although he does not travel on board, some technical reports and press articles describe him as the person who subjects to divers to long hours of work, exposing them to mistreatment, accidents and even the death. However, in the interviews conducted for this study it was clarified that the pressure exerted by the *sacabuzos* on fishermen is economic but not physical.

The *sacabuzos* pays advances to the divers and retains their identity documents and/or fishing permits before embarking, to ensure that divers make enough catches to cover at least the advances; this is the origin of the psychological pressure expressed by divers, since they feel compelled to make more daily immersions than recommended to pay the money and recover their documents. Other connoisseurs of the subject in Honduras added that the *sacabuzos* really does not run any economic risk because the advances are paid with the owners or vessels administrators' money; if any diver defaults, it is the shipowner who assumes the economic losses, pays the medical expenses and compensations for accidents that divers may have.

There are also conflicting versions regarding the captains and divers' relationships. It is common to hear that captains force fishermen to dive more than five times a day, diving up to 90 feet deep to search lobsters, and even under the influence of drugs, but interviews conducted for this study and also by the FIINPESCA-FAO/OSPESCA/SWEDEN TCP Project<sup>25</sup>, indicate that captains deny that this is true, because if a

<sup>25</sup> FIINPESCA-FAO/OSPESCA/SWEDEN TCP Project. "Resultados del trabajo de campo para el análisis integral de las pesquerías de langosta y camarón en los países centroamericanos". By: Claudia Beltrán. 2008. <http://www.sica.int/busqueda/secciones.aspx?IdItem=53447&IDCat=48&IDMod=1&Criterio=3.1.%20Productos%20finales%20de%20car%C3%A1cter%20regional&IdEnt=47&Idm=1&IdmStyle=1>

diver refuses to fish there is no way to force him. As for drug use, some captains have said that the reason they should tolerate and even sponsor the use of marijuana on board is because divers demand its supply, or else they would riot, thus creating a very difficult situation to handle on board. Likewise, some disagreements that arise between *sacabuzos* and captains with divers are due to some Miskitos intend to board or abandon the vessels by their own decision, thus breaching the agreed economic and production commitments.

In the opinion of the consultant, it is very likely that the different versions of the relationship between divers, captains and *sacabuzos* reflect a complex reality where each of the parties is partially right, but also because in the end, each part defends their own actions and interests, trying to avoid their own share of responsibility in the general problem of diving.

From the documents reviewed and the interviews carried out for the present study, it is concluded that the main reasons why until now it has not been possible to enforce the prohibition of autonomous diving in Honduras are the following:

- Diving is part of the culture of the Miskitos; they have learned it from their parents and consider it an inheritance they must pass to future generations. It is estimated that although 90% of divers are aware of the risks of the activity, only a 20% have received formal training on safety at sea, diving techniques and equipment maintenance, through the National Institute of Professional Training (INFOP) and the Naval Force.
- The Miskito communities assure that in their region there are no real alternatives for economic diversification and that diving is the only profitable activity. Despite several governmental and non-governmental organizations have formulated different proposals and have tried to carry out them (e.g. agricultural crops), none have been successfully completed, mostly because the communities do not accept them or consider them viable; to this is added the influence of drug trafficking with which, apparently some people have collaborated and obtained high incomes.
- Their vocation as fisherfolk motivates them to consider only fishing as a viable activity. Although some fishers could take advantage of other resources to generate products such as dried fish (an alternative that has already been tried and failed in the commercial stage), no fishery has the capacity to provide incomes and employment for nearly 5 000 divers and *cayuqueros*. Added to this, taking products from La Mosquitia to the main ports of the Honduran Caribbean generates high transportation costs at relatively low sales prices.
- A greater capacity of the State is needed to effectively enforce existing diving regulatory mechanisms, as well as to implement policies and programs focused on decent working conditions and adequate social security for dive fishers and other crew members.

Regarding exports to the United States of America, between 2009 and 2012 the “Global Fish Alliance's Spiny Lobster Initiative” was an issue for Honduras and Nicaragua, which included, among others, the World Wildlife Fund for Nature (WWF) and about five large companies purchasing spiny lobster. Its purpose was to promote the sustainable use of the resource and within its actions, it was proposed that the United

States of America refuse to buy lobster caught by autonomous diving. Although WWF undertook a Fisheries Improvement Program to satisfy the requirements of the case, this initiative did not prosper and still is possible to export lobster caught by diving to that country.

FAO has worked directly on the problem of autonomous diving. The most recent actions in Honduras have been a consultancy in 2018 on hyperbaric medicine, and the project “Technical assistance for capacity building in the fisheries sector in Honduras”. Two of its results are: the formulation of the “La Mosquitia Fishing Development Plan” between 2018 and 2019, and the subproject “Improving occupational safety and decent work in scuba diving in Honduras”, which formulated reforms to the “Regulation for the occupational safety and health of underwater fishing” and a safe dive guide proposal.

## 5.2. Nicaragua

As Honduras, autonomous diving in Nicaragua is practiced by the Miskitos to catch spiny lobster, queen conch and sea cucumber. The fleet operates under fishing seasons, as follows: eight industrial vessels to catch lobster between July and February; queen conch from October to May and sea cucumber from December to May. According to interviews conducted for the present study with the Nicaraguan Institute of Fisheries and Aquaculture (INPESCA), the three fisheries have adequate levels of abundance.

Nicaragua has undertaken several efforts during the last 13 years to ban autonomous diving, taking as legal basis the Law 613 of February 2007 “Law of protection and safety for people dedicated to the activity of diving”<sup>26</sup>, but there has been resistance from the Miskito community to accept it due to the lack of economic alternatives able to generate similar incomes than obtained through diving, that allow them to diversify and cover their family financial needs.

As will be further explained in more detail, Honduras, Dominican Republic and Nicaragua, as OSPESCA’s member countries, have the “Regulation OSP-02-09 for the Regional Management of the Caribbean Lobster Fishery (*Panulirus argus*)” which is binding and among other measures, prohibits SCUBA diving for this fishery. After five amends to this Regulation, in December 2019 was agreed by the OSPESCA’s Council of Ministers that considering the complexity of diving problems, it is necessary to let the member countries take the needed measures to implement the national plans designed for this purpose and report on their progress to the OSPESCA's Executive Committee.

To reduce the risks to the life and health of divers, the Naval Force and the National Technological Institute (INATEC) have given some courses on safety at sea and safe diving practices. Although divers recognize the certificates or diplomas received as an added value that differentiates them as professionals, it does not guarantee that they actually comply all the rules.

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<sup>26</sup> Asamblea Nacional de Nicaragua “Ley de protección y seguridad a las personas dedicadas a la actividad de buceo”. February 7, 2007.

[http://legislacion.asamblea.gob.ni/normaweb.nsf/\(\\$All\)/2595C3504FBE478A062573F30062EEE9?OpenDocument](http://legislacion.asamblea.gob.ni/normaweb.nsf/($All)/2595C3504FBE478A062573F30062EEE9?OpenDocument)

The effectiveness of training mainly depends on the awareness of Miskitos about their own responsibility to take care of their health and not to risk their lives when trying to increase the volume of production. Despite these efforts, it is necessary to improve the communication strategy with the Miskitos, intensify training on safe diving practices and teach them the importance of good administration of money.

