



Fisheries and Aquaculture in The Bahamas: A Review

Key Fisheries Sector Figures



**Annual fisheries
production 12
thousand tonnes**



**9,300 people
employed in
commercial
fisheries**



**Export value
70 million USD**



**4,000 Fishing
vessels**



**Rec Fish sector
contribution
500+ million USD**



**Consumption 31
kg/capita/year**

Major products



Spiny lobster



Queen Conch



Stone crab



Grouper

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Acronyms and Abbreviations

ACP	African, Caribbean and Pacific group of states
AFS	Assistant Fisheries Superintendents
BAIC	Bahamas Agricultural and Industrial Corporation
BAMSI	Bahamas Agriculture and Marine Institute
BCFA	Bahamas Commercial Fishers Alliance
BMEA	Bahamas Marine Exporters Association
BNT	Bahamas National Trust
BREEF	Bahamas Reef Environment Educational Foundation
BSCA	Bahamas Sportfishing and Conservation Association
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CRFM	Caribbean Regional Fisheries Mechanism
DCF	Data Collection Framework
DMR	Department of Marine Resource
EAF	Ecosystem approach to Fisheries
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization
FisMIS	Fisheries Management Information System
FSTL	Food Safety & Technology Laboratories
GDP	Gross Domestic Product
HACCP	Hazard Analysis Critical Control Points
IT	Information Technology
MAMR	Ministry of Agriculture, Marine Resources
MSC	Marine Stewardship Council
MT	Metric Tons
NEAFC	North East Atlantic Fisheries Commission
NEC	National Economic Council
SBIMR	South Berry Islands Marine Reserve
SME	Small and Medium-Sized Enterprise
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCP	Technical Cooperation Programme
TNC	Nature Conservancy
VMS	Vessel Monitoring System
WECAFC	Western Central Atlantic Fishery Commission

Executive Summary

The fisheries sector plays an important role in the Bahamian economy in terms of foreign currency earnings, food supply and employment. The commercial fisheries sector supplies 31 kg/capita/year of fish and fishery products to the population, generates some 80 million annually in export earnings and provides full-time employment to 9,300 commercial fishers and thousands of jobs more in recreational fisheries, vessel maintenance, fish processing, retail and trade. The fishing fleet is characterized as small-scale and counts approximately 4,000 fishing vessels ranging in length from 3 meters to 30 meters, but generally less than 7 meter in length.

The total commercial fisheries production in 2015 was estimated at nearly 12,000 tonnes. The total production has fluctuated in recent years. Fluctuations are largely caused by the variations in landings of spiny lobster, which were nearly 10,000 tonnes in 2010 and 2012 and around 6,500 tonnes in 2015.

Spiny lobster stocks in The Bahamas are being fully exploited, while conch, snappers and groupers are, like in the rest of the Caribbean, under heavy fishing pressure and some stocks are probably overexploited. The major threats to the marine fisheries resources are coastal zone development, boat and diver damage to the reef, over-harvesting of commercial species and disturbance to sensitive sites.

The recreational and sport fisheries subsector of the fisheries sector is also very important to the country contributes an estimated 500+ million USD annually to the national economy through related expenditures by tourists, and provides employment for some 18,000 Bahamians. The recreational and sport fisheries target game fish, such as marlins and sailfishes, as well as bone fish.

The total exports of Bahamian fish and fisheries products have gradually reduced over the last 6 years from 2,718 tonnes in 2009 to 2,397 tonnes in 2015. In line with the trends in products landed a reduction in exports of spiny lobster is visible. Since 2013, the combined exports of spiny lobster (meat, whole and live) have been below 2,000 tonnes. In terms of volume, the imports of fishery products are some 75% higher than the exports. The trade balance for fish and fisheries products is positive with export earnings around 70 million USD and imports around 24 million USD. The exports of fish and fisheries products in 2015 accounted for 31% of the domestic exports of The Bahamas. As such, the fisheries sector is a major contributor to reducing the trade deficit of The Bahamas.

The latest (2013) per capita fish supply figures indicate that Bahamians have a supply of fish and fisheries products of some 31 kg/capita per year. In 1990, this was only 23 kg/capita/per year.

The increase in supply of fish to the population has largely been achieved through an increase in fish and fishery product imports. Fish and fisheries products provide some 10% of the total protein intake by the Bahamian population.

The Bahamas participates actively in regional collaboration in fisheries management and development, especially within the frameworks provided by the Caribbean Regional Fisheries Mechanism (CRFM) and the Western Central Atlantic Fishery Commission (WECAFC), of which the country is member.

The fisheries sector development in The Bahamas has been hampered by the lack of a proper legal, policy and planning framework; a matter which has been addressed by the recently drafted Fisheries Act and the draft National Policy and the Strategic Plan for Fisheries and Aquaculture Development and Management in The Bahamas 2017-2022. Fisheries sector governance in The Bahamas is also constrained by the limited availability of data and information for management and development of capture fisheries (commercial and recreational).

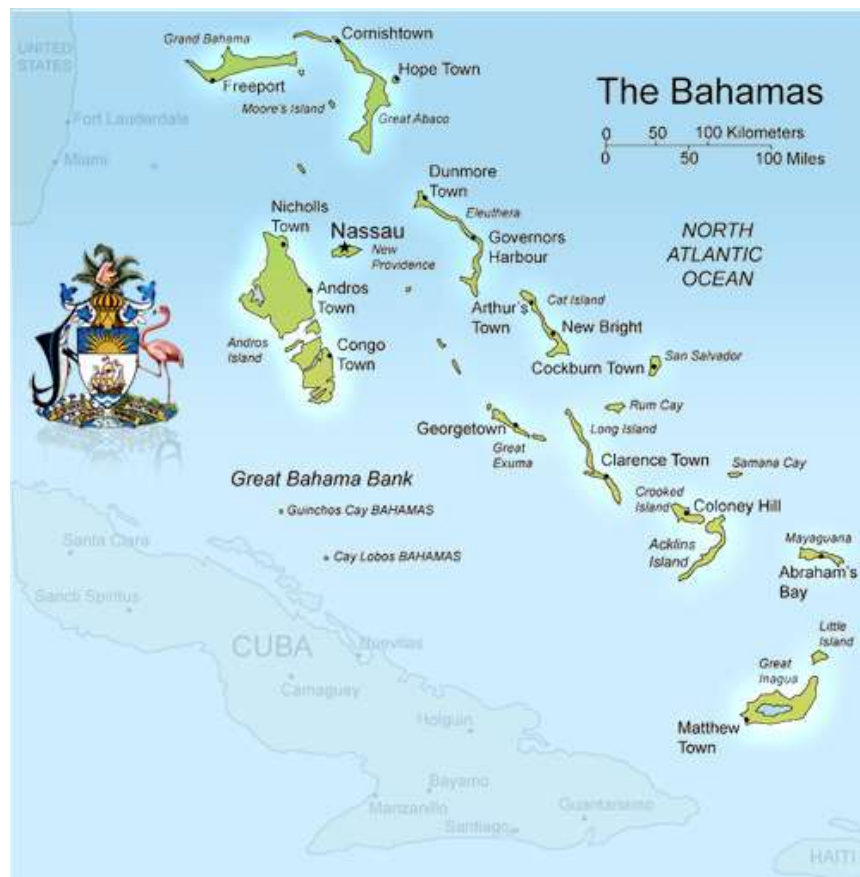
A Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis of the sector is provided in this report to create understanding and assist future decision-making processes in the sector.

1 Introduction

1.1 The Commonwealth of The Bahamas demography and economy

The Commonwealth of The Bahamas is an archipelago of roughly 3,000 small islands and cays with a land area of about 13,935 km². It has a total continental shelf area of approximately 116,550 km². The islands and cays are spread over an area of some 230,000 km² and are located on 16 plateaus separated from each other and from Florida, Cuba and Hispaniola by depths of 350 – 3600 meters. The archipelago comprises 700 islands and 2,400 cays, of which 29 are inhabited (referred to as Family Islands). The islands occupy an area of 13,939 km² (5,382 mi²) (FAO, 2014).

Figure 1: The Commonwealth of The Bahamas archipelago map¹



¹ This map is available at: [http://www.bahamas.gov.bs/wps/portal/public/About The Bahamas/Overview](http://www.bahamas.gov.bs/wps/portal/public/About%20The%20Bahamas/Overview) - short URL to directly access the page: goo.gl/YREEMo

The population of The Bahamas was estimated at 362,000 in 2013 (351,000 in 2010 from the 2010 census data). The population is distributed as follows: 0-15 years (25.6%), 15-64 years (68.1%) and 65 years and over (6.3%) (2013 projection). Eighty-five percent of the population is concentrated, mainly in the urban centers, of New Providence and Grand Bahama (Department of Statistics, 2014). Almost 73% of the population resided in New Providence, 14% in Grand Bahama and 13% in the other Family Islands.

The overall poverty rate in The Bahamas is 12.5 %. New Providence and Grand Bahama present a similar or lower poverty rates (respectively 12.4% and 9.4%) whereas Family Islands have a higher rate (17.2%). Hence, poverty rates are higher in rural communities. However, the total number of poor people in the population is higher in New Providence and Grand Bahama than in the rest of the Family Islands (Department of Statistics, 2016a).

The economic development of The Bahamas is largely driven by its tourism and finance sectors, which contribute respectively 10 and 11 % to the Gross Domestic Product (GDP). (Department of Statistics, 2016b)

1.2 Fisheries key factors in the Commonwealth of The Bahamas

Commercial fishing takes place on the continental shelf, mainly on the Great Bahama Bank and Little Bahama Bank. These two banks make up the majority of the 116,550 km² of continental shelf area. The continental shelf is nearly 18% of the total Exclusive Economic Zone (EEZ)² of The Bahamas of 654, 719 km².

The fisheries sector contributes an estimated 1% to the GDP (Department of Statistics, 2016b), but plays an important role in the economy in terms of foreign currency earnings, food supply and employment. The fish supply available to the Bahamian population is an estimated 31 kg/capita per year, however actual fish consumption levels are lower as a large share of the fish landed and imported is supplied to the tourism sector. Fisheries products are important in the diet of the Bahamian people as nearly 10% of total protein intake is originating from fish and fisheries products.

The fisheries sector generates some 80 million USD annually in export earnings and provides full-time employment to an estimated 9,300 commercial fishers and a few hundred people more in vessel maintenance, fish processing, retail and trade. The fishing fleet is characterized as small-scale and counts approximately 4,000 fishing vessels ranging in length from 3 meters to 30 meters, but generally less than 7 meter in length.

² EEZ figures used originate from: https://en.wikipedia.org/wiki/Exclusive_economic_zone

The total commercial fisheries production in 2015 was estimated at nearly 12,000 tonnes. The total production has fluctuated in recent years. Fluctuations are largely caused by the variations in landings of spiny lobster (*Panulirus argus*), which were nearly 10,000 tonnes in 2010 and 2012 and around 6,500 tonnes in 2015. Spiny lobster stocks in The Bahamas are being fully exploited, while conch, snappers and groupers are, like in the rest of the Caribbean, under heavy fishing pressure and some stocks are probably overexploited. The major threats to the marine fisheries resources are coastal zone development, boat and diver damage to the reef, over-harvesting of commercial species and disturbance to sensitive sites.

The recreational and sport fisheries subsector of the fisheries sector is also very important to the country contributes an estimated 500+ million USD annually to the national economy through related expenditures by tourists, and provides employment for some 18,000 Bahamians. The recreational and sport fisheries target game fish, such as marlins and sailfishes, as well as bone fish.

Aquaculture has been identified as a priority by the Ministry of Agriculture and Marine Resource in the last decade, but this subsector is still in its infancy phase and is growing slowly.

1.3 The current support to The Commonwealth of The Bahamas' fisheries sector

The Government of The Bahamas requested in 2013 assistance from the Food and Agriculture Organization of the United Nations (FAO) under its Technical Cooperation Programme (TCP) with an aim to enhance the capacity of the Department of Marine Resources (DMR) to guide the responsible development and management of the capture fisheries and aquaculture sectors, in a timely and consistent manner, through a complete and functional fisheries policy framework that is in line with the national and international best-practices, legislative and policy requirements and is supported by a functional Fisheries Management Information System. A TCP project was formulated and approved by FAO in early 2014, with the title: "Strengthening Fisheries and Aquaculture Governance in The Bahamas" (TCP/BHA/3501).

Specifically, the project aimed to strengthen the institutional and human capacity of the DMR and produce the following key results:

- A fishery and aquaculture policy and strategic planning framework for The Bahamas.
- An established and functioning Fisheries Management Information System (FisMIS) for The Bahamas.
- An assessment of the potential for aquaculture development in The Bahamas and the process for establishing aquaculture businesses.

- An assessment of the socio-economic impact of recreational fisheries in The Bahamas in support of fisheries policy and decision-making.
- An increased commitment towards sustainable fisheries and aquaculture development in The Bahamas.

The development goal of the project was to provide a significant contribution to the sustainable utilization and management of the fisheries and aquaculture resources in The Bahamas, adding to national food security, fisheries sector employment and generation of export earnings.

This sector review was prepared with support from FAO project TCP/BHA/3501.

1.4 Acknowledgements

This sector review was prepared as one of the results expected from above mentioned TCP project and provides an overview of the fisheries and aquaculture sector in The Bahamas. Stacey Moultrie was the main author of this review study. Contributors to this review were the Department of Marine Resources' staff (Michael Braynen, Edison Deleveaux, Gregory Bethel, Lester Gittens and Indira Brown), staff of the Ministry of Agriculture and Marine Resources (Delreese Grant), the Project Steering Committee members, and FAO consultants and staff (Pedro Bueno, d'Shan Maycock, Sharrah Moss-Hackett, Yann Laurent, Carlos Fuentesvilla and Raymon van Anrooy). Main sources of information included annual DMR reports, statistics provided by the DMR, past sector plans and FAO reports and an analysis of the sector.

2 Historical Background

This section provides a summary of information available in several historical reports on fisheries in the Commonwealth of The Bahamas, showing the evolution of the sector across the years and concerns about the preservation of the resources.

2.1 1883 Adderley Paper on Fisheries

In 1883, Augustus John (A.J.) Adderley presented a paper on the Fisheries of The Bahamas³ at the Great International Fisheries Exhibition in London. He described The Bahamas as being of 4,424 square miles in area with a population of 44,000 and a population density of 10 per square mile.

He detailed the fisheries sector as follows:

- Fish species are presented as “innumerable”; Adderley specifically cited grouper, red snapper, margate, barracuda, houndfish, porgy, google-eye, jack, muttonfish, shark, stingray, mullet, crawfish, swordfish, bonefish, hogfish, angelfish, jewfish, dolphin, kingfish, grunts and turtle;
- The total fleet is 100 vessels, employing 500 persons. These boats were described as “sloop rig with a leg-of-mutton sail, and a well for keeping the fish alive”;
- The fishing gear at the time consisted of fish pots, handlines and nets. The most commonly used bait in line fishing was conch.
- More specifically on sponge exploitation, he mentioned that thousands of people were involved in sponging and wrecking. The vessels used were described as “schooner rigs with fast sailors” and “small with a crew of 6-12 men”. Their tonnage varied from 15 to 60 tonnes. Adderley described the different sponge varieties as “sheep-wool, white reef, Abaco velvet, dark reef, boat, hardhead, grass, yellow and glove”. Spongers would go out to sea for periods of 6 weeks.

Adderley noted that no fish products were exported with the exception of turtle, specifically Green and Hawksbill for their shells. The estimated value of fish consumed locally was £18,000 (real price in 2015 of £1,635,000 or USD 2,330,774⁴) on an annual basis. The value of turtle exports was £600 annually (2015 real price of £54,500 or USD 77,692). In comparison the sponge exports added up to three times the value of the locally consumed fisheries products.

Table 1 below describes values of other fisheries products as described by Adderley with conversions to 2015 real prices, highlighting the contribution of fisheries to the Bahamian economy even as far back as 1883.

³ This book is available at:

<https://ia800208.us.archive.org/9/items/fisheriesbahama00addegoog/fisheriesbahama00addegoog.pdf>

⁴ Calculations made using a relative value calculator. See <https://www.measuringworth.com/ppoweruk/>.

Table 1: Estimates of fisheries products values for 1883 converted to 2015 values

Product⁵	1883 value in British pounds (£)	2015 real price in British pounds (£)	2015 real price in US Dollars (USD)⁶
Fish (L)	18,000	1,635,000	2,413,260
Turtle (E)	600	54,500	80,442
Shells (E)	1,200	109,000	160,884
Conch pearls (E)	3,000	272,500	402,210
Ambergris (E)	1,000	90,830	134,065
Sponge (E)	60,000	5,450,000	8,044,200
Total	83,800	7,611,830	11,235,061

Adderley noted the “absolute necessity” for life preserving apparatus on fishing vessels and recommended that there should be a heavy penalty for failure to do so. Based on consultations with fishing communities, this continues to be a problem in 2016.

Other recommendations by Adderley included:

- Periodic isolation and protection of sponging grounds to enable them to recover from over-fishing;
- Establishment of a “sponging nursery” that could be used to seed surrounding areas;
- Closed season for the Queen conch as a means to protect the species and increase their market value;
- Curing of goggle-eyes and jacks to create a market for these fish in Europe and South America

2.2 1986 Department of Fisheries Annual Report

A century after the Adderley review, in 1986, the Department of Fisheries of The Bahamas Annual Report presented a total production of edible fishery resource as 7,680 tonnes valued at nearly B\$⁷ 28 Million. Table 2 shows the products and their estimated value.

⁵ L stands for local use; E stands for exported.

⁶ Used 2015 currency conversion rate of 1.476 rounded to the nearest one.

⁷ 1 Bahamian dollar (B\$) = 1 United States Dollar (USD) – September 2016.

