

fluenced by the effects of vessel and screw turbulence. The positive factors which appear to affect catches all have the effect of minimizing turbulence in the area of the lure. With longer lines fished farther out, the effect is obvious. Why catches should be better on the less turbulent port side of the vessel is not obvious until the effect of a right hand turning propeller creating more turbulence on the right or starboard side of the vessel is remembered.

The idea of less turbulence—more opportunity for fish biting—is strengthened by the inboard lines during a turn tending to catch more than the others because they are inside the vessel's turning circle and wake and the resultant turbulences. This is so established that our trolling vessels often zigzag when in a school to increase catches.

The value of knowing what time of

day the fish are most likely to be caught trolling could be applied if trolling were to be combined with some other fishing operation, i.e., handlining or trap fishing, which could be conducted during the off peak trolling time.

In summary, troll fishing has displayed only slight success in harvesting the surface pelagic resources of the project region. Only the banks of the northern Leeward Islands, and these only during April and May, provided catch rates considered high enough to support troll fishing as an independent effort. As the method is already known in the West Indies and relatively inexpensive, if a vessel must travel to suitable offshore grounds for other

types of fishing, it can be a good secondary method during slack periods of handlining (mechanical reel) and trap fishing for snapper and related species.

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MFR PAPER 1086

Spiny Lobster Fishing Explorations in the Caribbean

GEOFFREY R. CHISLETT and MITSUO YESAKI

ABSTRACT—The Caribbean Fishery Development Project vessel *Alcyon* devoted four cruises toward assessing the spiny lobster resources of Pedro Bank and other small banks south of Jamaica; *Mouchoir*, *Silver*, and *Navidad* Banks north of Hispaniola; *Saba*, *Anguilla*, *Barbuda*, and other small associated banks in the northern Leeward Islands. This work was undertaken as a consequence of good incidental lobster catches having been made during pot fishing explorations for snappers and related demersal species in the northern half of the project region.

The exploratory technique applied consisted of an echo sounder survey of the bottom followed by try net trawling to assess the abundance and locate areas of concentration, after which lobster pots would be set to obtain catch rate data. The try trawling was abandoned after one cruise because of generally unsuitable trawling grounds in the places explored. Fish pots were also set alongside lobster pots on occasion for comparison.

Lobster catches were extremely low and only the western end of Pedro Bank displayed commercial potential with a catch rate of 0.45 lobster per pot.

INTRODUCTION

The Caribbean Fishery Development Project devoted four exploratory/experimental cruises to assessing

the abundance of spiny lobster¹ (*Panulirus argus*) in the northern half of the project region, from February to July

¹ Referred to hereafter as spiny lobster or lobster.

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1971. Good incidental catches of lobsters during fish-pot fishing explorations in these areas and the high economic demand for their meat were the primary reasons for this work, but the high success of recent exploratory fishing surveys off Honduras and Nicaragua (Yesaki and Guidicilli²) was also considered. It was decided that the exploratory techniques (including echo sounding, trawl netting, and pot fishing) used during this latter work would be experimentally attempted in our project region.

Some exploratory lobster fishing had been conducted earlier in other parts of the project region. During a general resources survey of Trinidad and Tobago by MV *Fregata* in 1968, a total of 144 lobster pot sets and 8 ice-can sets were soaked an average of 52 hours but yielded no lobsters.

² Yesaki, M., and M. Guidicilli. Summary of exploratory fishing operations of the RV *Canopus* in the western Caribbean Sea to June 1970. UNDP/FAO Central American Fishery Development Project, 46 p. (Unpubl. manuscr.)

On other occasions trammel nets set near the Grenadine Islands in the Windward Islands chain were also unsuccessful.

Between January and May 1971, the U.S. National Marine Fisheries Service provided a fishery consultant to help plan and direct lobster fishing operations.

AREAS OF EXPLORATION

During previous exploratory fishing using fish pots, spiny lobsters were caught incidentally on many occasions. A summary of these incidental catches is given in Table 1. It can be seen that most incidental lobster catches came from the northern half of the project region and the greatest proportion of these came from Pedro Bank south of Jamaica.

