

Experimental Pair Trawling for Squid in New England

ALAN J. BLOTT

Introduction

In pair trawling, two boats are used to tow a single trawl. The boats are far enough apart to spread the trawl horizontally, thereby eliminating otter boards and the high hydrodynamic drag associated with them. Two boats can fish a larger trawl than can be fished by either one alone; and with the reduced drag, the trawl can be towed faster with a probable increase in catch (Larsson, 1959). In addition, there are no trawl warps in front of the net to frighten the fish. Midwater and bottom pair trawling for various fish species has been used effectively in other countries for many years (Taber¹).

The objective of this study was to test the feasibility of harvesting winter or longfin squid, *Loligo pealei*, in inshore waters with a bottom pair trawl.

Procedure

Two pair trawlers which had previously been used in the squid fishery

¹Taber, R. E. 1976. Feasibility demonstration of bottom pair-trawling for herring and other finfish. S.N.E. Fisheries Development Group, U.S. Dep. Commer., Gloucester, Mass. Contract No. 03-6-043-35122, Jan. to June 1976, 5 p.

ABSTRACT—The use of a bottom pair trawl for catching squid was examined in this study. The object was to determine the commercial feasibility of harvesting winter squid with the pair trawl. The trawl used was designed by the vessel captains involved in the study. Study results show that further experiments are needed using additional trawl designs and that the influence of speed and other fishing parameters need to be investigated.

were chartered by the New England Fisheries Development Program (NEFDP) to fish up to 12 days in Nantucket Sound during the spawning season when squid are inshore in shoal water. They were the 85-foot (26-m) *Karen Sue* with 300 hp and the 57-foot (17.4-m) *Susan and Lori* with 335 hp. A fisheries engineer from the Gloucester Laboratory of the Northeast Fisheries Center was on board the *Karen Sue* during the experiment.

Originally, the NEFDP proposed the boats use their existing Christensen² pair trawl, a herring trawl with headrope and footrope lengths of approximately 185 feet (56.4 m). However, the skippers volunteered to build a squid pair trawl of their own design which they believed would be more effective than the herring trawl. The NEFDP agreed and the new squid trawl (Fig. 1) was used during the project.

Five trips were made. The first trip, of 3 days, was spent on exploratory fishing and gear familiarization in Block Island and Nantucket Sounds (Fig. 2).

Trip 2, lasting 1.5 days, took place on the quahog ground between Tucker-nuck Shoal and Nantucket Harbor, traditionally an area of good squid catches. During this trip, two tows were made after dark. All other tows in the experiment were made during daylight hours.

During the first two trips, the squid trawl was fished in the same manner as the herring trawl had been fished. Two warps with a ten-to-one scope were

²Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

used from each boat. Weights were secured to each lower warp 10 fathoms from the wing and there were no floats. With the trawl rigged this way, the vertical mouth opening of the trawl was 4 fathoms, as measured by the echo sounder on another boat.

The boats fished Nantucket Sound and the quahog ground for 2 days on Trip 3. Prior to the trip, modifications were made to the gear to make it dig harder on the bottom. Chain was added to the sweep (footrope), and the trawl was fished with the top warp on each side 1.5 fathoms longer than the bottom warp.

Trip 4 was spent testing the gear in Rhode Island waters for half a day. Further modifications were made to allow the trawl to dig harder. The trawl was towed with only one warp from each boat leading to two 20-fathom bridles (legs) on each side of the net. The weights were moved to the warp end of the legs on each side, and three inflated poly floats were attached to the headrope.

On Trip 5, the net was rigged the same as on Trip 3. The trip lasted 2 days and the quahog ground and Nantucket Sound were fished.

Results

The five trips totaled 9 fishing days and took place between 12 May and 13 June 1977. Fifty-one tows were made with a total squid catch of 14,200 pounds (6,441 kg) (Table 1). Twenty-five of these tows were made on the quahog ground and yielded approximately 315 pounds (143 kg) per hour. In the rest of Nantucket Sound, the average catch was about 160 pounds (73 kg) per hour.

The two tows made after dark resulted in small catches with the amount caught dropping to one-half of that from the last tow made just before dark.

The skippers found, by continually checking with other squid fishing vessels in the same area, that the catch rate

Alan J. Blott is a Fisheries Engineer at the Gloucester Laboratory, Northeast Fisheries Center, National Marine Fisheries Service, NOAA, Emerson Avenue, Gloucester, MA 01930.

