

# Notes on the Local Fishery and Import Trade for Spiny Lobsters in Barbados

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## ABSTRACT

Despite the importance of lobsters in Barbados to the tourist restaurant industry, neither the local fishery nor the import trade have been previously documented, and catch data for lobster are not recorded. This study examined the local lobster fishery during July/ August 1992 and lobster imports for the period December 1990 to December 1991. Spiny lobster is the most highly priced marine food item in Barbados. Locally caught and imported whole lobster sell for U.S. \$11.00/ kg, and lobster tails and lobster meat are imported at U.S. \$30- 33/ kg and U.S. \$20- 22/ kg respectively. The local lobster fishery is highly seasonal (June- October) and lobsters are caught of the east coast primarily by free- diving and secondarily by SCUBA, and off the west coast primarily by fish pots. The spotted spiny lobster (*Panulirus guttatus*) is the most prevalent species taken in the free- diving east coast fishery, accounting for 95.3% by number of the total lobster landings. The mean size of *P. guttatus* in the catches is 245 gm (whole wet weight) and the sex ratio is 1.83 males to 1 female. The larger Caribbean spiny lobster (*P. argus*) is the dominant species taken in the west coast pot fishery, accounting for 96.2% of the total lobster landings on this coast. The smoothtail spiny lobster (*P. laevicauda*) is the second most abundant species in the catches for both coasts. The import trade is dominated by *P. argus* from Belize (tails and meat), Grenada and Carriacou (whole lobsters), and totals approximately 26 mt per year.

**KEYWORDS:** Barbados, fishery, imports, *Panulirus argus*, *Panulirus guttatus*.

## INTRODUCTION

Barbados has a long tradition of commercially important artisanal fishing. Having a relatively small shelf area which extends approximately 1 km from the shoreline, the most important fishery here is the seasonal (November to June) offshore fishery for species such as dolphin and flyingfish (Oxenford and Hunte, 1987). However, nearshore shelf fisheries are important for recreational and subsistence fishing year round, and are important as alternative fisheries in the pelagic 'off- season' (June- October) (Mahon *et al.*, 1981). The nearshore shelf fisheries target reeffish, sea urchins

and lobsters. Although catch records have been kept by the Government Fishery Division for reef fish, there has never been any attempt to record sea urchin or lobster landings. Furthermore the fishery remains unregulated, the only restriction being a prohibition on the landing of berried females, which is rarely enforced. The location of lobster landing sites, the number of individuals involved in the fishery, the location of the lobster fishing grounds, fishing techniques used, and the individual weight and species composition of catches remains unknown.

Whilst it is known that lobster is one of the most highly priced items on the market here and is very important to the tourist restaurant trade, neither the size and the market for local lobsters, nor imported lobsters is known. This study attempts to document the past and present state of the local lobster fishery, and present lobster trade for the first time, comment on possible management measures and to suggest areas of further research needed to help assess the state of lobster populations around Barbados.

#### METHODOLOGY

Information of the history of the lobster fishery, present fishing techniques and the species targeted, were obtained from interviews with past and present lobster fishermen around the island.

Local catch composition during the main lobster fishing season was determined by sampling lobster catches at landing sites. This included recording species, sex and size (carapace length and weight) of all individuals in the catch. Imported lobsters were also examined for species, sex, and size, wherever possible, at the storage facilities of hotels and restaurants.

Carapace length (CL) was measured to the nearest millimeter using a centimetre rule. The weight was measured with a spring balance (for lobsters <1 kg) to the nearest 5 gm or with a top pan scale (for lobsters > 1 kg) to the nearest 12.5 gm. Sex was determined by either observing the last leg to see if two extra claws were present (female) or looking for a padded opening at the base of the last leg (male).

Local catch rates were calculated during the main fishing season by recording the total number and weight of lobsters landed, together with the number of divers and time spent diving, or the number of traps and the soak time.