To promote awareness-raising among communities, INPESCA has also organized visits of active divers to disabled divers and widows. This seeks to generate a psychological impact by visualizing the real consequences of unsafe diving practices.

Nicaragua has data about the total number of divers in the spiny lobster and queen conch fisheries because most of them operate in the industrial fleet. Depending on the closure periods, both resources can or not be caught simultaneously. On the other hand, it has not been possible to establish the number of people and vessels involved in sea cucumber fishing because it is mainly a small-scale fishery.

During the interviews carried out for this study, the importance of taking advantage of FAO's experience in other latitudes of the world to develop a training program and exchange of experiences with authorities and divers from other countries of the world was stressed in order to learn the best lessons that can be replicated. This program should be aimed at divers and their assistants, as well as other crew members of the fishing fleet to achieve an effective application of measures in favor of safe diving.

As in Honduras, the *sacabuzos* is the person in charge of hiring divers, but unlike that country, in Nicaragua the *sacabuzos* travel on board of the vessels, decide which divers can travel and have a remarkable leadership that is respected by both, captains and shipowners. He is also a controversial figure about whom unfavorable opinions are often expressed, but he is also responsible for providing financial and first aid assistance when decompression accidents occur.

It is common to hear that divers are forced by the *sacabuzos* and/or the captains to dive for longer and/or at great depths, bypassing safety protocols, but the interviews carried out indicate that this is not accurate because if the diver does not agree, he cannot be compelled. However, it is true that the psychological pressure that *sacabuzos* exert on divers to comply with the established monetary commitments, which include the payment of advances before starting each fishing trip, lead the diver to submerge frequently. Most of them work between 60 and 70 feet, although some of them dive as deep as 90 or 100 feet.

Among the advances done by the country in favor of safe diving are the investments made by shipowners to improve diving equipment (tanks, compressors, filters, mouthpieces, masks and fins) and the periodic reviews carried out by the General Directorate of Aquatic Transport to verify the good condition of these equipment.

Regarding the attitudes of the Miskitos on board, it is recognized that some divers consume marijuana, arguing that this drug allows them to feel more resistant to diving and cold. However, there seem to be some positive changes in their behavior because there are an increasing number of people professing the

evangelical religion, which has succeeded teach them new behaviors that are also reflected in their attitude at work.

The fleet dedicated to lobster by diving has been reduced gradually; some vessels have been converted to catch lobster with pots; a proportion of divers are currently small-scale sea cucumber fishers with hookah or free diving; others catch jellyfish or fish, and a smaller proportion are crew members of the converted boats now using traps, although their income decreased because with this method the production is lower, and trips are longer<sup>27</sup>. In any case, all of them continue working on fishing activities.

For entrepreneurs, lobster caught with traps is more profitable but less abundant than fishing with divers; lobster caught with traps is used to offer two higher-priced products (live lobster and whole frozen lobster, mainly to sell in Europe and Taiwan), while with diving, the fisher must hit it in the cephalothorax with a harpoon, which damages its quality and presentation. For this reason, SCUBA lobster is used to produce tails to export to the United States of America, where buyers do not express objections, as explained in the case of Honduras.

The COVID-19 pandemic that has affected the people and economies of Latin America and the Caribbean since March 2020, is not alien to the sector. The fishing fleet with divers, whose spiny lobster fishing season began on July 1, after finalizing the OSPESCA regional closure<sup>28</sup>, is authorized to operate as long as it implements biosecurity protocols. Despite this authorization, in July 2020 some companies had informed to INPESCA their decision to remain ashore, since an outbreak of COVID-19 on board could represent large economic losses and a high social impact for the crews. However, Miskito divers and women selling lobster and other fishery products (known in Nicaragua as "*piquineras*") expressed their dissatisfaction with this business decision and demanded the immediate restart of activities<sup>29</sup>, for which the companies took the necessary biosecurity measures.

The annual closed seasons that are applied in Nicaragua for the three resources caught by diving are: spiny lobster (OSPESCA regional closure: March 1 to June 30), queen conch (June 1 to September 30) and sea cucumber (June 16 to November 30), which implies that only from June 16 to June 30 there is a total closure for all resources caught by diving.

From the clinical point of view, the care of decompression accidents is carried out in the hospital of Puerto Cabezas (also known as Bilwi, in Miskito language), capital of the Autonomous Region of the North Atlantic (RAAN), which is eminently indigenous and where the Miskito ethnic group is the majority. This hospital has a hyperbaric chamber, and another will be installed with the expansion in progress.

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<sup>27</sup> During the interview with INPESCA it was established that the duration of a lobster fishing trip with diving ranges from 8 to 14 days, while fishing trips with traps increase to 30 - 45 days.

<sup>28</sup> The OSPESCA's "Regulation OSP-02-09 for the regional management of the Caribbean Spiny lobster (*Panulirus argus*) fishery" of July 1, 2009, is binding on its eight member countries. Among its measures, a four-month regional closure is established, from March 1 to June 30 of each year.

<sup>29</sup> YouTube. "Lobster fisherfolk demand to go back to work". Nicaragua (video in Spanish). July 2020. <https://www.youtube.com/watch?v=ND3rcccOZZI>

FAO has cooperated with INPESCA in the search of fishing methods for spiny lobster to replace diving, but both the *Casitas Cubanas* and the collapsible traps currently used in Mexico fail to reach similar levels of productivity than diving, which allows predicting that their acceptance by the Miskitos may not be wide, added to the fact that these methods would not provide enough sources of work for most of the current active divers.

In INPESCA's opinion, FAO cooperation should help to better understand the current situation of the Miskito population in order to achieve a more effective approach with the communities. It is also necessary to intensify training in safe SCUBA and hookah diving techniques, as well as to awake their interest to diversify with finfish, which is underexploited in the Caribbean. Likewise, to encourage the use of folding traps and other efficient and environmentally friendly catch technologies.

### 5.3. Dominican Republic

Free diving and autonomous diving with hookah are practiced in the Dominican Republic, but most of the divers do not have adequate equipment and even more, instead of proper equipment, they adapt acrylic paint compressors for cars to obtain compressed air, without taking into account the health risks that this implies<sup>30</sup>.

Divers tend to operate in coral reefs areas, also causing some damages to the ecosystem, where in addition to spiny lobster and queen conch (or *Lambí*, as it is commonly known in the country), divers can catch groupers and snappers with harpoon. The main areas where divers settle are the municipalities: Río San Juan, Nagua and Puerto Plata.

The Law 307 of 2004 created the Dominican Council of Fisheries and Aquaculture (CODOPESCA)<sup>31</sup> and regulates fishing and aquaculture activities in the country, defining, among others, the prohibitions on fishing gear and methods. In this regard, the article 64 of this law prohibits the use of compressors for diving fishing and also, to carry out underwater fishing at night. However, for CODOPESCA it has been exceedingly difficult to enforce the rule because coastal communities refuse to do so, despite the serious decompression accidents and death rates that this activity has caused. For this reason, it would be convenient to promote safe diving practices.

