

# THE LINE-TRAWL FISHERY FOR COD AND HADDOCK AT CHATHAM, MASSACHUSETTS

By Albert C. Jensen\* and Robert K. Brigham\*\*

## ABSTRACT

The line trawl was developed in New England about 100 years ago and, until the introduction of the more efficient otter trawl, was the principal gear used in the cod and haddock fishery. Line trawls are still fished today from small boats, particularly over bottom too rough for otter trawling.

Chatham, Mass., is the home port for a fleet of line trawlers that fish with two-man crews and land the fish in prime market condition. Annual landings are on the order of 1.7 million pounds, mostly cod and haddock. The gear, the boats, the fishing operation, and the catch of the Chatham fleet are described and illustrated.

## INTRODUCTION

The line trawl was once the principal gear used by the New England fishing industry but it has been replaced by the more efficient otter trawl, particularly on the off-shore fishing grounds. However, the old style gear is still used in many parts of New England. On some fishing grounds it is the only gear that can be used because the bottom is too rough for otter trawling. This article is an attempt to document the fishery as it exists today at one of the New England centers of line-trawling fishing, Chatham, Mass.

## FISHING GEAR

In other parts of the country this gear is sometimes called a long line, but in New England it is called a line trawl. It was developed from the older hand line and consists principally of a horizontal ground line with short ganging lines, each with a baited hook, attached at intervals. Two similar types of gear, a halibut long line and a steel cable long line, are illustrated by Dumont and Sundstrom (1961).

A "tub of trawl" is the unit of gear. The tub itself is a half barrel and is the container in which the trawl is stored before and after it is fished. The gear (table 1) consists of 10

Table 1 - Specifications of Chatham Line-Trawl Gear

Item	Size or Weight	Approximate Dimensions	Material
Ground lines	18 lbs. per 50-fathom bundle	3/16-1/4" dia.	Tarred cotton or nylon
Ganging lines	3-1/2 lbs. per 50-fathom bundle	1/16-3/32" dia.	Tarred cotton
Buoy lines	32 lbs. per 50-fathom bundle	3/8-1/2" dia.	Tarred cotton or manila
Hooks	6/0 Pflueger	2" length over-all	Steel
Anchors	12 lbs. at start of string	36" length over-all 24" width across flukes	Steel
	6 lbs. at end of string	30" length over-all 20" width across flukes	Steel
Kegs	8-gallon capacity	12-1/2" dia. at bulge 18-1/2" length over-all	Wood
Poles	14 feet long	1-1/2 to 2" dia. at butt end	Bamboo or Calcutta cane

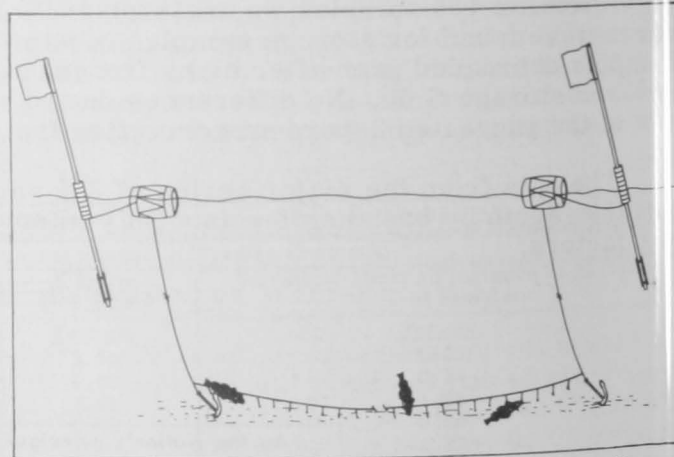


Fig. 1 - Diagrammatic sketch showing the layout of a New England line trawl in a fishing position. The details of the parts of the trawl are described in table 1.

\*Fishery Biologist (Research)

\*\*Photographer, Biological Laboratory

U. S. Bureau of Commercial Fisheries, Woods Hole, Mass.

Connected sections of ground line, each 50 fathoms long. Lengths of ganging with 6/0 hooks are fastened to the ground line at 6-foot intervals. Thus there are about 500 hooks per tub of trawl. The length of the ganging varies and depends on the height of the vessel's rail above water, and is gauged to enable the fishermen to bring the fish into the boat in an easy operation.