Table 2: Summary of estimated total edible fishery production and landings 1986

Fishery Products	Production (lbs.)⁸	Landings by weight (lbs.)	Landings by value (USD)
Crawfish (Spiny Lobster)	10,240,607	3,419,799	20,555,334
Conch	1,254,197	1,213,333	2,368,061
Turtles	61,350	61,350	93,627
Groupers	1,918,064	1,418,374	2,686,989
Snappers	1,596,896	1,596,896	1,165,551
Jacks	1,022,117	1,022,117	704,093
Grunts	240,802	240,802	177,880
Other Scale fish	596,616	596,616	231,244
TOTAL	16,930,649	9,569,287	27,982,779
	(7,680 tonnes)	(4,341 tonnes)	

The report did clarify that these recorded (and estimated) landings are probably lower than actual landings. This was due to the lack of extension officers in many of the Family Islands, which led to marine product landings going unrecorded.

2.3 1992 Department of Fisheries Semi-Annual Report

The 1992 Department of Fisheries Semi-Annual Report provides a listing of commercially important fisheries species caught in The Bahamas. These are listed below in Table 3.

⁸ Where lbs. = pounds and tonnes are metric tons

Table 3: Commercially important fishery resources in The Bahamas (1992)

Common Name	Scientific Name
Shallow water scale fish	
Nassau grouper	<i>Epinephelus striatus</i>
Red hind ⁹	<i>E. adscensionis</i>
Yellowfin grouper	<i>Mycteroperca venenosa</i>
Black grouper	<i>M. bonaci</i>
Gag grouper	<i>M. microlepis</i>
Scamp grouper	<i>M. phenax</i>
Mutton snapper	<i>Lutjanus analis</i>
Lane snapper	<i>L. synagris</i>
Grey snapper	<i>L. griseus</i>
Schoolmaster	<i>L. apodus</i>
Yellowtail snapper	<i>Ocyurus chrysurus</i>
Margate fish	<i>Haemulon album</i>
White grunt	<i>H. plumierii</i>
Bluestripe grunt	<i>H. sciurus</i>
Sailor's choice	<i>H. parra</i>
Bar jack	<i>Caranx ruber</i>
Blue runner	<i>C. fusus (also known as C. crysos)</i>
Yellow jack	<i>C. bartholomaei</i>
Horse-eye jack	<i>C. latus</i>
Goggle-eye	<i>Selar crumenophthalmus</i>
Jolthead porgy	<i>Calamus bajonado</i>
Sheepshead porgy	<i>C. penna</i>
Hogfish	<i>Lachnolaimus maximus</i>
Turbot	<i>Balistes vetula</i>
Barracuda	<i>Sphyraena barracuda</i>
Deep water scale fish	
Misty grouper	<i>Epinephelus mystacinus</i>
Red grouper	<i>E. morio</i>
Silk snapper	<i>Lutjanus vivanus</i>
Blackfin snapper	<i>L. buccanella</i>
Black snapper	<i>Apsilus dentatus</i>
Crustaceans	
Crawfish (Spiny lobster)	<i>Panulirus argus</i>
Molluscs	
Queen conch	<i>Strombus gigas</i>
Queen helmets	<i>Cassis madagascariensis</i>

⁹ This may be the Rock Hind. The Red Hind's scientific name is *Epinephelus guttatus*.

Reptiles	
Green turtle	<i>Chelonia mydas</i> (now protected from commercial sale)
Loggerhead turtle	<i>Caretta</i> (now protected from commercial sale)
Sponges	
Wool	<i>Hippiospongia lachne</i>
Grass	<i>Spongia graminea</i>
Hardhead	<i>S. barbara dura</i>
Reef	<i>S. oblique</i>

The same report notes total landings for the first half of 1992 as 3.867 million lbs. (approximately 1,754 tonnes) valued at USD 16,561 Million. Table 4 provides the production for that period.

Table 4: Summary of total landings in The Bahamas – first half of 1992

Fishery Product	Landings by weight (lbs.)	Landings by value (USD)
Crawfish tails	1,358,798	12,937,178
Crawfish whole	1,989	4,427
Conch fresh	571,361	1,030,196
Conch dried	0	0
Turtle green	5,375	5,776
Turtle loggerhead	4,357	8,507
Nassau grouper	497,683	1,076,853
Other groupers	0	0
Grouper filet	105,485	283,894
Snapper	416,991	374,323
Jacks	106,890	92,398
Grunts	27,441	21,796
Other	770,784	726,493
TOTAL	3,867,154	16,561,841

2.4 2000 Harbor Branch Aquaculture Assessment

In 1977, the Government of The Bahamas considered aquaculture as promising sector for development and drafted aquaculture regulations for incorporation into the Fisheries Resources (Jurisdiction and Conservation) Act 1977 (revised 1987). In 1983, the Government, with assistance from the United Nations developed the legal framework under which aquaculture should be developed and licensed in The Bahamas. In 1984, the Tariff Act was amended to allow duty-free importation of items to be used in aquaculture (i.e., building materials, equipment, supplies, feed, broodstock and seed) as a development incentive for the sector. Other sectoral development incentives included availability of large areas of flat land and sub-aquatic land for lease or purchase at reasonable rates. There were also tax reliefs applied, such as on export taxes on processed and unprocessed aquaculture products, income tax on profits gained, and property tax on lands and premises for aquaculture operations.

The Harbor Branch Oceanographic Institution (Florida, USA) did an assessment of the sector in 2000 and characterized the aquaculture sector as having great potential and providing a viable business opportunity for the following reasons:

1. Large areas of flat land that are available for lease or purchase.
2. Expanses of pristine saltwater.
3. Favorable geographic climate – temperature and rainfall.
4. Good communication systems to all parts of the world.
5. Proximity to the United States for supplies and as export market.
6. A market for seafood in local and tourist establishments.
7. Readily available manpower resources.
8. Stable democratic system.
9. Excellent tax incentives.

Table 5 provides a summary of the aquaculture development trends in The Bahamas compiled from that same assessment report.

Table 5: Bahamas Aquaculture Sector Historical Overview

Year(s)	Activities
1976-1978	Six applications to establish aquaculture projects in The Bahamas were received. None of these ventures were implemented. One permit was granted for importation of 2000 freshwater prawns (<i>Macrobrachium rosenbergii</i>). The culture trials were unsuccessful.
1979-1981	The Department of Fisheries received 22 applications requesting permission to commence or continue aquaculture projects in The Bahamas. A total of four applications were permitted and licensed:

	<ol style="list-style-type: none"> 1. Wallace Groves Aquaculture Foundation (active 1980 – 1984); 2. Bahamas Mariculture Research Institute (active 1981 – 1991); 3. Morton Bahamas Limited (active 1981 – 1990); 4. Caribbean Mariculture Farms and Aquatic Laboratory Limited (no activity confirmed)
1982-1984	<p>In this period 16 applications were submitted to the Department of Fisheries. Of these 4 new operations were permitted and licensed for aquaculture research and commercial scale production:</p> <ol style="list-style-type: none"> 1. Bahamas Marine Farms Limited (active 1984 – 1999) 2. Worldwide Protein Bahamas Limited (active 1983 – 1992) 3. Caribbean Marine Research Center (active 1984 – 1996) 4. Aqualife Research Corporation (active 1984 – 1996)
1987	One new aquaculture venture was permitted and licensed – Noraqua Limited (active 1987 – 1988)
1989	The aquaculture sector employment increased to over 80 persons. Approximately 75% were Bahamians. Six individuals and companies applied for aquaculture permit approval. Lack of approval was due to permit requests still undergoing review, lack of fully completed investment proposals provided to the Government, or lack of financial resources.
1990	One aquaculture venture was permitted and licensed - Abaco Mariculture Company Limited (active 1990 – 1994)
1991	<p>Three projects were permitted and licensed to engage in aquaculture:</p> <ol style="list-style-type: none"> 1. Ocean Technologies Bahamas Limited (active 1991) 2. Food Limited (active 1991 – 1994) 3. The Shrimp Project/Hatchery (active 1992 – 1997, 1999)
1992	One new aquaculture venture was permitted and licensed, but no activities started
1993-1994	<p>Four applications were submitted to the Department of Fisheries and two were permitted and licensed:</p> <ol style="list-style-type: none"> 1. Richard Arnold (active 1996 – 2000) 2. Integro Limited (no activities)
1995	Five applications were submitted to the Department of Fisheries and one was permitted and licensed – CAN-AM Fisheries Bahamas Limited (active 1995 – 1998)
1996	One new venture was permitted and licensed – Lucayan Aquaculture Limited (formerly Food Limited; active 1996 – 2000)
1997	<p>Seven applications were submitted to the Department of Fisheries and two were permitted and licensed:</p> <ol style="list-style-type: none"> 1. Aquatic Farms (active 1997 – 1999) 2. Cape Eleuthera Marine Conservation Project and Island School

	(active 1997 – present)
1998-2000	<p>In this period there were five applications made of which three new ventures were permitted and licensed and two applications were approved in principle:</p> <ol style="list-style-type: none"> 1. Cooper’s Catch International (active 1998 – 2000) 2. Abaco Conch Farm (approved in principle 1999) 3. Aquafarms Limited (approved in principle 1999) 4. Goombay Group Limited (active 1998 – 2000) 5. Coral Reef Marine Farms (active 1999 – 2000)

Between 1979 and 2000, there were 24 aquaculture establishments licensed to for aquaculture in The Bahamas. The length of operation for the commercial ventures, of which many are now closed, ranged from 9 – 16 years, with Bahamas Marine Farms Limited operating the longest.

The other aquaculture operations were classified as pilot-scale farms or research and educational facilities. In 2000, there were 7 licensed aquaculture operations in The Bahamas. Of these, one was operating at a commercial-scale (Lucayan Aquaculture Ltd), three were operating at a pilot-scale (Taino Farms Ltd., Cooper’s Catch International, Coral Reef Marine Farms) and three were operating at a research and educational level (Richard Arnold, Cape Eleuthera Marine Conservation and Island School, Goombay Group Ltd.). Of all the facilities described, only Cape Eleuthera is still active.

3 Current Status of Fisheries and Aquaculture

The Fisheries and Aquaculture sectors in The Bahamas are small compared to tourism and finance. However, their importance should not be neglected as the sectors provide valuable income, employment and food to the population. Moreover, the exports of high values species (lobster and conch) generate considerable revenues.

3.1 Natural resources and the potential for fishery sector development

The 2014 Ecological Gap Analysis describes the Bahamian environment as follows (Moss and Moultrie, 2014): *The distinct environment of The Bahamas gives rise to numerous irreplaceable habitats and species, including vast expanses of Caribbean pine forest, tidal flats with thriving bonefish populations, extensive barrier reefs, the highest concentration of blue holes in the Western Hemisphere, and critical fish nursery habitat believed to contribute significantly to fisheries stocks throughout the Caribbean region. The insularity and extensive carbonate shelf with productive coral reefs and other habitats, plus a large area of coastal wetlands, especially mangrove forests, contribute to the abundance and diversity of fish. Rare, critically endangered, and endemic species can also be found in The Bahamas including the Bahama Parrot, several species of Rock iguana, Kirtland's Warbler, West Indian Flamingo, Hutia, Smalltooth sawfish, Queen Conch, and Loggerhead, Hawksbill, and Green turtles.*

Marine biodiversity features of significance for The Bahamas include (Moss and Moultrie, 2014):

- Spawning aggregations
- Marine mammal habitat and sightings
- Turtle habitat and nesting beaches
- Bonefish flats and spawning grounds
- Shark nursery and sightings
- Coral framework – platform top, shelf edge and shallow
- Reef flat
- Montastrea reef and reef connectivity
- Acropora palmata reef
- Non-reef flat
- Sand
- Sponge/hardbottom
- Mixed substrate
- Seagrass
- Mangroves
- Nursery habitat
- Deep water
- Tidal creek
- Gorgonian dominated hardground and slopes
- Conch
- Mud
- Coral walls
- Rocky shore
- Sandy beach

These features provide ecosystem services required for a sustainable fishery sector and support the fishery stocks that are currently exploited or may be exploited in the future. Fishery stocks currently being utilized either for commercial fishing or sportfishing include Spiny lobster, Queen conch, groupers, snappers and jacks as well as dolphin, wahoo, marlins, tunas, bonefish, tarpon and permit. The Gap Analysis also resulted in production of habitat maps, including those for important marine biodiversity features. Figures 2 and 3 are examples of two of these maps.

Figure 2: Seagrass map

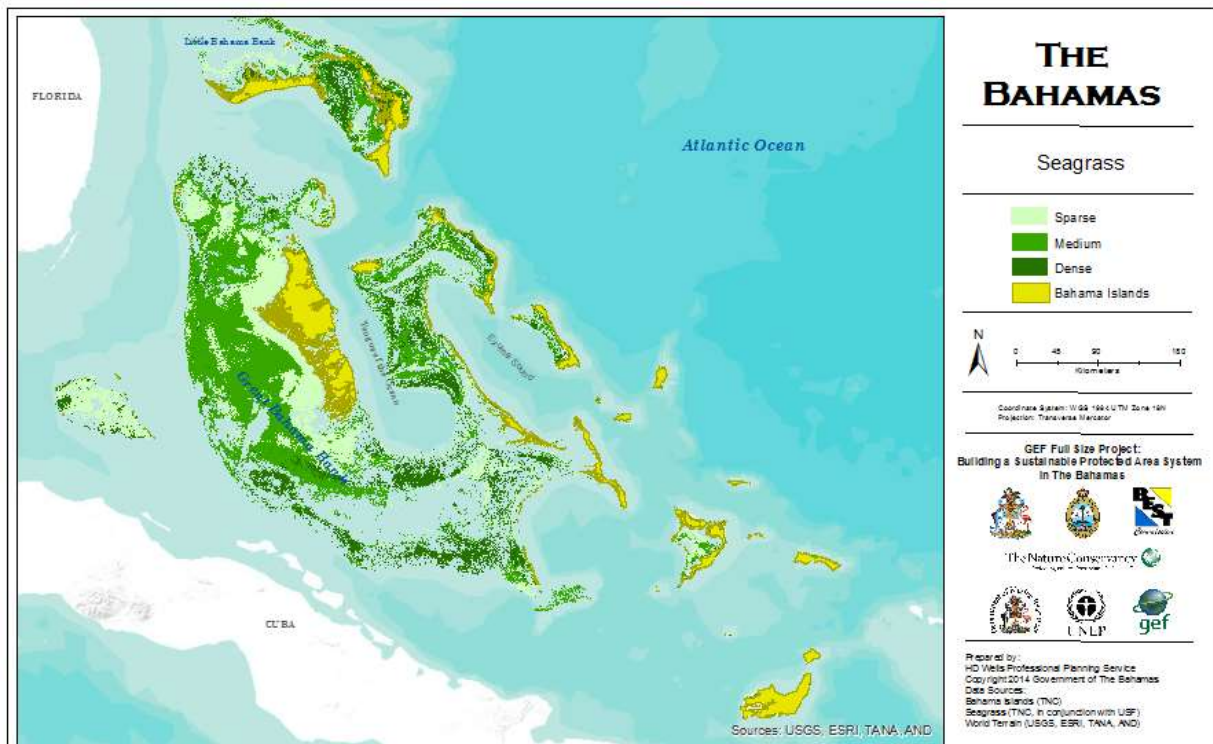
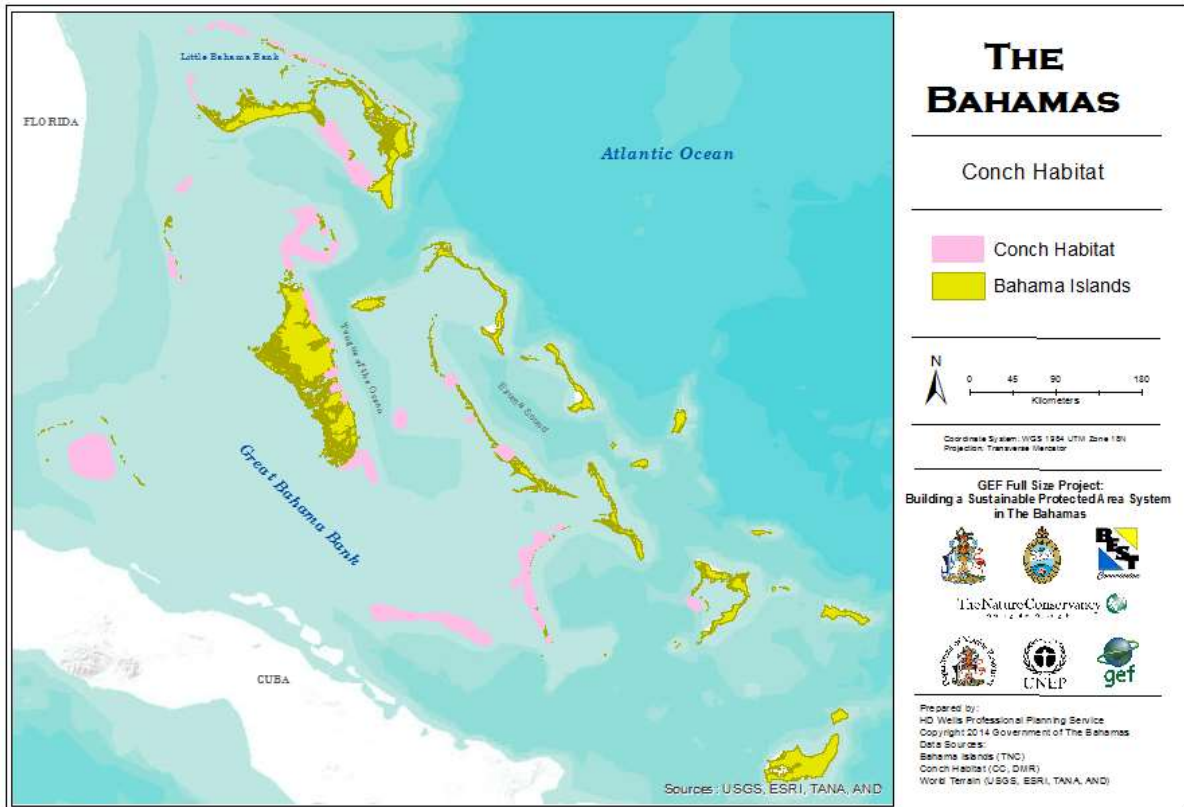


Figure 3: Conch habitat map



The most recent assessment of the potential yield of the fishery sector was completed over three decades ago by Smith and van Nierop entitled the *Distribution, abundance and potential yield of shallow-water fishery resources of the Little and Great Bahama Banks*. The 1984 assessment estimated mean density of neritic fishery resources on the Little Bahama Bank as 6.1 tonnes per km² and 3.6 tonnes per km² on the Great Bahama Bank (Smith and van Nierop, 1984). The most important fishery resources by numbers were identified as surgeonfishes, grunts, parrotfishes, Queen conch and squirrelfishes. The most important fishery resources by biomass were surgeonfishes, grunts, groupers, parrotfishes and triggerfish. Table 6 below shows the potential yield estimates calculated by Smith and van Nierop (1984).

