

An Economical Method of Trap Fishing for Spiny Lobster, *Panulirus argus*, in the Bahamas

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Fishing for spiny lobster, *Panulirus argus*, in the Bahamas with wooden traps was first legalized for the 1973-1974 season. Spiny lobsters are commonly referred to as crawfish by most Bahamians.

Prior to the 1973-1974 season, the only legal method of harvesting crawfish commercially was bully netting; traps or pots were outlawed. With the advent of spearfishing and the increased value of catches, numerous crawfish are now captured by divers using a spear.

Legal gear for use in spearfishing, or skindiving as it is called, consists of mask, flippers, snorkel, and a free spear used with a Hawaiian sling. SCUBA equipment or any other auxilliary breathing apparatus, spear guns, or compressed gas guns are illegal. It is also illegal to sell fish or crawfish which have been speared.

Many boats are working the Bank area of the Bahamas, capturing fish and crawfish by skin-diving and by using Hawaiian slings and spears. Unfortunately some of these fishermen use chlorine bleach and other caustic substances to drive the crawfish and fish from their rocky hiding places, out into the open where they are easily speared. This procedure is damaging to coral reefs and marine life and must cease.

With the recent declaration claiming the crawfish as a creature of our continental shelf, our Banks and waters have been closed to foreign owned boats. The Bahamian fishing effort must now increase to properly harvest the available catch.

Presently, almost 90% of the crawfish taken in Bahamian waters by our fishermen for the commercial market is obtained by spearfishing. This is wasteful in that once speared, if the fish is undersized, or if it is a female with spawn (eggs) it would probably die if released. Therefore we feel that once traps are fished by Bahamians, spearfishing will be discouraged.

Converting our village fishermen from the spearfishing and bully netting styles of commercial fishing to the use of wooden traps need not involve the vast capital outlay anticipated.

Bully net commercial fishing is limited to depths less than 20 ft. Divers work from the shallows out to depths of 35 or 40 ft. As much of the water in the Bahamas is in this category, the area available to the bully net fisherman and the diver is vast. Traditionally, the bully net fisherman uses a native dinghy and, even if equipped with an outboard motor as they usually are, they seldom venture more than 12 miles from home, leaving in the early morning and returning in the early afternoon.

The divers are usually young fishermen, equipped with high speed run-abouts, and have been known to fish areas as far as 40 miles from home; leaving home in the early morning and returning in the afternoon. The catch per diver is usually much more than the catch per bully netter. Some divers in fast run-abouts operate from mother ships, which are relatively large, expensive, well-equipped vessels with refrigeration and modern conveniences. They are thus able to provide a much higher share per crew members, than a smack (native boat) would, if operated as a mother ship with dinghys and bully net fisherman, where the catch would be kept in the vessel's live well.

In the past, fairly large boats crewed by Cuban Americans have fished traps on the banks to the north and south of Bimini, on the Great Bahama Bank and to the north of Grand Bahama on the Little Bahama Bank. A large boat must set traps singly – that is, with a buoy line to every trap. The vessel is maneuvered into position, the buoy is hooked with a gaff, and the trap is pulled onto the ship. On the relatively smooth bank areas, it may be possible for the boat to fish several traps on a trot line, i.e. all connected. There is, however, a danger, that while the vessel is drifting and rolling around, the trot line may snag on coral heads or rough bottom, thereby chaffing the line, or causing trap damage or loss. It is for this reason that most large boats fish traps singly.

In our clear waters, traps set on the banks are easily seen lying on the bottom, and since most of them have floating buoys, they are subject to poaching. For this reason when traps are set by boats, it is normal practice for the boat to stay in the vicinity to make sure that no poaching occurs.

Many miles of deep water in the Bahamas are at present relatively unfished, (e.g. the south shore of Grand Bahama; the west side of the Little Bahama Bank from West End Village northward; the Abaco Cays from Matanilla Shoals on east all along the Abacos around the Hole in the Wall, and around to Mores Island).

Do you say that trap fishing for crawfish requires a large, fully equipped boat, capable of traveling to various areas? This is absolutely false, though of course, it could be done like that.

These past two seasons (1975-1976; 1976-1977), a trapping license K-1, granted by the Ministry of Agriculture and Fisheries, authorized us to fish in the Grand Bahama area. A 16-ft Boston Whaler was outfitted with a trap puller obtained from the Fisheries Store, a home-made tripod with an open block was installed; traps, ropes, and floats were purchased, bait was obtained and we were ready to begin trapping (Fig. 1).

