PART II NATIONAL REPORTS AND REFERENCES

compiled and edited by S.C. Venema

1 NATIONAL REPORT ON THE SPINY LOBSTER FISHERY IN THE BAHAMAS[1]

V.K.W. Deleveaux and G. Bethel

1.1 DESCRIPTION OF THE FISHERIES

The Bahamas is an archipelago that extends from south Florida of the USA to the large island of Hispaniola in the Caribbean Sea. The Bahamas covers an area greater than 259 000 sq. km and has a mean temperature around 25°C. The shallow water banks have an average depth around 9 m but water depth can exceed 1.6 km in the Tongue of the Ocean. Just west of the Tongue of the Ocean is the world's third longest barrier reef, running along the east coast of Andros, the largest island in The Bahamas.

The Bahamian fishing industry has great potential for growth through the development of the necessary infrastructure and manpower to efficiently and fully utilize the natural resources available within the Exclusive Fishery Zone of The Bahamas.

The Department of Fisheries is responsible for the administration of the fishing industry and for the management and development of fisheries in a sustainable manner for the benefit of all Bahamians. Therefore, a prime responsibility of the Department is the formulation and implementation of sound fisheries policies and development objectives.

The commercial fishing industry of The Bahamas is based primarily on its shallow water banks, principally the Little Bahama Bank and the Great Bahama Bank. Other shallow water bank areas are also found adjacent to several of the southeastern islands. These banks cover an area of about 116 550 sq. km. and have a edge estimated at 4 000 km, along which the depths plummet to between 370 m and 3 700 m. Much of the fishing effort is concentrated on the Great Bahama Bank and the Little Bahama Bank.

The principal categories of fishery resources caught in commercial quantities from the Bahamian Exclusive Fishery Zone are spiny lobster (*Panulirus argus*), conch (*Strombus gigas*), shallow and deep water scalefish (*Epinephelus spp, Mycteroperca spp, Lutjanus spp, Haemulon spp, Caranx spp, Selar spp*), sponges (*Hippospongia lachne, Spongia spp*), marine turtles (*Chelonia mydas, Caretta caretta*) and another marine gastropod, the queen helmet shell (*Cassis madagascarienis)*. Most of the catch is landed in the islands of New Providence, Abaco and Eleuthera, however Grand Bahama, Long Island and Andros have lesser but still significant landings of fishery resources (Figure 1.1).

The typical fishing unit in The Bahamas is a small open boat, locally called a dinghy, which is approximately 5.2 m in length with an outboard engine of about 70 hp. This boat usually carries two men and is used mainly as a platform from which a diver armed with either a spear, or now more often a spiny lobster hook, will operate. The spiny lobster diver searches the natural reefs and artificial habitats (casitas) for his targets. He may legally be supplied with air from a compressor on board the dinghy during the spiny lobster open season. This boat, along with up

[1] Version presented at Workshop in Mexico, 1998 and additional figures presented in Belize

Figure 1.1 Main fishing grounds of the Bahamas

to 7 or 8 similar boats, is often towed by a larger vessel, ranging in size from 13.7 m to 30.5 m, which acts as an operations base, providing food, sleeping quarters and catch storage. This arrangement allows the small boat to operate for up to four weeks at sea. Other fishing gear that may be carried by the larger vessel include fish traps, spiny lobster traps, hook and lines and seine nets. The larger fishing vessels usually sell the spiny lobster catch to a processing plant while the remaining catch may be sold to the processing plant or to fish vendors.

The importance of the artificial habitats (casitas) to the Bahamian spiny lobster fishery is evident. These devices, which are placed on the seabed by fishermen, are used to attract lobsters by providing a shelter from predators. It was estimated that there were approximately 650 000 of these artificial habitats and about 105 000 lobster traps being used by fishermen.

1.2 MANAGEMENT REGULATIONS

It has been the Government's policy to reserve the commercial fishing industry for exploitation by Bahamians as far as possible. To this end, all commercial fishing vessels fishing within The Bahamas' Exclusive Fishery Zone must be fully owned by Bahamian citizens who are resident in The Bahamas. Recently, shore-based seafood processing and marketing establishments have been allowed to have full foreign ownership.

The harvesting of spiny lobster is legally done during the open season: August 1 through March 31. The legal minimum size limit for possession of spiny lobster is a tail length of 14 cm or a carapace length of 8.25 cm. Possession of any egg-bearing spiny lobster and the removal of eggs from an egg-bearing spiny lobster is prohibited.