Alcyon devoted four exploratory and experimental cruises to spiny lobsters. During cruise 71-1 (23 February — 11 March 1971) parts of Pedro Bank were surveyed. Cruise 71-2 (23 March — 5 April) explored Navidad, Silver, and Mouchoir Banks north of Hispaniola. Other parts of Pedro Bank plus Albatross Bank, Eight Mile Bank, and the Morant Cays area were examined during cruise 71-3 (20 April — 6 May) (Fig. 1a). Saba, Barbuda, and Anguilla Banks plus other small associated banks received attention during cruise 71-5 (13-30 July) (Fig. 1b).

While most banks were given only a minimum of effort, Pedro Bank was explored much more thoroughly, as shown in Figure 2.

EXPLORATION METHODS

Survey Techniques

Initially the technique used consisted of a thorough researching of existing knowledge of the area. After the review of bathymetric charts and direct knowledge of the area, a series of transect lines were established. These lines were traversed using the echo sounder. When the bottom was considered smooth enough the lobster trawl was dragged for a short distance. If the results were positive, additional drags were made to locate the centers of abundance. Strings of lobster pots were then put at these centers of abundance in order to establish catch

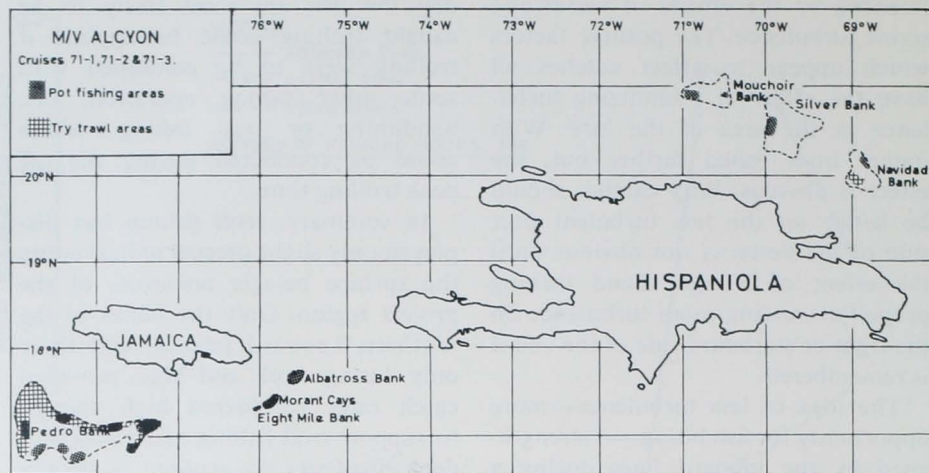


Figure 1a.—Banks south of Jamaica and north of Hispaniola where spiny lobster exploratory operations were conducted.