After considerable experimentation, a method of rigging the traps was perfected, whereby the whole operation was simplified. Since our boat was comparatively small, instead of dragging traps over the bottom during the pulling operation, each trap acted as an anchor. The boat was therefore pulled along the line of traps during the hauling operation. Because of the limited cockpit size, we placed our traps on a trot-line with five traps. Instead of emptying, cleaning, and rebaiting each trap as it was pulled and re-setting it before pulling the next one on the trot-line, all five traps were pulled and placed in the whaler. As one man pulled the other man emptied, cleaned, and rebaited each trap where necessary. Reference marks were observed on shore so that each trot line was reset in the same location.



Fig. 1. The 16-ft Boston Whaler loaded with 10 traps which are rigged and ready to begin fishing.

Our traps were set in 80 to 100 ft of water, thus making them invisible to the naked eye, and too deep to be poached by spearfishermen or divers. Each trot line was attached to a buoy line 100 ft in length. As each series of traps was placed in the boat, the buoy line would be removed from the first trap in and tied to the last trap pulled, which would be the first one over when the traps were reset. Interconnecting trap lines had a length of 60 to 80 ft, and were so arranged that the rope was continuous, even though connected in sections. This was perfected for two reasons: one, for easier handling in the pulling stage; and, if a trap were broken up for any reason, the other traps in the trot line would not be lost. The interconnecting lines are less than the depth of water to discourage anyone from pulling them by hand.

A poacher could attempt pulling a trap, should he spot a buoy, but before the first trap reached the surface, the second trap would leave the bottom. Pulling the weight of two traps by hand would be discouraging. This happened on one occasion, and the poacher cut away the buoy line. We were able to find the traps by swimming along the surface in the approximate area where the traps were left and hooking one of the interconnecting lines with an anchor.

We then commenced using pop-ups, or time delayed release devices, on our buoy lines. This device is made of an alloy of magnesium and zinc, which corrodes or dissolves in salt water at a known rate. A wire is attached through a braid of the rope approximately 40 ft below the float, with a second wire some 20 ft above the trap. After connecting the two wires with the pop-up, the first trap overboard pulls the float below the surface of the water (Fig. 2). The

remaining traps in the trot line would then be run out in a straight line on marks from shore. We always noted shore marks, so that we know where each line of traps was located.

The pop-ups used were the 3-day type, actually timed for 60 h plus or minus 5 h. Two of us usually left home at daybreak in our 16-ft whaler and ran to the fishing area along the edge of the ocean on the south side of Grand Bahama. We would head for the area of the first trot line, snag the buoy, start the trap-puller, and begin pulling the traps. The five traps would be in the boat within 5 min with one man pulling, which requires little effort, while the second man would stack, empty and clean the traps. When the last trap was boated, we would shift the buoy line, install a new pop-up, rebait the traps if required, and head for the marks where the first trap would be placed overboard. The boat would be maneuvered along the line where the traps would be placed overboard as the line pulled tight from the previous trap. Each trot line of traps would require approximately 10 to 15 min if all went well.

Occasionally a trap had to be repaired, or a margate fish, grouper, or hogsnapper would be in a trap, requiring more time to remove it. The obviously small crawfish would be released; the larger ones placed in the box, and the doubtful ones measured to ascertain their legality.

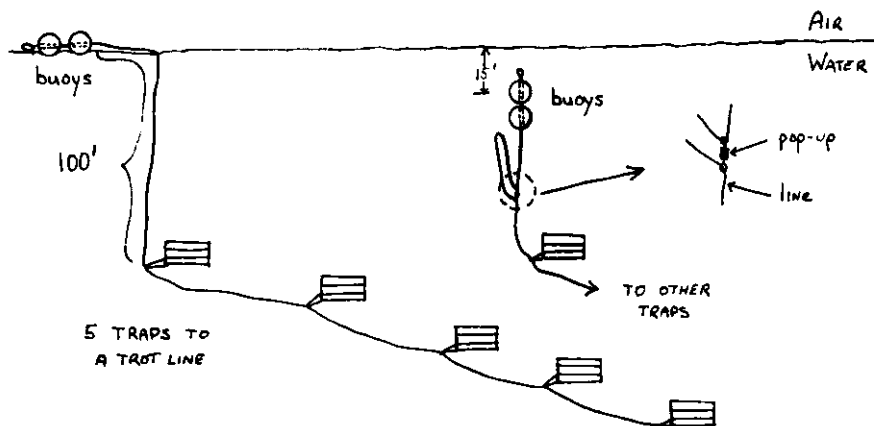


Fig. 2. This figure illustrates our method of attaching the pop-ups to the buoy line. The total length of the buoy line is 100 ft. The depth of water fished is a factor of the length of buoy line and the positioning of the pop-up.

We were always able to fish four to six trot lines per hour. After resetting them with pop-ups, the buoys were hidden from view for the next 3 days. On the morning of the third day, we would again check the traps.

