

This longline technique lets tropical fishermen work snapper concentrations more intensively.

A Vertical Longline for Red Snapper Fishing

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INTRODUCTION

Tropical inshore fisheries are confronted with two basic problems. Firstly, biological communities within the tropics tend to be diverse (MacArthur and Wilson, 1967). This diversity means that, unlike temperate fisheries which can concentrate on large populations of single species, tropical fisheries must be flexible. Fishing gear must be able to capture a variety of species to be effective in the reef environment.

The second characteristic of most tropical fisheries is a strong reliance on the small boat. In a survey of the South Pacific, Clutter (1971) found this to be the general case. Recent fishery development within the area has concentrated on improving this unit of fishing gear rather than introducing new levels of technology.

A similar situation exists in the Caribbean. Dammann (1969),

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Brownell and Rainey (1971), Swingle, et al. (1970), and Sylvester and Dammann (1972) have described the fisheries of the region to this effect. The present report is based on the idea that to be effective, fisheries development must find ways of maximizing and diversifying the catching ability of the basic unit of gear, the small boat.

MATERIALS AND METHODS

The basic program of exploratory fishing is described in Brownell and Rainey (1971). The technique utilizes a 35 ft New England-style lobster boat for drift fishing on the edge of the

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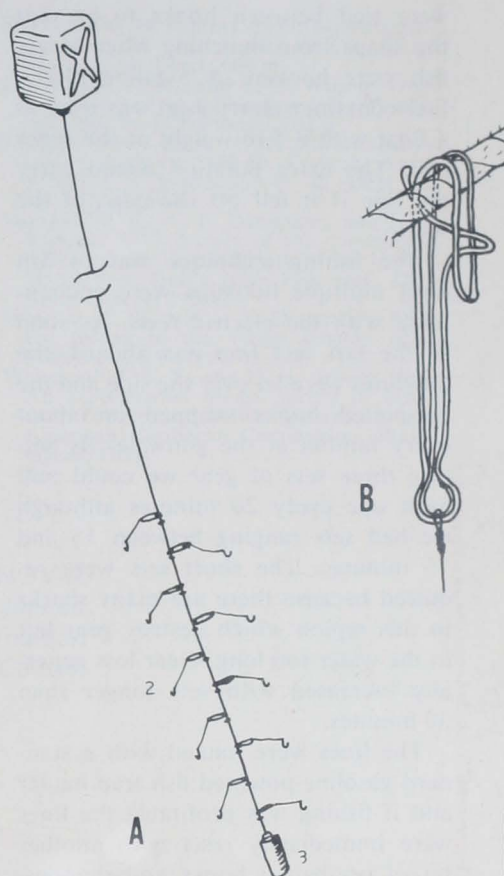


Figure 1.—A vertical longline (A) is constructed of a float (1) attached to 100-200 fathoms of 0.25-inch polypropylene line. Tuna gangions with hooks wired on them (2 and B) are placed every fathom up from the 5-lb weight (3) on the bottom. Knots between the hooks prevent the gangions from bunching up when big fish are hooked. From 15 to 20 hooks wired to gangions gave best results.

Virgin Islands' shelf. Fishing is done with electric snapper reels.

The vertical longline was developed to enable the fisherman to concentrate his efforts on the highly discontinuous schools of snappers which are first located by electric reel fishing. Once one of these schools is encountered, the longline is let over the side and from 15 to 20 baited hooks, wired with 6-in leaders to longline snaps, are clipped to the line about every fathom of the ¼-inch polypropylene line (Figure 1). We tried a variety of hooks, wiring methods, and baits but ended up using from 15 to 20 No. 7 circle hooks, wired loosely to the snap. Knots

were tied between hooks to prevent the snaps from bunching when larger fish were hooked. A 5-gallon plastic fuel container (Jerry Jug) was used as a float with a 5-lb weight at the other end. The extra flotation would carry the line if it fell off the edge of the shelf.

The fishing technique was to fish until multiple hookups were encountered with the electric reels. As soon as the last reel line was aboard, the longlines were let over the side and the pre-baited hooks snapped on about every fathom at the gunwale. By setting three sets of gear we could pull each one every 20 minutes although we had sets ranging between 15 and 75 minutes. The short sets were required because there are many sharks in this region which destroy gear left in the water too long. Gear loss generally increased with sets longer than 30 minutes.

The lines were hauled with a standard gasoline-powered fish trap hauler and if fishing was profitable the lines were immediately reset with another set of pre-baited hooks and snapons. At least one extra set of hooks was baited at all times. This was continued until such time as it was no longer profitable.