From the regional perspective, since the Dominican Republic is an OSPESCA's member country, the application of the "Regulation OSP-02-09 for the Regional Management of the Caribbean Lobster Fishery (*Panulirus argus*)" is also binding, that as above-mentioned, among its measures prohibits the autonomous

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<sup>30</sup> YouTube. "Improvised compressors become machines of death in fishing" (part 1 and 2. Videos in Spanish). Dominican Republic, June 2016.

<https://www.youtube.com/watch?v=qD6Fp05p88s> and [https://www.youtube.com/watch?v=X8\\_mHgHz9Po](https://www.youtube.com/watch?v=X8_mHgHz9Po)

<sup>31</sup> Congreso Nacional de la República Dominicana. Ley 307-04 que crea el Consejo Dominicano de Pesca y Acuicultura (CODOPESCA). 2004. <http://extwprlegs1.fao.org/docs/pdf/dom153611.pdf>

diving in this fishery. However, at OSPESCA level there are no other regulations related to autonomous diving in other fisheries.

Spiny lobster and queen conch live in the same areas and divers could catch them in the same fishing operations, but this can only occur in the four-month period between November 1 and February 28 because both resources are closed in different periods: spiny lobster during the regional closure defined by OSPESCA (March 1 to June 30) and queen conch from July 1 to October 31. This implies that limitations to diving occur mainly because of the closures, rather than actual compliance with the regulations that prohibit it.

However, in the sea cucumber fishery there could be illegal catches because the fishery was closed in 2019 under the precautionary principle because, although there are no conclusive studies, the monitoring indicates that the resource is overexploited. Before the closure, its sales were destined exclusively for export because this product does not like the national population, but it has been known that buyers possibly from China currently offer money to small-scale divers to catch it.

In fact, NOAA statistics (see Table 3) reflect exports to the United States of America of 1 506 kilos in 2019 and 1 030 kilos until July 2020. The fact that no company has been authorized since 2019 to legally export sea cucumber indicates that apparently there are sales that somehow managed to leave the country without the necessary controls or verifications.

Regarding the illegal or unclear marketing of sea cucumber, it is worth noting that in a random search on the internet, the author of this study found an unsafe website ([www.pepinodemar.com](http://www.pepinodemar.com))<sup>32</sup>, whose presentation looks no professional and generates doubts because it does not have contact information, but a link to register personal data of visitors. The page is in Spanish, but its English translation would be: *“Sea cucumber origin Caribbean. Cuba and Dominican Republic. Chile, Ecuador, Morocco, Mexico, Peru, Turkey. Product: Sea Cucumber – Latin: Isostichopus badionotus and another that I don't know the specie... We have good quantities to serve the whole world with this dried cucumber from the Caribbean. Contact us... If you are interested in these products, you can contact us”*.

In the case of the marketing of spiny lobster (whole, live and in tails), the most important buyers are the United States of America, China and South Korea, while the United Arab Emirates only buys live lobster. The main method of capture is hookah, with which lobsters are manually caught, thus avoiding cutting them with harpoons hurting the cephalothorax. The industrial fleet operates with hookah diving; its products are aimed to export, while a small proportion of the catches come from traps used in artisanal boats and sold in the national market.

From the interviews carried out with CODOPESCA for the present study, it was indicated that from the social perspective, divers differ from other fishermen because their communities consider them as intrepid heroes not afraid to face the risks of diving and therefore, accidents and its consequences are perceived as insignia of which they can be proud, similar to war wounds. Dominican divers do not belong to any

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<sup>32</sup> Please be careful when visiting this unsafe website: [http://www.pepinodemar.com/PepinodeMar\\_Caribe.htm](http://www.pepinodemar.com/PepinodeMar_Caribe.htm)



indigenous group or particular population group. Most of these divers have been empirically trained by their parents, thus becoming a tradition that remains among generations.

Added to their heroism is the perception of being the fishermen with the greatest ability to earn money, which is true compared to the income generated by other fisheries or even any other profession or legal job. However, good income levels are not always reflected in better personal and family living conditions because a significant proportion of the money is spent by fishermen on entertainment.

In order to keep or gain their prestige as heroes and also to accumulate the highest possible profits, usually divers compete between each other, which is also a cause of decompression accidents, mainly because they do not know or do not respect the safe diving standards (maximum depths, duration and daily frequency of immersions), spending up to eight hours a day under water, thus exposing themselves to inhaling high concentrations of nitrogen produced by artisanal compressors that the body cannot metabolize. This implies that neither the shipowners nor the captains force the fishermen to dive, but they take their own decisions, as established during the interviews.

Another unsafe practice of some divers is the consumption of rum, mainly in artisanal fishing boats, but drug use is not usual. In the industrial fleet, this is less likely to occur because vessels are inspected by CODOPESCA, the National Directorate of Drug Control, and the Ministry of Health when setting sail and when docking.

From the labor perspective, there are three types of divers: 1) those working in the industrial fleet on trips of 20 to 30 days, with contracts stipulating that 50% of their income is paid in advance to their relatives; 2) those who belong to small-scale fishing crews organized by merchants or boat owners financing all fishing expenses, 3) independent small-scale fishing divers using their own boats and equipment. These last two groups of fishermen tend to fish in coastal areas, while the industrial fleet goes to the open sea.

As mentioned in this paper, the main cause of mortality caused by decompression accidents is the delay in accessing hyperbaric chambers that allow the body to compress nitrogen bubbles and avoid the formation of embolisms, a situation that is also repeated in the Dominican Republic because there are few specialized teams in coastal hospitals or health centers. Added to the lack of provision of cameras is the need to train health personnel in hyperbaric medicine, being Puerto Plata and Pedernales the two locations where this medical specialty would be most needed.

CODOPESCA is the national authority that has the greatest interaction with divers. It has had the support of the Dominican Republic Navy to give talks on safe diving, although to date no formal training program aimed to fisherfolk has been implemented. The participation of other authorities such as the Ministry of Labor and the Ministry of Public Health that could help improve decent working conditions and access to specialized health services is still lacking.



Many divers are part of a union of sea workers that by 2010 reached an agreement with the shipowners of the industrial fleet regarding the commitment to return to the families the bodies of divers who die on fishing trips. This agreement eliminated the ancient practice of throwing the corpses into the sea.

#### 5.4. Colombia

The FAO study (2017a) on diving in fishing and aquaculture in Latin America and the Caribbean indicates that in the insular territory of Colombia, which is the Archipelago of San Andrés, Providencia and Santa Catalina, located about 775 km from the continental territory of Colombia and some 220 km from Nicaragua, free diving and harpoon are the authorized methods used in small-scale and industrial fishing of spiny lobster and queen conch.

In May 1990, Colombia banned autonomous diving to protect the sustainability of these fisheries. Considering that since that date, the national authority of fisheries and aquaculture has been assumed by four institutions (National Institute of Renewable Natural Resources and Environment – INDERENA between 1968 and 1990; National Institute of Fisheries and Aquaculture – INPA between 1990 and 2003; Colombian Institute of Rural Development – INCODER between 2003 and 2013 and the National Authority of Aquaculture and Fisheries – AUNAP from 2013 to date), the measure established by INDERENA has had to be ratified consecutively by INPA, INCODER and AUNAP.