The size/economic value of the lobster import trade into Barbados was determined by interviewing the managers of all the various importing firms and the managers of the food and beverage of many hotels and restaurants.

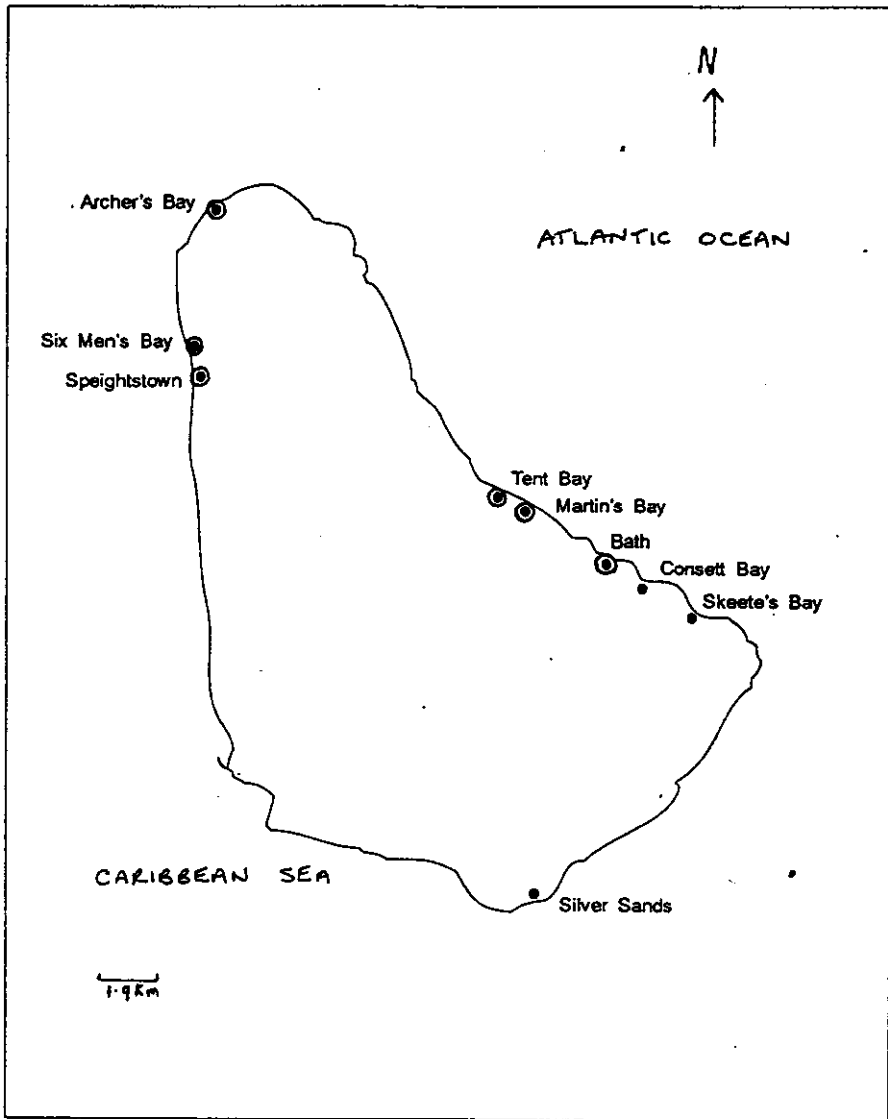


Figure 1. Fishing areas and landing sites for lobster in Barbados.

## RESULTS

### The Local Fishery

The local lobster fishery has been in existence in Barbados for at least 70 years. Traditionally two fishing techniques were commonly employed, diving *i.e.* free- diving and trapping in lobster pots. The traditional lobster fishing and landing sites which are still used today are shown in Figure 1.