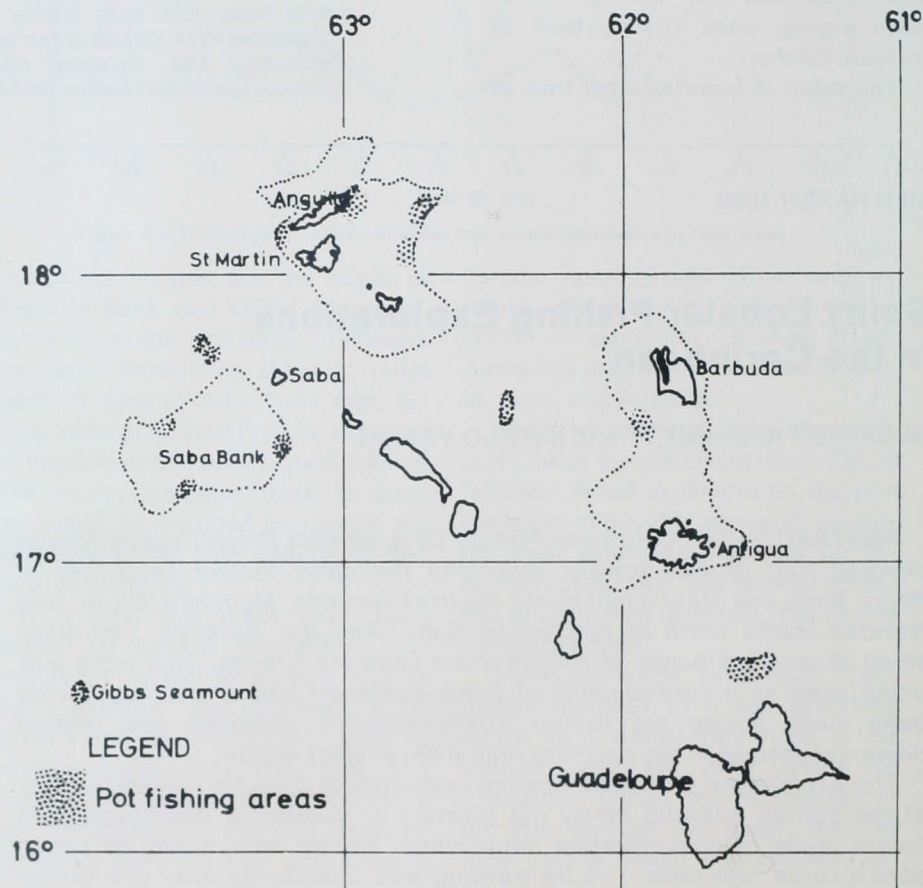


Figure 1b.—Leeward Islands Banks showing areas of pot fishing.

rates. This technique was used during cruise 71-1 and on Navidad Bank during cruise 71-2 before the trawling step was eliminated due to the scarcity of trawlable ground in the areas explored and lack of catch. The remainder of the explorations was conducted using just the echo sounder,

followed by sets of lobster pots. A few fish pots of the same "Z" and "D" configurations used when lobsters were caught incidentally during explorations for snappers and other related demersal species were then added to assess their performance against the Nicaraguan lobster pot.

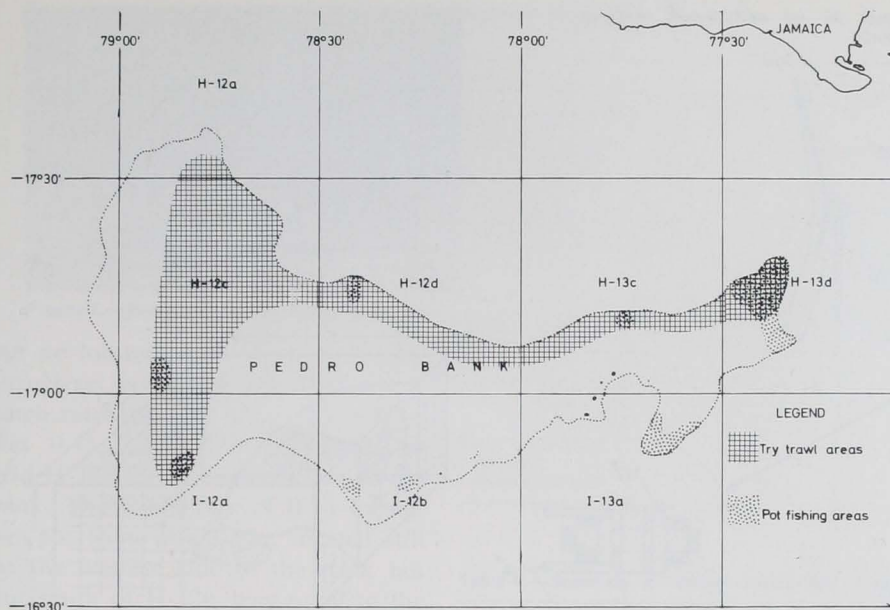


Figure 2.—Pedro Bank showing area of exploratory effort.

Table 1.—Summary of incidental lobster catches during fish pot explorations.

Vessel and Cruise	Area	No. of pot lifts	Lobster Catch (No - lb)
<i>Alcyon</i>			
69-11	Anguilla Bank	20	12 - 41.4
70-2	E. Pedro Bank	29	36 - 87.0
70-3	Albatross Bank	27	2 - 11.0
70-3	Anguilla Bank	42	5 - 18.0
70-4	E. Pedro Bank	174	357 - 960.5
70-6	Anguilla Bank	52	3 - 7.5
70-7	E. Pedro Bank	174	95 - 217.5
70-12	E. Pedro Bank	50	19 - 40.5
<i>Calamar</i>			
70-8	Anguilla Bank	15	2 - 6.5
71-1	Grenada Shelf	80	2 - 5.0
71-2	T'dad-Guyana	296	3 - 5.0

IZ and D pots (see Project Cruise Report No. 26, 29 July, 1970).