By request of the Government of the Department of San Andrés, Providencia and Santa Catalina, and based on the current legal framework (Law 195 of 1993), since February 2000 assumed by delegation most of the functions of the national fisheries authority (currently, AUNAP) in its area of jurisdiction, except for the issuance of fishing permits and licenses. Therefore, the departmental government is in charge of the management of diving as fishing method in the archipelago.

In 1990, INDERENA imposed an annual five-month closure (June-October) on industrial queen conch fishing, which was in effect until 2010 when INCODER<sup>33</sup> closed industrial fishing indefinitely throughout the Archipelago of San Andrés, Providencia and Santa Catalina, allowing only its artisanal fishing; like the other national fisheries, its use is regulated by annual fishing quotas. On the other hand, in the case of spiny lobster, in addition to the fishing quotas, an annual closure of four months (March 1 to June 30) is applied, which was harmonized with the regional closure defined in 2009 for the countries of OSPESCA.

The effectiveness of the ban on autonomous diving in fishing activities has been affected by the judgment of the International Court of Justice (ICJ)<sup>34</sup> issued on November 19, 2012 regarding the dispute between

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<sup>33</sup> The INDERENA Agreement 17 of 1990 established a five-month closure in the Bajo Quitasueño of the Archipelago of San Andrés, Providencia and Santa Catalina. 20 years later, INCODER by the Resolution 3312 of 2010 definitively closed industrial queen conch fishing throughout the Archipelago.

<http://www.funlam.edu.co/revistas/index.php/summaiuris/article/view/2330/pdf>

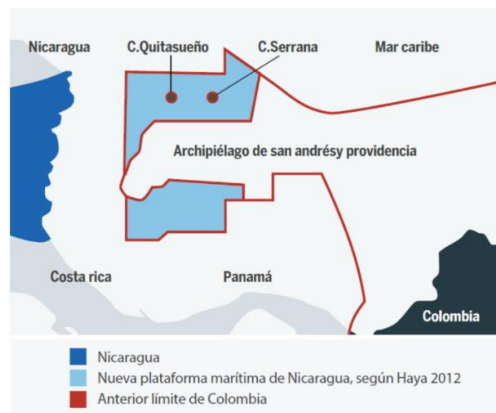
<sup>34</sup> ICJ. Territorial and maritime dispute (Nicaragua V. Colombia). Judgment of 19 November 2012. <https://www.icj-cij.org/files/case-related/124/124-20121119-JUD-01-00-EN.pdf>

Colombia and Nicaragua for the delimitation of marine and underwater areas in the 82nd meridian. The ICJ determined that the islands of the Archipelago of San Andrés, Providencia and Santa Catalina belong to Colombia, but it drew up a maritime delimitation that granted Nicaragua 75 000 km<sup>2</sup> of maritime territory previously considered Colombian.

Colombia argues that the judgment is inapplicable, since the Quitasueño and Serrana keys are located within the territory granted to Nicaragua; despite each having 12 nautical miles of territorial sea, it does not recognize to the raizal (native) communities of the Archipelago their right to possession of the territory and use of the resources that historically have belonged to them which are essential for their subsistence, for the free development of their culture and for the normal development of the natural relationship between fishing and navigation<sup>35</sup>, aspects that are protected by the Political Constitution of Colombia.

Colombia also argues that the ICJ did not take into account that all the island and maritime areas of the Archipelago make up the Seaflower Biosphere Reserve<sup>36</sup>, which is an indivisible environmental and cultural unit, while Nicaragua has expressed its intention to expand the search for oil in a maritime area of the Archipelago that Colombia had declared protected<sup>37</sup>.

**Figure 3 – Maritime boundaries Colombia and Nicaragua, after the ICJ judgement of November 19, 2012**



Source: *Atlas de los Océanos, 2018*

During the interviews conducted for the present study, it was identified that in practice, the above-mentioned ICJ judgement has made it difficult to determine the legality or illegality of fishing activities in

<sup>35</sup> Universidad Nacional de Colombia. Revista Cuadernos del Caribe. “The rights of the raizal people of the archipelago beyond the judgment of the International Court of Justice in The Hague” (in Spanish). 2013.

<https://revistas.unal.edu.co/index.php/ccaribe/article/view/43408>

<sup>36</sup> CORALINA. On November 10, 2000, the Archipelago of San Andrés, Providencia and Santa Catalina was declared by UNESCO as “Seaflower Biosphere Reserve”, with an area of 300 000 km<sup>2</sup>. Since then, it has been part of the World Network of Biosphere Reserves and is considered the largest marine area to date.

<http://www.coralina.gov.co/nuevositio/reserva-de-biosfera-seaflower>

<sup>37</sup> Fundación Heinrich Böll para Centroamérica. “Atlas de los océanos – Adenda Centroamérica 2018” [https://sv.boell.org/sites/default/files/atlas\\_centroamerica\\_f.pdf](https://sv.boell.org/sites/default/files/atlas_centroamerica_f.pdf)

the disputed areas between Colombia and Nicaragua. Based on the country's position and the current national regulations, the Colombian authorities have kept their air and maritime patrols, as well as control and surveillance operations in fisheries and environmental matters.

The industrial fishing fleet that legally operates in the Colombian insular territory, mainly for the spiny lobster fishery, is affiliated with national companies but mostly they are vessels with flags from Honduras, Jamaica, Nicaragua and the Dominican Republic. On the other hand, the implementation of national norms and policies that, since the beginning of the 90s, privilege access to artisanal fishing, reduced the operation of the Colombian-flagged industrial fleet in the areas that since then have been in dispute with Nicaragua.

However, this lower presence of the industrial fleet employed by the Colombian industry and the wealth of the natural fishing banks, could be contributing to the continuation of illegal fishing by vessels with flags of some six Caribbean countries sharing maritime borders with Colombia in the 82nd meridian area, as it was recognized even before The Hague judgment in November 2012.

Interviews conducted for this study indicates that it is not easy to control illegal fishing with autonomous diving because international industrial fleets operate in the area; also due to the lack of agreements and cooperation between the countries involved and the great variety of tricks that are generated around fishery resources of high commercial value. Specifically, regarding diving it is recognized that the most frequent illegalities are:

- Industrial fleet carrying more divers than legally authorized by their countries; some of them have even left divers stranded at sea. Furthermore, the safety and comfort conditions of the crews on board are not adequate, a situation aggravated by the high concentration of people.
- Even when Colombia had a greater effort of industrial fishing in the Archipelago, illegal catches by diving could have been equivalent to or greater than legal catches, not only because of the greater number of divers, but because the use of SCUBA or hookah allows them to dive longer than fishers practicing free diving.
- As a consequence of the modifications to the fisheries regulations aimed to control the access and support the sustainability of fisheries resources, the annual fishing quotas have been reduced, which has made more evident the impact of illegal fishing by the industrial fleet from neighboring countries.