### Trapping

Lobster pots were used in both shallow (less than 8m) and deep (up to 60m) waters. These pots were made from wire, bamboo or 'sea-grape' wood. If baited the bait consisted of 'sea- moss' or 'fry'. Rocks were sometimes placed on shallow water pots to simulate a lobster's habitat. The pot fishery for lobster is now non-existent at Skeete's Bay and Silver Sands and only about three individuals at Martin's Bay still utilize this method for lobster capture.

### Free Diving

Traditionally this type of fishing was done in the daylight hours, but if a spring low tide occurred at night, lobsters would be harvested from nearshore rocks with the aid of a light.

The earliest diving equipment consisted of a crocus bag tied over the lower arm or an octopus tied to a stick, either one being used to extract the lobster from its 'hole'. Home made masks were then developed (utilizing perspex and rubber from truck tyres), and these were used either with a 'lobster spear' ( 1- 1.5m length of sharpened iron), or a broomstick with a metal hook inserted at one end. Spear guns and snorkelling gear then became prevalent.

### Present Day

At present, there is an active fishery operating mainly at 6 sites with occasional lobster fishing occurring at 3 sites (Figure 1). The same two techniques (trapping and free- diving) are still commonly used today and some SCUBA diving for lobster is also practised.

Free- diving for lobsters along the windward coast (Bath, Martin's Bay and Tent Bay ) is now done mostly at night (8- 11 pm) on week- days from June to October (depending on good weather conditions) by three small fishing groups. These groups comprise three to four men, who swim out through the surf together and along the coast for 1- 1.5 km (with the prevailing current), diving to approximately 10m depth and returning to the

shore 2- 3 hours later and a considerable distance from the place of entry. The species targetted by these groups is *P. guttatus*, with *P. argus* seldom being caught. This is the most active fishery for lobsters on the island.

Free divers also operate from Archers Bay on the north coast, during daylight hours swimming from shore southwards of their starting point, and diving to depths of 13m or more. The species targetted by free- divers in this area is *P. argus*.

SCUBA diving (though not primarily for lobster) operates from Skeete's Bay, Consett Bay and Silver Sands . *P. argus* and *P. laeviscauda* is targetted. Pot fishing for lobsters and snappers from day boats occurs at Six Men's and Speightown (Figure 1). The pots are 3m (length) by 1.5m (width) by .9m (height) and are baited with fry or roasted moray eel, and are mechanically hauled approximately every three days. The traps may be set in shallow (13m) or deep (about 60m) water. The targetted species is *P. argus*.

The local lobster fishing season is ths same (June to October), at all sites regardless of the fishing technique and lobster fishermen either work in the pelagic fishery or in agriculture for the rest of the year. Approximately 40 fishermen are involved in lobster fishing.

### Catch Composition

Four species of lobster including 3 Panulirids, namely *P. argus* (great kind or red lobster), *P. guttatus* (speckled lobster) and *P. laeviscauda* (green back) and one scyllarid (*Parribacus antarcticus*, crab lobster) were taken by the local lobster fishery.

The species composition appeared to vary with the fishing technique, depth and time of day. The west coast pot fishery had a catch composition by number of 96.2% *P. argus* (mean size: 102 mm CL, 1.17kg) and 3.8% *P. laeviscauda*. The east coast nighttime free- diving fishery had a catch composition of 95.3% *P. guttatus* (mean size: 66 mm CL, 235gm), 2.5% *P. laeviscauda* and 2.7% *P. argus* (Table 1). The north coast free- diving fishery at Archer's Bay landed *P. argus*. The daytime tank fishery at Consett Bay landed *P. argus* and *P. laeviscauda*, whilst the daytime tank fishery at Skeete's Bay and Silver Sands lands only *P. laeviscauda*.

*P. guttatus* had a straight line length/ weight relationship ( $y = -206.54 + 6.96x$  ;  $r = .824$ ,  $p < .05$  (Figure 2)). The average carapace length and weight for males (mean size; 69 mm CL, 261 gm) was greater than that for females (mean size: 61 mm CL, 205 gm).