Table 6: Potential Yield Estimates for Fishery Resources in The Bahamas (1984)

Fishery resource	Little Bahama Bank Potential yield estimate (kg/km²)	Great Bahama Bank Potential yield estimate (kg/km²)
All grouper	148	74
Nassau grouper	41	17
Red hind	30	23
Snappers	149 - 264	65 – 106
Grunts	345 - 447	317 – 363
Spiny lobster	257	155
Queen conch	152 - 263	54 – 93

Based on the results of the assessment, it was estimated that all fishery resources were under-exploited. For example, Spiny lobster actual yields were only 32% of their potential for the Little Bahama Bank and 9% of their potential for the Great Bahama Bank.

Taking in consideration the intensive fishing of these areas over the past decades, a new stock assessment and an assessment of the sector’s potential yield is urgently needed to inform fisheries management.

3.2 Marine capture fisheries

3.2.1 The fishing fleet

Fishing in the Bahamas as in most Caribbean countries is based on open access fisheries. No license is required to fish with authorized fishing gear. Fishing by use of scuba diving gear is officially forbidden, but a special license can be obtained by trained professional divers to use compressors for target conch and lobsters. Fishing is restricted to Bahamian vessels, except if issued with a foreign permit to operate in sport fishing. Tournaments are organized on a regular basis by US and Bahamian sport fishing associations.

The commercial fishing fleet is well known and described. It is characterized by two types of vessels with two sets of activities.

- Small vessels (around 17 feet / 5.5 meters) often referred to as dinghies operate different gears/techniques, including diving to target conch and lobsters. These vessels are typically operating on a one-day trip basis (Abaco fishers, Montaigne Ramp fishers in New Providence). Some of these vessels will operate under a mothership during the season. Figure 4 shows two examples of a typical 17-ft fiberglass dinghy in Abaco with a 60 HP engine. It can catch 200 lbs. of lobsters a day.

Figure 4: Typical fiberglass dinghy



- Large vessels: The above dinghies can also be operated from larger vessels, known as mothership in the Bahamas. These vessels are usually above 20ft (6.6 meters) and are required to be registered (to obtain a FDC, Fisheries Department Commercial number – it is not a fishing license per se, but a registration – the fee is low at USD 10). In that case, the fishing trip can be of several days to weeks, depending on the size of the mothership. These vessels operate mostly during the conch and lobsters season. They target mainly conch and lobster, but can also operate secondary gears like nets to capture snappers, groupers or other demersals. Figures 5, 6 and 7 provide examples of motherships.

Figure 5: Large motherships at the dock in New Providence (Potters Cay Dock in Nassau)



Figure 6: Dinghies and small motherships in New Providence (with direct conch sales on the dock)



Figure 7: A mothership in Abaco (smaller than in New Providence)



There are few large commercial vessels targeting other species, like stone crabs. Other small vessels which are not dinghies are also operating (for recreational or subsistence fisheries).

The structure of the fleet varies from one island to another (mainly dinghies in Abaco directly landing in the processing plants docks, mainly Motherships in Eleuthera Spanish Wells, few small vessels in Mayaguana). The type of gears used depends on the targeted species.

A comprehensive list of landing sites is difficult to compile as nearly any beach in The Bahamas can be used as a landing site. Some major ones are well known, Spanish Wells in Eleuthera and Montaigne Ramp in New Providence, which are monitored. Other landing sites are locally known, but not directly monitored.

The absence of industrial fishing vessels per se (due to a ban on longliners) is to be highlighted. Large pelagics are not targeted by the Bahamas commercial fishing fleet.

Recreational fisheries, subsistence fisheries in the Family Islands and sportfishing (national or international) are not well described in The Bahamas.

In terms of vessels used, there are large variations in size and gears used, ranging from small canoe like boats and the use of one hook and line or a few traps to 60 feet game fishing vessels applying trolling gears. In general, these categories of fishers go out on one-day trips. Many sports and recreational fishers are targeting high-value species to sustain tourists' consumption (and their own too) and other species, like reef fish, for local consumption (family or communities).

The 1995 fisheries census showed a total of 4,000 vessels in total (independently from the type of vessels). In 2014, a total number of 585 dinghies and 399 motherships were reported to FAO.

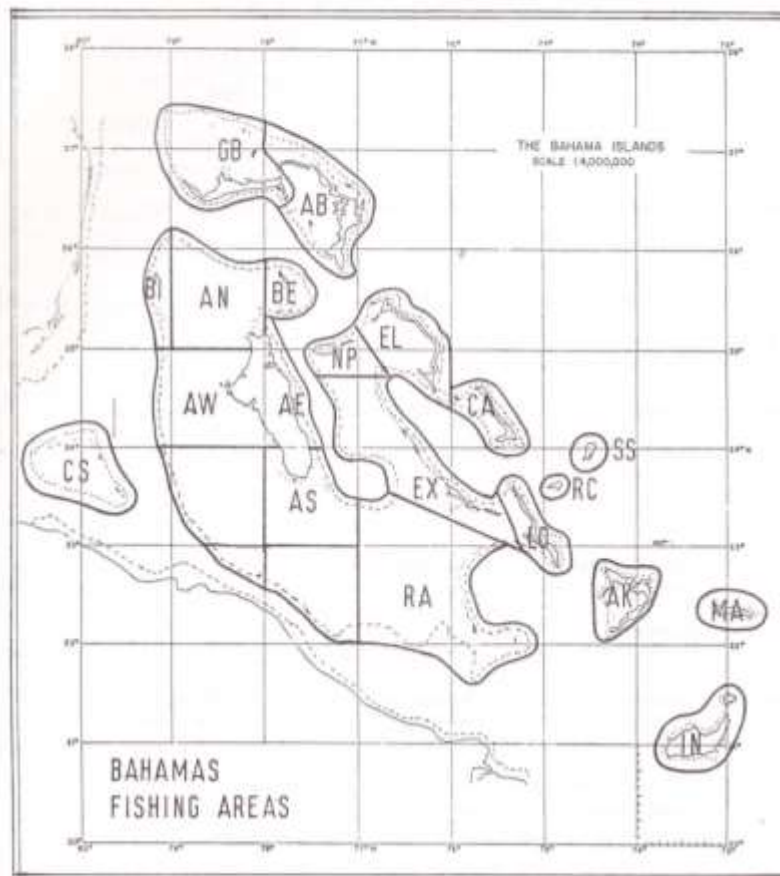
In absence of provisions in the Fisheries Act for fishing vessel registration (except for vessel above 20 ft.) and in the port Act to report the vessel activity in the registration process, it has been a challenge for the DMR to maintain an up-to-date registry.

3.2.2 Main fishing areas and species targeted in the Bahamas

The designated fishing areas of The Bahamas are shown below in Figure 4.

Figure 8: Designated fishing areas

Designated Fishing Areas Used in The Catch Recording Scheme



- | | |
|--------------------|---------------------|
| AB - Abaco | EL - Eleuthera |
| AE - Andros East | EX - Exuma |
| AK - Acklins | GE - Grand Bahama |
| AN - Andros North | IN - Inagua |
| AS - Andros South | LO - Long Island |
| AW - Andros West | MA - Mayaguana |
| BE - Berry Islands | NP - New Providence |
| BI - Bimini | RA - Ragged Island |
| CA - Cat Island | RC - Rum Cay |
| CS - Cay Sal Bank | SS - San Salvador |

The main commercially targeted fisheries species in The Bahamas are spiny lobster, queen conch, groupers, snappers and jacks. Stone crabs are also targeted for their claws.

3.2.2.1 Spiny lobster (Panulirus argus)

The Bahamian lobster fishery exploits the relatively shallow and productive waters of the Little Bahama Bank, located in the north, and the much larger Great Bahama Bank, situated in the west, south and central areas of the archipelago. Combined, this region extends over an area of approximately 45,000 square miles (MRAG, 2009). Distributed within the archipelago are a large number of landing sites, which cover about 20 islands.

According to the 2009 MRAG pre-assessment of the Bahamian lobster fishery:

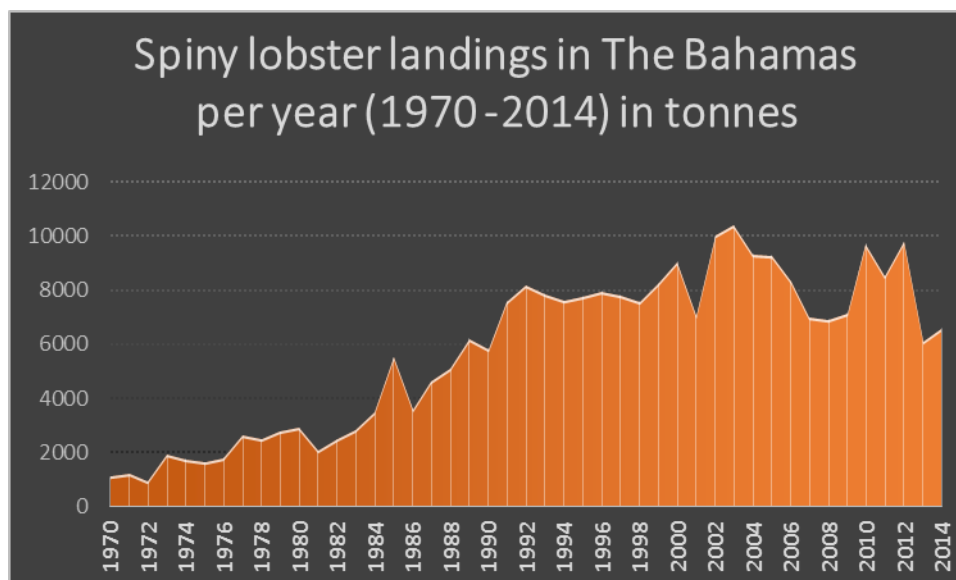
About 9,000 part- and full-time fishers target lobster during the fishing season, which occurs between August 1st and March 31st. The majority of these fishers use a small boat, known locally as a dinghy, approximately 17 feet in length and fitted with an outboard. These vessels go out for a single day trip with two to three fishers per boat. Lobsters are also targeted by a fleet of mothership-dory vessels that can operate up to three and four weeks at sea. Each mothership vessel may support fishers on five or more dinghies, which collect lobster during the day before returning to the larger vessel to process and freeze the catch. The majority of lobster is now landed as tails only, with the carapace discarded at sea. This strategy increases the number of lobsters fishers can retain on board their vessels at any one time.

Lobster is targeted using two main gear types; wooden traps and casitas. A string of five or more traps are used by fishers set adjacent to the reef. Fishers are then required to lift each trap in order to release and sort their catch. Casitas (or condominiums) have increased in popularity since the mid-1980s and peaked during the late 1990s. These devices are placed semi-permanently on the bottom. Fishers then dive down and retrieve their catch from each casita using a lobster hook. Although use of SCUBA diving equipment is illegal, fishers can obtain a permit to use compressed air supplied through an air hose to increase the amount of time spent underwater. Regulations also exist to restrict the depth to which a fisherman can dive (between 30-60 ft.), but this is largely considered unenforceable. This activity can lead to safety issues such as the bends, although reported deaths are very rare. The Department of Marine Resources conducts diver safety workshops in various islands annually. Collecting lobster by hand is very selective and can minimize the retention of undersized lobster and bycatch from the fishery. Lobsters are normally pre-processed by fishers at sea by removing the carapace and leaving only the tail section. Due to space limitations on each boat, this can increase the potential to collect more lobster during any one trip. However, this practice also discards any potential for value-added from retaining the carapace.

At its peak in 2003, the annual production of spiny lobster was estimated at 10,378 tonnes. Fluctuation in landings has been considerable since, with levels of over 9,000 tonnes in 2004, 2005, 2010 and 2012, and below 7,000 tonnes in 2007, 2008, 2013 - 2015. The 2014

production was estimated at 6,569 tonnes (DMR & FAO FishStatJ, 2016) and 6,526 tonnes in 2015 (DMR). Figure 9 below outlines spiny lobster landings from 1970 to 2014.

Figure 9: Spiny lobster (crawfish) landings in The Bahamas over the period 1970 -2014 in tonnes.



Approximately 90% of all lobster caught are exported overseas¹⁰. The majority of lobster tails are exported to the United States (64%) followed by France accounting for approximately 28% of this product (MRAG, 2009). There are currently 10 processing plants that are licensed to export lobster (MRAG, 2009). The majority of product bought by these plants is supplied by mothership-dory companies, which maintain a high quality product. The frozen product is then carefully thawed and re-processed by the processing plants into different size categories. Lobster and other fishery products are also transported from the Family Islands to New Providence, the main market, by approximately 23 mail boats that operate between New Providence and the Family Islands on a weekly basis.

In 2014, the recorded spiny lobster exports were as follows:

- Crawfish¹¹ tails – 3,993,080 lbs. (value of USD 60,338,463)
- Live Crawfish – 18,360 lbs. (value of USD 192,780)
- Whole frozen Crawfish – 22,694 lbs. (value of USD 249,275)

The latest export figures for crawfish available (for 2015) were as follows:

- Crawfish tails – 4,136,817 lbs. (value of USD 62,850,896)
- Live Crawfish – 18,400 lbs. (value of USD 193,200)
- Whole frozen Crawfish – 53,547 lbs. (value of USD 413,040)

¹⁰ Production figures for crawfish are based on reported landings of crawfish tails which are multiplied by a factor of 3 to give the total live weight of production.

¹¹ Crawfish = spiny lobster

Lobster exports were over 5 million lbs. in 2009 and have since been fluctuating between 3.9 and 4.9 million lbs. annually. The world market price has influenced the export earnings from lobster, which fluctuated between 60 million (2009) and 71 million USD in 2012. In 2015, the combined value of lobster tails, live lobster and whole frozen that was exported by The Bahamas added up to 63 million USD.

3.2.2.2 Queen conch (Strombus gigas)

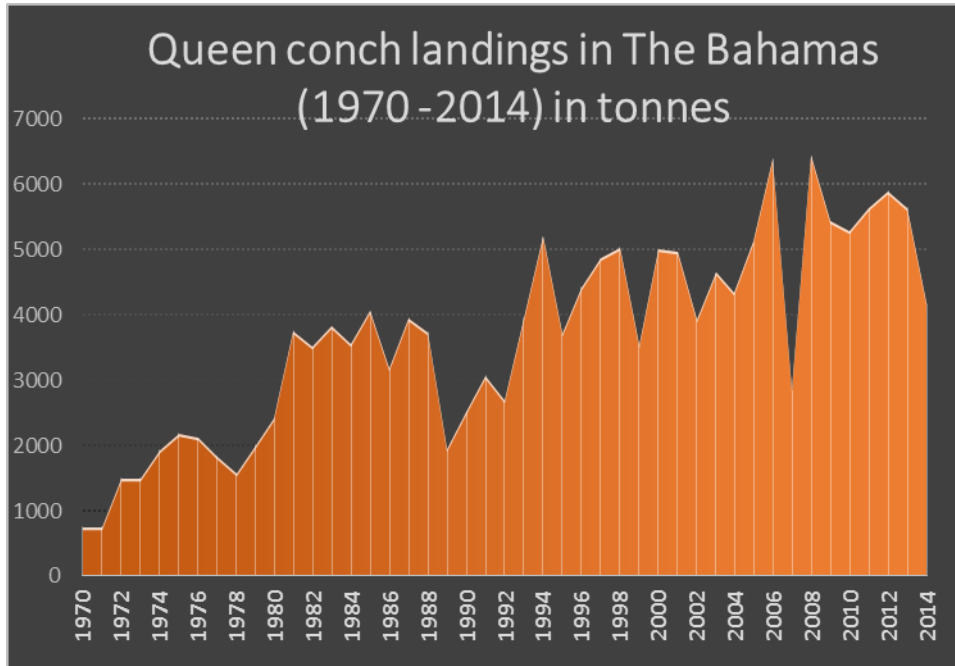
In its assessment in several areas in The Bahamas, Community Conch (2011) describes the Queen conch population as declining precipitously since the 1990s with even conch inside large protected areas like the Exuma Cays Land and Sea Park being vulnerable to fishing that occurs outside the park. A survey of the Exuma Cays in 2011 found that the density of adult conch had declined almost 91% on the islands shelf over a 20-year period; densities on the bank declined by 69% to 16 adults per hectare (Community Conch, 2011).

Similar stock assessments carried out by Community Conch over the last six years for most of the conch fishing grounds of The Bahamas showed there is a trend for local conch populations to be overfished to densities incapable of reproduction. As expected densities of conch increase with distance from human settlements. Community Conch (2015) describes that on the Little Bahama bank, with the exceptions of substantial populations of queen conch on Mantanilla Shoal and in localized areas of the Matanilla Reef near Carter's Cay, that the conch populations are typical of the overexploited populations now widespread in The Bahamas. It was added that current management and regulations are not adequate to sustain Queen conch resources in The Bahamas.

The Queen conch production by The Bahamas grew rapidly in the 1970s from an estimated 750 tonnes per year to 2,003 tonnes in 1980. By the mid-1990s annual production was generally higher than 3,500 tonnes. The highest conch production on record was reached in 2006 with an estimated landing of 6,383 tonnes (see Figure 10 below). The last few years (2014 and 2015) the conch production estimated¹² was respectively 4,178 and 4,056 tonnes.

¹² It should be noted that the Queen Conch stocks are under significant pressure of Illegal, Unreported and Unregulated (IUU) fishing in The Bahamas; including pressure by foreign fishers.