The capital investment necessary to organize a one-boat, 300-trap fishing unit is outlined in Table 1. Two village fishermen could be established as a fishing unit with a \$12,000 investment.

The cost analysis covers 3 years, which equals the life time of the weakest piece of gear, i.e. the traps (Table 2). The traps and engines were depreciated over 3 years, whereas, the rest of the gear was depreciated over 5 years.

Table 1. Capital investment necessary in organizing a one boat (16 ft), 300 trap crawfish fishing unit

Item	Cost (\$)
Boat (New Boston Whaler)	\$3,000.00
Trap Puller (New 7 H.P. Gas Puller)	400.00
Mounting	400.00
Traps (\$16 ea. rigged)	4,800.00
Bait Cans (350 @ \$.34 ea.)	125.00
Engine (New 85 H.P. Outboard)	2,200.00
Other Expenses & Working Capital	1,075.00
Total	\$12,000.00

A summary of actual catch and effort data appears in Table 3. Our average catch rate of 0.3789 pounds per trap day (td) is the figure used in estimating the potential returns from this fishery. Trap day is defined as one trap fishing a 24-h period.

Fishing 300 traps with an average soak time or fishing time of 30 days per month results in 9000 trap days per month. Using our average catch rate of 0.3789 lb/td, the potential monthly catch equals 3410.1 lbs. This weight sold at the average price per pound whole weight of \$1.50, would gross the fishermen \$5115.15 per month. Based on an 8-month season, the theoretical gross per year

Table 2. Cost analysis for a small Bahamian crawfish boat fishing 300 traps

Item	Dollar Cost for Years 1 to 3		
	Year 1	Year 2	Year 3
Variable Costs			
Fuel	\$ 720.00	\$ 720.00	\$ 720.00
Oil and Oil Change	160.00	160.00	160.00
Bait	960.00	960.00	960.00
Brush	17.00	17.00	17.00
Gloves	60.00	60.00	60.00
Rain Gear	70.00	70.00	70.00
Boots	20.00	20.00	20.00
Wages	8,000.00	8,000.00	8,000.00
Repairs and Maintenance	1,000.00	2,000.00	3,000.00
Total Variable Costs	11,007.00	12,007.00	13,007.00
Fixed Costs			
Depreciation			
Traps	\$ 1,600.00	\$ 1,600.00	\$ 1,600.00
Boat	600.00	600.00	600.00
Trap Puller	133.34	133.33	133.33
Engine	733.34	733.33	733.33
Bait Cans	41.67	41.67	41.66
Loan	12,000.00	---	---
8% Interest on Loan	960.00	---	---
Total Fixed Costs	16,068.35	3,108.35	3,108.35
Total All Costs	27,075.35	15,115.35	16,115.35

Table 3. Summary of actual catch and effort data for March, August, September, October, and November 1976. (Trap day(td) is defined as one trap fishing a 24-h period)

Date	Number Legal Lobsters	Weight (lb)	Number Shorts	Total No. Lob.	No. Fish	Trap Day (da.)	Average Legal Catch Per td(lb)	Income (\$)
March	803	1,162.0	259	1,061	13	2,700	0.4304	\$2,033.50
August	407	486.5	—	—	—	1,525	0.3190	851.38
September	214	272.0	424	538	25	1,805	0.1507	476.00
October	1,199	1,241.0	342	1,541	38	2,220	0.5590	2,171.75
November	1,671	1,835.5	748	2,419	35	4,214	0.4356	3,212.13
Totals	4,294	4,997.0	1,773	5,559	111	12,464		\$8,744.76
Average Catch							0.3789	

equals \$40,921.20; quite a high return for an investment of only \$12,000. The potential earnings of our fishing unit over a 3-year period appear in Table 4.

It is our contention that with the adoption of the outlined fishing method, a fleet of small fishing boats could be outfitted at a much reduced cost, providing a significant boost to the local economy. A loan program could be developed by the Ministry whereby interested fishermen would be set up to trap crawfish for \$12,000 per fishing unit. Projecting our catch rates, the loan could be repaid within the first year. Thus a large expenditure is not necessary to establish a crawfish industry and the funds allocated would assist a greater number of fishermen by using small but efficient fishing units.

In conclusion, by adopting our recommendations and fishing methods a fleet of small Bahamian fishing boats could start to harvest the vast quantity of crawfish available in our Nation's waters.

Table 4. Summary of costs and returns for a small boat crawfish fishery. (No estimate of marketing costs have been included because this would be highly variable, depending on where the fishery was based)

Item	Year 1	Year 2	Year 3
Total Costs	\$27,075.35	\$15,115.35	\$16,115.35
Gross Return	40,921.20	40,921.20	40,921.20
Net Return	13,845.85	25,805.85	24,805.85
Return Rate	1.15	2.15	2.07