Table 1. Composition of lobsters caught by free diving.

Haut No.	Location	Kgs. Landed	No. Divers	Dive Time (hr)	No. Lobsters	Sex ratio (m/f)	% P. guttatus	% P. argus	% P. laevicauda	% Fem. berried	Mean weight
1	Martin's Bay	-4	2.5	49	1.22	92	0	0	8	45	27
2	Glenburnie	6.95	3	2	30	4.88	100	0	0	17	0
3	Bathsheba	9.27	4	2.5	38	1.38	100	0	0	42	75
4	Bath	5.41	4	1.5	16	2.20	87.5	12.5	0	31.2	60
5	Bathsheba	10.45	4	2	50	1.03	94	0	6	54	40.7
6	-	12	3	2.5	61	0.66	95	0	5	60.3	71.8
7	Bath	17.59	3	2	70	1.43	98.6	1.4	0	41.2	44.8

### Catch Rates

The catch rate for the east coast nighttime free-diving lobster fishery during the peak season July/ August was 45 lobsters (10kg) per trip or 11.8 lobsters (2.71kg) per diver per night (Table 1).

The catch rate for the west coast was 1.6 lobsters (1.8kg) per pot hauled.

### Import Trade

Lobsters (exclusively *P. argus*) are imported into Barbados as whole lobster, lobster tails or lobster meat. There are three importers of whole lobsters, who import approximately \$250,000 US from Grenada and Carriacou. Each importer has their own group of divers in these islands, with whom they deal with directly.

There are two importers of lobster tails and lobster meat on the island, who import approx. 5.2 mt of tails a year at a cost of approx. \$166,750 US and approx. 1.4 mt of lobster meat a year at a cost of \$24,000 US. These processed lobsters are all imported from the Belize Fishermen's Cooperative.

The amount of money spent on lobster per month by hotels and restaurants is shown in Tables 2 and 3, and varied according to whether it was the tourist high season (Nov.- Apr.) or low season (May- Oct.). On the average hotels spend 1.7 times and restaurants 2.6 times more per month during the tourist high season than during the low season (Tables 2 and 3). Total expenditure per year for hotels is approx. \$181,912 U.S. and for restaurants is \$124,155 U.S. (Tables 2 and 3).

## DISCUSSION

The lobster fishery in Barbados has been operating from the same sites for more than 70 years (either as a primary, *i.e.* specifically targeting lobsters, or as a secondary fishery, *i.e.* where the capture of lobster is incidental). There are basically four lobster fisheries on the island, all operating exclusively in the pelagic off-season between June and October. The east coast nighttime free-diving fishery is the most active and targets only lobsters. The north coast daytime fishery is sporadic. The west coast pot fishery targets snappers and lobsters with relatively low catch rates for the latter. The south coast SCUBA diving fishery targets reef fish and lobsters, again with relatively low catch rates for the latter.

The resource increased considerably in value with the development of the tourist industry in Barbados in the 1960's, but participation in the lobster industry has never become large scale since; (1) there is the general perception that the Barbadian stock is too small to warrant capital