From the human perspective, it is important to highlight that despite the Decree 2256 of 1991 prohibits autonomous diving in fishing, this practice persists with SCUBA and hookah. San Andrés and Providencia are two important tourist destinations, where the protection of biodiversity is promoted, for which the local authorities have organized training workshops on diving; there are also two modern hyperbaric chambers installed in 2015 in the local Hospital, which replaced the old equipment. Likewise, the Corporation for the Sustainable Development of the Archipelago of San Andrés, Providencia and Santa Catalina (CORALINA) and the Departmental Government have developed programs such as “I am legal” in 2019, with mini diving courses for young people living in the islands, as an educational strategy of the Corporation's biodiversity projects.

## 5.5. Mexico

The above-mentioned FAO study (2017a) characterizes 10 fishing ports in the Yucatan Peninsula, which separates the Gulf of Mexico from the Caribbean Sea, where there are about 3 800 registered divers; 55% of them are dedicated to catch spiny lobster and the other 45% to sea cucumber, although during the fishing seasons the number of divers from other communities and regions of the country increases.

Mexico has a legal and institutional framework protecting the rights and duties of workers, as well as work performance in safe conditions. Diving accidents cause decompression sickness, carbon monoxide poisoning, and arterial gas embolism, which are recognized as occupational diseases. However, fishermen are not well acquainted with the legal framework and information is not disclosed on existing protocols to mitigate the risks of diving; there are also no adequate first aid services to prevent divers' injuries from worsening before obtaining specialized medical assistance.

Divers affiliated to fisherfolk cooperatives are usually registered in the national social security system, some of which provide life insurance, access to savings funds, and finance inputs for fishing. From a production perspective, cooperatives can have exclusive access to spiny lobster, while private fishing permit holders can catch sea cucumber and hire local or foreign divers to do so. When any of them suffers decompression accidents, their expenses for care in hyperbaric chambers are covered by the employer, although in most cases there are no formal employment contracts.

Free diving and hookah are used to catch spiny lobster (*Panulirus argus*), sea cucumber (*I. badionotus*, *Holothuria floridana*), grouper (*Epinephelus* spp.), hogfish (*Lachnolaimus maximus*), octopus (*Octopus maya*) and several species of conch. Fishing operations are carried out close to the coast, on daily trips with fiberglass boats and outboard motors from 55 to 75 HP.

About 50% of divers are adults between 35 and 50 years old, often with risk factors for diving (overweight, hypertension and diabetes), although many of them do not know it. In the specific case of SCUBA diving, the risk of suffering from carbon monoxide poisoning is added.

During the interviews conducted for this study it was identified that divers population increases with the arrival of the sea cucumber fishing season, when even people who cannot swim join in, as well as children learning to dive from the empiric knowledge of their fathers or other relatives without proper training on safe diving, thus making children vulnerable to lung and ear diseases. These problems are aggravated by the weak control of the fishing areas by the competent authorities.

Although some members of cooperatives have obtained the PADI certification from the Professional Association of Diving Instructors, they do not always follow the recommendations on safe diving because the trajectory and duration of diving depend on the location of the fishing grounds.

The FAO study (2017a) also indicates that in terms of medical centers, there are statistics about the number of people treated in hyperbaric chambers, decompressions being more frequent than carbon monoxide

poisonings, but no data is collected on the fisheries that cause the accidents, making it difficult to identify the impact of each fisheries on the health of divers.

Diving fishing has high social and commercial importance, given the number of families depending on their target fisheries, but its risks make fishers highly vulnerable. It is necessary to strengthen the capacities of fisherfolk in matters of health, risk prevention, knowledge about their rights and duties granted by current legislation, as well as conducting a census to determine the real number of active, disabled and deceased fishermen due to diving.

## 5.6. The Bahamas

According to the Fisheries Resources Report (2016) of the FIRMS Project (Fisheries and Resources Monitoring System)<sup>38</sup>, the spiny lobster (or *crawfish* as locally known) is the most important fishery of The Bahamas; it is artisanal in nature and can be found in the shallow waters throughout the country. The fishing season is from August 1 to March 31 and the duration of fishing trips ranges from one day to six weeks, depending on the type of boats and fishing methods, which are: *casitas* as aggregation devices semi-permanently placed on the bottom (fishers retrieve the catch by free diving from each *casita* using a lobster hook) and traps, followed by dive compressor and free diving.

Based on the report “Fisheries and aquaculture in The Bahamas: a review” (FAO & Department of Marine Resources, 2016)<sup>39</sup>, the sector is small compared to tourism and finance, but its importance is reflected in valuable incomes from spiny lobster and queen conch exports, employment and food to the population. The main commercially targeted fisheries species are spiny lobster, queen conch, groupers, snappers and jacks; also, stone crabs are caught for their claws.

During the period 2006-2015, spiny lobster represented 51% of total fisheries production in The Bahamas and the stock is being fully exploited. About 90% of the most important products of this fishery (frozen tails and live lobsters) are aimed to export to France, United States of America and China with a gradual reduction due to the behavior of catches. On the other hand, queen conch is probably overexploited and combined with other conchs contributed with 39% to the fisheries production during the same period.

Although SCUBA diving is officially forbidden, fishers can obtain a special license to use compressed air supplied through an air hose (hookah) to increase the amount of time spent underwater to catch spiny lobster and queen conch. Regulations also exist to restrict the depth to which a fisherman can dive (between 30-60 feet), but this is largely considered unenforceable. This activity can lead to safety issues, although reported deaths are very rare.

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<sup>38</sup> FIRMS. Fisheries Resources Report – Bahamas lobster fishery. <http://firms.fao.org/firms/fishery/970/en>

<sup>39</sup> Fisheries and aquaculture in The Bahamas: a review. <http://www.bahamas.gov.bs/wps/wcm/connect/e1d636dd-1a9b-4661-9e38-ba9bf546a534/FINAL+Bahamas+Fisheries+%26+Aquaculture+Sector+Review+17Nov16.pdf?MOD=AJPERES>

Annually, the Department of Marine Resources of The Bahamas organize one-day safety workshops for divers, in order to train fisherfolk using air-compressors, as well as first responders and medical assistants. It is necessary to obtain a compressor permit to harvest spiny lobster; the requirements to obtain it are: to complete and submit the relevant application form with supporting documents (proof of undertaking formal dive training by provision of a Dive Certification Card, a copy of passport or Voters Card), and to pay a fee of around US\$ 11,20.

The above-mentioned FAO & Department of Marine Resources report (2016), based on statistics of the Caribbean Fisheries Information System (CARIFIS), indicates that in The Bahamas there are around 1 010 fishers with compressors license registered as divers, being a quit stable statistic in the period 2009-2015.

Most of fishers use small boats (locally known as *dinghy*) for one-day trips, with two to three fishers, but there is also a fleet of mothership vessels operating for three or four weeks at sea. Each mothership vessel may support fishers on five or more dinghies, who collect lobster during the day before returning to the larger vessel to process as tails (discarding the carapace at sea) and freeze the catch. This strategy allows increasing the crew on board.