Figure 10: Queen conch landings in The Bahamas over the period 1970 -2014 in tonnes.



In 2014, some 553,410 lbs. of conch meat were exported, valued at USD 3,266,577. In 2015 the quantity exported was 401,838 lbs., which was valued at USD 2,343,142. The exported quantity of conch meat was thus some 150,000 lbs. lower in 2015 than the average exports over the period 2009 - 2014.

The majority of conch landed in The Bahamas is consumed locally. Local consumption was estimated at 1.3 kg/capita/year in 2010 and 2011 (Gittens and Braynen, n.d.).

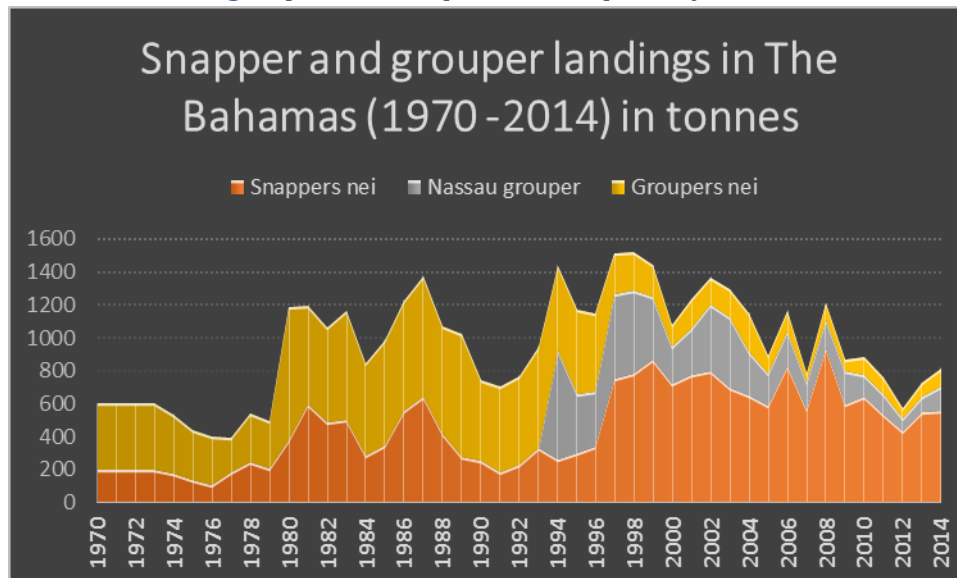
The Bahamas currently utilizes a quota system for export of conch from its fishery. The quota is shared between nine exporters. 99% of exports went to the United States in 2011 (Gittens and Braynen, n.d.). Conchs are normally caught by free diving or persons wading out in shallow water to pick them up. Harvesting conch using compressors is permitted during the crawfish season.

3.2.2.3 Grouper species (*Epinephelus spp.*)

Of the grouper species produced in The Bahamas, the majority are Nassau grouper (*Epinephelus striatus*). In 2001, 281 tonnes of Nassau grouper were landed, valued at USD 1,852,150 (DMR, 2001); this statistic did not include local landings or recreational catch. A decade later, in 2011, approximately 123 tonnes of Nassau grouper were landed, valued at more than USD 500,000 (BREEF, 2014). Over time, recorded landings of Nassau grouper have been declining. Since 2008 the annual landings of Nassau grouper were less than 200 tonnes. The latest figure (for 2014) was 148 tonnes.

Other grouper species landings have also reduced significantly from annual levels of over 600 tonnes, up to 808 tonnes in the 1980s, to levels around 100 tonnes since 2005 (see Figure 11 below). In 2014, the estimated production of other groupers by commercial fisheries in The Bahamas was 114 tonnes.

Figure 11: Snapper and grouper landings in The Bahamas over the period 1970 -2014 in tonnes. Nassau grouper data are presented separately since 1994



The exports of groupers and other scale fish (such as snappers) showed significant variations in recent years. In 2011, some 258,788 lbs. of groupers and scale fish was exported with a value of USD 847,313. The year after the export was less than one-third of this volume and value. In 2014 and 2015, the exported volumes were 161, 501lbs. and 143,372 lbs. with values of respectively USD 504,489 and USD 340,692.

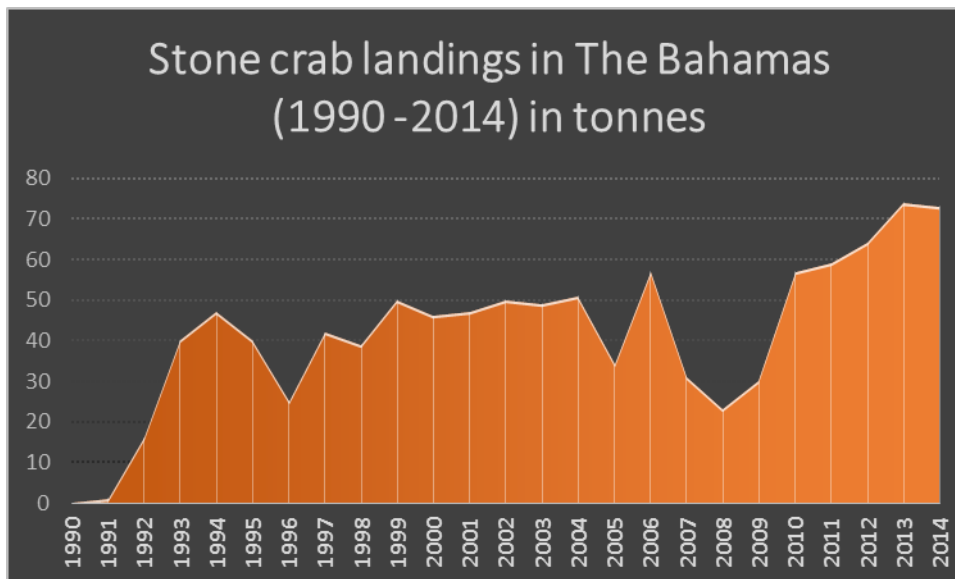
Grouper and other scale fish are caught using spears, scale fish traps, hook and line or nets. Aggregating devices are sometimes used to attract snappers and grunts. Deepwater grouper and snapper species are caught using scale fish traps in strings lowered down the drop-off from shallow to deep water, ranging in depths from 80 – 800 feet (BREEF, 1998).

The Nassau grouper and other major groupers are vulnerable to over-exploitation due to their slow growth rate and need to aggregate to an exact location annually to reproduce. Aggregations of Nassau grouper occur during full moon periods from December to February and the closed season usually spans the same period. Because of the species vulnerability and its threatened status throughout the Western Atlantic, the Department of Marine Resources has established seasonal closures since 1998 to enable spawning aggregations to occur without risk of exploitation.

3.2.2.4 Stone crabs (*Menippe mercenaria*)

Stone crab is another major commercial fishery in The Bahamas. The commercial fishery for stone crab only started in the 1990s with annual harvests generally between 40 and 50 tonnes. After a dip in production in 2007-2009, the production in recent years was between 51 and 74 tonnes, with 54 tonnes in 2015 (see Figure 12 below).

Figure 12: Stone crab landings in The Bahamas over the period 1990 -2014 in tonnes



Nearly all stone crab landed in The Bahamas is exported. The exports of stone crab (claws), mainly to the USA, have grown significantly from 88,989 lbs. in 2009 to 242,483 lbs. in 2014. The value increased from USD 838,924 to USD 3,891,012 over the same period. In 2015 the export of stone crab claws was 160,396 lbs. with a value of USD 2.8 million.

The main method for harvesting stone crabs is baited traps. Harvesting can be done sustainably if fishers only remove one claw. It is currently illegal to take both claws of a stone crab in Bahamian waters. The crab survival rate is increased when the claw is broken correctly, only one claw is removed, and crabs are properly handled both before and after claw removal. It takes several molts for the lost claw to fully regenerate. Juvenile crabs molt two or more times a year while adults only molt once per year. There is concern about harvesting of large males. Large males have the highest mortality because their claw represents a very high proportion of their body weight which is lost when the claw is removed (Florida Fish and Wildlife Conservation Commission, 2016). These males are the prime mating males and their increased mortality rates from harvesting can have implications for the sustainability of the fishery.

The closed season for stone crab is June 1 to October 15 annually, and minimal crab claw size is 4 inches. Possessing or selling female crabs is prohibited.

3.2.3 Conclusion on species and catch statistics

Spiny lobster (*Panulirus argus*) stocks in The Bahamas are being fully exploited, while conch (*Stombus gigas*), snappers (*Lutjanidae spp.*) and groupers (*Epniphelus spp.*) are under heavy fishing pressure, similar to the situation in most of the Caribbean, and probably overexploited. The major threats to the marine fisheries resources are coastal zone development, boat and diver damage to the reef, over-harvesting of commercial species and disturbance to sensitive sites. Illegal, unreported and unregulated (IUU) fishing by nationals and foreigners is another major cause of decreasing stocks of a range of fisheries species.

The most recent fisheries production statistics, reported to FAO by DMR on an annual basis, are presented in table 7:

Table 7: The Bahamas fisheries production statistics in tonnes (period 2006 -2015)¹³

Species (groups)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Marine fishes not identified	86	88	40	48	88	16	15	12	25	23
Miscellaneous coastal fishes	1227	823	1259	994	972	901	691	884	976	632
Miscellaneous pelagic fishes	79	83	40	84	39	58	48	65	51	3
Black stone crab	57	31	23	30	57	59	64	74	73	54
Portly spider crab	0	0	0	0	6	0	0	0	0	0
Caribbean spiny lobster	8294	6977	6896	7138	9692	8505	9761	6088	6569	6526
Miscellaneous aquatic animal products	112	66	119	86	161	147	285	0	6	-
Miscellaneous aquatic animals	4	1	1	0	54	2	0	0	0	0
Stromboid conchs nei	6383	2843	6435	5430	5273	5625	5893	5642	4178	4056

The total fisheries production in The Bahamas fluctuates very much with the variations in spiny lobster production. Between half and two-thirds of the total volume of fisheries products landed in The Bahamas consists of spiny lobster.

In 2014, the total volume of fisheries products landed in The Bahamas was 11,878 tonnes, which is significantly lower than the 16,757 tonnes in 2012.

Figure 13 shows the composition of landings (by volume) by the Bahamian fisheries sector in 2014 in percentages.

¹³ Sources: DMR (2016) and FAO FishStatJ (2016) databases

Figure 13: Bahamas' fisheries production by main species (groups) in 2014.

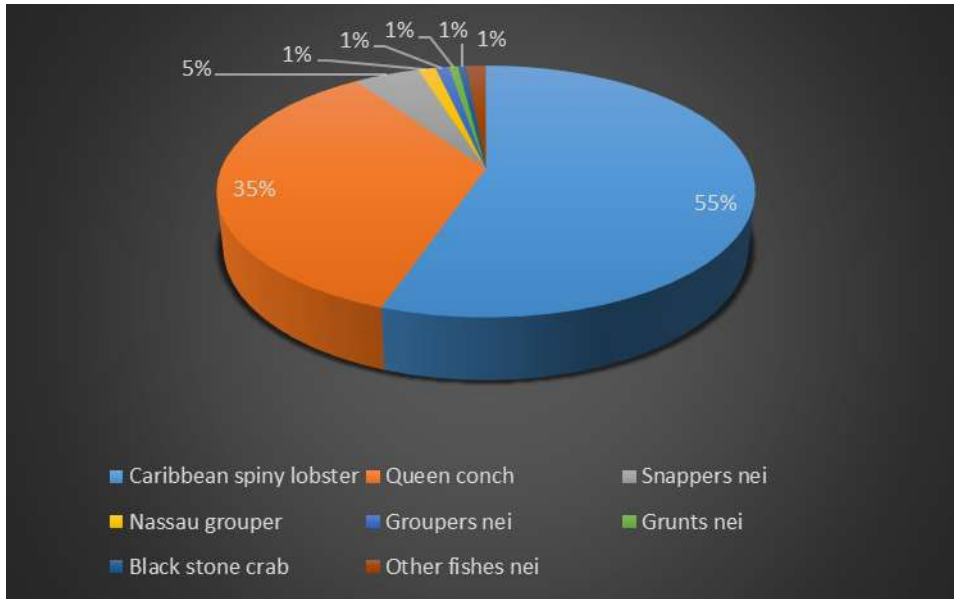
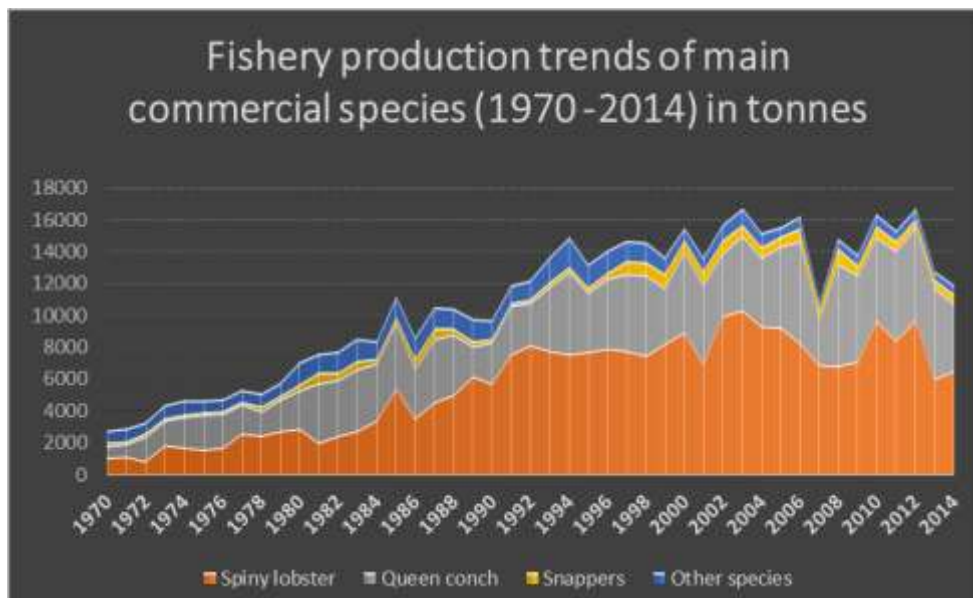


Figure 14: Fishery production trends in The Bahamas of main commercial species over the period 1970 -2014 in tonnes.



3.2.4 Recreational fisheries¹⁴

Recreational fishing in The Bahamas has a heightened season and peak season that fluctuates with the tourism season. Anglers either visit to participate in sportfishing tournaments or flats fishing in which they target bonefish, tarpon and permit. Fishing occurs in open-ocean as

¹⁴ This section is taken in large part from Maycock, V. (2016). *Economic Impacts of Recreational Fishing Tourism in The Bahamas*. Nassau: FAO and DMR.

well as flats or wetland areas and in both protected and unprotected habitats¹⁵. The peak of the billfish and wahoo fishing season in The Bahamas occurs from April to June each year with tournaments held on the islands of Abaco, Grand Bahama and Cat Island. Tournaments take place during the year, with most tournaments held during the winter months.

Flats fishing is done during the year with a voluntary closed season of August to October. Bonefish is the preferred species and this type of fishing takes place on several islands, with the islands of Abaco, Andros, Bimini and Grand Bahama as the top four.

Maycock (2016) estimates that an average of nearly 37,000 persons visit The Bahamas annually to participate in recreational fishing. These visitors spend about \$527 Million per year on expenditures, such as restaurants, local transportation, lodging, fishing, and recreational activities. The recreational fisheries sub-sector is estimated to provide more than 18,000 jobs¹⁶ directly and indirectly. In comparison, the fisheries and aquaculture sector had an estimated export value of more than \$69 Million in 2014.

The majority of tourists visiting The Bahamas for recreational fishing are from the United States. Other countries include the United Kingdom, Canada, Norway, Australia, Barbados, South Africa, Republic of Korea and Mexico. Bahamians and residents also participate in recreational fishing.

Regulations of the sector relate to licensing, maximum catch levels and gear restrictions. Foreign fishing vessels must apply for a license to fish for non-commercial fishing purposes. It is an offense for a non-Bahamian to fish for fishery resources for commercial purposes within the Exclusive Economic Zone even if they are on a registered Bahamian vessel. Maximum catch limits per vessel are:

- 18 migratory fish (kingfish, tuna, dolphin, wahoo)
- 6 Queen conch
- 10 Spiny lobster
- 20 fish or 60 lbs. of demersal fish (groupers, snappers, etc.)

Gear restrictions are:

- Only hook and line can be used unless a spearfishing permit is obtained.
- Long-line fishing is prohibited.
- Only six rods or reels are permitted for use at each time.
- Sale of fishery resources caught during tournaments is prohibited.
- Billfish (marlin, sailfish, swordfish, etc.) are to be returned to the sea unharmed unless permitted under the terms of the fishing tournament.

¹⁵ Fishing is banned in marine reserves managed by the Department of Marine Resources, but some national parks managed by the Bahamas National Trust allow catch and release fishing.

¹⁶ This job estimate for the recreational fishing sector was determined by dividing the total amount spent by anglers by 1 million then multiplying the quotient by the employment multiplier of 35.80.

Maycock (2016) recommends that creative entrepreneurs, the Government, and existing businesses can take advantage of the economic opportunities that exist in the recreational fishing sector. These opportunities can include revenue generated from taxi fares, lodging, restaurants, and other recreational/tourism activities. Maycock (2016) also recommends that the recreational sector be recognized as separate and apart from the tourism sector for future management, decision-making and policy updates.