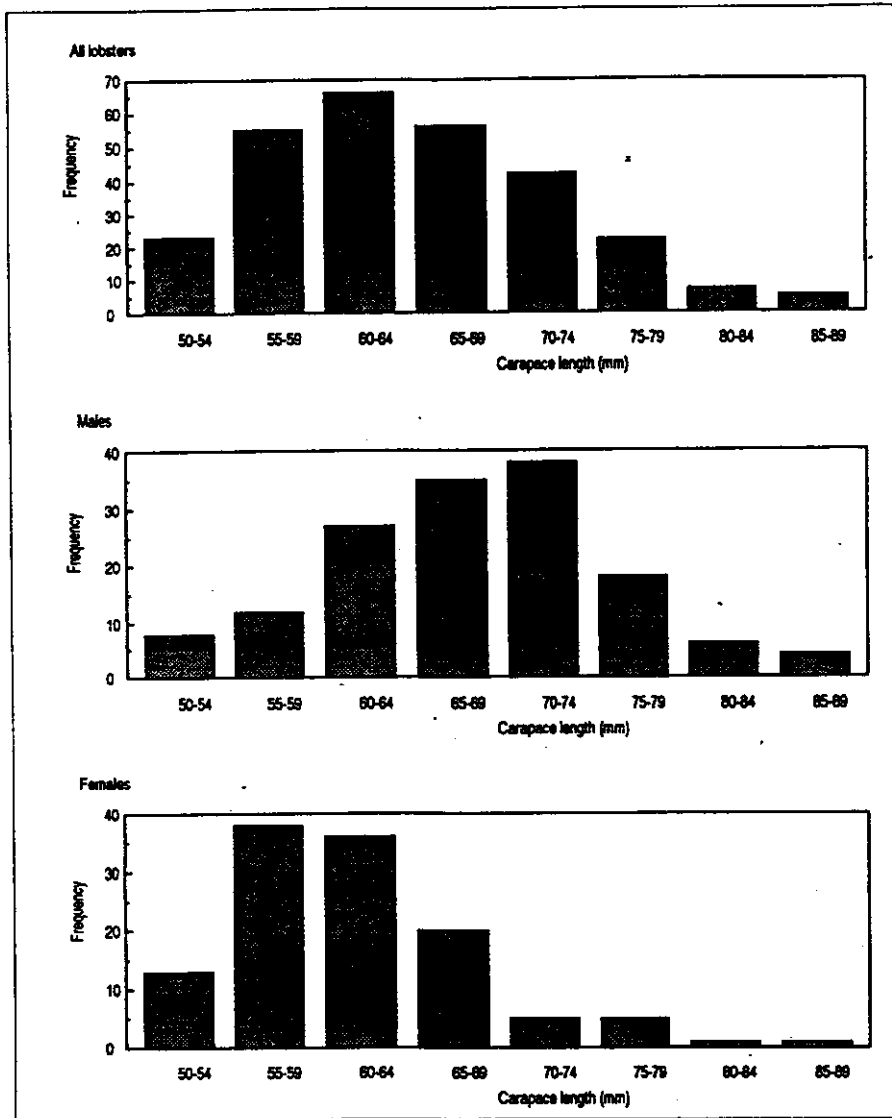


Figure 2a. Carapace length frequency distribution for *P. guttatus* on the east coast of Barbados from July- August, 1992.



