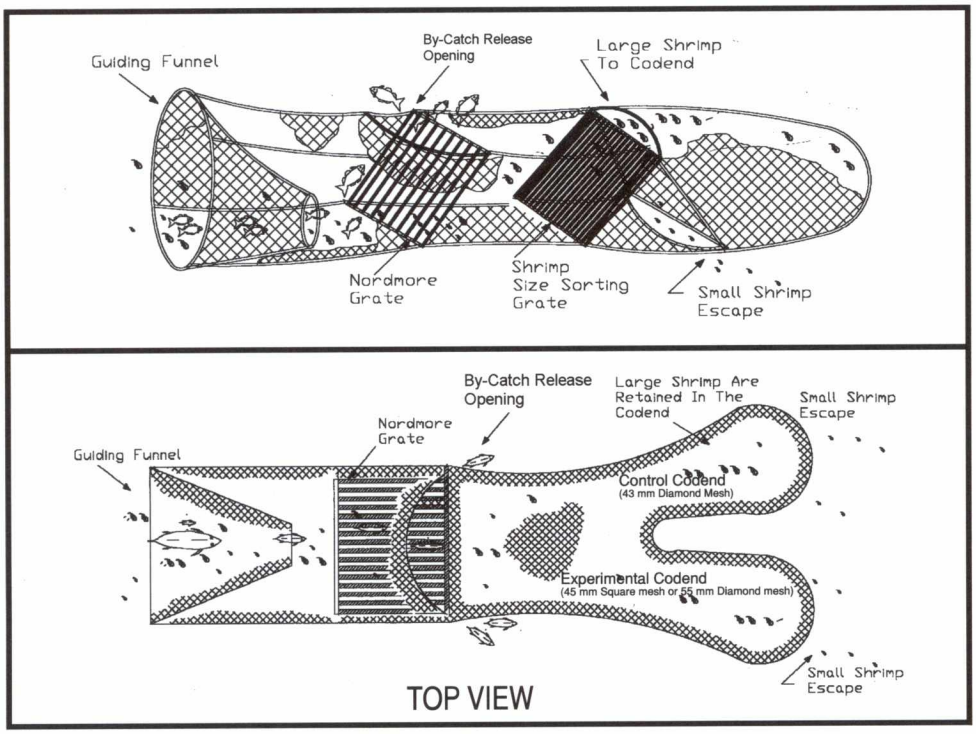
CANADA/NEWFOUNDLAND COOPERATION AGREEMENT
FOR FISHING INDUSTRY DEVELOPMENT (CAFID)

PROJECT SUMMARY

Shrimp Size Selectivity

CAFID #10 **1995**



BACKGROUND

The established trawl fishery for northern shrimp (Pandalus borealis) has been characterized by low selectivity in terms of shrimp size and excessive amounts of unwanted, juvenile finfish by-catch. This has resulted in increased labour to sort the catch, reduced product quality and lowered overall returns to the fishing enterprise. Government and industry have recognized the problem of non-selectivity associated with shrimp fishing for a number of years. Collaborative efforts by both groups in addressing this problem through jointly shared research efforts has resulted in the development and adoption of more selective gear types. Shrimp trawls containing square and diamond mesh codends have been tested with combinations of lastridge ropes and the Norwegian developed Nordmore sorting grate. For both the Northern (NAFO Area 2 + O + K) and Gulf (NAFO Sub-area 4R) shrimp fisheries the modifications to the catch technology did reduce by-catch but was not successful in reducing the catch of small shrimp (< 2 grams). Based on this finding, the Department of Fisheries and Oceans, at the request of Industry, decided to test the shrimp size sorting effectiveness of a combination of sorting panels, shrimp size sorting grates and various mesh sizes and shapes in the codend of a shrimp trawl. It was hoped that improvement would result in the elimination (live release) of the undersized shrimp which have no commercial value. The testing took place during three cost shared projects conducted with west coast fishermen, local processors and the Fish Harvestors' Resource Centres (FRC) and the Canada/ Newfoundland Cooperation Agreement for Fishing Industry Development (CAFID) in 1995.