Smith and Zeller (2013) estimated recreational fishing catches from tournaments and outside tournaments as a peak of 16,100 tonnes annually in 1985, declining to 7,300 tonnes in 1986. The catch estimate for 2006 was 9,000 tonnes annually, declining again to under 5,700 tonnes in 2010. Although Bahamians do participate in recreational fishing, Smith and Zeller (2013) estimate that 89% of fish are caught by tourists. It is important to note a number of qualifiers documented by Smith and Zeller (2013):

1. After 2007, tournament organizers stopped reporting their billfish catches for The Bahamas to the U.S. Recreational Billfish Survey Program, which had been recording data from 1972 until 2007 for blue marlin, white marlin and sailfish.
2. Pelagic species (e.g. dolphin, wahoo and tuna) caught during tournaments data was not accessible for use in the estimates.
3. Points 1 and 2 mean that their estimate of total retained catch is limited to billfish species and likely highly conservative.
4. The proportions of stopover visitors fishing recreationally outside of tournaments were extrapolated based on 1980 statistics from the Ministry of Tourism.
5. Visitors who fish recreationally in The Bahamas often exceed maximum catch limits.
6. Reconstructed recreational catches from 1950 – 2010 were 1.4 times the commercial catches, accounting for 55% of total catches.
7. The reconstructed total catches for The Bahamas from 1950 – 2010 were 2.6 times larger than the officially reported data presented to the FAO. Two reasons for this are that only commercial fisheries are accounted for in official data and unreported catches for the recreational and subsistence fisheries are substantial and missing in national statistics.

All of these points have major implications for management of recreational fisheries as well as the overall fisheries sector. Smith and Zeller (2013) recommend that the sport fishing regulations be thoroughly reviewed and where necessary, further revised and closely monitored. This recommendation seems still valid in 2016.

3.3 Facilitating industries

Most fishing and aquaculture equipment, vessels, gears and accessories are imported from overseas, primarily the United States. Import of these items from China has recently increased as the Government has been developing a trade relationship with China. There are a few boat builders in the country (e.g. Man-O-War Cay in the Abacos), which locally build smacks, sloops, schooners, outboard runabouts and skiffs. Boat construction materials

include wood and fiberglass. One company, Albury Brothers Boats has been successful and expanded to the United States.

Tax exemptions are provided for import of some items, such as vessels, but key items, such as engines, are generally not exempt from taxation. Fishers have called for expansion of the duty-free concessions to support the sustainable development of the sector.

3.4 The aquaculture sector

Between the mid-1980s and early 1990s, aquaculture production of tilapia was experimented on a few islands with production ranging between five and 55 tons annually (FAO, 2014) Production statistics from recent years are not available. The available statistics show however that the aquaculture production reached a high in 2005 with 85 tonnes, including production of whiteleg shrimp, cobia and Florida pompano. A range of fish and shrimp species have been raised, but with limited success to date. Initiatives such as raising cobia and sponges and tilapia at the Cape Eleuthera Institute are ongoing, but aquaculture production is insignificant. Most of the limited aquaculture production at present is coming from aquaponics farms, which generate more income from the vegetable production activities than from fish culture.

The opportunities in the country for development of the aquaculture sector include (Department of Fisheries, 1986):

- Large areas of flat land available for lease or purchase
- Large expanses of pristine marine waters
- Favourable temperature and rainfall patterns
- Good communication systems, connecting the country globally
- Good export market potential
- Stable political system
- Available manpower

Considered to be a priority for fisheries development in the country, aquaculture has been identified as an investment area that allows participation by non-Bahamians, unlike commercial fisheries, which is exclusive to Bahamians or persons with permits to participate in the sector. As of 2015, there are seven permitted aquaculture establishments. These are described in Table 8 below.

Table 8: 2015 Bahamas aquaculture establishments

Name	Species
Tropic Seafood	Spiny lobster, Nassau grouper, Yellowtail snapper
Maillis (experimental)	Tilapia, mullet, shads, snappers, Nassau grouper
Hanna	Shrimp, Tilapia, Red snapper, Nassau grouper
Adderley	Tilapia
Cape Eleuthera Institute	Cobia, Pompano, Queen conch, Spiny lobster, penshell, algae
Goodfellow Farms	Tilapia (aquaponics)
Hall	Tilapia (aquaponics)

There have been 22 species permitted for aquaculture in The Bahamas. Of these 50% are indigenous species. The most popular native species requested for permit are crawfish, Queen conch, Mutton snapper, Nassau grouper and mahi mahi. The most popular exotic species requested for permit to culture is the Pacific white shrimp.

The systems used in The Bahamas for aquaculture include floating cages in freshwater and salt water canals for finfish; pond culture for finfish, shrimp and brine shrimp; sea pasture ranching for conch and crawfish; ocean cages for finfish; and hatchery and tank culture for all species.

Potential of the sector

The potential for growth in the aquaculture sector is detailed in the Prospectus for Investment in Aquaculture and the Aquaculture Resources and Potentials of The Bahamas (both by Bueno, 2015). The aquaculture sector is described as being in the experimental stage of development with the presence of political will and commitment, primary resource assets, and existing market demand to move the sector to the developmental and commercial stages (Bueno, 2015). Potential species rated high for commercial aquaculture were determined to be Tilapia in aquaponics systems and Tilapia in integrated farming systems (only for the Family Islands). While there are currently experiments with the following species, their potential for commercial aquaculture was rated as moderate or low:

- Tilapia in outdoor ponds (low in New Providence; moderate in Family Islands)
- Tilapia in tanks (moderate in New Providence; low in Family Islands)
- Cobia cage culture (low to very low)
- Sea cucumber (low to moderate)
- Queen conch (moderate)
- Nassau grouper in floating cage (very low)
- Nassau grouper in land-based tank (very low)

4 Processing, Marketing and Trade of Fish and Fisheries Products (since 2010)

4.1 Fish processing and storage

Seafood packaging and fish processing is done for Spiny lobster, stone crabs and various fish species. Processing may involve sorting, grading, bleeding, gutting, washing, chilling, storing, and freezing. Processing also entails control of a number of factors, including temperature, water activity, microbial loads, and oxygen reduction potential.

Fish processing involves very strict controls and measures in order to ensure that all processing stages have been completed hygienically. Training in certifications, such as Hazard Analysis Critical Control Points (HACCP) enables plants to ensure their products are safe for human consumption. HACCP certification is required by the main export markets.

Processing companies in The Bahamas have sought various certifications to enable them to access various markets. These certifications include those issued by:

- British Retail Consortium
- USFDA HACCP
- USDA HACCP
- DMR HACCP
- DMR Sanitation

Bahamas Bureau of Standards & Quality has recently (2013) become member of the International Organization for Standardisation (ISO) and is assisting the fisheries industry to get ISO certified, particularly in terms of fish and fisheries products traceability.

Moreover, *Codex Alimentarius*¹⁷ provides for international food standards, guidelines and codes of practice that contribute to the safety, quality and fairness of this international food trade. As such, the standards and guidelines of the Codex Alimentarius related to fish and fisheries products are being promoted by the DMR among fish processors and exporters in The Bahamas.

The fisheries sector is pursuing certification of spiny lobster by the Marine Stewardship Council (MSC). MSC will certify these fishery products as having originated from a sustainable fishery. While this certification does not speak to the quality of the product itself, it does speak to the status of the fishery where the product was harvested. While there are no standards for fisheries exports, the Department of Marine Resources has informally adopted a Codex Alimentarius standard for frozen lobster. The Department conducts its seafood inspections according to this standard.

¹⁷ More information can be found at: <http://www.fao.org/fao-who-codexalimentarius/codex-home/en/>

Packaging and labeling requirements have become a significant hurdle to participating in certain export markets. All processing plants are required to declare their exports with a reference to the corresponding landing locations, through purchase orders declarations. So far (2015), five companies (the largest ones) are reporting on a monthly basis. This procedure will be extended to the other processing plants and factory vessels. Bahamian fishery products exporters often participate in international seafood expos or tradeshows to market their products and gain information on processing and packaging technologies and labeling requirements.

In The Bahamas, there is no dedicated fish processors or exporters association, which focuses on or supports small and medium export enterprises, or which aims to build a national brand for fisheries products.

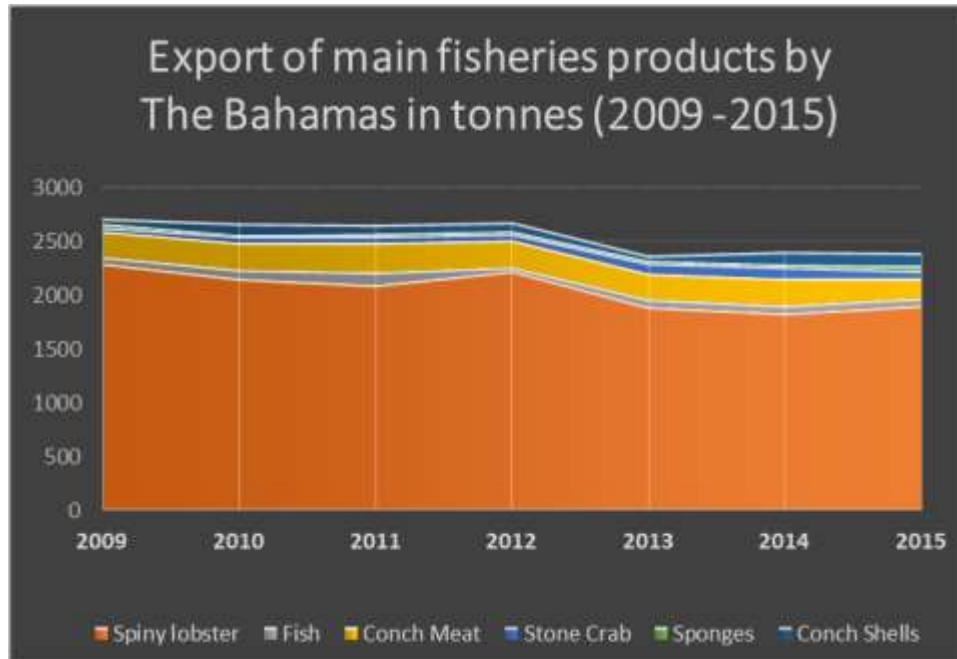
Live (scale)fish is often sold directly to the consumer at landing sites, as well as in fresh (iced) and frozen products to fish houses, hotels, restaurants or processing plants. Live conch is sold directly to consumers or vendors for preparation of conch salad and scorched conch. Frozen conchs are usually sold to processing plants, hotels and restaurants. Crawfish are mainly sold to processing plants which sell them locally or export them.

4.2 Fish trade

Products exported include frozen spiny lobster (crawfish) tails, crawfish meat, whole live crawfish, scale fish and stone crab claws. Scale fish exported include snappers (*Lutjanidae*) and grouper (*Serranidae*) species. Main export markets are the United States of America and the European Union. Non-edible marine products exported include sponge and Queen helmet shells (*Cassis madagascariensis*).

The total exports of Bahamian fish and fisheries products have gradually reduced over the last 6 years from 2,718 tonnes in 2009 to 2,397 tonnes in 2015. In line with the trends in products landed, a reduction in exports of spiny lobster is visible. Since 2013, the combined exports of spiny lobster (meat, whole and life) have been below 2,000 tonnes. Stone crab (mainly claws) exports have increased from 40 tonnes in 2009 to 110 tonnes in 2014. The Queen conch meat exports appear rather stable around 250 tonnes annually. The reduction in exports of Queen conch meat in 2015 is a consequence from reduced production in 2014 and 2015 (see Figure 15 below).

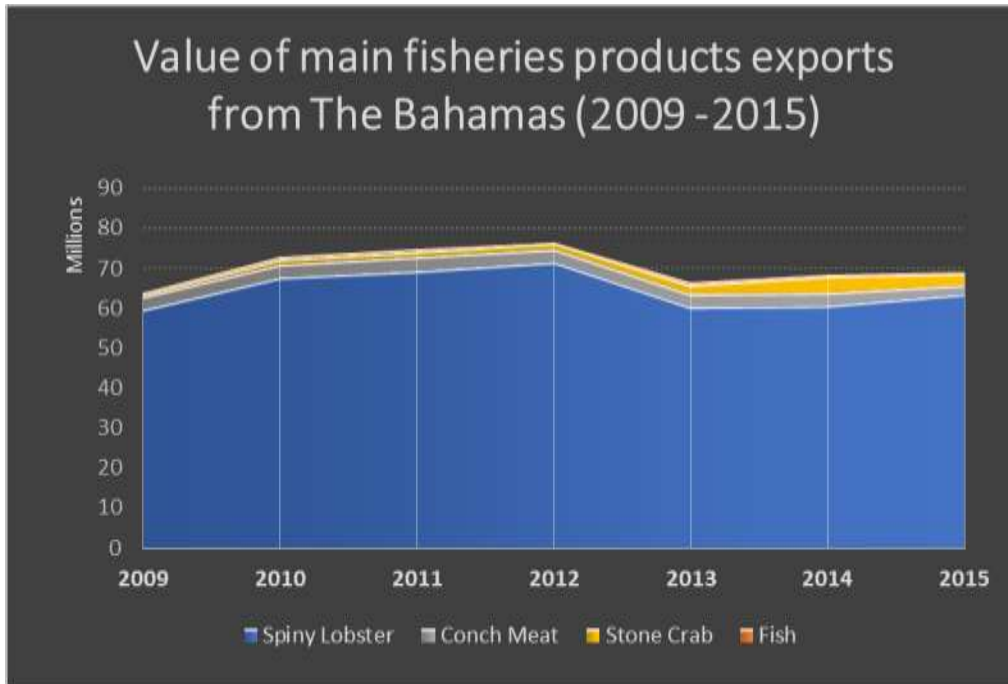
Figure 15: Export of main fisheries products by The Bahamas in tonnes over the period 2009 - 2015.



Similarly as the export volume, the total value of the Bahamian fishery sector products exports is highly influenced by the spiny lobster landings. The Bahamas operates in an international market where the price it gets for its products depends not only on the supply from The Bahamas, but also on supply from elsewhere. For spiny lobster, there are many Caribbean states, for instance, that operate on the same global market. Consequently, The Bahamas is not price-setting for its fishery products. However, being one of the main exporters of Queen Conch meat from the region, there is a possibility to influence the international market price for conch products.

Of the last 6 years, the export value of spiny lobster was highest in 2012 at 71 million USD. In 2015, the value of exported lobster was 63 million USD. Stone crab exports have been increasing both in volume and in value in recent years. Stone crab exports were 3.9 million USD in 2014; however, this value reduced in 2015 again to 2.8 million USD. Conch meat exports valued around 3.3 million USD in recent years, and showed a decline in 2015 due to reduced production. Figure 16 shows values for main fisheries products exports from 2009 to 2015.

Figure 16: Value in USD of export of main fisheries products by The Bahamas over the period 2009 -2015.



At present, 18 processing plants are approved for exporting fishery products to the European Union¹⁸. Additionally, 2 factory vessels and 39 reefer vessels under Bahamian flag are approved to export fishery products to the EU.

The USA does not have a system of approval for fisheries exporters. Importers of Bahamian fishery products into the USA can do so without prior sanction by the Food and Drug Administration (FDA), as long as the facilities that produce, store, or otherwise handle the products are registered with the FDA, and prior notice of incoming shipments is provided to the FDA. Imported fishery products are subject to FDA inspection when offered for import at U.S. ports of entry. The FDA Food Safety Modernization Act¹⁹ was put in place as the current reliance on port-of-entry inspection could not handle the increase in imported food. It mandates that importers are now responsible for ensuring that their foreign suppliers have adequate preventive controls in place and it requires food from abroad to be as safe as from domestic sources.

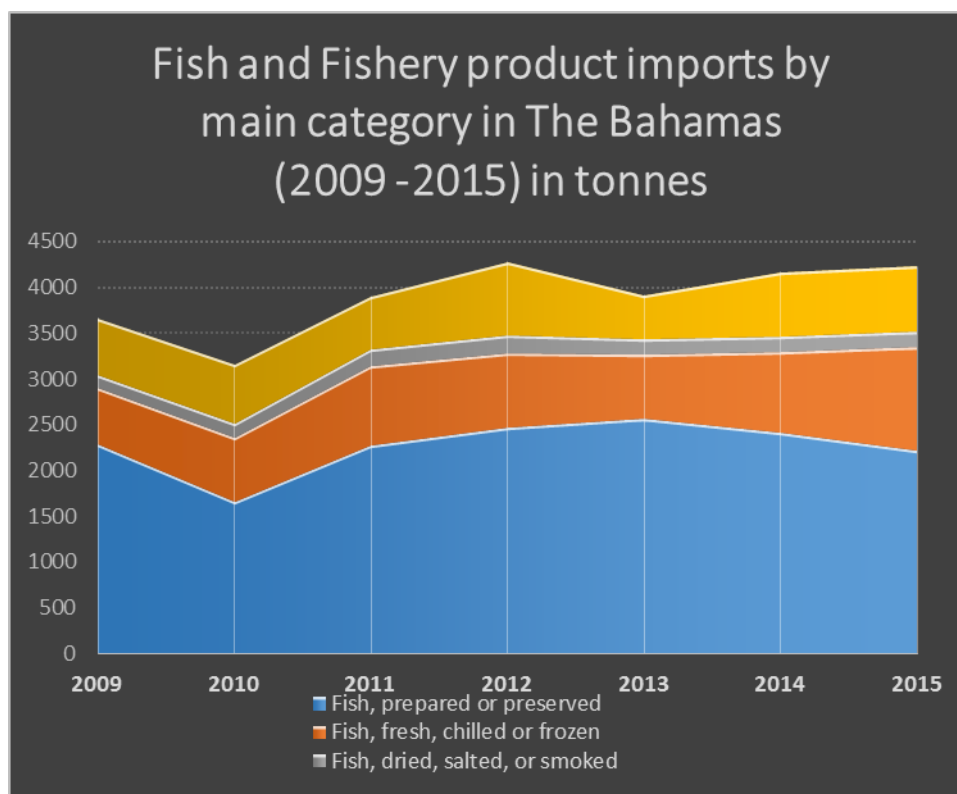
The total volume of fish and fishery product imports by The Bahamas has increased in recent years to 4,227 tonnes in 2015. Although the increase is not much, the trend seems to continue steadily.