Fishing Gear and Handling

Lobster try trawl net

The lobster trawl used during explorations was 18-foot head-rope \times 18-foot footrope, two-seam bottom-hugging net. It was constructed to the consultant's design with heavy weight 4-inch braided mesh nylon webbing. Details of construction are given in Figure 3. Steel trawl doors of V configuration, designed by the project staff, were used to spread the net (Fig. 4). The doors were attached to a 5 fathom $\frac{3}{8}$ -inch wire bridle which in turn was shackled to the $\frac{1}{2}$ -inch trawl wire.

Drags of 10 minutes duration were completed and timed from the braking of the winch to the start of retrieval. When the doors were hauled to the trawl block, the lazyline attached to

the port door was hauled aboard, hooked to the hauling system on the main mast, and the cod-end winched aboard.

Lobster pots

The pots used were obtained from the UNDP/FAO (United Nations Development Program/Food and Agriculture Organization) Central American Fishery Development Project and are identical to lobster pots

used in commercial lobster fishery centered at Corn Island, Nicaragua. They are constructed of 1-inch \times 2-inch galvanized rectangular mesh wire of 14-18 B.W.G. (Birmingham Wire Gauge). Overall, they measured 2 feet \times 2 feet \times 1 foot. A woven wicker funnel was fastened to a 1-square-foot opening in the side. A 1-fathom branch line with an A.K. quick release snap spliced into the other end was fastened to one of the upper front corners of the pot. A blob of concrete hardened into the bottom or iron weights strapped to the bottom provided ballast. The total pot weight was around 6 pounds (Fig. 5a, 5b).

One hundred and fifty pots were obtained from Corn Island. These were initially divided into five strings of around 30 pots each, but gradual losses reduced this to four 30-pot strings during the latter part of cruise 71-2 and cruise 71-3; five, then four strings of 20 pots each were used during cruise 71-5. Strings of pots were usually set about 1 mile apart when they were the only exploratory gear. The pots were normally left in the water only 24 hours or less, depending on the operational schedule of the vessel.

Setting and Hauling.—Lobster pots were set in strings from the ship as

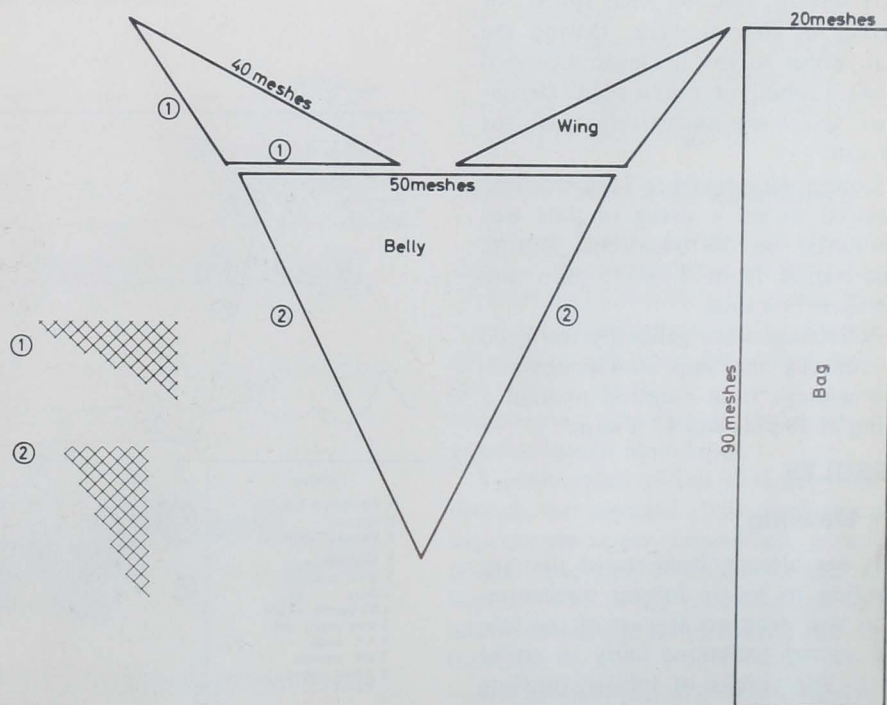


Figure 3.—Construction diagram of lobster try trawl.