The total cost (excluding line hauler) was \$100 for three complete sets of gear with spare hooks and snapons. This is roughly broken down as follows: Hooks (\$10/100), snapons (\$33/100), 1,800 ft of ¼-inch polypropylene line (\$30), floats (\$15), and the remainder on spare weights and baskets for coiling the lines on deck when not in use. A gasoline powered pot-hauler with reduction gears can be purchased for \$260 and is proving to be very effective in our work with native-style boats in the 20 ft class.

Figure 2.—The catch rate (fish/hook/minute) appears to decrease with the length of the set. The number of sets within the time interval is shown on the top line and the percent of those sets that were successful, i.e. caught fish, is shown immediately below. Only successful sets are shown.

RESULTS

Catches of over 100 lb of snappers and groupers per hour were recorded several times throughout the course of the study. This would pay for the gear in one hour. The largest fish caught were roughly the same size as those caught with electric reels. Two men used the gear in conditions that ranged from flat calm to 25-knot winds and 12-ft seas. No weather-related gear limitations were observed which were peculiar to this method.

The gear is extremely durable. During one stretch of three trips, gear loss was confined to less than 10 hooks. Sources of gear loss could generally be related to either sharks or handling problems.

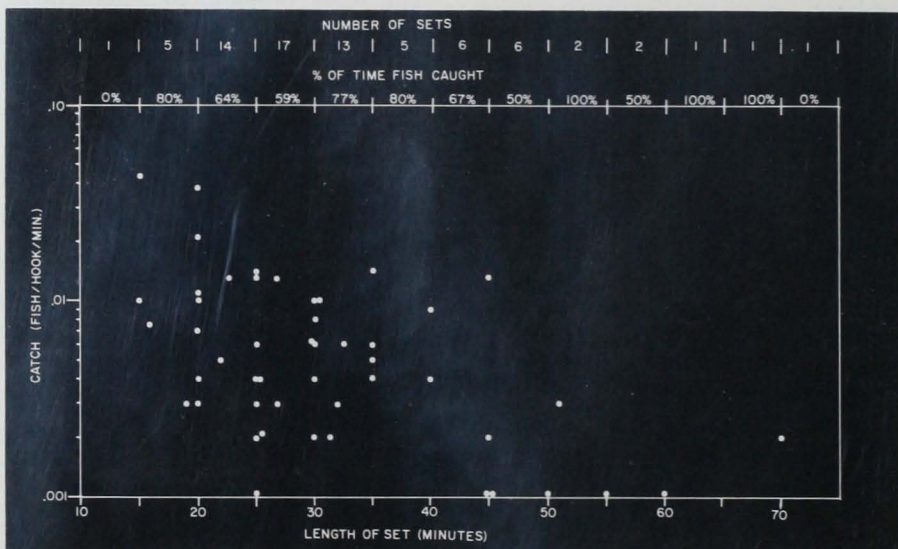
The set lines caught fish 64 percent of the sets (49 out of 77 times). The most frequently caught fish were red snappers, groupers, and jacks. The general size and species composition of the catch was similar to that from electric reel fishing (listed in Brownell and Rainey, 1971).

The effectiveness of the gear decreased with the length of the set (Figure 2) and ranged downward from a high of 0.04 fish/hook/minute. A regression of catch rate with length of set was marginally non-significant ($F = 3.06, df = 1, 75; 0.05 < P < 0.1$).

This suggests a fishery strategy of 15 to 40 minute sets. All gear losses related to damage from sharks occurred during sets greater than 40 minutes in duration.

DISCUSSION

A method of fishing for red snappers and groupers has been presented which increases fishing effectiveness over electric reels by permitting the fisherman to work concentrations of these fishes more intensively. It is particularly effective in areas where predation upon caught fish prevents the use of the conventional bottom set longline. Although longlines and setlines have been used in the snapper fishery previously (Carpenter, 1965; Suarez-Caabro, 1970) these have been of the conventional bottom set type. Other workers (Jarvis, 1935; Whiteleather and Brown, 1945) stated that they were not successful in catching commercial quantities of snappers. Jarvis (1935) attributed this failure to strong currents and rough bottoms. The present gear was fished in these conditions (of strong current and rough bottom) with notable success. Since Kristjansson (1969) makes no mention of this method of fishing, it may be relatively new. Use of vertical setlines permits



the small boat to maintain mobility on the fishing grounds. The buoy serves as a point of reference for boat maneuvering since this fishery usually occurs in deep water away from accurate land marks. The high currents in this region (up to 2 knots) had little effect on catch. The gear itself is inexpensive and requires little supporting equipment other than a power line hauler. The lines have been hauled by hand with some success. The setlines are inexpensive to purchase, durable in use and easily operated from a small boat.

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