¹⁸ Information from: https://webgate.ec.europa.eu/sanco/traces/output/BS/FFP_BS_en.pdf (accessed October 2016)

¹⁹ Information on this act can be found at: <http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm257980.htm#law>

Imported fish and fishery products in The Bahamas include mainly fish (bait, frozen, salted, smoked and canned). Swai (*Pangasianodon hypophthalmus*) also known as striped catfish, has become a popular import species; it is sold in food stores and often passed off as grouper in restaurants. The same can be said for *Tilapia* spp. which have become a more popular import in recent years. The most common form of imports of both catfish and tilapia are frozen fillets. Figure 17 shows fish and fishery product imports from 2009 to 2015.

Figure 17: Volume of fish and fisheries product imports in The Bahamas by main categories in tonnes.



If export and import trends over the last 6 years are compared, it is clear that exports slightly decreased while imports continue to increase (see Figure 18). In terms of volume, the imports of fishery products are some 75% higher than the exports. In 2015, some 24 million USD of fish and fisheries products were imported into The Bahamas. The largest imports in value consisted of fresh, frozen and chilled products, which added up to 9 million USD. The trade balance for fish and fisheries products is positive with export earnings around 70 million USD and imports around 24 million USD. The exports of fish and fisheries products in 2015 accounted for 31% of the domestic exports of The Bahamas. As such, the fisheries sector is a major contributor to reducing the trade deficit of The Bahamas, which added up to USD 2.719 billion in 2015.

Figure 18: Imports and exports of fish and fisheries products by The Bahamas in tonnes over the period 2009 -2016.

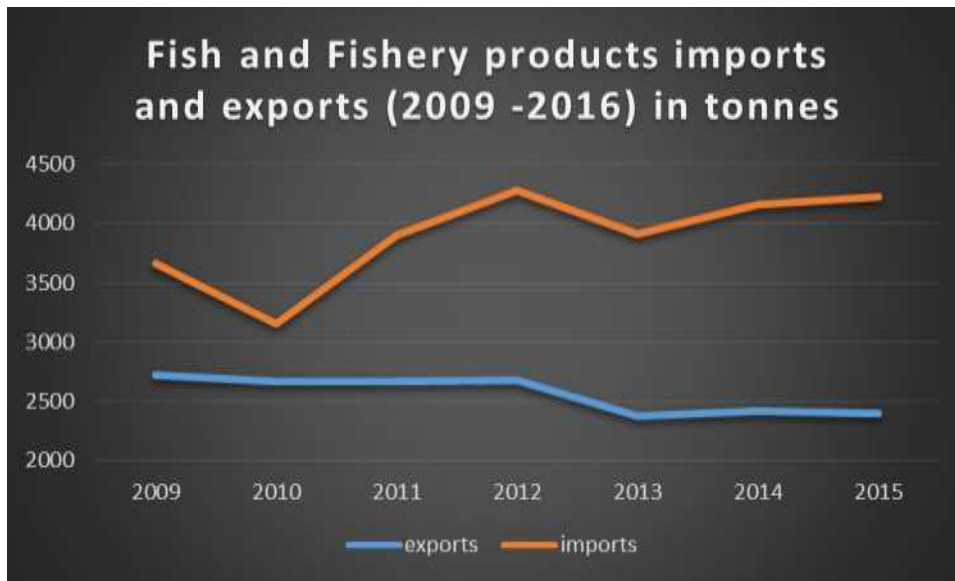
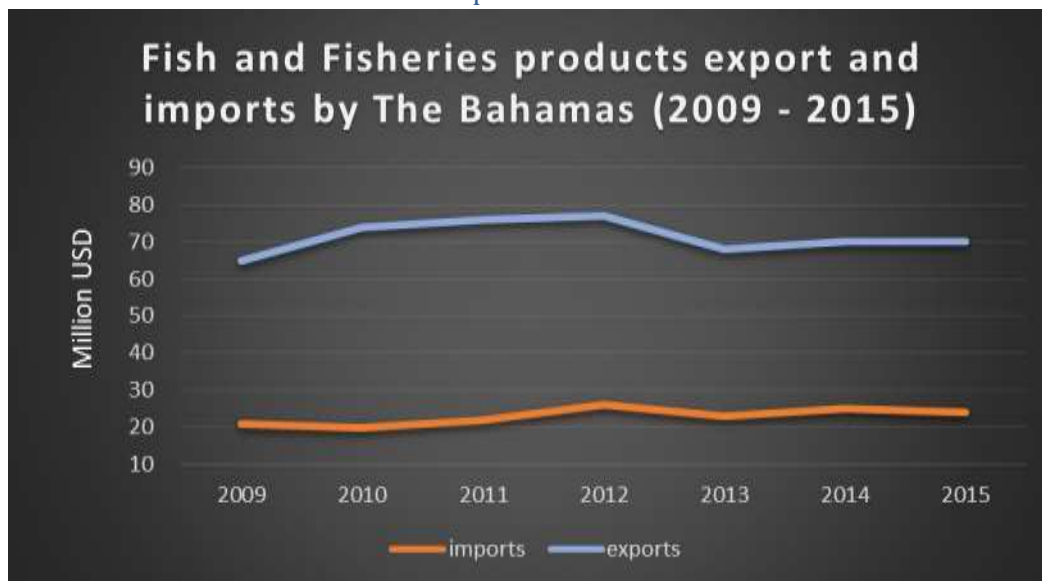


Figure 19: Imports and exports of fish and fisheries products by The Bahamas in million USD over the period 2009 -2016.



Statistics for exports and for imports for the period 2009 – 2015 are provided below in Tables 9 and 10 respectively.

Table 9: Bahamas Fishery Exports, 2009 – 2015

YEAR		2009		2010		2011		2012		2013		2014		2015	
PRODUCTS	UNITS	QUANTITY	VALUE (\$)	QUANTITY	VALUE (\$)	QUANTITY	VALUE (\$)	QUANTITY	VALUE (\$)	QUANTITY	VALUE (\$)	QUANTITY	VALUE (\$)	QUANTITY	VALUE (\$)
<i>Crawfish⁽¹⁾</i>	LBS.	5,080,330	59,614,813.00	4,750,040	67,851,364.00	4,632,902	69,426,792.68	4,918,798	71,479,325.54	4,165,508	60,221,466.00	3,993,080	60,338,463.00	4,136,817	62,850,896.00
<i>Crawfish⁽¹⁾ Live</i>												18,360	192,780.00	18,400	193,200.00
<i>Crawfish⁽¹⁾ Whole Frozen</i>												22,694	249,275.00	53,547	413,040.00
<i>Scale fish</i>	LBS.	112,806	374,336.00	193,815	644,412.00	258,788	847,313.00	80,264	260,585.00	157,996	498,149.00	161,501	504,489.00	143,372	340,692.27
<i>Conch Meat</i>	LBS.	532,225	3,197,293.00	554,100	3,214,332.00	592,800	3,328,113.00	546,350	3,174,721.75	544,950	3,310,971.00	553,410	3,266,577.50	401,838	2,343,142.00
<i>Stone Crab Cl.</i>	LBS.	88,989	838,924.00	121,409	1,302,529.00	128,933	1,352,865.00	138,993	1,628,313.78	195,899	2,436,802.00	242,483	3,891,012.10	160,396	2,813,639.05
<i>Total Sponge</i>	LBS.	58,586	536,977.00	36,680	396,069.00	61,535	540,173.65	49,384	515,398.25	61,776	566,893.00	52,184	437,800.68	100,343	633,506.05
<i>Q. Helmet Sh.</i>	Pieces														
<i>Conch Shells</i>	LBS.	116,253	31,286.00	230,177	101,528.00	189,200	80,800.00	165,996	49,270.00	99,980	41,000.00	267,799	82,840.00	257,526	57,777.50
<i>Conch Horn</i>	LBS.			2,464	11,628.00										
<i>Conch Pearls</i>	Pieces			624	23,479.00										
<i>Other Shells</i>	LBS.														
<i>Mar. Invert.</i>	LBS.	4,488	123,420.00			10,560	588,720.00	3,020	168,365.00	16,608	925,896.00	13,707	764,165.25	11,660	650,045.00
<i>Sea Cucumbers</i>	LBS.			30,703	149,579.00	29,773	148,865.00	1,581	7,907.00						
TOTAL		5,993,677	64,717,049		73,694,920.00		76,313,642.33		77,283,886.32		68,001,177.00		69,727,402.53		70,295,937.87

⁽¹⁾ Crawfish is Spiny lobster (*Panulirus Argus*)

Table 10: Bahamas Fishery Imports, 2009 – 2015

	2009		2010		2011		2012		2013		2014		2015	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Fish, fresh, chilled or frozen	617	5 582	707	6 734	868	7 272	813	8 014	706	6 745	889	7 785	1 129	9 002
Fish, dried, salted, or smoked	148	1 194	158	1 262	186	1 436	193	1 647	158	1 460	169	1 678	168	1 642
Crustaceans & Molluscs, live, fresh, chilled, etc.	541	5 132	539	5 210	509	4 764	677	6 093	385	3 818	604	6 468	622	5 004
Fish, prepared or preserved	2 281	8 428	1 649	6 039	2 268	8 006	2 473	9 395	2 566	9 747	2 409	8 592	2 217	7 607
Crustaceans and molluscs, prepared or preserved	55	420	81	810	55	457	99	1 102	50	482	60	620	64	602
Meals	0	1	-	-	-	-	-	-	-	-	1	4	0	1
Oils	1	6	1	7	1	7	1	5	1	5	0	0	0	0
Sponges, corals, shells	8	71	9	86	5	39	8	70	5	39	9	68	4	37
Aquatic plants	6	49	6	43	6	46	8	61	7	48	0	0	9	41
Inedible	3	14	3	17	5	23	5	26	38	175	24	101	14	66
TOTAL	3 660	20 897	3 153	20 208	3 903	22 050	4 277	26 413	3 916	22 519	4 165	25 316	4 227	24 002

Where Quantity: tonnes and Value: USD 1 000

[Source: FAO Fishstatj; accessed October 2016]

4.3 Fish demand and consumption

The demand for fish and fisheries products from the local population in The Bahamas is high. The latest (2013) per capita fish supply figures indicate that Bahamians have a supply of fish and fisheries products of some 31 kg/capita per year. In 1990, this was only 23 kg/capita/per year. The increase in supply of fish to the population has largely been achieved through an increase in fish and fishery product imports. The volume of fish and fisheries imports has tripled since 1990. The population grew over the same period by some 120,000.

At global level, the per capita fish supply was 20 kg in 2013 and 2014, thus the supply available to the Bahamian population is significantly higher.

Fish and fisheries products provide some 10% of the total protein intake by the Bahamian population. Of the total animal protein intake of Bahamians, the fish and fishery products supply 15%. This corresponds to 8 grammes of fish protein per capita intake per day; a figure which is 1 gramme higher than in 1990.

Fishery products, especially Queen conch, are culturally significant for Bahamians in addition to being a source of protein. Smith and Zeller (2013) note that tourism increases demand for local fish for sportfishing as well as consumption of native seafood. It appears however that the increase in tourism is supplied not just with Bahamian caught fishery and aquaculture products, but increasingly with imported fish. This is also a consequence of the harvest by the Bahamian fishing fleet, which did not show increases in recent years.

Estimates of subsistence fishing would add to values of local demand and consumption, but are not officially recorded. Consumption by the tourism sector is also not officially recorded.

5 Governance and Institutional Frameworks

5.1 Fisheries administration

The Ministry of Agriculture, Marine Resources (MAMR) is the national authority responsible for fisheries and aquaculture management and development, as well as fish and fishery products safety and trade management. The Ministerial portfolio adjustments of 22 February 2006 resulted in the morphing of the former Department of Fisheries into the Department of Marine Resources (DMR). While no written mandate was given at that time it was made clear that the intent of this change was to broaden the responsibilities of this Department beyond the traditional areas of focus, i.e. the management and regulation of the commercial fishing industry, to include responsibilities for the range of species and habitats that make up the marine environment of The Bahamas.

Therefore, the Department of Marine Resources (DMR) addresses the ministerial responsibilities and aims to develop the fisheries sector, through sustainable use and integrated management of the fishery resources, coastal zone, and marine environment for the well-being of Bahamians.

The Fisheries Resources (Jurisdiction & Conservation) Act 1977 establishes the Exclusive Fishery Zone (EFZ). It reflects concern with respect to conservation and management of the marine environment and its resources. It also recognizes traditional fishing rights and provides for the declaration of protected marine areas and regulation of the fishing industry. Current marine reserves declared for management by the Department are:

- South Berry Islands;
- Jewfish Cay;
- No Name Cay; and
- Crab Cay.

The legal declaration process involved numerous stakeholder consultations to agree on reserve boundaries and permitted activities within each reserve. The Department of Marine Resources in cooperation with The Nature Conservancy has developed management, zoning and communication plans for the South Berry Islands Marine Reserve (SBIMR), which is to serve as a model for all other reserves in the planned reserve network.

The Department issues permits and licenses for fishers, vessels and aquaculture facilities, in its role as manager of fisheries resources. Most permits and licenses are for commercial fishing, sport fishing, use of compressors, and scientific research. Strictly speaking for commercial fishing, FDC (Fisheries Department Commercial) registration numbers are issued on demand. There is no restriction in number of registrations nor in type of gear, except for long lines, which

were banned in 1993, and scuba diving (a compressor license can be requested though by professional trained divers).

The Department is also tasked with enforcement of Fisheries Regulations, Marine Mammal Regulations and the Seafood Processing and Inspection Regulations.

The Department is also in charge of collecting and analyzing fisheries data and preparing the official fisheries and aquaculture statistics for The Bahamas.

The DMR has various offices, including the Fish Landing Complex at Potter's Cay and the Food Safety & Technology Laboratories (FSTL) at Gladstone Road, Nassau. The main offices of the Department are located in two (2) buildings on East Bay Street, Nassau. The total number of staff of the DMR is forty-nine (49), of which 29 persons, including 18 professionals/technical and senior administrative staff are working at the main offices. There are ten (10) Assistant Fisheries Superintendents (AFS) stationed in the Family Islands. The DMR has an annual budget of just over 2 million USD, of which about 60-70 percent is used for personnel.

5.2 Fisheries training, research and extension

DMR staff members participate in training activities available regionally and internationally on an annual basis. There is not sufficient budget allocation by the Government for all capacity building required for the DMR staff. Therefore, the DMR tries to take advantage from some capacity building opportunities provided by regional and international organizations such as CRFM, WECAFC, FAO and various universities.

The DMR staff provide training locally in HACCP and compression diving safety. Such training sessions are held frequently and on-request.

The Department is responsible for issuance of research permits in the marine environment. Sometimes, the Department is able to participate in research projects by universities and institutions. The Department provides for a repository of some of the publications resulting from marine and fisheries research conducted in the country. DMR also partners with other agencies to carry out research in priority areas. Research partners include Community Conch, The Nature Conservancy, REEF and several universities.

Extension services in fisheries and aquaculture are extremely limited due to staffing constraints by the Department.

5.3 Fisheries statistics

Collection of statistical data is challenging due to the archipelagic geography of The Bahamas. There are so many areas where fish is being landed. However, the DMR does not even have sufficient manpower to collect data at all the formal landing sites.

Until the initiation of the FAO TCP project which supports the development of a new centralized information system, fisheries data were mostly coming from two sources: administrative records from the exporting companies declaring the landing sites from which the exported products were purchased; and landing data collected by DMR staff from certain landings sites. These data were compiled manually to produce Bahamas' catch statistics. This system had three major drawbacks: first, only commercial fishing was targeted, secondly, only few species were targeted resulting a certain underestimation of total catches, and thirdly, no raising factors were applied to derive statistics from data collection in landing sites (Morand, 2015).

The FAO TCP project (TCP/BHA/3501) aimed to improve the data collection process by reviewing the current situation and proposing new options for data collections compliant with DMR financial and human resources constraints and existing methodologies. These options were to be implemented in a centralized Fisheries Management Information System (FisMIS), replacing the old CRFM CARIFIS now defunct (for some technical reasons of non-compliance of the software platform to the new MS Windows version).

The current situation assessment report (Morand, 2015) resulted in a proposal to improve DMR's Data Collection Framework (DCF) through reinforcing the current monitoring of motherships by implementing a log book approach (large vessel = trip at sea over more than 2 days) and extending it to recreational fisheries (Small-medium vessel = one-day trip at sea) with a sample-based survey for selected islands.

In addition to the statistical assessment, a review of the existing IT systems in DMR and a comprehensive needs analysis were conducted during several missions (Taconet 2014, Laurent 2015a and 2015b) to build the foundation of the FisMIS. The final target of the system, as defined by the Director of the Department, is "to get accurate fisheries statistics in a timely manner". Hence, the FisMIS is dedicated to produce statistics. To reach this goal, the system is also aimed to manage certificates and permits as some of these provide sources of data to raise the said statistics.

The FisMIS is now operational with all its components:

1. Managing fishermen, companies and vessels registries, including permits and certificates;
2. Data upload for purchase orders (a reliable source of data for lobsters catches to be compare with the results of new DCF computation);
3. Data upload for the logbook landing forms and activity sheets;

4. Data upload for sample base survey (telephone survey and landing forms); and
5. Statistics computation and reporting.

FisMIS is now currently being used by DMR staff to maintain registries and issue certificates and permits.

The next steps will be to expand the methodology to the other Family Islands, depending on their specificities.

The main risk for successful implementation of FisMIS is the lack of a provision in the current fisheries act for fishers to mandatorily declare their catches. Implementation of log-books will require the acceptance by mothership captains and owners to declare their catches on a monthly basis (the information is already there as they keep data to pay the divers). It will also be necessary for DMR staff to cover all islands for the sample-based survey generalization, and to produce a precise definition of the dinghies vessel frame.

5.4 Fisheries and aquaculture related unions, cooperative, association and other fisheries linked institutions

5.4.1 Bahamas Agricultural and Industrial Corporation

The mandate of the Bahamas Agricultural and Industrial Corporation (BAIC) is to stimulate and encourage the creation, expansion and promotion of small and medium-sized Bahamian businesses and to assist them in developing and enhancing profitable opportunities for domestic and international trade. BAIC does this by providing businesses with research and feasibility studies, industrial lands for lease at concessionary rates, access to development funding and buyer markets, and business monitoring and evaluation.