Canada

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

PROJECT #1 SHRIMP SIZE SORTING SYSTEM
Wade Lavers and the M.V. "Mazie and Murray"

The 58' stern trawler "Mazie and Murray" (see Figure 1) participated in an experimental shrimp size selectivity project in cooperation with the Department of Fisheries and Oceans during May 18-June 16, 1995. The purpose of the experiment was to test the effectiveness of installing a shrimp size sorting grate as shown in the gear set-up in Figure 2. A guiding funnel directed shrimp and any by-catch toward the Nordmore grate which diverts fish by-catch out through an opening in the top of the trawl. The shrimp pass through the Nordmore grate and then encounter a size sorting grate with 7mm bar spacing. This size sorting grate directs large shrimp into the codend. Small shrimp pass through the grate. A sloped panel installed behind the shrimp size sorting grate directs small shrimp out through an opening in the bottom of the trawl and allows them to escape. A DFO technician was onboard the vessel periodically during the project to observe fishing activity and operate an underwater video camera.

Results

A sorting grate with 5mm bar spacing was only tested for one day then removed. It proved to be ineffective since it tended to block up which greatly reduced the water flow through it. Fishing with the 7mm grate in place allowed the MV "Mazie and Murray" to catch an average 9% more large shrimp (ie. shrimp weighing 6 grams or more) by weight, worth an extra $0.09/lb., compared to other similar shrimp vessels fishing along side. In terms of fishing efficiency the underwater camera showed a relatively large flow of small shrimp through the 7mm grate. The total catch rate was not reduced significantly and the overall catch consisted of an average 67.5% large shrimp. The overall results of this project indicate that the 7mm sorting grate has a positive impact on shrimp size selectivity.

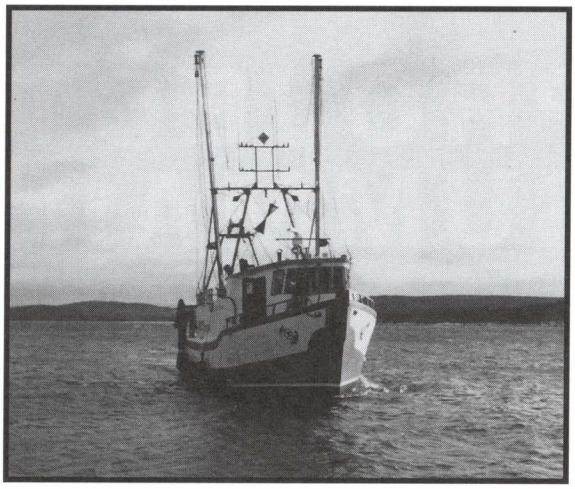


Figure 1: The 58' shrimp vessel "Mazie and Murray"

PROJECT #2 SHRIMP SIZE SORTING SYSTEM
Fish Harvestor's Resource Centre

A 250mt quota of northern shrimp was approved for the Fish Harvestors' Resource Centres (FRC) after the regular quota was caught in 1995 in order to continue work on shrimp size sorting grates. Thirty vessels in the 13-20 meter range participated in the project from September 16-November 3, 1995. Twenty-five vessels used the model 1168 shrimp trawl, four used the model 1000 and one used the model 1340. Many of the mesh sizes were measured onboard the vessels by project monitors using calipers, although this is not the type of gauge used by DFO. It indicated that some of the codends appeared to have mesh sizes below 40 mm. Fishing occurred in depths ranging from 249 m to 293 m. The 30 vessels were divided into 5 groups of 6 vessels. Within each group 4 vessels used size sorting grates and the other 2 fished without grates. Two vessels used a large 1.3mm x 1m grate and two vessels used a smaller 1.3m x 0.7m grate with either 8mm or 10mm bar spacing. The gear set-up is shown in Figure 2. A