When the trawl is fished, it is rigged in strings consisting usually of  $1\frac{1}{2}$  tubs of trawl. Sometimes two tubs will be set in a string. A  $1\frac{1}{2}$  tub string consists, then, of a ground line 4,500 feet long with about 750 hooks. A cane pole with a small flag is attached with a 10-foot-length of buoy line to a wooden keg and floats on the surface as a marker at each end of the string. The kegs are connected with long buoy lines to anchors that hold the ground line on the bottom (fig. 1). The boats from Chatham usually fish in depths of from 20 to 30 fathoms.

### LINE TRAWL BOATS

The vessels engaged in the Chatham line-trawl fishery are of the type known as a Cape Island or Jonesport boat. The basic design of the vessel is described by Chapelle (1955). Locally they are called "Novie (Nova Scotia) boats", or "Novie lobster boats." A typical Chatham boat (fig. 2) is 33.7 feet long, 11.0 feet beam and 4.9 feet draft, and is registered at 13 gross tons and 12 net tons. It is powered by a 165 h.p. gasoline engine and carries a two-man crew.

### FISHING OPERATIONS

A typical day of line-trawl fishing at Chatham begins about 2:00 a. m. (two hours later in the winter) when the fishermen bait the hooks and coil the line in the tubs preparatory to steaming out to the fishing grounds. The kind of bait that is used depends on its availability and the season. Squid is sometimes used in the summer, particularly when fishing for cod. Mussels or sea clams are used in the winter. Cut, frozen herring is often used, particularly when the other kinds of bait are not available.



Fig. 2 - The Hazel Y., a 34-foot-long Chatham vessel engaged in the line-trawl fishery.

The boats leave the pier about 3:00 or 4:00 a. m., often taking advantage of high tide to get over the shallow entrance to the harbor. Final baiting of hooks and other preparation of the gear are done on the way to the grounds. The most productive ground is "The Mussels" located about 18 miles south-southeast of Pollock Rip lightship. The bottom here is too rough for otter trawls but yields excellent catches of groundfish, particularly cod (Gadus morhua) and haddock (Melanogrammus aeglefinus), to the line trawlers.

When the vessel reaches the fishing ground the gear is set out. A flag and keg are set over the side and the buoy line paid out by flipping it over the after port rail with a short, wooden "heaving stick." Then, the first anchor is dropped. The ground line with the attached ganging lines and baited hooks are next flipped out with the heaving stick (fig. 3). Finally the second anchor and a keg and flag are set out. The trawl is now fishing on the bottom.

Sometimes only one tub is set out and allowed to "soak" for as long as it takes the boat to return to the first buoy. The gear is immediately hauled back and the abundance of food fish determined by the catch on the line. If the catch is good, 2, 3, or 4 strings may be set; the first string is hauled back as soon as the last one is set. Hauling back (figs. 4, 5, 6 and 7) is simply a reversal of the setting out procedure. The first keg and flag are hauled into the boat and then the buoy line is hauled in over the roller-rail. When the anchor is brought into