1.3 BIOLOGY

During 1995 the Food and Agriculture Organization of the United Nations (FAO) funded a project to assess the management options for the spiny lobster fishery that was conducted by the Department of Fisheries. In order to increase the employment and earnings in the sector, the Department of Fisheries has adopted policies leading to the expansion of the industry. Accordingly, it was necessary to focus on the conservation and management of the fishery resources, particularly for the spiny lobster. Therefore, a minimum size for harvesting spiny lobsters needed to be defined so that the optimum yield is maximized in a sustainable manner. Defining such a minimum size would also enable the Department of Fisheries to take steps to minimize the over-fishing and over-capitalization of the industry and the negative economic and social effects that occur with these conditions.

The project was based on data from the Department of Fisheries spiny lobster export databases. The databases give information on exports in all the commercial size categories. Since about 90 percent of the landings are exported each year, the export statistics were used as a fairly accurate representation of the landings. The weights of spiny lobster tails within each commercial size category were converted to number of animals by tail length in centimeters. This conversion was done by a computer programme that takes into consideration the natural and statistical uncertainty observed in the tail length frequency distributions.

Once the number of animals within specific size intervals is known, a number of length-based techniques can be used to estimate fishing mortality rates and population sizes. A tuned length cohort analysis procedure was chosen as it gave more consistent population estimates over time.

The results indicated that a minimum tail size in the range of 13.5-13.7 cm (which corresponds to a tail weight of about 0.14 kg) would sustainably optimize the yield from the fishery and not endanger future harvesting of spiny lobster. The average weight of a spiny lobster tail exported from The Bahamas during calendar year 1997 was 0.22 kg.

1.4 AVAILABLE DATA AND RECENT DEVELOPMENTS

Fishery-dependent data

The data that has been collected over the last two decades indicate that both the weight and value of the total landings of fishery products have steadily increased. This is especially so in the case of the spiny lobster (Table 1.1 and Fig. 1.2). This increase is mainly due to the enhanced landings of spiny lobster due to increased fishing effort, changes in fishing techniques and increased resources applied to harvesting that resource. The total recorded landings of fishery products for 1997 was 10 487 tonnes with a value of B$69.5 million. Note that these recorded landings figures are known to be less than the actual landings because there are no fishery extension officers in some of the Family Islands where there are major fishing communities. Since there is no one to collect the required information, the landings data are simply lost.

Recorded catch figures are available for the entire country. However, catch and effort data are only recorded for several of the main fishing islands, where a fisheries officer is posted. The effort data are not recorded in the Family Islands as there are no fishery officers available to collect these data. In the past, New Providence, being the capital and main population centre,

Table 1.1 Bahamas, recorded landings of spiny lobster

Year	1982	1983	1984	1985	1986	1987	1988	1989
Weight (t)	2,427	2,599	3,455	5,543	3,579	4,591	5,103	6,192
Value 1,000$B	10,757	10,528	14,472	23,469	15,811	28,651	26,241	31,124

Year	1990	1991	1992	1993	1994	1995	1996	1997
Weight (t)	5,806	7,575	8,156	7,855	7,587	7,788	8,262	7,949
Value 1,000$B	32,321	51,012	54,115	45,285	57,263	59,982	54,008	59,346