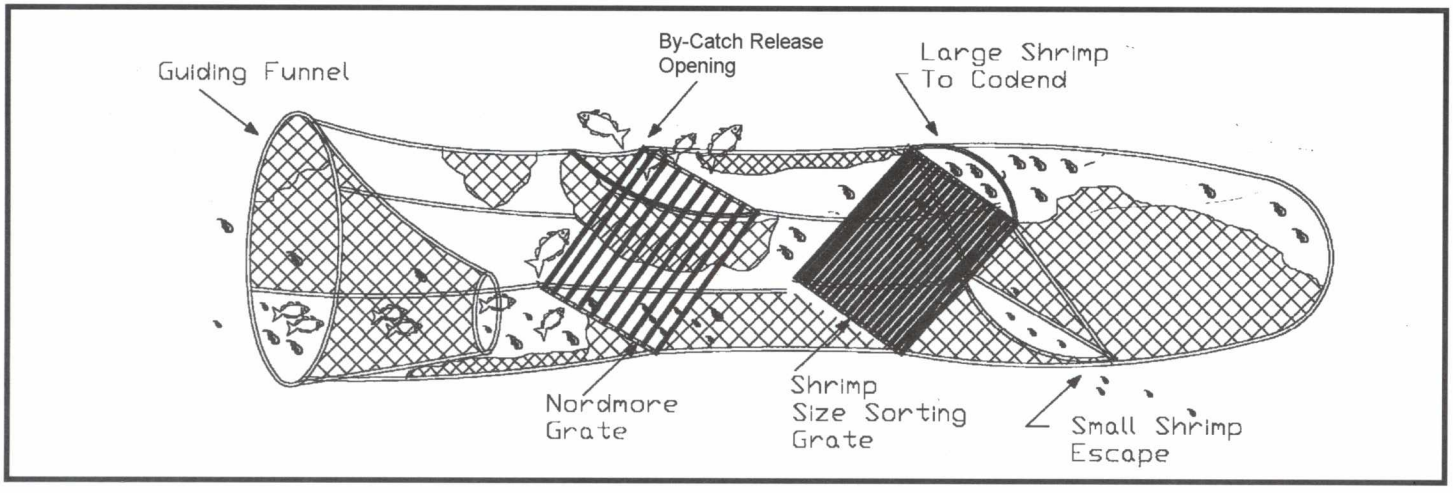


Figure 2: Shrimp size selectivity system using a size sorting grate.

monitor was onboard each vessel during the project and DFO provided a gear technologist and an underwater video camera when required.

Results

The percentage of large shrimp obtained by the vessels was found to differ significantly with the various riggings used but this percentage did not differ significantly among the different vessel groups. Figure 3 compares the percentage of large shrimp caught by the various gear types. It was found that the large size sorting grate with a 10mm bar spacing resulted in the highest percentage of large shrimp caught at 57.8% compared to 48.9% with standard rigging and 45.5% with the small size sorting grate with 8mm bar spacing. Comparing the different riggings used it appears that the value of the shrimp caught ranged from $188.76/hr for the standard rigging, $199.81/hr for the small size sorting grate with 8mm bar spacing to $224.00/hr for the large size sorting grate with 8mm bar spacing and $183.95/hr for the small grate with 10mm bar spacing to $215.68/hr for the large grate with 10mm bar spacing. The large size sorting grate with a 10mm bar spacing resulted in catches with the highest shrimp value of $0.66/lb. The catch value obtained for the weight landed (ie. $/lb.) and duration fished (ie. $/hr.) was found to always be highest when one of the large grates were used. The large grate with a 10mm bar spacing averaged $26.92/hr. and $0.09/lb. more than was obtained with the standard rigging while the large grate with an 8mm bar spacing averaged $35.24/hr. and $0.03/lb. more. The results indicate that large grates with 10mm bar spacing produced the best results, however further work with more control over the participating vessels is needed to confirm this finding. It appears that groups fishing late in the fall had a lower fishing efficiency indicating that shrimp become less available as the fall season progressed.