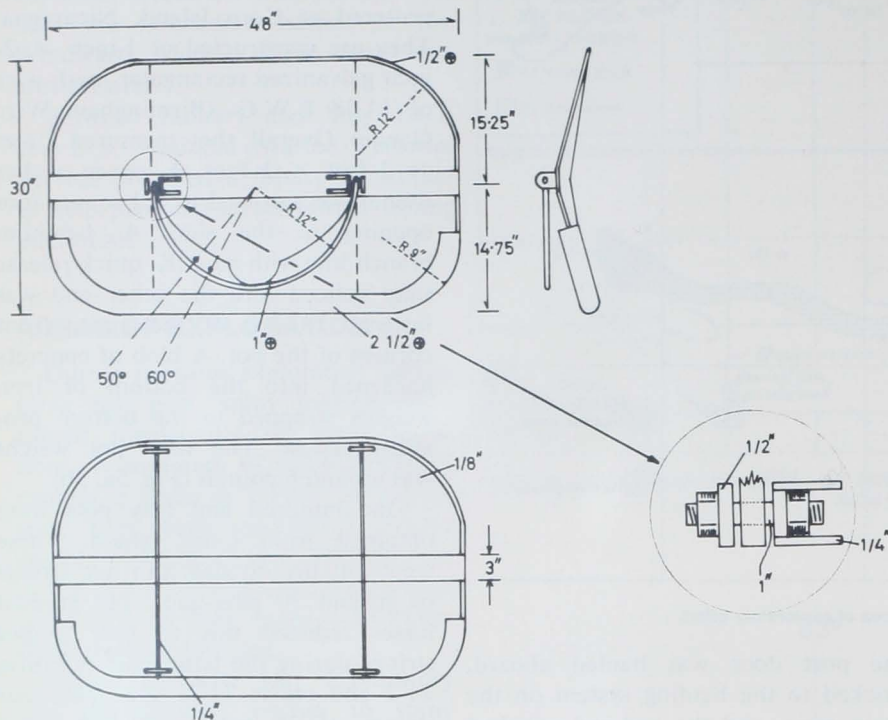


Figure 4.—Construction diagram of doors used with try trawl.

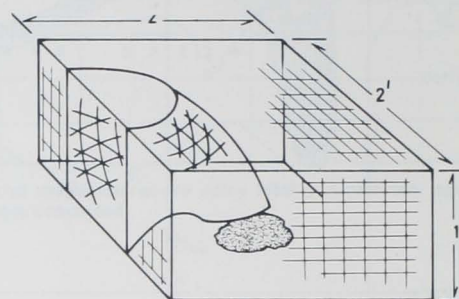


Figure 5a and 5b.—Nicaraguan wire mesh lobster pot.

Lobster Pots

Pedro Bank

she drifted downwind (Fig. 6). The pots were generally baited with both raw cowhide and frozen Spanish mackerel. A piece of hide about 6 inches \times 3 inches was strung on one side of the funnel, and half a mackerel was strung on the other (Fig. 7). Usually the mackerel was replaced at each setting, but the hide lasted for periods of over a week. During the final cruise to the northern Leeward Banks, "robin" or round scad (*Decapterus* sp.) were exclusively used for pot bait.

During *Alcyon* cruise 71-1, the time required to set a string of pots was monitored on 38 occasions. Setting time varied from 8 to 15 min and averaged 11.8 min.

Pot strings were generally retrieved by running the ship slowly upwind. The average time required to haul a string of 30 pots was 17.5 min.