Given the high probability of Decompression Sickness (DCS), Arterial Gas Embolism (AGE) or other accidents derived from SCUBA diving, which is practiced in The Bahamas for both, commercial and recreational fishers, at Nassau there is The Bahamas Hyperbaric Center Ltd.<sup>40</sup>, a private medical center in operation since 1996, which is located relatively close to the fishing sites (compared for instance, with the greater distances in Honduras and Nicaragua) allowing fast access to the hyperbaric chamber and thus reduces the death rates of divers. Besides, the Center coordinates air and sea evacuations and patients transfers from the site of the injury. It is important to highlight that this medical center support the local population with free educational programs to dive operators and commercial fisherfolk.

On the other hand, according to WWF, this NGO jointly with the Bahamian government's Department of Marine Resources, the Bahamas Marine Exporters Association (BMEA), and the NGO The Nature Conservancy (TNC), since 2010 it was developed the "Bahamas Spiny Lobster Fishery Improvement Project", aimed to gather data, enforce sustainable practices, and improve fishery management with the objective of achieving certification from the Marine Stewardship Council (MSC).

Regarding queen conch, the above-mentioned FAO & Department of Marine Resources report (2016) indicates that its population is declining precipitously since the 1990s and it has been overfished to densities incapable of reproduction, with the exception of substantial populations in Mantanilla Shoal and localized areas of the Matanilla Reef near Carter's Cay. It is necessary to improve the current management and regulations to sustain queen conch in The Bahamas, also to control the pressure of Illegal, Unreported and Unregulated fishing (IUU) by national and foreign fishers.

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<sup>40</sup> The Bahamas Hyperbaric Center Ltd. <https://www.sssnetwork.com/our-chambers-and-medical-clinics/nassau-bahamas/>

Conchs are normally caught by free diving or persons wading out in shallow water to pick them up. Harvesting conch using compressors is allowed during the spiny lobster season. Queen conch and other conchs contributed with 39% to the fisheries production of the country during the period 2006-2015.

## 5.7. Jamaica

According to the FAO “Fisheries and Aquaculture Country Profile”<sup>41</sup>, fishing and its related activities make an important contribution to food security and employment of nearly 100 000 people in Jamaica (about 5% of total population), of whom 24 469 are fisherfolk. The country has one of the highest levels of per capita fish consumption in the Americas (25,8 kg/year in 2017); its supply for the national population and tourists significantly depends on imports representing about 80% of all the fishery products consumed. For that reason, imports (US\$ 117 million in 2017) are greater than exports (US\$ 15 million), which represents a negative trade balance of about US\$ 90 million per year.

Industrial catches of queen conch, spiny lobster and some first quality finfish are aimed to exports. Traps are used to catch spiny lobster, while diving is used for queen conch. These two resources are managed through mandatory measures (closed season, minimum sizes and fishers’ licenses, among others), but the other fisheries are practically open access.

The most important measures for queen conch and spiny lobster, which are considered overexploited several decades ago, are:

- Fishers licenses: since 2000 for queen conch, while lobster licensing started in 2017.
- Closed seasons: queen conch (September 1 – April 1); spiny lobster (March 1 – June 30 since 2017; this closure is based on the Caribbean Regional Fisheries Mechanism (CRFM) “St. George’s Declaration on conservation, management and sustainable use of the Caribbean spiny lobster”<sup>42</sup>, which simultaneously is harmonized with the annual closure defined by OSPESCA).
- Queen conch and spiny lobster fishers must have valid food handler’s certification from the Ministry of Public Health.

Regarding diving in the queen conch fishery, the national “Queen conch management plan” (Fisheries Division – Ministry of Agriculture & National Environment and Planning Agency, 2017), indicates that by the 1960s, the fishery was small-scale, based on free-diving mainly in shallow waters, but given its commercial and fishing potential, by the late 1980s the industrial fleet started operations with large vessels in deeper waters using SCUBA diving and hookah, thus Jamaica became the largest queen conch producer in the

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<sup>41</sup> FAO. Country Fisheries Profile – Jamaica. <http://www.fao.org/fishery/facp/JAM/en>

<sup>42</sup> CRFM. St. George’s Declaration on conservation, management and sustainable use of the Caribbean spiny lobster. [http://www.crfm.int/~uwohxjxf/index.php?option=com\\_k2&view=item&id=441:st-george-s-declaration-on-conservation-management-and-sustainable-use-of-the-caribbean-spiny-lobster-panulirus-argus&Itemid=460](http://www.crfm.int/~uwohxjxf/index.php?option=com_k2&view=item&id=441:st-george-s-declaration-on-conservation-management-and-sustainable-use-of-the-caribbean-spiny-lobster-panulirus-argus&Itemid=460)

Caribbean by the early 1990s to satisfy exports demand, representing at that time a high risk of overfishing and the need for management of the fishery.

Nowadays, Jamaica is the only country in the region that has been certified to export queen conch to the European Union and it is considered Jamaica's most lucrative fishery. More than 90% of queen conch meat production is exported to the United States of America, France and its Caribbean territories.

According to Fisheries Division data, in 2015 there were 10 mother vessels linked to 11 industrial companies with conch quota, working with 342 fishers, not all of them Jamaicans; these mother vessels work in conjunction with smaller boats. Some of these companies bring foreign divers (mostly from Honduras and the Dominican Republic), while others rely on the production of Jamaican artisanal fishers contracted to fish for licensed harvesters.

The preference for foreign divers by some companies is explained by their work capacity, since they spend up to six hours diving per day. This represents high productivity and earnings for contractors. Apparently, Jamaican fishermen seem not to be able (or willing) to spend such a long time under water due to high health risks, so some industrial operators consider employ Jamaican divers would increase their production costs.

The queen conch management plan also describes that an industrial fishing trip can extend up to 10 days, so each mother vessel conducts three to eight fishing trips per season. Each Jamaican industrial vessel supports around 10 small canoes with a boat driver and two or three divers, mostly using hookah. The canoes operate in an area of 2-10 km from the vessel, carrying their production every 3-4 hours depending on the level of catches. Also, there are some canoes fishing in association with carrier vessels, used to leave conch directly at national processing plants within eight hours.

Most Jamaican conch divers start working in their late teens. Given the intense fishing journeys, the lack of good SCUBA tanks or hookah equipment and due safe dive protocols, it is usual to suffer from barotraumas such as bends or oxygen toxicity. It appears that fishers receive some information about dive safety that allow them to quickly identify the symptoms. In such cases, they use to go back immediately in the water and return to the depth where they were fishing to counteract the disease at sea. However, the application of this procedure depends on the individual decision of each diver.

In 2013, a modern Hyperbaric Chamber to treat decompression illness was commissioned into service at the University of the West Indies (UWI) Discovery Bay marine laboratory. The unit can accommodate up to five persons at a time, replacing an outdated 37-year-old facility. From 2011-2015, 68% of the patients treated were fishers and some of them received treatment more than once, 19% were tourists and 13% sport/commercial divers.

