

FISHERIES DIVERSIFICATION PROGRAM

Environmental Awareness and
Conservation Technology

Project Summary: EACT- 1.2001.DFO (FDP 292)

By-catch Reduction in Shrimp Beam Trawls



INTRODUCTION

Because of its small-mesh construction, a shrimp trawl's cod-end is said to be "fully selective" - that is, it will retain virtually everything it catches. To reduce by-catches of other species, a number of selectivity devices have been developed. The Nordmore Grate, used in most countries, is able to eliminate by-catches of large roundfish and significantly reduce catches of larger flatfish, but it doesn't sufficiently reduce catches of small fish, especially small flatfish. Separation of the footrope and the fishing line of shrimp trawls by using longer toggle and chain lengths has also been tested and has reduced the catches of turbot and lantern fish. In Newfoundland's shrimp trawl fishery, toggle and chain lengths are required to be 71 cm (28.5").

A shrimp beam trawl fishery has been developed in Fortune bay, on the south coast of Newfoundland. After a period of testing, a requirement was made to have all beam trawling conducted using Nordmore grates, with bar spacings of 22 mm. Anticipating similar by-catch problems, it was decided to test various toggle and chain lengths.

MATERIALS AND METHODS

A 35 feet vessel - the J.D. WEBB, under skipper Willoughby Bolt - was chartered to carry out the 15-day project in the Fortune Bay area of NAFO sub-area 3PS. A 40 feet Cantrawl Pacific beam trawl, provided by the province's Department of Fisheries and Aquaculture, was used for the project. Prior to sea trials, a model of the trawl was tested at the Marine Institute's flume tank. Design problems were observed in the lower front belly of the trawl that prevented the toggle

and chain lengths from extending fully. Changes were made to the model, and later to the full-scale trawl.

It was proposed that testing would be conducted using the 'alternate haul' method, whereby on alternate days one of three different toggle and chain lengths - 12", 28" and 36" - would be tested. Because of extremely low catches, this part of the fishing plan was only partly adhered to.

Samples of shrimp were collected from one set each day, and measured for length. Total weights of all by-catch species were also collected, as well as total shrimp weights. An underwater camera was used at the beginning of the trip and periodically thereafter to make sure the gear was performing correctly and to observe fish behavior.

Table 1: Vessel and Gear

Vessel: J. D. WEBB

LOA: 34' 11"

Horsepower: 260

Gear: Beamtrawl

Warp: 273 m / 500 fa

Netdrum: Yes

Winch: One single drum

Trawl beam: 12.2 m / 40 ft

Mesh size - body: 40 mm

Mesh size - codend: 48 mm

Twine: Twisted polyethylene

Toggle & chain: varied -12", 28", 36"

Nordmore grate: 22 mm bar spacing

Footrope: 14 m / 27 ft.

Roller: 20 cm

FISHING OPERATIONS

Fishing was conducted during 13 sea days, beginning on November 25, 2000, and ending on January 26, 2001. Day one was spent fishing in the harbor of Grand La Pierre in an effort to get the net fishing. The total catch of shrimp and by-catch was negligible. The skipper was of the opinion that the trawl was not contacting the bottom, and to remedy that he removed the floats from the fishing line. On fishing day two (November 26) the gear was modified by attaching 15 pounds of chain to each wing end. For sets 5 and 6 (made on November 26

and 27), the toggle and chain were lengthened to 28 inches. On November 27, for set 7, the toggle and chain lengths were shortened back to 16 inches and the floats were again put back on the fishing line. For the final set, made on January 26, The toggle and chain were again extended to 28 inches.

DISCUSSION

Shrimp catches and by-catches of all species were very low. It is not known whether this is because of scarcity, or because of gear problems which may have kept the trawl

Table 1: Sets, depth of sets, shrimp catches, by-catches.

Date	Set	Depth - metres / fathoms	Shrimp - kg / lb	By-catch - kg / lb
Nov. 25 ⁽¹⁾	1	240 m / 131 fa	negligible	negligible
	2	283 m / 155 fa	negligible	negligible
	3	282 m / 154 fa	negligible	negligible
Nov. 26 ⁽²⁾	4	247 m / 135 fa	negligible	negligible
	5 ⁽³⁾	300 m / 164 fa	60 kg / 132 lb	3 kg / 6.6 lb
Nov. 27	6 ⁽³⁾	285 m / 156 fa	15 kg / 33 lb	nil
	7 ⁽⁴⁾	282 m / 152 fa	negligible	negligible
Nov. 28	8	163 m / 89 fa	nil	nil
Nov. 29	9	283 m / 155 fa	120 kg / 264 lb	nil
	10	329 m / 180 fa	5 kg / 11 lb	nil
	11	274 m / 150 fa	100 kg / 220 lb	nil
Nov. 30	12	83 m / 45 fa	50 kg / 110 lb	nil
	13	247 m / 135 fa	negligible	nil
Dec. 4	14	194 m / 106 mfa	negligible	nil
	15	320 m / 175 fa	negligible	nil
Jan. 21	16	201 m / 110 fa	25 kg / 55 lb	nil
Jan. 24	17	311 m / 170 fa	60 kg / 132 lb	nil
Jan. 25	18	293 m / 160 fa	70 kg / 154 lb	nil
	19	302 m / 165 fa	90 kg / 198 lb	nil
Jan. 26	20 ⁽⁵⁾	283 m / 155 fa	negligible	nil

- (1) Fished in Grand Le Pierre harbour in an effort to get the net fishing; floats removed from the fishing line, as the trawl was thought not to be contacting bottom.
- (2) Gear modified by attaching 15 lbs. of chain to wing ends.
- (3) For sets 5 and 6, toggle and chain lengths increased to 28 inches.
- (4) Toggle and chain lengths shortened back to 12 inches, and floats put back on the fishing line.
- (5) Toggle and chain extended to 28 inches for this set.

partially off bottom. When the underwater camera was used, indications were that the trawl was somewhat off bottom and that warp lengths were inadequate. Except for the 3 kg of witch flounder in set 7, by-catch was negligible or non-existent. Shrimp catches ranged from nothing to 120 kg (264 lb), totalling 598 kg (1,315 lb), for an average of 29.9 kg (66 lb) per set. Because of these low catches, it is impossible to draw conclusions from the results of this experiment.

RECOMMENDATION

That a similar period of testing be conducted in the spring and summer of 2001.

Partners/Contributors:

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- Fisheries Technology Unit
Fisheries and Marine Institute
Memorial University
- Program Planning & Coordination Division
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The \$10 million Fisheries Diversification Program is part of the \$81.5 million Canada-Newfoundland Agreement respecting the Economic Development Component of the Canadian Fisheries Adjustment and Restructuring Initiative, announced in August, 1999. The main thrust of the Fisheries Diversification Program is industry-wide research and development initiatives that reflect the economic development priorities of the Newfoundland and Labrador fishing industry.