RESULTS

Try Trawling

It has already been stated that try trawling to locate lobster concentrations was dropped as part of the lobster survey technique early in cruise 71-2. The results of lobster trawling on Pedro Bank during cruise 71-1, as seen in Table 2 (see also Fig. 3)

show that lobster catches by trawling were extremely light. Trawl drags were made in depths of 9 to 21 fathoms, but lobsters were caught only between 16 and 20 fathoms. Five drags were made on southeast Navidad Bank before trawling stopped. No lobsters were caught.

The data obtained from lobster pot catches taken on Pedro Bank are summarized in Figure 8 and Table 3. In Figure 8, there is some indication that catches were higher if pots were set in a narrow depth range rather than a wide one. It is of interest that most pot strings caught at least one lobster,

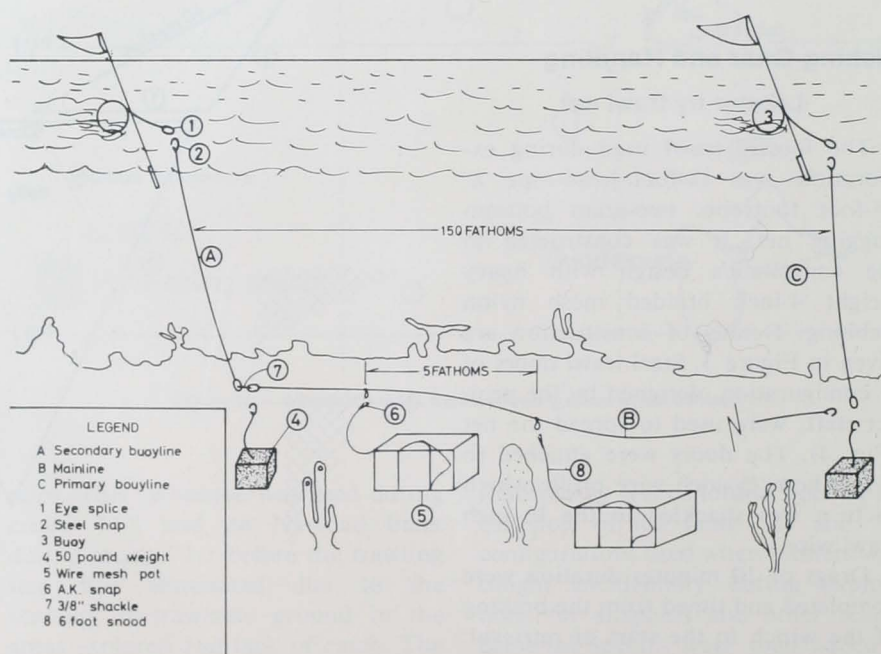


Figure 6.—Diagram showing method of rigging pot strings.

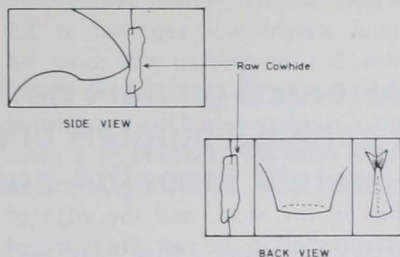


Figure 7.—Method of baiting lobster pots.

but no lobsters were taken from four strings set in grid H-13c. The highest catch rate observed from Pedro Bank was 0.45 lobster per pot, taken in grid H-12c on the western end of the bank. The catch rate of 0.14 lobster per pot from grid I-12a, located still on the western side of the bank but just south of H-12c, was equal to the overall average rate on Pedro Bank. About 800 pounds of assorted demersal fish, plus eight sand lobsters (*Passiabicus atarticus*) and 36 crabs, were also taken in the 2,078 pot lifts made.

Other banks

Lobster pot effort and catch data from all other banks explored are given in Table 4. The only significant catch came from the Morant Cays Bank, located southeast of Jamaica, where 10 strings totaling 268 pots caught 20 lobsters for a catch rate of 0.08 lobster per pot. No lobsters

Table 2.—Geographic distribution by 30 foot grid areas of try net drags on Pedro Bank (Cruise 71-1).