The treatment costs are covered by patients (including fishers), unless having health insurance, as usually is the case of recreational certified divers. The Discovery Bay laboratory does not have enough funds to



subsidize treatments nor other external financial support. In 2016 a treatment cost for Jamaicans was around US\$ 885 while international patients had a fee of US\$ 5 500. During the treatment and visits to fishing communities, personnel from the Discovery Bay Laboratory offer information and talks on safe diving, but there is no a formal training program in place, nor printed or audiovisual educational material aimed to fisherfolk that can be widely distributed.

Regarding small-scale fishing, a typical conch trip can land around 43 kg per day, of which 50% is sold clean. Fishermen interviewed by Prada & Appeldoorn when formulating the queen conch management plan (2016), indicated that each boat has one driver and up to seven divers who use around four tanks/day/diver. Queen conch fishers and traders consider that this is a good family business and when in season, the product can get fair prices despite fish is the preferred product for consumers in Jamaica. Conch meat harvested from the small-scale fleet not linked to a licensed processing plant is not eligible for export certification. It is fished on demand of local buyers like restaurants, supermarkets and hotels.

## 5.8. St. Lucia

Based on the FAO “Fisheries and Aquaculture Country Profile”<sup>43</sup>, St Lucia’s fisheries are largely artisanal and subsistence based, but the industrial production began in the 1990s with the introduction of long-liners and larger boats for offshore pelagic fisheries. Unlike other Caribbean countries, Saint Lucia’s spiny lobster production is low.

Queen conch is produced in great quantities to sell in the local market. As the country is not exporting it, its production is not covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), so concerns about its sustainability are justified.

The Fisheries Act 10 of 1984 and the Regulation 7.15<sup>44</sup> are the legal framework for the promotion and regulation of fishing and fisheries in St. Lucia. Section 39 of the Fisheries Regulation establish the requirements to obtain SCUBA and hookah licenses for facilities operators, as well as the use of SCUBA or hookah diving gear which requires to be registered and authorized by the Chief Fisheries Officer. Free diving is also allowed.

According to the interviews conducted for this study, although the regulations refer to banned activities using diving equipment, the issue of personal safety is not covered in the Act. The main challenges faced by the national authority to enforce the management measures related to diving are: the fact that many fishers involved in diving activities are not certified (for instance, PADI certification) and not trained to deal with emergency situations, as well as the utilization of safety equipment during diving, which can cause Decompression Sickness (DCS), Arterial Gas Embolism (AGE) or other accidents derived from autonomous diving.

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<sup>43</sup> FAO- Fisheries country profile – St. Lucia. <http://www.fao.org/fishery/facp/LCA/en>

<sup>44</sup> Government of St. Lucia - Law Revision Commissioner. Fisheries Act 10 of 1984 and Regulation 7.15. <http://www.govt.lc/legislation/saint-lucia-fisheries-act-cap-7-15->

On the other hand, the most relevant achievements complying with safety regulations include: 38 divers (up to August 2020) receiving PADI training and becoming in certified advanced open water divers, as well as divers with training in emergency oxygen delivery and first aid.

To date, St. Lucia does not have statistics about the number of active, disabled and deceased divers, so it is not easy to measure the impact of bad diving practices. Many of them are not certified or trained to face emergency situations which shows the need to reinforce the attention to this issue.

## 5.9. The experience of Chile

For the specific purposes of this study, the measures and decisions taken by Chile to regulate diving and ensure its safe practice are highlighted, which are extracted from the above-mentioned FAO report (2017a), taking as basis the fact that as in the Wider Caribbean, most of Chilean divers belong to fishing communities and have learned the job through family inheritance, so learned lessons could be transferred or adjusted to the particular context of each Caribbean country.

- The first regulation for all types of diving, including diving in fishing and aquaculture, was issued in 1982 and is periodically updated as required.
- This regulation establishes the requirements that divers in fishing and aquaculture must fulfill, as follows:
  - In artisanal fishing with depths up to 20 meters, there must be a diver with his assistant using light semi-autonomous equipment.
  - Each diver and his assistant must have a registration or certification issued by the maritime authority closest to their location. To obtain this certification, it is necessary to pass an annual examination issued by a certified doctor on fitness to dive, present the certificate of criminal record, certificate of studies at least of the basic level and certificate of having complied with the law of recruitment to the armed forces. Divers must be at least 18 years old and Assistants at least 16 years old.
  - Comply with the maximum term of 15 days authorized per fishing trips.
  - Have in force the proof of the annual inspection on the fishing equipment carried out by the maritime authority.
  - Have in force a life insurance for accidental death and disability, as established by the General Law of Fisheries and Aquaculture of Chile for all persons working in the sector, which is checked by the fisheries authority, and
  - Be registered in the Artisanal Fishing Registry managed by the fisheries authority.
- Chile has a detailed registry of people dedicated to fishing and aquaculture diving, including: instructor divers, basic and intermediate diver supervisors, basic divers, intermediate divers, diver assistants and contractors authorized to employ divers complying with all legal requirements.
- In artisanal fishing, the weakness of the lack of formal contracts between ship-owners and fisherfolk persists, which makes it difficult to monitor compliance with the rules. When fisherfolk suffer diving

accidents, the costs of medical treatment are covered by themselves or by their families, although also in some cases, ship-owners subsidize part of these expenses on a voluntary basis.

- The current regulations for professional diving do not make it mandatory to take courses to obtain the registrations or certifications defined by the Regulation, but fisherfolk's organizations usually request training sessions on safe diving practices to the local maritime authority, the fisheries authority or the health authority.

The main lessons learned from the Chilean experience could be summarized as follows:

- Rules and policies related to diving should be formulated considering the cultural, ethnic, environmental, and economic aspects of the communities involved in diving.
- It is necessary to have a high institutional capacity and officials' commitment to effectively regulate and supervise all activities related to diving, which allows comprehensive responses to this problem that has implications for human health, community well-being, fisheries, environmental and legal issues.
- It is important to establish or strengthen coordination between inspection and health authorities to sensitize fisherfolk about the risks of inappropriate diving practices. In the Chilean case, the authorities face resistance from fisherfolk to take the medical evaluation needed to obtain a diving license.
- In opinion of the author of this study, it would also be necessary to include interlocutors who are respected and listened by fishermen and their families (at least their couples and children), in order to achieve effective dialogues aimed to their awareness-raising and correctly influencing in the fisherfolk decision-making regarding the need to take their own responsibility and take their own steps to protect their lives through safe diving, which should be more important than their goal of making money from spearfishing, rather than seeing it as sole or major responsibility of their employers and governments to provide safe diving conditions.
- It is also important to consider that the combination of a solid regulatory framework, a certification system and possibilities for training in safe diving, has allowed Chile to have a lower accident and death rate compared to some Caribbean countries that do not have enough legal and institutional strengths, even without considering the cultural and socioeconomic aspects that have strong influence and that may differ between the diving communities of the Central American countries, northern South America, the West Indies and Chile.

## **6. Employment generation and gender roles in dive fisheries**

Although there are no employment statistics disaggregated by gender, it is commonly known that the participation of women in the fisheries sector is higher at industrial and semi-industrial scale processing plants, at collection centers and assuming the marketing of products from artisanal fishing. There is also a growing participation of women at small-scale fishing associations and cooperatives, where they assume administrative and marketing responsibilities, also representing their associations in dialogs with governments, development partners and other stakeholders.