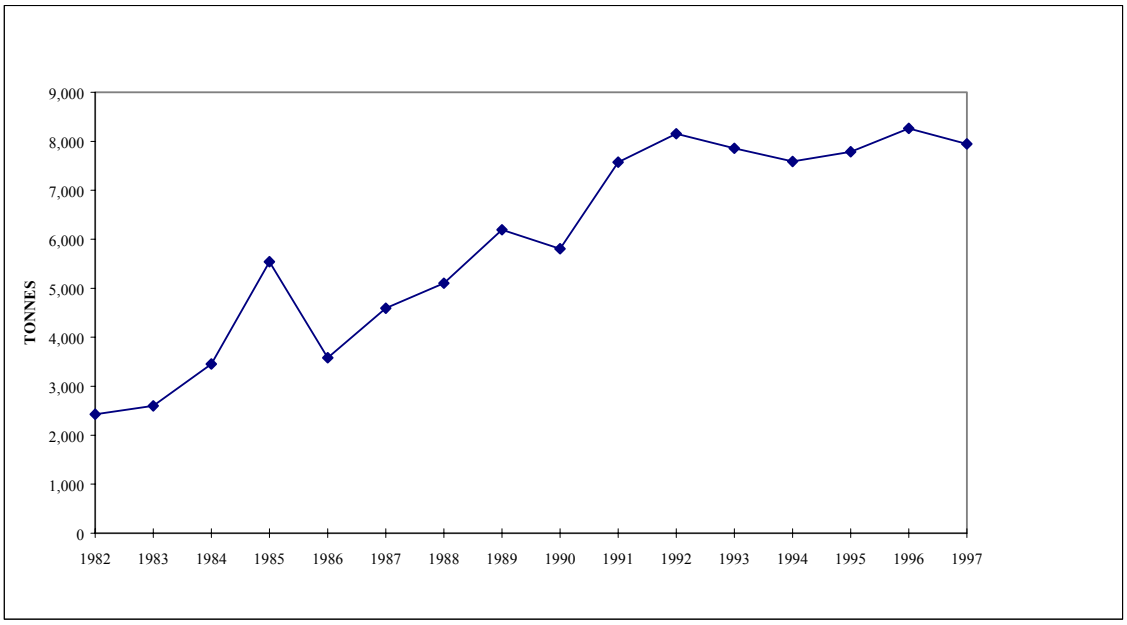

Fig. 1.2 Recorded weight of spiny lobster landed in the Bahamas

received most of the marine resource landings, but in recent years, as the Family Islands became more developed and as the processing and export facilities in the Family Islands expanded, this is no longer the case.

The Department of Fisheries has officers in New Providence, Andros, Abaco and Grand Bahama who visit the landing sites to collect catch and effort data on a daily basis. The information is recorded on a **Marine Resource Landing Form** which takes note of the fishing area, gears used, the time factor, the number of men involved, the catch, its weight and value by species. Also, all processing plants are required to submit to the Department a **Monthly Purchase Report** that details total purchases by weight and value, the source of the resource and date of purchase on a monthly basis (see Fig. 1.3). Further, the data collectors record all marine resources shipped from the Family Islands to New Providence as Freight Landings in New Providence. The freight landings are then correctly associated with their island of origin. Note that in calculating the total recorded landings for The Bahamas those products known to have been landed in the Family Islands and shipped to New Providence as freight are not duplicated. The catch and effort data is recorded into the Bahamas Fisheries Information

DEPARTMENT OF FISHERIES
MARINE RESOURCE LANDING FORM

Landing site:_____

Date:_____ Time:_____

Name of Vessel:_____ Name of Captain:_____

Number of Crew:_____ Number of dinghys used:_____

Date of departure:_____ Time of departure:_____

Date of return:_____ Time of return:_____

Days fishing:_____ Area fished:_____

FISHERY RESOURCES LANDED

	Weight	Value	Gear Used
Crawfish:	_____ Lbs at $B	_____ per Lb	_____
Conch:	_____ Lbs or each at $B	_____ per Lb or per conch	_____
Nassau Grouper:	_____ Lbs at $B	_____ per Lb	_____
Other Groupers:	_____ Lbs at $B	_____ per Lb	_____
Fillet:	_____ Lbs at $B	_____ per Lb	_____
Scale fish*:	_____ Lbs at $B	_____ per Lb	_____
Scale fish*:	_____ Lbs at $B	_____ per Lb	_____
Scale fish*:	_____ Lbs at $B	_____ per Lb	_____
Green Turtle:	_____ Lbs at $B	_____ per Lb	_____
Loggerhead turtle:	_____ Lbs at $B	_____ per Lb	_____
Stone crab claws:	_____ Lbs at $B	_____ per Lb	_____
Other resource*:	_____ Lbs at $B	_____ per Lb	_____
Other resource*:	_____ Lbs at $B	_____ per Lb	_____

_____
Name of person completing this Landing Form

Please specify

Fig. 1.3 Marine resource landing form

DEPARTMENT OF FISHERIES

MONTHLY PURCHASE REPORT OF MARINE PRODUCTS PURCHASED

PROCESSING PLANT ..... MONTH..... YEAR.....

Purchase Date	Product Purchased	Amount (Lbs.)	Price (per. Lb.)	Name of Fishing Vessel	Name of Captain	Carrier	Sender

Fig. 1.4 Monthly purchase form

System (BFIS), a computer programme at the Department of Fisheries which calculates the effort figures. The final results are compiled and included in the Department's Annual Report.