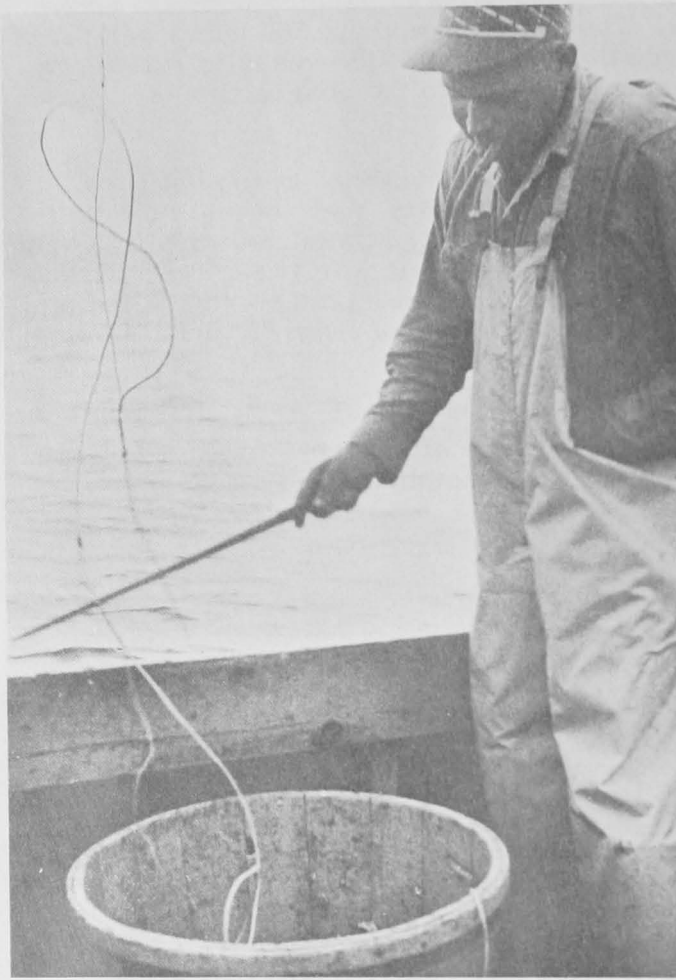


Fig. 3 - Setting the trawl. As the boat moves ahead about half speed, the ground line, with the attached ganging lines and baited hooks, is flipped clear of the tub with a light, wooden stick.



Fig. 5 - A gaff is used to boat large fish, particularly the soft-mouthed haddock, as shown here. As one man hauls in the line and handles the fish, the second man coils the gear into the tub.

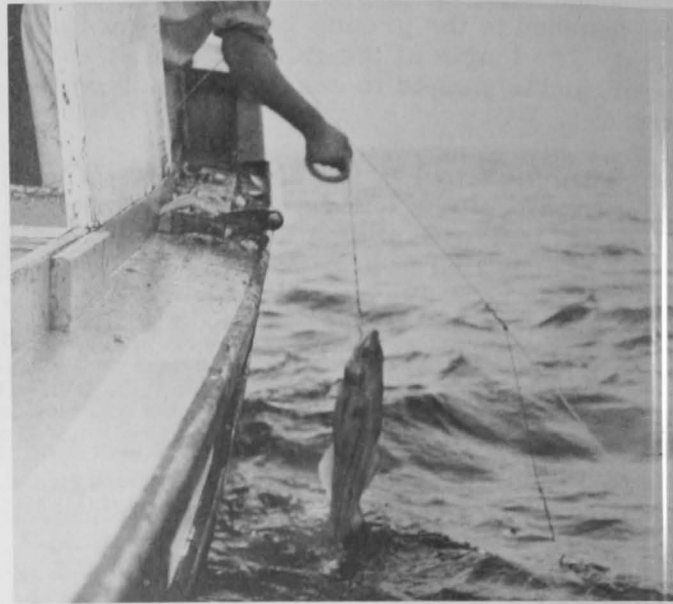


Fig. 4 - The ground line with a hooked haddock is hauled back hand-over-hand. The fisherman's hands are protected by doughnut-shaped, woolen "nippers" that insure a firm grip on the line but permit bare-finger freedom of movement.



Fig. 6 - When a fish is brought aboard it is "slatted off" the hook into the fish box (foreground).

the boat, the ground line is unfastened and hauled in, hand-over-hand, over the roller-rail. One man hauls in the line and maneuvers the boat by adjusting the wheel and engaging and disengaging the clutch, thus keeping the boat broadside to the line. The other man coils the gear into the tub. A gaff is used to haul in large fish, especially the soft-mouthed haddock, that might otherwise drop off the hook. Food fish are placed in pens on each side of the cockpit; unwanted fish and unused bait are shaken off the hook to fall back into the water. As the gear is coiled back into the tubs it is examined for damaged hooks or frayed ganging and ground lines. At the end of the ground line the last anchor, keg, and flag are hauled into the boat.

In the summer months, large sharks, particularly the blue shark (*Prionace glauca*), cause a great deal of damage to line trawls. The sharks may tangle the ground line into a hopeless snarl and often bite the ground line and sever it. Spiny dogfish (*Squalus acanthias*) are another serious pest. Frequently they devour the bait and are hooked, or feed on the hooked cod and haddock leaving only the head and part of the spinal column. When spiny dogfish are very abundant, the line trawl fishermen are unable to use the gear and resort to jigging with hand lines and artificial lures.



Fig. 7 - Coiling the gear back into the tub. During this operation the fisherman checks for damaged hooks or worn or frayed ganging and ground lines.

The catch is dressed as the vessel returns to Chatham (fig. 8). During the winter months, when the fish are not as abundant and the most productive grounds are not readily accessible, a good trip will average about 2,000 pounds of dressed fish. During the summer months a good trip will average about 3,000 pounds of dressed fish, and under ideal conditions line trawlers occasionally land 3,500 to 4,000 pounds per trip.