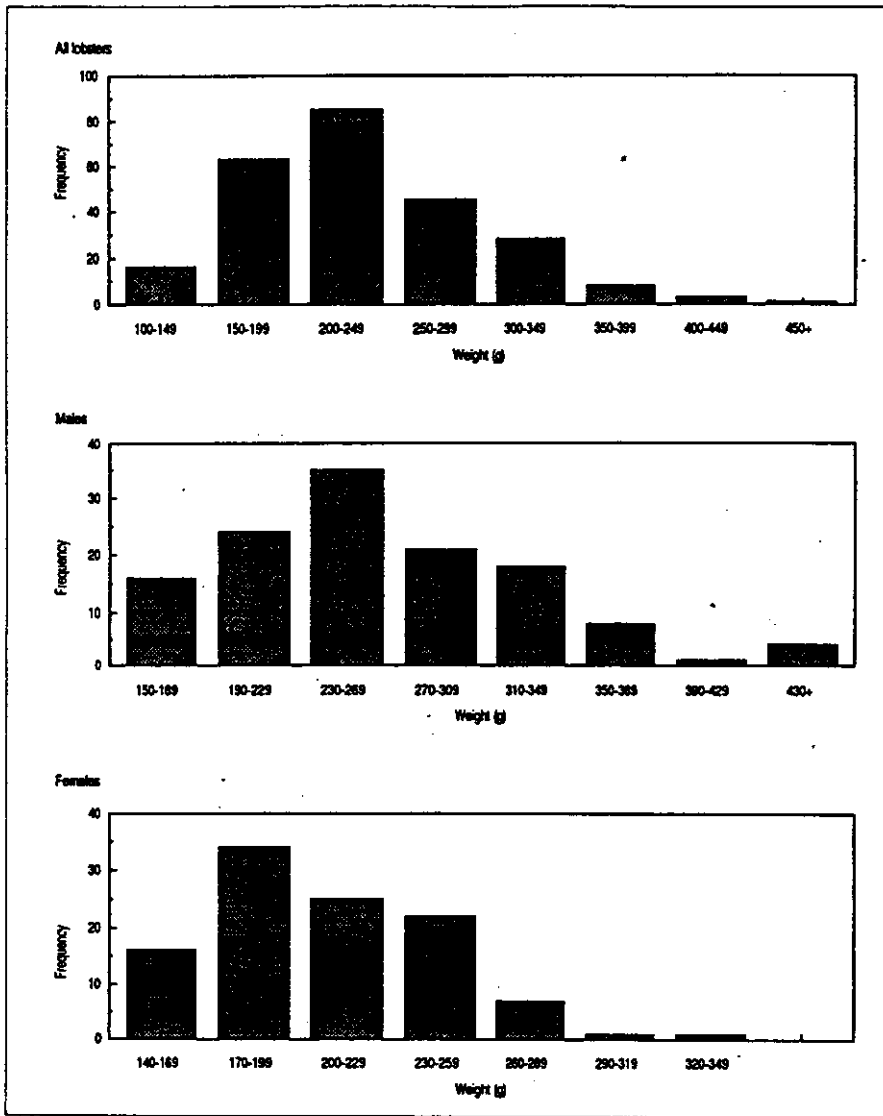


Figure 2b. Whole weight frequency distribution for *P. guttatus* landed on the east coast of Barbados, from July - August 1992.

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**Table 2.** Estimated expenditure (\$US) on lobsters by hotels in Barbados for the period December 1990-December 1991.

<b>Hotel No.</b>	<b>High Season</b>	<b>Low Season</b>	<b>Annual Total</b>	<b>H/L</b>	<b>Type</b>
5	–	–	5250	–	whole
7	811	390	6570	2	tails
12	556	187	3900	3	whole
14	2489	1195	20160	2	whole
15	1689	811	13680	2	tails
16	1667	1459	14063	1	tails
17	9334	8000	7800	2	tails
18	1217	779	8979	3	tails
19	–	–	17000	–	tails
20	445	214	3600	2	whole
21	1245	598	10080	2	tails
22	1920	768	14400	1	whole/ tails
25	2667	1280	21600	2	whole
26	249	146	2190	1	tails
27	6111	5867	71500	1	whole
28	–	–	25345	–	whole/ tails
29	–	–	14438	–	whole
30	2361	2267	27625	–	whole
31	778	747	9100	1	tails
32	94	56	842	1	tails
34	8111	3894	65700	2	tails
<b>Average</b>	<b>2026</b>	<b>1685</b>	<b>17325</b>	<b>1.7</b>	

H/L is the high season expenditure/ low season expenditure  
 – indicates no data available

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**Table 3: Estimated expenditure (\$US) on lobsters by restaurants in Barbados for the period December 1990-December 1991.**

<b>Restaurant No.</b>	<b>High Season</b>	<b>Low Season</b>	<b>Annual Total</b>	<b>H/L</b>	<b>Type</b>
1	1556	747	12600	2	tails
2	2778	1334	27500	2	whole
3	834	800	32250	1	tails
	2778	1334		2	whole
4	2027	1034	16872	2	meat
5	267	128	5688	2	whole
	400	231		2	tails
6	1067	1024	12480	1	whole
7	1440	691	11664	2	tails
8	1667	800	13500	2	whole
9	1600	768	12960	2	tails
10	1467	512	13170	3	whole
	234	224		1	tails
11	2667	1280	21600	2	whole
12	778	374	6300	2	tails
13	167	160	1950	1	whole
14	845	406	6840	2	tails
15	1578	848	13462	2	tails
16	4074	0	18330	N.A.	tails
17	1734	759	14475	3	whole/ tails
18	1330	91	6669	14	tails
<b>Average</b>	<b>1490</b>	<b>645</b>	<b>13795</b>	<b>2.78</b>	

H/L is High season expenditure/ Low season expenditure.