BAIC was established by the Bahamas Agricultural and Industrial Corporation Act in 1981 and became operational in 1982. It is currently under the portfolio of the Ministry of Agriculture, Marine Resources and Local Government.

On 18 July 2013 the Prime Minister provided BAIC with six mandates relevant to fisheries and aquaculture: to research the viability of cleaning and processing sponges nationally, to create a shell industry for export, to utilize government equipment, to work with the Ministry of Agriculture in relation to the new Agriculture and Marine Science Institute, and to help develop young Bahamian talent.

5.4.2 Bahamas Agriculture and Marine Science Institute

Bahamas Agriculture and Marine Science Institute (BAMSI) offers teaching and training to provide the necessary professional and technical qualifications for the agriculture and fishery and

aquaculture sectors. Based in North Andros, its department for marine resources development provides the following services:

- Curriculum development to obtain an associate degree in marine science;
- Aquaculture – practical vocational training is offered in aquaculture. BAMSI has a 65,000 sq. ft. shade house for aquaponics with freshwater fish and plants;
- Research and extension – studies are currently underway on Nassau grouper aggregations and Queen conch populations. Research is proposed for sponges, bonefish and Spiny lobster.

5.4.3 Bahamas Commercial Fishers Alliance

The mission of the Bahamas Commercial Fishers Alliance (BCFA) is to organize all fishers in The Bahamas into one united body. The goals of the Alliance are to secure, protect, maintain, promote, advance and generally ensure the welfare and interest of fishers by developing and maintaining among its members the highest standards of conduct, practice and responsibility in pursuit of their trade. The Alliance aims to provide the means for cooperation and collaboration through the regulation of the fishing industry by strengthening partnerships, local and international for the sustainable management of the fisheries resources. The members of this organization have been vocal in the call for Government action to stop poaching in Bahamian waters and to enforce the country's fisheries legislation and regulations.

5.4.4 Bahamas Conservation and Sportfishing Association

With a membership consisting mainly of flatsfishing guides, the Bahamas Sportfishing and Conservation Association (BSCA) is headquartered in Andros and focuses on marine environmental issues. This Non-Governmental Organization (NGO) promotes conservation of habitats, the development and management of marine conservation programmes, and the promotion of a sustainable fishery in The Bahamas.

5.4.5 Bahamas Marine Exporters Association

Founded in May 2010, the Bahamas Marine Exporters Association (BMEA) is comprised of licensed seafood exporters. Their highest grossing export is the spiny lobster (*Panulirus argus*). The Association's mission is to collaborate with the Government of The Bahamas, fishermen and NGOs in preserving the lobster industry in The Bahamas.

The BMEA is actively involved in the Spiny Lobster Fisheries Improvement Project to certify the Bahamian lobster fishery as a sustainable fishery under the Marine Stewardship Council (MSC) certification programme. This certification would be the first of its kind for lobsters in the Caribbean islands and will assure the broadest possible market for Bahamian lobster tails exported and served in restaurants and resorts globally. The certification process has involved a number of stakeholders including the Department of Marine Resources, fishers, local

environmental NGOs as well as scientists who have reported on the health of the lobster stocks and fishery.

5.4.6 Other Non-Governmental Organizations

Non-Government organizations that are active in The Bahamas and play a significant role in fishery resource management from a conservation and research perspective include: the Bahamas National Trust (BNT), Bahamas Reef Environment Educational Foundation (BREEF), and the Nature Conservancy (TNC).

The BNT was established by an Act of Parliament in 1959, which makes it unique in the NGO community. It represents a unique collaboration of governmental, private sector and scientific interests dedicated to the conservation of the natural and historic resources of The Bahamas for the enjoyment and benefit of the Bahamian people. The major mandate of the Trust is management of the National Parks System of The Bahamas. Many of its parks have a marine component, including the longest existing park – the Exuma Cays Land and Sea Park. The Bahamas National Trust Act of 1959 gives the Trust the power to create by-laws to be in effect in the protected areas it establishes. These areas are of environmental, historical and/or cultural importance. The Act was amended in 2010.

The Bahamas Reef Environment Educational Foundation (BREEF) is concerned primarily with coral reef education and fund-raising for the protection of marine resources of The Bahamas through education. Its mission is to strengthen the symbiosis between the Bahamian people and the reefs, which protect, nourish, and enrich us, by focusing Bahamian and allied minds on this relationship. The Foundation's *raison d'être* is the restoration of the reefs of The Bahamas to their former glory and abundance. BREEF has been active in encouraging respect for seasonal closure of the Nassau grouper fishery through public education and outreach.

The Nature Conservancy has been working in The Bahamas for more than 10 years along with the Bahamas Government and a variety of partners to protect natural resources. TNC is working along with the BNT, Department of Marine Resources and the BEST Commission to build political support and garner long term financing for protected areas across the Caribbean through an initiative called The Caribbean Challenge. TNC Bahamas has also been collaborating with DMR on certification of the spiny lobster fishery, through the Marine Stewardship Council (MSC).

5.5 International and regional cooperation in fisheries development and management

The Bahamas is a Party to the 1982 United Nations Convention on the Law of the Sea since July 1983 and to the 1995 UN Fish Stocks Agreement since January 1997. The Bahamas also is party to a range of conventions and international instruments, such as the Convention on Biological Diversity, Convention on Climate Change, the Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Ozone Layer Protection, Ship Pollution, Wetlands. The government has signed, but not ratified any of these selected agreements. The Bahamas has neither accessed nor ratified the 1993 FAO Compliance Agreement. However, at the 14th session of the Western Central Atlantic Fishery Commission (WECAFC), held in Panama City, 6-9 February 2012, the country actively supported a resolution to strengthen the implementation of international fisheries instruments in the region. Recently, on 21 September 2016, The Bahamas acceded to the 2009 FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PSMA).

At the regional level, The Bahamas is an active member of the Western Central Atlantic Fishery Commission (WECAFC). The WECAFC provides a regional forum and technical advisory body regarding the management of shared fisheries stocks, making sure that these are sustainably managed and harvested across the Wider Caribbean Region. WECAFC provisions closely follow the Code of Conduct for Responsible Fisheries and its related instruments. Moreover, WECAFC facilitates fisheries scientific and management collaboration between The Bahamas and neighboring countries that are not member of the CARICOM.

Through its active participation in the Caribbean Regional Fisheries Mechanism (CRFM) of CARICOM, The Bahamas has access to a mechanism for joint fisheries research projects and is able to exchange best practices across the region. Both WECAFC and CRFM enhance regional harmonization of fisheries management, collaboration and cooperation in fisheries research, and promotion of best practices, but also enhance trade and fisheries development and thus strengthen regional integration.

At regional level within the WECAFC framework, a number of voluntary (non-binding) fisheries management recommendations and resolutions were developed and adopted in recent years. These recommendations resulted from scientific and technical working group meetings, studies and projects and were thoroughly reviewed by all stakeholders before they got adopted for regional implementation.

The Bahamas is expected to support implementation of these recommendations and resolutions, which often provide the minimum requirements for management of a specific fisheries, at national level, through practices, regulations and management and enforcement. Not all

recommendations are relevant for the situation in The Bahamas, and for some fisheries (e.g. Nassau Grouper), the management regulations are stricter in The Bahamas than advocated in the regional recommendation; the reasons being that the regional recommendations are the outcome from discussions and negotiations between many countries.

The WECAFC Recommendations adopted in 2014 by the 15th session of the Commission held in Port of Spain, Trinidad and Tobago, from 26 to 28 March 2014 (WECAFC/FAO, 2014), were the following:

- WECAFC/15/2014/1 “on the establishment of a regional closed season for fisheries in the WECAFC area to protect spawning aggregations of groupers and snappers”
- WECAFC/15/2014/2 “on the sustainability of fisheries using fish aggregating devices in the WECAFC area”
- WECAFC/15/2014/3 “on the management and conservation of Queen Conch in the WECAFC area”
- WECAFC/15/2014/4 “on strengthening fisheries management planning in the WECAFC area”

At the same session, the following resolutions were adopted:

- WECAFC/15/2014/6 “on region-wide support to the implementation of the CRFM “Castries, St Lucia, (2010) Declaration on Illegal, Unreported and Unregulated Fishing”.
- WECAFC/15/2014/7 “promoting the implementation of the Regional Strategy for the Control of Invasive Lionfish in the Wider Caribbean, as prepared by the International Coral Reef Initiative (ICRI) and partners”.
- WECAFC/15/2014/8 “promoting the implementation of voluntary guidelines on Small-scale fisheries and tenure”.
- WECAFC/15/2014/9 “on the implementation of the Port state Measures Agreement and the FAO Voluntary Guidelines on flag State performance in the region”.
- WECAFC/15/2014/10 “on the strategic action programme for the sustainable management of the shared living marine resources of the Caribbean and north Brazil shelf large marine ecosystems (CLME+ SAP)”

Recommendations made in 2016 by WECAFC 16 (Guadeloupe 20-24 June 2016) (WECAFC/FA, 2016), include:

- Recommendation WECAFC/16/2016/1 “on the regional plan for the management and conservation of Queen conch in the WECAFC area – addendum to recommendation WECAFC/15/2014/3
- Recommendation WECAFC/16/2016/2 “on spiny lobster management and conservation in the WECAFC area”

- Recommendation WECAFC/16/2016/3 “on the sub-regional fisheries management plan for flyingfish in the Eastern Caribbean”
- Recommendation WECAFC/16/2016/4 “on the management of deep sea fisheries in the high seas”
- Recommendation WECAFC/16/2016/5 “on the management of shrimp and groundfish resources in the WECAFC area”

Resolutions made in 2016 by WECAFC 16 (Guadeloupe 20-24 June 2016), include:

- Resolution WECAFC/16/2016/6 “on sea cucumber fisheries management and aquaculture”
- Resolution WECAFC/16/2016/7 “on Marine Protected Areas as fisheries management tool in the Caribbean”

The CRFM has been producing and adopting in recent years a range of strategies, declarations and management plans that are of great importance to the Bahamian fisheries sector. The most important ones include:

- The Castries (St. Lucia) Declaration on IUU Fishing through the adoption of a Regional Strategy on MCS and manuals for Prosecution and Standard Operating Procedures for enforcement personnel.
- The first Sub-regional Fishery Management Plan for the Flying fish Fishery.
- Regional Plan of Action 2014-2019 on Improving the Outlook for Caribbean Coral Reefs.
- Lionfish strategy.
- Aquaculture Programme of Action.
- Five-Year Plan of Action for the Development of Aquaculture in the CARIFORUM States.
- St. George`s Declaration on Conservation, Management and Sustainable Use of the Caribbean Spiny Lobster.
- Regional Strategy and Action Plan – Climate Change and Disaster Risk Management in Fisheries and Aquaculture in the CARICOM region.

A major milestone for the implementation of sustainable fisheries through the CRFM was the signing of the St. George`s Declaration on Conservation, Management and Sustainable Use of the Caribbean Spiny Lobster (*Panulirus argus*) in May 2015 (CRFM, 2015). The Spiny Lobster Declaration recognizes the trans-boundary nature of the species and the interconnectedness of the marine ecosystems in which they live, and it highlights the need for Member States to cooperate and coordinate actions.

The Caribbean Community Common Fisheries Policy (CCCFP), which was approved in 2014 by the Council for Trade and Economic Development (COTED) of the CARICOM states, provides

the regional policy framework for fisheries for all CARICOM countries, including The Bahamas. Therefore, this policy contributes to the national implementation of the CCCFP in The Bahamas.

In recent years, The Bahamas has also been active in the northern parts of the Atlantic Ocean, where Bahamian flagged fish transport and transshipment vessels are active in the mandate area of the North East Atlantic Fisheries Commission (NEAFC). The Bahamas is a cooperating non-contracting party in NEAFC.

6 Policy, Regulatory and Management Frameworks

6.1 Fisheries and aquaculture policies and planning

Although the fisheries sector is important for the country in terms of food security, export earnings and employment provider, The Bahamas does not have a fishery sector policy. As a consequence, the daily politics and ad-hoc issues are largely interfering in fisheries management and development.

The informal (not-formally endorsed) government policy contains a few practical directions. It presently reserves the commercial fishing industry, as far as is practical, for the exploitation by Bahamian Nationals. Only commercial fishing vessels that are 100% Bahamian owned are considered Bahamian and therefore allowed to fish within the country's Exclusive Economic Zone (EEZ). No fishing treaties have been established with any foreign states and fishing by foreign commercial fishing vessels has been prohibited. Seafood processing facilities have been placed on the list of areas specifically targeted for overseas investors. Further, all investment projects with non-Bahamian interest must have the approval of the Government's National Economic Council (NEC).

In the period 2014 -2016, a National Policy for Fisheries and Aquaculture and a Strategic Plan for Fisheries and Aquaculture Development and Management in The Bahamas 2017-2022, has been developed in a participatory manner with a range of national- and local-level stakeholder consultations. This policy and planning process was supported by FAO within the framework of the TCP project on "Strengthening Fisheries and Aquaculture Governance in the Bahamas". The National Policy and Strategic Plan were awaiting Ministerial approval at the time of the writing of this review.

6.2 Fisheries legal and regulatory framework

The Bahamas received assistance from the European Union funded ACP Fish II project to review the 1977 Fisheries Resources (Jurisdiction and Conservation) Act and to prepare, through a consultative process, a new fisheries act for The Bahamas. The draft Fisheries Act is currently undergoing a governmental approval process.

This new (draft) Fisheries Act makes provisions to lay the foundations of improved fisheries monitoring and management:

- Licenses are requested for any individual operating on a fishing vessel (linked with safety at sea training)
- Licenses are requested for fishing vessels

- There are obligations to report catches for fishing vessel
- Application of a Vessel Monitoring System (VMS) for fishing vessels is required
- A better vessel registration system

The new Port Act, which is an amendment of the 2006 Port Authorities Act, also reinforces the capacity of DMR to create quality vessel frames from the Port Authorities' vessel registration form, as the vessel' main activities should be defined at the registration level.

It is to be said that the new Fisheries Act and Port Act are still awaiting approval by the Government of The Bahamas. Once adopted by the Houses of Parliament, it will certainly take some time to move from a situation where no license is required to fish to a better regulated fisheries sector.

The legal framework relevant for fisheries also includes the following main acts and regulations:

- 1964 – **Agriculture and Fisheries Act**, which provides for the supervision and development of agriculture and fisheries in The Bahamas and gives the Minister of Agriculture and Fisheries the authority to declare an area protected;
- 1985 - **Food Act**, which regulates the manufacturing of food and provides for quality control, testing and certification for food processing and preservation. This act is supported by the 2002 **Food (Seafood Processing and Inspection) Regulations**;
- 1986 - **Fisheries Resources (Jurisdiction and Conservation) Act**, which establishes the Exclusive Fisheries Zone. It reflects concern for the conservation and management of the marine environment and its resources. It recognizes traditional fishing rights and provides for the declaration of protected marine areas and regulation of the fishing industry. An amendment in 1993 prohibited long line fishing, except with the written permission of the Governor General. An amendment in 2009 provides for the protection of marine turtles and an amendment in 2011 provides for the protection of sharks;
- 1993 - **Archipelagic Waters and Maritime Jurisdiction Act**, which delineates the territorial sea, archipelagic waters, internal waters and the Exclusive Economic Zone of The Bahamas;
- 2003 – **Family Islands Enterprise Zones Act**, which allows for exemption on customs or excise duties for supplies related to construction of buildings, including those for fisheries, in specified zones in the Family Islands;
- 2004 - **Wildlife Conservation and Trade Act**, which regulates trade in protected animals and plants. It requires the appointment of a scientific authority to advise Management Authority on the proposed exports and imports of species listed in the Appendices of the Convention on the International Trade in Endangered Species of Wild Flora and Fauna. The Minister is required to appoint a National Advisory Committee of individuals from the public and private sectors involved in the management and enforcement of wildlife protection; and

- 2005 - **Marine Mammal Protection Act**, which protects marine mammals belonging to the family Delphinidae and any other marine mammal designated by the Minister within the exclusive economic zone of The Bahamas. It regulates facilities involved with marine mammals and requires the appointment of Marine Mammal Inspectors. The Act has supporting regulations – the 2005 **Marine Mammal Protection (General) Regulations** and the 2005 **Marine Mammal (Captive Dolphin Facility) Regulations** (amended in 2006).
- 2006 - **Port Authority Act**, which regulates port authorities and port areas, establishes functions of port controllers and harbor masters and deals with port infrastructures.

6.3 Fisheries management

The DMR recognizes that fisheries management practices that are currently applied in The Bahamas take environmental issues insufficiently into consideration and require additional efforts to implement the FAO Code of Conduct for Responsible Fisheries (FAO, 1995). The promotion of the Ecosystem Approach to Fisheries (EAF) is still in its infancy. There is work underway to develop fisheries management and conservation plans for Spiny lobster and Nassau grouper.

There are a few fisheries management measures have been in place for some years now and are worth mentioning. The most important are the following:

- Scuba diving in fisheries is prohibited – a compressor license is required to use compressed air to target lobster with depth restriction.
- Long liners have been prohibited to fish in Bahamian waters since 1993.
- Trap licenses are needed to use traps for lobsters – trap numbers (markers/identifiers) must be written on the traps, with some specific characteristics.
- A closed season is in place for spiny lobster and groupers.
- A minimum size for lobster is defined.
- Possession of bleach and dishwashing liquid on board is subjected to a specific license.

At present 13 Marine Protected Areas (MPAs) are in place (see <http://bnt.bs/parks/>) and 15 more have been announced in August 2015. The establishment, management, surveillance and enforcement of these MPAs has an impact on fisheries management and the conservation of fisheries target stocks. As a consequence, the DMR is closely involved in the MPA matters that relate to fisheries and the fisheries sector stakeholders.

7 Social and Economic Aspects of Fisheries and Aquaculture

7.1 Fisheries and aquaculture employment

The latest official figure regarding employment in the fisheries sector originates from the 1995 census with a total of 9,300 persons directly employed. This figure is considered stable by the Department of Marine Resources, and a correct estimation of the situation in 2016. No recent census has been conducted to update this number. Estimates for employment in the recreational fishery are 18,000 direct and indirect jobs (Maycock, 2016).