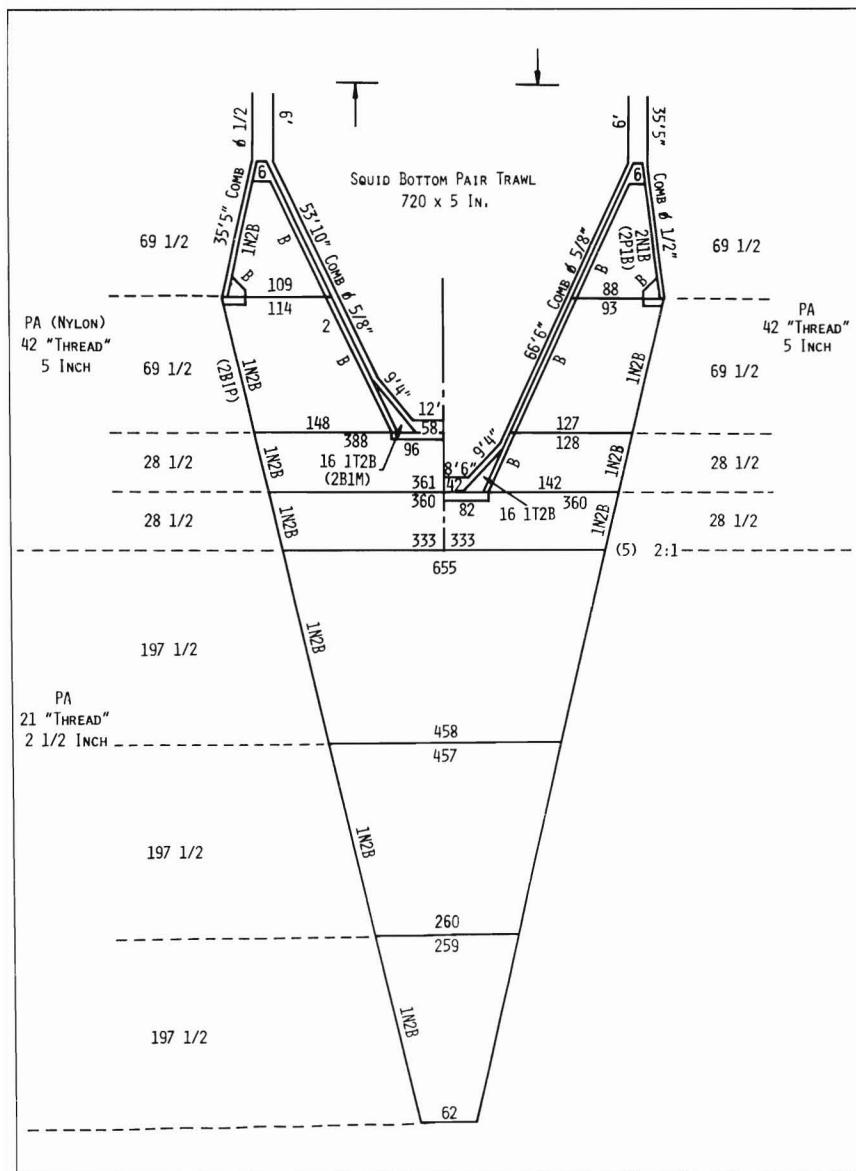


Figure 1.—Squid bottom pair trawl.

Table 1.—Squid catch by trip and location: NS = Nantucket Sound, QG = Quahog Ground, and BIS = Block Island Sound.

Trip	Date	Tow	Location	Time of setting	Squid catch (bu)	Catch rate lb/h	
1	5/12	1	NS	0715	0.25	30	
		2	NS	0855	0	0	
		3	NS	1025	0.75	80	
		4	QG	1215	0.75	60	
		5	QG	1415	Net fouled		
		6	QG	1530	2.5	200	
	5/13	7	QG	0605	0.5	40	
		8	QG	0740	1.25	100	
		9	NS	1000	0.5	40	
		10	NS	1350	2	480	
		11	NS	1745	0.5	160	
	5/14	12	BIS	0600	0.75	60	
		13	BIS	0720	1	80	
		14	BIS	0930	0	0	
		15	BIS	1130	0	0	
		16	BIS	1345	0	0	
2	5/26	17	QG	0825	3	240	
		18	QG	0945	6.5	520	
		19	QG	1110	6	320	
		20	QG	1305	16	640	
		21	QG	1520	11.5	460	
		22	QG	1745	6	240	
		23	QG	2005	5	200	
		24	QG	0545	9	480	
		25	QG	0745	6	320	
		3	6/4	26	NS	0825	2.5
27	NS			0940	4.5	240	
28	NS			1145	7.5	400	
29	QG			1450	2	107	
30	QG			1700	2.5	133	
6/5	31		NS	0640	4	213	
	32		NS	0840	6	320	
	33		NS	1120	0.25	60	
	34		NS	1430	1	160	
	35		NS	1515	0	0	
4	6/8	36	BIS	0615	0	0	
		37	BIS	0825	0	0	
		38	BIS	0935	0.25	20	
		39	BIS	1150	0	0	
5	6/12	40	QG	0645	8	427	
		41	QG	0845	13	693	
		42	QG	1045	6	320	
		43	QG	1245	9	480	
		44	QG	1445	7	373	
		45	QG	1645	8	320	
		6/13	46	QG	0545	5	267
			47	QG	0745	6	274
			48	QG	0950	4	183
			49	NS	1245	0.5	80
			50	NS	1350	0	0
51	NS		1600	0	0		

¹Night tows.

of the pair trawl was approximately the same as the single-boat trawls. Pair trawlers must catch at least twice as much as single boats in order for pair trawling to be viable.