Area, Grid No.	H-12c	H-12d	H-13c	H-13d	I-12a	Total
No. of drags attempted	18	6	4	7	5	40
Depth range of drags, fathoms	14-20	9-18	11-15	19-21	12-17	9-21
No. of drags with lobster catch	2	0	0	3	1	6
No. of lobsters	3	0	0	3	1	7
Catch of lobsters per drag	0.17	0.00	0.00	0.43	0.20	0.175

Table 3.—Summary of lobster catch data from pot catches on Pedro Bank (Cruises 71-1 and 71-3).

Grid No.	H-12c	H-12d	H-13c	H-13d	I-12a	I-12b	I-13a	Total
No. of strings	8	4	4	20	4	8	25	73
Total pots recovered	224	111	110	592	112	226	703	2,078
Spiny lobsters caught	98	4	0	46	14	24	86	272
Lobsters per pot	0.44	0.04	—	0.08	0.13	0.11	0.12	0.13

Table 4.—Summary of lobster catch data from pot catches by area (Cruises 71-2, 71-3 & 71-5).

Area	Albatross	Morant Cays	Eight-Mile	Mouchoir	Silver	Navidad	N. Leeward Islands
No. of strings	5	10	2	8	13	10	34
No. of pots recovered	132	268	54	220	327	292	1,055
Depth range (fathoms)	18-20	13-25	18	8-13	10-16	13-17	9-150
Spiny lobsters caught	0	20	0	1	1	2	3

were caught on Albatross or Eight Mile Banks and insignificant catches were obtained from Mouchoir, Silver, and Navidad, and northern Leeward Islands Banks. About 1,100 pounds of assorted demersal fish, four sand lobsters, and 64 crabs were taken in the 1,055 pot sets.

Fish Pots

The incidental catch results of fish pots set for comparative purposes in lobster fishing areas are given in Table 5. The fish pots caught only seven lobsters—all on Pedro Bank. The fish catch at lobster fishing depths was significant on Navidad Bank, where "Z" pots caught an average of 21 pounds per lift and on the northern Leewards' Banks, where "Z" pot hauls averaged 33 pounds per lift.

DISCUSSION AND SUMMARY

It was found during the project lobster explorations that the try trawl was not applicable in many areas, due to the rugged nature of the bottom and low catch rate. The wire mesh pot strings, however, proved to be adequate in determining the areas of greatest lobster abundance.

Various types of bait were used and though no specific bait preference experiments were conducted, it appeared that raw cowhide worked at least as well as fish bait and had the added advantage of extended life in the traps.

The availability of lobsters on the banks surveyed was shown to be, in general, low. The exception to this

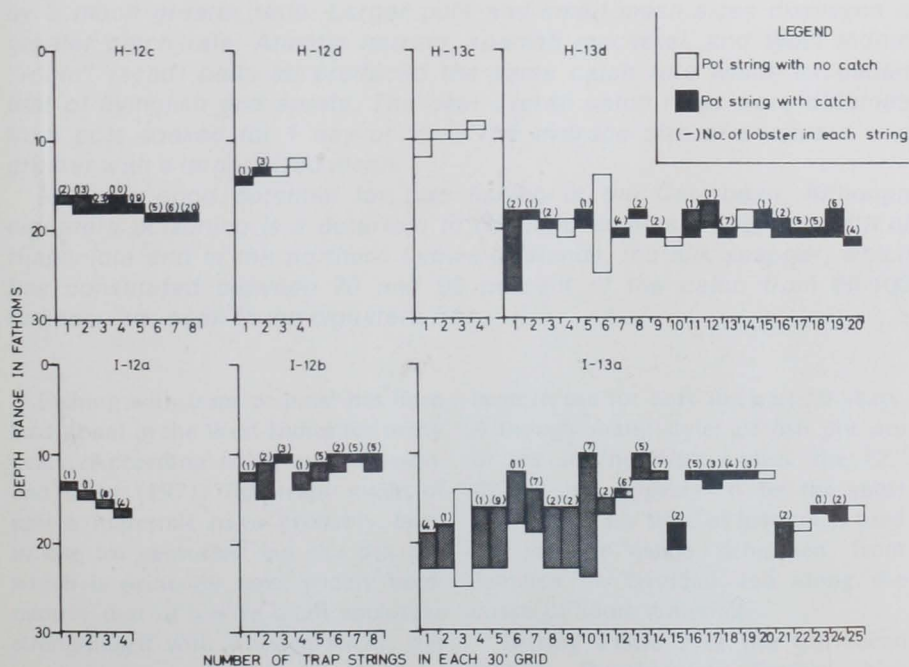


Figure 8.—Depth distribution by 30 foot grids of pot string sets on Pedro Bank.