The vessels usually return to the Chatham fish pier about 3:00 p.m. The fish are unloaded with a pitch fork from the boat to a large steel bucket that is hoisted to the dock when full. The bucket slung from an overhead rail, then is rolled into the packing house. After the catch is unloaded (figs. 9, 10, 11, and 12), the species are separated by hand and packed with ice in wooden boxes. The Chatham boats carry no ice but the catch is landed within 4 or 5 hours of the time the fish are taken from the water and thus is quite fresh when boxed for shipment. The boxes are then shipped in refrigerated trucks to New York, Boston, and other nearby eastern cities. The cod are sold mostly in the New York area whereas the haddock are sold mostly in the Boston area. This separation of species is dictated by consumer preferences in those areas.



Fig. 8 - All the fish are eviscerated and the large cod are beheaded as the vessel returns to port. The catch includes cod, with the light line on the side, and haddock, with the dark line on the side.

## LANDINGS

Over the 5-year period 1957-1961, food fish landings at Chatham averaged about 1.7 million pounds a year (table 2). The size distribution of a sample of 207 cod caught by a Chatham line-trawl vessel is shown in table 3. It is noteworthy that in the cases of cod and haddock, almost no scrod (fish that weigh  $1\frac{1}{2}$  to  $2\frac{1}{2}$  pounds, gutted) are landed. The majority of the fish are in the "large haddock" (more than  $2\frac{1}{2}$  pounds, gutted) and "market cod" ( $2\frac{1}{2}$  to 10 pounds, gutted) categories. This is in contrast to otter-trawl landings where scrod cod and scrod haddock (particularly the latter) make up a large part of the landings of the two species. Presumably this is because the smaller fish are not easily caught by the relatively large, baited hook of the line trawl.

A small-scale fishery of this type has some advantages that cannot be matched by fisheries using more complex gear, and the capital outlay for the boat is considerably less. From the fisherman's viewpoint, the line-trawl fishery yields a comparatively large quantity of high quality fish that bring a very good price with a relatively low overhead cost. The quality of the fish is maintained by the 1-day delivery schedule, and the product is sought by

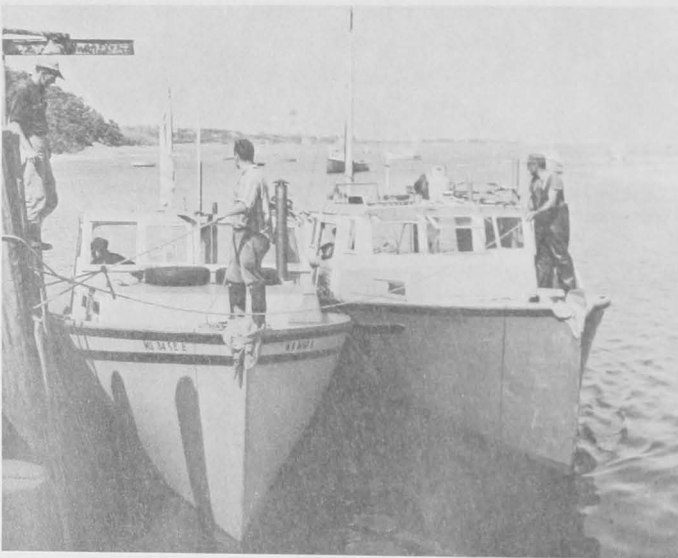


Fig. 9 - Tying up at the pier to unload the catch. At Chatham most of the vessels return about midafternoon so usually there is a lot of shifting of lines as each vessel takes its turn to unload.

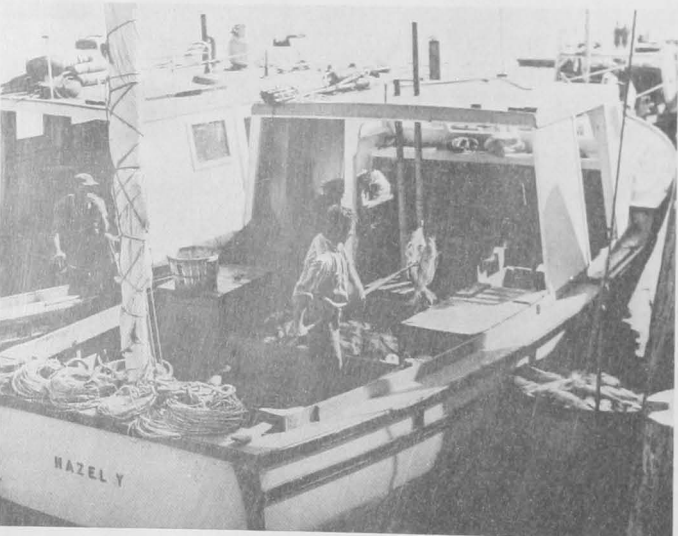


Fig. 10 - Unloading the catch. An average good trip will yield about 2,500 pounds of fish, mostly cod and haddock.