One of the two best days of fishing occurred during Trip 2 with the gear used as originally rigged when the catch rate was 380 pounds (172 kg) per hour, and the other was after the modifica-

tions were made with a catch rate of 430 pounds (195 kg) per hour on Trip 5. However, the abundance of squid could have changed significantly in the time between the two best days.

Discussion

At the end of the experiment, the skippers felt they were still a long way

from optimizing gear performance. They felt the trawl was not fishing hard enough on the bottom. That was the principal reason for the gear changes between cruises. Catch rates did not offer conclusive evidence in support of this contention. They also thought the 5-inch (127-mm) mesh in the wings of the trawl may have been too small. FAO (1976) indicated that Japanese

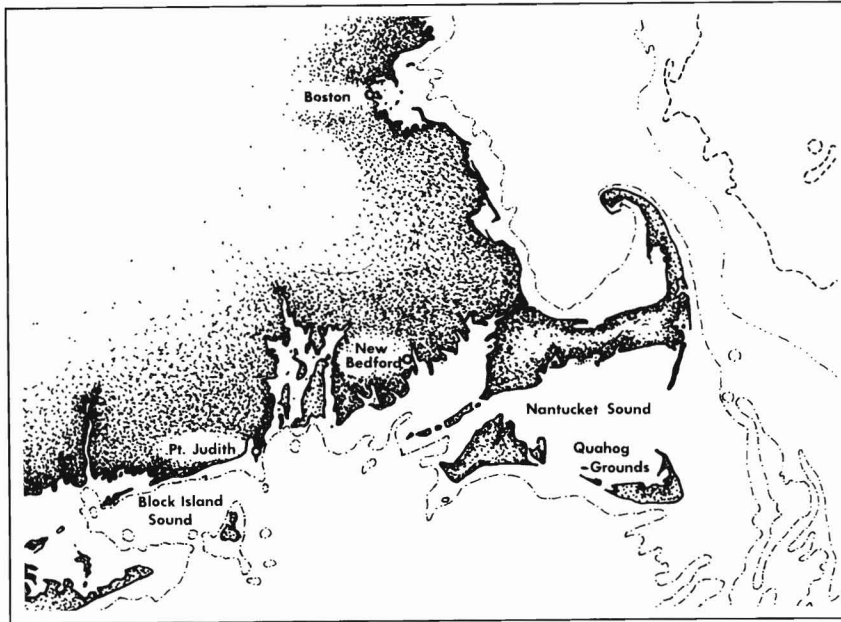


Figure 2.—Chart of fishing areas.

squid fishermen used 9.4-inch (240-mm) mesh in the outer wings and 4.7-inch (120-mm) mesh in the inner wings. French squid trawls use 3.9-inch (100-mm) mesh in the wings, while the Germans have used trawls with 5.7-inch (145-mm) and 7-inch (180-mm) mesh in the wings. In the California lampara net fishery for *Loligo opalescens*, 6-inch (152-mm) and 9-inch (230-mm) meshes are used.

Mesh size in the wings of the experimental pair trawl could be increased somewhat. The value of an in-

crease is questionable as other nations are successfully fishing with mesh both larger and smaller. In any case, the maximum mesh size probably should be not greater than 9-10 inches (229-254 mm) because squid, reportedly, are not "herded" well with large mesh or warps (FAO, 1976). The ability of a pair trawl to herd well because of the diverging warps is usually an advantage of this type of gear. This may not be the case in the squid fishery.

Another problem with the experimental pair trawl may have been the

small overhang of the square. All nets mentioned above had overhangs 2-3 times as deep as the pair trawl. This could have allowed the squid to avoid capture by swimming over the net.

Speed is another parameter to consider and is probably one of the most important. Towing speed during the experiment was only about 2.5 knots at 1,600 rpm. The foreign nets mentioned above are bigger and are towed at 3-6 knots; thus, they are more difficult for the squid to actively avoid. If possible, within the constraints of the available horsepower, a towing speed of 3.5-4 knots should be tried.

Conclusion

At the onset of this experiment, it was assumed that pair trawling would be a viable method for harvesting squid. Although the results did not corroborate this, further investigation is warranted. The study has shown that the net is sensitive to variations in rigging parameters. Future studies should look at the performance of this net in relation to changes in trawl speed and variations in other operational and rigging parameters, and should investigate alternate net designs which take foreign experience into account.

Literature Cited

- Larsson, K.-H. 1959. Scandinavian experience with midwater trawling. In H. Kirstjansson (editor), *Modern fishing gear of the world*, p. 344-347. Fishing News (Books), Lond.
- FAO. 1976. Expert consultation on fishing for squid and other cephalopods. FAO Fish. Rep. 170, Suppl. 1, 150 p.