Processing plants are the main generators of female employment and have a notable impact on socially vulnerable women. Many companies sign contracts with social security and in some cases, they also have nurseries for children, which constitutes two valuable benefits appreciated by women, particularly for those who are heads of families and single mothers.

Since many companies are located in areas far from capital cities, they become important development poles, not only because of the job opportunities for the surrounding population, but also because many of them carry out social works benefiting employees' families, and in some cases, to neighboring communities with schools, health journeys, donations of school supplies, construction of roads, etc.

Although women are not usually part of the crews of fishing boats, it is important to note that they are frequent members of the teams of professionals who carry out fishery research cruises, and they also occupy various positions, not only in activities of the value chain (fishing, processing and marketing) but also at institutions such as: fisheries authorities, academia, international organizations, non-governmental organizations, etc.

For their part, men assume those functions that involve strength, risks, resistance to low temperatures (management of cold rooms, fast freezing tunnels and ice handling), diving, manual or mechanized harvests, repair of fishing nets, motors, boats, loading and unloading of boats, surveillance, etc.

## **7. Conclusions and recommendations**

The conclusions and recommendations of this study, are the following.

- a) It is recommended to design (or review, as appropriate) a legal and policy framework recognizing diving as a risky activity, in such a way that allows to include divers and their assistants as beneficiaries of the labor and occupational safety legislation, but taking into consideration the cultural, social, political and economic particularities of each country.
- b) Considering that three countries of the SICA/OSPESCA region (Honduras, Nicaragua and the Dominican Republic) have the highest accident rates due to autonomous diving in the Wider Caribbean, but that in the case of spiny lobster, this activity is prohibited by the OSPESCA Regional Regulation OSP-02-09, it is recommended to promote awareness-raising and training actions in safe diving practices aimed to divers working on fisheries without legal restrictions to use this fishing method.
- c) Taking into account that in the OSPESCA and CRFM regions, as well as in other countries of the Wider Caribbean, no regional or national standards have been established for fisheries such as queen conch and sea cucumber, in which autonomous diving is the main fishing method, it is recommended to regulate the conditions and requirements to practice diving under the international principles of decent work and safe diving practices, as well as to design rules and mechanisms to discourage other practices threatening the sustainability of these fishery resources.

For example, it is known that in some countries where there is the sea cucumber fishery, there are informal agreements between foreign not authorized buyers with divers, whose products could be IUU

fishing, therefore it is necessary to regulate the fishery, reinforce control and surveillance in the fishing zones and to work closely on traceability in order to recognize if actually there are illegal activities in processing, transport and export of sea cucumber products, and to apply the necessary measures to control bad and irregular practices along the entire value chain.

- d) It is necessary to design practical guides on safe diving (both simple as well as detail guides accessible to different levels of education), with drawings and a simple and direct language easy to understand by divers and their assistants, regardless their level of education. Given the high cultural diversity in the WECAFC region, it is recommended to edit these guides in English, Spanish, French and native languages of the indigenous ethnic groups (prioritizing the Miskito language due to the high population involved) practicing diving.

A valuable example reported by ILO<sup>45</sup> is about divers on the west coast of Thailand, who have also suffered illnesses by unsafe SCUBA diving practices. Given the difficulty of having hyperbaric chambers near fishing areas, national specialists concluded that without evading the importance of chambers, a better understanding about the risks of diving, knowledge to avoid decompression and the importance to provide first aid, helped to reduce accidents. With the participation of ship-owners, community representatives, medical and nursing personnel, a 10-page primer was developed with 10 concise and direct rules on safe diving. Validation sessions were held with groups of divers and also workshops to disseminate the new guides were organized with divers and captains; each fisher also got a dive shirt with the following safety message on the back "*Ascend slowly after every dive*".

- e) On the other hand, considering that audiovisual material is more attractive and easy to understand, it is also recommended to design an application for smartphones where divers can access to safe diving instructions and recommendations, first aid guides, real-time location of medical centers with hyperbaric chambers, communication with maritime search and rescue units, among other functions.
- f) Due to in the Wider Caribbean the number of health professionals with training and experience in hyperbaric medicine is small, it is recommended to negotiate with the health authorities, the academia and cooperation agencies among other possible partners, the creation of formal education programs aimed to medical and nursing personnel (postgraduate courses, short or medium-term courses, etc.), particularly for those working near the largest fishing diving areas.
- g) One of the greatest challenges for the effective management of safe diving and protection of the life of fishers is the capacity for inter-institutional coordination, effective control and surveillance and changes in the attitude of fishers and entrepreneurs towards safe diving. To reach definitive changes in people's decisions and behavior, it is recommended to include in the technical assistance programs, professionals in social work who know the culture of each community or social group and who can establish effective channels of communication and awareness-raising with divers and their assistants.
- h) To achieve better results in promoting safe diving, families of divers and their assistants, as well as captains and crew members of the industrial fleet should also participate in training programs and awareness activities, thus exerting a positive influence on divers, discourage them from risking their lives for the need to earn money and also, to know how to proceed if a diver is involved in an accident.

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<sup>45</sup> ILO. Magazine TRABAJO. "Diving safely or how the Thai 'Gypsies of the Sea' overcome diver's disease". (in Spanish). [https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/dwcms\\_080698.pdf](https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/dwcms_080698.pdf)

- i) The present study describes the experiences of autonomous diving in eight countries of the WECAFC region (Honduras, Nicaragua, the Dominican Republic, Colombia, Mexico, The Bahamas, Jamaica and Saint Lucia), but this does not mean that these are the only countries sharing the need to advance in decent work actions, promotion of safe diving measures and if possible, to discourage autonomous diving, but if this is not possible, reinforce control and surveillance.

In this sense, it is recommended that the actions proposed in an eventual international cooperation project about health and safety in diving fishing promoted by FAO, may include other countries and territories of the WECAFC region. For this, it is suggested to consult with its members the final selection of the countries that would be included in the project, considering the availability of financial resources and the involvement of the fisheries, maritime and health authorities of the countries, in order to achieve better results and ownership of the project, and by this way to procure that the activities will continue when the FAO technical assistance ends.

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## Annex 1 - List of key informants

<i>Name</i>	<i>Position</i>	<i>Country or Organization</i>
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Renaldy Barnuty	Chief Department of Research	INPESCA (Nicaragua)
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Jeanette Mateo P.	Chief of Fisheries Resources	CODOPESCA (Dominican Republic)
Martha Prada T.	International consultant	
Glenda Peña G.	National expert	Honduras
Sarita Williams-Peter	Chief Fisheries Officer	Department of Fisheries (St. Lucia)
Charlie Prospere	Fisheries Biologist	Department of Fisheries (St. Lucia)
Reinaldo Morales R.	Regional Director	OSPESCA
Milton Haughton	Executive Director	CRFM
Alejandro Flores N.	Senior Fishery and Aquaculture Officer	FAO Regional Office for Latin America and the Caribbean