- indicates no data available.

N.A. means "not applicable."

investment, (2) the fishery is very dependent on good weather conditions (3) the cost of materials for pot construction is considered too high for the returns (4) the now common theft of pots and their contents, with no legal redress, and (5) the physical labour involved in free-diving or hauling pots remains a deterrent. Thus the local lobster fishery remains incapable of supplying the market demands for lobster on the island especially given that it is highly seasonal (June- October) and ceases during the tourist high season (November- April) when demand is highest.

The lobster import trade is substantial with over 27 mt of whole lobster, lobster meat and tails being imported per year at a cost of over \$ US 1/2 million. The main consumers appear to be tourists, with lobster purchases by hotels and restaurants during the tourist high season (Nov.- Apr.) more than doubling those in the low season.

The species of greatest importance to the local fishery is *P. guttatus* which comprises over 95% of the catch by number for the most active fishery (east coast free-diving fishery). Males in the catch are larger than females and 45.6% of the females were berried. Farrugio and Felix (1975) also found that males were heavier than females for *P. guttatus*.

The prevalence of males in the heavier weight classes was also observed by Farrugio and Felix (1975) in studies of *P. argus*, suggesting that male lobsters grow faster and/or reach a larger maximum size (Olsen and Koblic, 1975). More research is needed to confirm this.

Marfin (1978) working with *P. guttatus* in Martinique obtained values of 58.70 mm and 51.33 m (cephalothoracic length) for males and females respectively; the present study obtained values of 69 mm and 61 mm for the corresponding cephalothoracic lengths. Further research is necessary to determine whether this difference is due to environmental factors affecting growth rates, different rates of stock exploitation or differences in sample size between the studies.

The variation in species catch composition between the east (predominantly *P. guttatus*) and the west coast (predominantly *P. argus*) fisheries in Barbados is likely a result of habitat differences on the fishing grounds. Farrugio and Felix (1975) found that *P. argus* preferred algal covered areas, coral reefs and deep reefs in excess of 10 m depth, which describes the fishing grounds of the west coast fishery, but is deeper than areas on the east coast. More research is needed however to determine whether sizable populations of *P. argus* exist further offshore the east coast of Barbados.

The paucity of *P. laevicauda* in the catch of the east and west coast fisheries may be due to the species preferring depths between those exploited by the free-diving and pot fishery, or naturally lower population sizes