One of the major problems with the catch and effort data recording system involves the lack of manpower and equipment available to collect the data. Also, the very archipelagic nature of The Bahamas makes data collection as well as the enforcement of fisheries regulations quite difficult. There are currently no fishery officers available to collect the relevant data in all of the Family Islands. However, efforts continue to be made to correct this situation. This results in the loss of very important data to the Department of Fisheries, especially in light of the recent shifts in marine resource landings to the Family Islands. Also, there certainly are not enough trained and/or motivated staff members to collect data in New Providence at all the various landing sites. Further, equipment such as vehicles and boats that would enable fishery officers to be able to effectively and efficiently collect the required data and execute their other duties are simply not available. Therefore, the total recorded landings information that is received and distributed is accepted to be incomplete.

Fishery-independent data

Currently there is no fishery independent data collected by or supplied to the Department of Fisheries on a continuous basis on spiny lobsters in The Bahamas.

Socio-economic data

The commercial fishing industry makes a significant contribution to the country's economy. Fishing vessel owners and operators earned in excess of B$69.5 million through the harvesting of fishery resources during 1997 (B$1.00 = US$1.00). The harvesting of spiny lobster is by far the most important commercial fishing activity in The Bahamas (Table 1.2). During 1997, it contributed 75.8 percent by weight and 85.3 percent by value of the total recorded landings of fishery products in The Bahamas. These spiny lobster landings amounted to 7 949 tonnes and had a value of B$59.3 million.

Table 1.2 Summary of total recorded landings of marine products in the Bahamas by weight (tonnes) and value (b$), 1995 - 1997

Year	1995		1996		1997	
Products	**tonnes**	**b$**	**tonnes**	**b$**	**tonnes**	**b$**
Spiny lobster	7,788	59,982,048	8,262	54,008,396	7,949	59,346,784
Conch (fresh)	494	2,106,925	589	2,715,510	648	2,942,065
Stone crab	40	622,616	25	394,837	42	658,967
Turtle (green)	1	1,615	2	3,661	2	5,923
Turtle (loghd)	2	3,826	1	2,310	1	2,557
Nassau grouper	358	1,613,648	331	1,699,039	514	2,477,255
Other grouper	4	16,216	15	64,417	76	365,099
Grouper (fillet)	61	394,817	52	349,051	68	438,563
Snappers	297	658,607	341	1,001,784	751	2,303,289
Jacks	72	150,188	91	226,336	103	220,602
Grunts	8	12,521	14	26,129	67	121,516
Sharks	0	0	4	24,471	3	14,252
Others	381	875,392	385	876,422	264	644,148
TOTALS	9,504	66,438,419	10,111	61,392,363	10,487	69,541,020

Table 1.3 Summary of fishery products exports from the Bahamas during 1997

Products	Units	Quantity	Value (b$)
Spiny lobster	tonnes	2,351	59,142,969
Scalefish	tonnes	143	676,754
Conch meat	tonnes	165	981,961
Stone crab claws	tonnes	22	394,022
Total sponges	tonnes	56	858,175
Queen helmet shells	pieces	3,834	120,300
Conch shells	tonnes	4	4,675
Marine invertebrates	tonnes	1	36,480
Total			62,215,336

About 90% of the spiny lobster landed are eventually exported by processing plants. Exports of all fishery resources and fishery products during 1997 had a value of B$62.2 million. Spiny lobster exports accounted for 95.1 percent of this total value.

Spiny lobster exports for 1997 amounted to 2 351 tonnes with a declared value of B$59.1 million (Table 1.3). Most of the spiny lobster was exported as 'individually quick-frozen' (IQF) tails.

Using data derived from the 1995 Bahamas Fisheries Census, the commercial fishing fleet consists of approximately 650 active and licenced vessels, each having a length greater than 6.1m and about 1500 smaller boats which currently are not required by law to be licenced for commercial fishing.

The labour force estimates from the census indicate that there were about 9 300 persons employed on a permanent basis in the commercial fishery sector during 1995. Fishermen comprise about 93 percent of this total, numbering about 8 800. The remaining persons are employed mainly as workers in either processing plants or buying stations throughout the country.

Important Developments in the Fishery

During the last year the Department of Fisheries implemented its training programme for quality assurance and seafood safety. The objective of this training programme was to ensure a successful implementation of a Hazard Analysis and Critical Control Points (HACCP) based programme within the processing facilities of the country. This programme will allow the international markets to remain open to Bahamian seafood products, thereby allowing the continuation of commercial harvests of the spiny lobster. Thus far, the Department of Fisheries has agreements in place with the Food and Drug Agency (FDA) of the USA, allowing the continued entry of Bahamian fishery products into the USA.

1.5 STATUS OF THE STOCK

The Department of Fisheries considers that the spiny lobster stocks in The Bahamas are still in a healthy condition and that currently the fishery is not fully exploited.