Table 5.—Summary of fish pot catches on lobster grounds.

AREA POT TYPE	Pedro		Navidad	Silver	Mouchoir	N. Leeward	Banks
	Z	D	Z	Z	Z	Z	D
No. of pot hauls	6	5	6	5	2	26	6
Avg. soak (hr.)	157.0	157.0	21.7	18.7	14.5	16.4	16.4
Spiny lobsters (nos)	5	2	0	0	0	0	0
Sand lobsters (nos)	0	0	0	0	0	0	0
Crabs (nos)	0	0	0	0	0	0	0
Snappers (nos-lbs)	2-1.5	1-1.0	21-67.0	7-9.5	0-0.0	524-670.0	35-18.0
Groupers (nos-lbs)	0-0.0	0-0.0	6-51.0	2-17.0	2-13.0	20-128.0	1-13.0
Hinds (nos-lbs)	13-11.0	2-2.0	0-0.0	6-9.0	0-0.0	2-1.0	0-0.0
Grunts (nos-lbs)	41-23.0	9-10.0	21-8.0	2-1.5	0-0.0	0-0.0	0-0.0
Others (nos-lbs)	17-62.0	59-94.0	2-2.0	5-2.0	0-0.0	21-45.0	4-3.0

generalization was that certain areas of Pedro Bank produced relatively good catches, having commercial significance. Grid H-12c on the western end of the bank showed a pot catch rate which was considerably in excess of the average catch rate observed for similar wire mesh lobster pots during other lobster explorations in the Caribbean off Panama (Butler and Pease 1965). Although specific pot catch data are not available, a comparison of trawl net catch data between Pedro Bank and the continental shelf east of Honduras and Nicaragua would indicate that Pedro Bank possessed a much lower concentration of lobsters.

Even though a few lobsters were found on Morant Cays Bank, it is not likely that it could support much intensive lobster fishing because of its size.

The remarkable catch rates of lobsters taken incidentally in fish pots on Pedro Bank during earlier exploratory fishing efforts could not be duplicated with either lobster pots or fish pots during these investigations.

The higher lobster catch rates observed on the western side of Pedro Bank are indicative of a commercially available resource. Indeed, this fact was already known to some fishermen, as *Alcyon* observed a number of U.S. vessels fishing for lobsters along the northwestern edge of the bank during February and April of 1971.

It is unfortunate that other project exploratory efforts for lobsters both in the northern and southern portions of the project region were negative. There is ample evidence that lobsters are present in commercial quantities on the northern Leeward Islands Banks and in the Grenadine Islands. The total production of lobsters in Antigua (which would have been caught in Barbuda Bank) was esti-

mated at 175,000 pounds in 1969 (Vidaeus 1971a) and in 1967, 65,000 pounds of lobsters, which were likely caught on Anguilla Bank, were exported from Nevis-Anguilla-St. Kitts (Vidaeus 1971b). In 1966 and 1967, the Windward and Leeward Islands were reported to have exported 31 and 35 metric tons of lobsters, respectively, into the United States (Windley 1968).

In the Grenadine Islands, a viable lobster fishery existed during 1969 and 1970. Don Crausbay used his 80-foot converted shrimp trawler, *American Lady*, and another smaller boat to fish 250 traps. These were normally raised twice per week to catch between 600 and 800 pounds

of whole lobster. Their average individual weight was reported at 3.5 pounds, but the median was about 1.5 pounds. Basing his operation on Union Island, Crausbay fished his traps inside the area generally enclosed by Union, Maryean, and Little Martinique Islands in the west, and the edge of the island shelf in the east. He reported good catches at all fishing locations. Crausbay no longer fishes lobsters in this area, but the discontinuance was not due to a lack of resource.

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