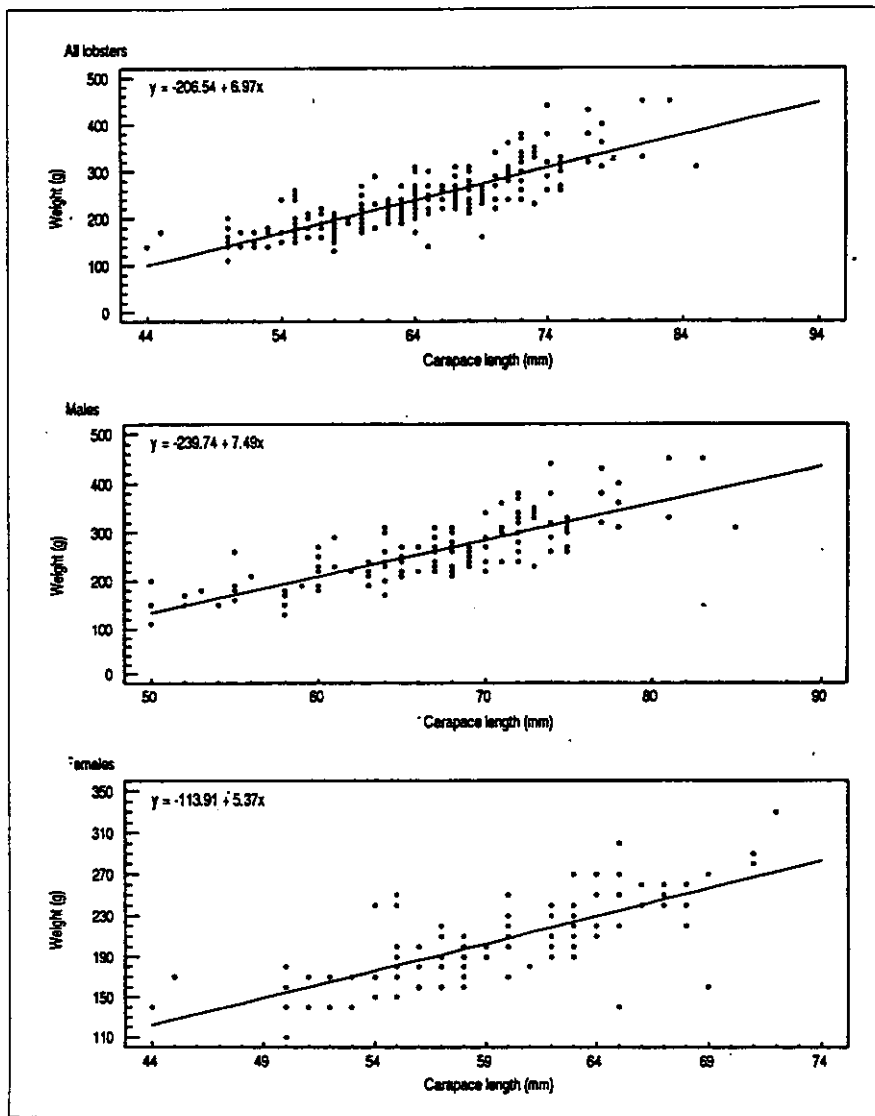


Figure 3. Regression of weight versus carapace length for *P. guttatus* landed on the east coast of Barbados from July-August, 1992.

around Barbados than the other two species.

At present there is no legislation governing lobster harvesting in Barbados other than a prohibition of harvesting berried lobsters, which is rarely enforced. Neighbouring islands have OECS legislation governing the minimum size of *P. argus* in catches and a ban on the harvesting of berried females. Some islands e.g. St. Vincent and the Grenadines have a closed season from March to September. Equivalent legislation should be considered in Barbados with respect to the three species taken here, but especially *P. argus* and *P. guttatus*. Lobster fishermen in the free-diving east coast fishery have begun to notice a decrease in the average weight of *P. guttatus* in the catch over the past five years.

It should be noted that the imposition of a lobster closed season at the same time as in Grenada and St. Vincent may not be feasible, since the lobster fishing here is only active during June to October when the seas are relatively calm on the east coast. In addition Marfin (1978) has observed peak spawning for *P. guttatus* in the months March to May (in Martinique), which is the 'off-season' for lobster fishing in Barbados. Furthermore since spiny lobsters in the Caribbean appear to spawn relatively year round (Peacock, 1974 cited by Mahon 1986), and lobster fishing effort here ceases between Nov.- Apr., the imposition of a season may be unnecessary.

Gear restriction, such as the prohibition of the use of SCUBA gear for harvesting lobster, may be necessary since the high price of the product is likely to promote increased harvesting in the future. A system of community or co-management would be effective at least for the east coast free-diving lobster fishery since the fishermen already work closely together in fairly tight community groups. This could ensure a long term sustainable yield from the fishery.

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