7.1.1 Divers statistics from DMR CARIFIS

In 2015, 957 fishers applied for a compressor license (Source of data: CARIFIS software). The number of applications has been quite stable from the last 6 years (see Table 12). Approximately 1,000 fishers are registered as divers in The Bahamas.

Table 11: number of compressors licenses (2009 to 2015) from CARIFIS

Year	2009	2010	2011	2012	2013	2014	2015
Number of compressor licenses	1004	1022	1038	1056	1026	976	957

Source: Bahamas CARIFIS

7.1.2 Fisheries sector employment information from the 2010 census

According to the Bahamas Department of Statistics 2010 Census Report (Department of Statistics, 2010a), employment in the sector can be described as outlined in Table 13 below. There are likely many more persons employed in the sector, but other employment categories were not disaggregated specifically for fisheries or aquaculture, such as building and repair of ships and boats, public administration, and professional, scientific and technical activities.

Table 12: Employment in the fisheries and aquaculture sector (2010 Census)

Industry	Total	Male	Female
Fishing	1,597	1,553	44
Aquaculture	16	12	4
Processing and preserving of fish, crustaceans and molluscs	130	96	34
Building and repairing of ships and boats	23	22	1

Table 14 details the various occupations that were documented that can be applicable to the sector (Department of Statistics, 2010b). There are more occupations associated with the sector, but these were not disaggregated specifically for fisheries and aquaculture, such as senior Government officials and secretaries. Some of the occupations are not exclusive to the sector, but include categories which would be considered a part of the sector.

Table 13: Occupations in the fisheries and aquaculture sector (2010 Census)

Occupation	Total	Male	Female
Aquaculture and fisheries production managers	6	2	4
Farming, forestry and fishery advisers	17	13	4
Aquaculture workers	12	9	3
Inland and coastal fishery workers	895	876	19
Deep sea fishery workers	630	603	27
Aquarist	31	16	15
Subsistence fishers, hunters, trappers and gatherers	7	6	1
Butchers, fishmongers and related food preparers	401	332	69
Underwater divers	65	58	7
Fishery and aquaculture labourers	68	43	25
Totals	2,132	1,958	174

These Census 2010 derived figures are far from the 9,300 employed individuals in fisheries as reported by the DMR. The difference may be explained by the fact that fisheries in The Bahamas is highly seasonal for the main species (lobster and conch). Hence, full-time workers in other sectors will typically take holidays to fish during the lobster season. But, there is a need to define more precisely the repartition of these 9,300 fishers, by full-time and part-time fishers, divers and vessel crew. Provision in the new Fisheries Act to request a fisher license to go for commercial fishing should improve the level of details in the available statistics.

7.2 Social security of fisherfolk, aquaculturists and others working in the sector

Social security is a priority need within the fisheries sector. Most persons in the sector do not have medical insurance and have not taken advantage of benefits available under the National Insurance because they have failed to make the necessary monthly contributions.

Insurance for fishing vessels, gears, equipment, and related infrastructure is costly in The Bahamas and therefore not every fisher is able to ensure their investments. This puts them at high risk from natural disasters and problems at sea, which can result in large losses. There has been discussion about development of affordable insurance schemes for the sector, and this was identified as an output of social objectives under the draft 2016 Fisheries and Aquaculture Strategic Plan. The Bahamas has been a member of the Caribbean Catastrophe Risk Insurance Facility (CCRIF), but there have been challenges in accessing the insurance as recently as 2015 after Hurricane Joaquin.

A recent survey (2015) carried out by FAO and CRFM among fishers and fisheries authorities in the CARICOM countries showed that:

- 97% of the fishing vessels and fishing assets are presently **not** insured.
- In each of the CARICOM countries, there is at least one insurer offering marine insurance.
- 83% of the fishers would purchase insurance coverage if more affordable than at present.
- Only 17% of the fishers have a health insurance and 20% have a life insurance policy at present.
- About 50% of the fishers are participating in national social security schemes.

It is estimated by the DMR that these figures are similar for the Bahamian fisheries sector.

The fisheries research vessels, patrol vessels or fish landing sites in The Bahamas are not being insured by the DMR. In most CARICOM states, this is the case.

Tenure rights have also been identified as a priority issue for social security under the draft Strategic Plan for Fisheries and Aquaculture Development and Management in The Bahamas 2017-2022. Fishers need tenure rights to their fishing areas, to ensure long-term physical access to the marine environment, storage of boats and gear, and areas for sale of products. There need to be development of formal policies and legislation to secure tenure rights, such as right-of-ways and shoreline access. It is recognized by the DMR that such tenure rights will increase the viability of fisheries and promote sustainable and stewardship practices in the sector.

Small scale, artisanal and traditional fishers need to be included in the decision-making process for the sector. The draft Strategic Plan proposes that this be achieved through a number of

activities including inclusion of these stakeholders in a Fisheries Advisory Council and a National Fisheries Stakeholder Forum.

7.3 Economics of fisheries and aquaculture

A number of economic statistics for the sector have been provided in previous sections of this review. Sectoral performance indicators are provided below in Table 15.

Table 14: Sectoral Performance Indicators

PERFORMANCE INDICATOR	2009	2010	2011	2012	2013	2014
National GDP (US Dollars)	\$7.8 Billion	\$7.9 Billion	\$7.9 Billion	\$8.2 Billion	\$8.4 Billion	\$8.5 Billion
Fisheries Contribution to National GDP (US\$M)	\$62 Million	\$79 Million	\$78 Million	\$84 Million	\$60 Million	\$ 67 Million
Production in tonnes	13,810	16,342	15,313	16,757	12,765	11,878
Per capita fish supply	29 kg	29 kg	29 kg	30 kg	31 kg	31 kg est.
Employment Level (# of persons)	9,300	9,300	9,300	9,300	9,300	9,300
Production per fishery sector worker in tonnes	1.5	1.8	1.6	1.8	1.4	1.3
Value of Fisheries Exports (US\$M)	\$65 Million	\$74 Million	\$76 Million	\$78 Million	\$65 Million	\$70 Million
Value of Fisheries Imports (US\$M)	\$21 Million	\$20 Million	\$22 Million	\$26 Million	\$23 Million	\$ 25 Million
Trade balance for fisheries products (US\$M)	\$44 Million	\$54 Million	\$54 Million	\$51 Million	\$45 Million	\$45 Million

7.4 Investment in fisheries and aquaculture

Currently potential investors in fisheries and aquaculture (whether domestic or foreign) are hesitant to invest in these sectors. They are not sure of the political commitment and willingness to support the sector in the long term. The long time it takes to finalize the new Fisheries Act and the absence of a Government-approved Policy and Strategic Plan has caused the investment in the sector to be lower than could have been expected. Investors seek to make secure investments that are supported by an enabling policy and legal framework.

Moreover, in terms of resources available and the administrative requirements and processes to establish an aquaculture enterprise, even the DMR had no clear information available for prospective investors. In 2015, the DMR developed, with FAO support, a prospectus for commercial aquaculture to assist investors to access the type of information they would need.

7.5 The role of fisheries and aquaculture in providing food security and alleviation of poverty

The 2012 Diagnostic Study to determine poverty levels in CARICOM fishing communities, which was carried out by the CRFM, identified poverty in households in the Bahamian fisheries sector. The extent of poverty levels found is provided below in Table 16. All vulnerable households belonged to the capture fisheries sector and their main constraints were access to services, economic capacity and education. These fisheries households were in the communities of North and Central Andros and Abaco. While fishing makes an important contribution to the livelihood of households, most households have more than one source of income, making them less dependent on fishing incomes.

It can be concluded from the study that poverty is absent in the fisheries sector, and that some 6 percent of the fisheries households are vulnerable to drops in fish production and fish price fluctuations. Climate change and variability, as well as natural disasters, such as caused by the recent (2016) Hurricane Matthew, are increasing the vulnerability of the fisheries sector. It is therefore important that climate change adaptation measures are being taken by the stakeholders in the sector, supported by the Government.

By providing employment and livelihoods for an estimated 9,300 persons in commercial fishing and 18,000 in recreational fishing related activities, the sector makes an important contribution to poverty alleviation in The Bahamas if we use the average household size in The Bahamas, which was 3.4 persons (2013) and the total population was an estimated 362,000 persons in 2013 (Dept. of Statistics, 2013). The same Department of Statistics estimates the total labour force in The Bahamas in 2015 at around 186,000 persons. This would mean that nearly 15% of the labour force is working full-time or part-time in the fisheries sector or related business. Moreover, if we estimate that there are a little over 100,000 households in The Bahamas, it would mean that about a quarter of the households derive some income from fisheries or related business.

Table 15: Extent of poverty in households in the Bahamian fisheries sector

Surveyed districts	Non-poor (%)	Vulnerable (%)	Poor (%)	Percentage responses per region
Long Island	4.67	0	0	4.67
South Andros	4.67	0	0	4.67
Crooked Island	5.61	0	0	5.61
Mayaguana	5.61	0	0	5.61
Acklins	6.54	0	0	6.54
Eleuthera	6.54	0	0	6.54
Grand Bahama	11.21	0	0	11.21
Central Andros	3.74	0.93	0	4.67
North Andros	22.43	3.74	0	26.17
Abaco	23.36	0.93	0	24.30
BAHAMAS	94.39	5.61	0	100

The diagnostic study report recommends the following to alleviate poverty and reduce vulnerability amongst those dependent on the fisheries sector for their livelihoods (CRFM, 2012):

- Enhancement of fisheries training to improve quality of fish products, crew safety and fishing efficiency.
- Establishment of a fishermen’s pension and social security benefit scheme within the legislative framework.
- Promotion of participation in a social security system by those in extractive fishing so they are able to receive both short- and long-term benefits.
- Development of a financial support plan to provide fishers and fisher organizations with access to credit for investment in responsible fishing gear and technologies, safety gear, and safer practices. The plan should include micro-finance schemes.
- Enhancement of the role of cooperatives as a form of co-management. Cooperatives can also provide legal advice, credit or financial assistance, training, gear and equipment at affordable prices, and help with marketing and distribution of products. Co-management can also increase stewardship amongst fishers.
- Strengthening of the participation of unemployed women in the sector.

Food security at the household level is contributed to through the consumption of the catch. In The Bahamas, some 8% of catch is used for home consumption by the fishing households (CRFM, 2012). Apparent per capita supply of fish is estimated as 31 kg/capita/year (FAO Food Balance Sheets). Aquaculture has the potential to increase food security in the country; a promise it has yet to deliver. Food security is threatened by those factors that can negatively impact fishery stocks. These include pollution, habitat degradation, natural hazards and climate change.

8 Sectoral Diagnosis

There are various methods that can be used to diagnose the current situation for fisheries and aquaculture at the national level. One of the most commonly used to analyze a situation, create understanding and assist future decision-making processes in a simple manner is the SWOT (strengths, weaknesses, opportunities and threats) analysis. This has the advantage that it addresses both internal and external factors that support or constrain sectoral development.

In the process of formulation of the draft National Policy and Strategic Plan, a SWOT analysis was carried out, using a consultative process. The SWOT reflects the views and experiences of the stakeholders of the sector, and informs the objectives and work operationalized by this Strategic Plan (see Table 5). The SWOT analysis, initially done in the inception workshop in 2014 was further enhanced by comments provided during the subsequent stakeholder consultations held in 2015 and 2016. Given the differences between the various subsectors, the SWOT tables below represent an aggregate understanding of the strengths, weaknesses opportunities and threats to aquaculture, fisheries and post-harvest activities in The Bahamas. To some extent, the National Policy for Fisheries and Aquaculture Policy and the Strategic Plan have been created to respond to the issues identified by the SWOT analysis.

8.1 SWOT for Fisheries

Fisheries	
Strengths	Weaknesses
<ul style="list-style-type: none"> • Employment generator • Quality and availability of education • The presence of Bahamas Agriculture and Marine Science Institute (BAMSI), which is dedicated to education in marine science • Existence and capacity to hold numerous sport fishing tournaments • Revenue generator • Stable Government • Fisheries provide good proteins/ healthy food • Some fisheries stocks are healthy • Availability of funds for management in relation to other CARICOM nations • Political buy-in exists • Relative large size of the sector and related economic contribution • Fair and transparent legal system • Increased visitor arrivals with interest in recreational/sports fishing and who need food supply 	<ul style="list-style-type: none"> • Lack of a national fisheries management plan • Generally insufficient resources for fishery management (i.e. human, financial and equipment) • Open access to coastal and marine resources • Lack of stock and fisheries assessments (and expertise to conduct them) • Insufficient data, statistics and information technology to aid in fisheries management • Insufficient use of fisheries technology in the sector • High prices of fishery products compared to chicken and beef, which reduce consumption • Incomplete knowledge of rules and regulations among local fishers • Low levels of compliance with regulations • Market access issues (e.g. lack of certification/eco-labeling) • Inadequate extension services

<ul style="list-style-type: none"> • Strong and well-informed NGO partners which provide support and collaboration 	<ul style="list-style-type: none"> • Outdated and inadequate fishery regulations • Small marine reserve network in need of expansion to be effective
<p>Opportunities</p>	<p>Threats</p>
<ul style="list-style-type: none"> • Outreach to facilitate changes in attitudes and behavior toward sustainable fisheries (e.g. sport fishing catch and release) • Healthy fisheries habitats and resources still exist in some locations • Education, research and training, and extension, workshops • Investment opportunities for quality assurance, ecotourism, aquaculture and ancillary industries • Increase employment • Improve food security • Improve social standing for fishers • International collaboration (research, information exchange, management, etc.) • Improve fishing technology and fisheries management • Increase revenue from fishing • Upgrade fisheries landing sites • Lobster Fishery Improvement Project can serve as a model for other species 	<ul style="list-style-type: none"> • No assurance of continuity of policies and programmes if administrations change • Overfishing • Illegal, unreported and unregulated (IUU) Fishing • Conflicts at sea between sectors and within fisheries • Pollution and other forms of environmental degradation • Invasive alien species • Natural disasters • Climate change • Unchecked and unregulated technology • Misinformation being provided to the public

8.2 SWOT for Aquaculture

Aquaculture	
<p>Strengths</p> <ul style="list-style-type: none"> • Product uniformity • Consistency of supply • Product origin - The Bahamas' reputation/image • Stock recovery • Minimal land required • Availability of adequate land and water resources • Diversification of products • Government support and incentives • BAMSI - an institutional resource (for technology and trained personnel) • Water quality — coastal waters are pristine in some locations 	<p>Weaknesses</p> <ul style="list-style-type: none"> • High cost of capital • Environmental and ecological impacts from aquaculture • Limited local knowledge and expertise • High cost of production (labor, utility, inputs) • Lack of support from enforcement agencies • Poor availability of seed and feed • Geography: topography, geology, climate • Transport between islands is costly • Cost and reliability of electricity • Limited political will • Lack of policy and legislation • Limited current market demand and cultural appeal
<p>Opportunities</p> <ul style="list-style-type: none"> • Increase food security and nutrition for the population • Nearby markets - regional, local and tourist markets in The Bahamas • Spin-off industries - ancillary, support, input production and supply • Closed recirculation and controlled systems technologies proven • Integration with crop production (aquaponics) • Employment creation • Economic growth • Research 	<p>Threats</p> <ul style="list-style-type: none"> • Invasive alien species • Aquatic animal diseases • Pollution • Security of stock (praedial larceny) • Natural predators • Natural and man-made disasters • Weather and climate variability with changes becoming less predictable • Competition with imports • Conflict among common resource users and with other sectors

8.3 SWOT for Post-Harvest

Post-Harvest	
Strengths	Weaknesses
<ul style="list-style-type: none"> • A framework is in place for securing fish quality and safety (including HACCP, ISO and EU certified processors/exporters, competent authority, training of vendors in fish handling and use of SPS manual standard operating procedures) • The Department of Environmental Health Services inspects the domestic fish markets • Cold storage facilities are available in all major fishing ports • There are well-established business relationships with main export markets • The Bahamas' fisheries products have a good reputation abroad and at national level • The Bahamas is a net exporter (in value terms) of fisheries products • Fish-buying stations (collection centres) are established in almost all islands, facilitating fish sales by fishers 	<ul style="list-style-type: none"> • High labor costs • Weak quality and safety inspections or controls in some Family Islands and fish landing sites • Poor (refrigerated) transport links for fish between certain islands • Flake ice supply for fishing vessels and transporters or middlemen is not available in most islands • Freshwater or tap water availability for fish processing is limited or lacking in various landing sites and markets • No proper traceability and labelling at retail level of fisheries and aquaculture products (origin, species names, expiry dates, etc. are not provided) • Lack of education or knowledge of fishers on hygiene, fish quality, safety and value of byproducts and by catch (poor handling practices affect price and market opportunities) • Market infrastructure for fresh fish is limited in some islands (no flake ice, no certified scales, only chest freezers, electricity failures)
Opportunities	Threats
<ul style="list-style-type: none"> • Strong market demand locally • International market for conch, spiny lobster and stone crab • Marine Stewardship Council (MSC) certification of spiny lobster • Tourist market of 5 million visitors annually • Potential value added (spiny lobster, conch, sponge, other species) • Potential new product developments (e.g. lionfish) • Ease of entering post-harvest sector business –only need to meet technical requirements in conformity with main export markets • Use of byproducts (conch shells and horns, carapace of spiny lobster) • Use of waste from processing for animal feed, energy, fertilizer 	<ul style="list-style-type: none"> • High electricity costs 5. Disruption in cold chain during fish transport between islands • Few incentives provided by Government to the post-harvest sector (e.g. no duty free concessions) • Perception of consumers – they prefer fresh over frozen in the domestic market • Endangered Species Act (ESA) process in the USA may be detrimental to export of conch and Nassau grouper to the US market • VAT of 7.5% on fisheries products (from January 2015) • High market price of fish compared to chicken and pork in the domestic market • Price fluctuations – high prices for fish around Easter.

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| <ul style="list-style-type: none">• BAMSI with expertise to conduct market research• Standards Bureau recently established | |
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