Fig. 11 - A pitch fork is used to transfer the fish from the vessel to the bucket. When the bucket is filled it is hoisted to the deck of the pier.



Fig. 12 - The bucket of fish is moved on an overhead trolley into the packing room. The fish are separated by species and packed with ice in wooden boxes for shipment to Boston, New York and other eastern cities.

Table 2 - Annual Landings at Chatham, Massachusetts, 1957-1961

Species	1961	1960	1959	1958	1957
. . . . . (1,000 Pounds) . . . . .					
<b>Cod:</b>					
Large . . . . .	741	523	566	450	515
Market . . . . .	293	468	570	198	159
Scrod . . . . .	5	-	-	-	-
Total Cod . . . . .	1,039	991	1,136	648	674
<b>Haddock:</b>					
Large . . . . .	902	788	584	697	707
Scrod . . . . .	-	-	-	-	2
Total Haddock . . . . .	902	788	584	697	709
Hake, White . . . . .	5	4	7	10	11
Wolffish (Catfish) . . . . .	6	8	10	8	18
Halibut . . . . .	26	11	10	14	15
Misc. species . . . . .	41	52	48	21	14
Total Other Species	78	75	75	53	58
Grand Total . . . . .	2,019	1,854	1,795	1,398	1,441

Table 3 - Percent Size Composition and Market Classification of a Sample of Cod Caught by a Chatham Line Trawl

Length Class	Number of Fish	Market Category <sup>1/</sup>
<u>Centimeters</u>	<u>Percent</u>	
21-30	0.5	} sub-market (released)
31-40	3.0	
41-50	16.9	scrod
51-60	24.1	} market
61-70	19.3	
71-80	15.9	
81-90	13.0	
91-100	6.3	} large
101-110	1.0	
	100.0	

<sup>1/</sup>Market category is approximate. In actual practice the categories are based on weight and not length of fish.

and sparing the smaller, younger fish for later harvest. In summation, the Chatham line-trawl fishery appears to be in the fortunate position of supplying a high quality food product to a ready market under economic and biological conditions that suggest stability of the fishery for the future.

the restaurant trade and the fresh fish markets. Furthermore, from the biological viewpoint, the line trawls tend to conserve the fishery by removing the larger and older fish

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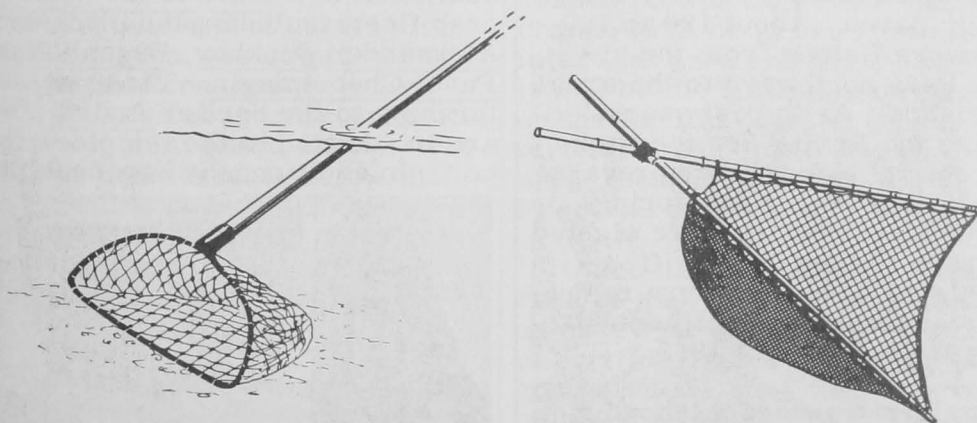
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PUSH NET

A push net is a modification of a dip net. It is constructed of a shallow wire or webbed mesh bag attached to a wooden or metal frame which has a handle. In fishing, it is pushed over the bottom in shallow water.



Push nets.

Note: Excerpt from Circular 109, Commercial Fishing Gear of the United States, for sale from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., single copy, 40 cents.