PROJECT #3 EXPERIMENTING WITH 45MM SQUARE, 43MM DIAMOND AND 55MM DIAMOND MESH TO REDUCE THE CATCH OF SMALL SHRIMP

Rendell Genge and the MV "Cape Ryan"

The MV "Cape Ryan" shown in Figure 4, participated in a shrimp size selectivity project from May 10-June 6, 1995 in the Esquiman Channel in NAFO area 4R. Mr. Genge used the gear set-up shown in Figure 5. The Nordmore grate used was 1.7m wide x 3.45m long with 19mm bar spacing. A trouser type codend was used on the trawl with 43mm diamond mesh (control codend) on one side and a 45mm square or 55mm diamond mesh on the other side. An onboard project monitor recorded data related to fishing activity and catches.

Results

The overall results from the various mesh sizes and shapes used in the codends are summarized in Table 1.

The catch in the 55mm diamond codend consisted of 50% large shrimp compared to 46% in the 43mm diamond codend. It appears from the limited data available, the 45mm square mesh tends to catch the greatest percentage of large shrimp at 59.5% of the catch compared to the 43mm diamond and 55mm diamond mesh. However the square mesh resulted in more broken shrimp.

DISCUSSION

The projects demonstrated that size selectivity in the Gulf shrimp fishery can be improved with various combinations of size sorting grates and various codend mesh configurations. Overall, the large size sorting grate with 10mm bar spacing produced the best catch results compared to standard rigging. It caught 6.9% more large shrimp (ie. shrimp > 6 grams) worth

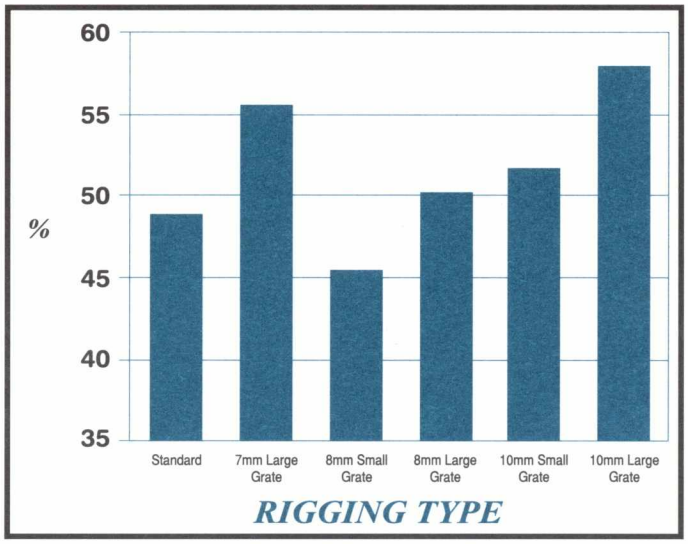


Figure 3: % of large shrimp caught by gear type.

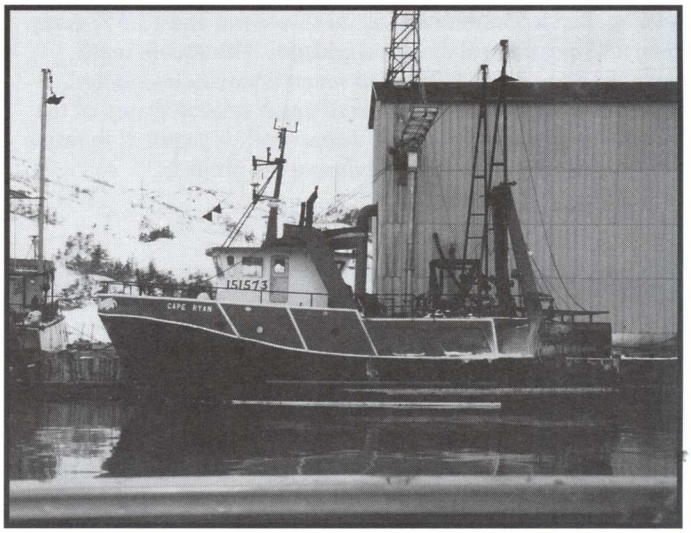


Figure 4: The shrimp vessel "Cape Ryan".

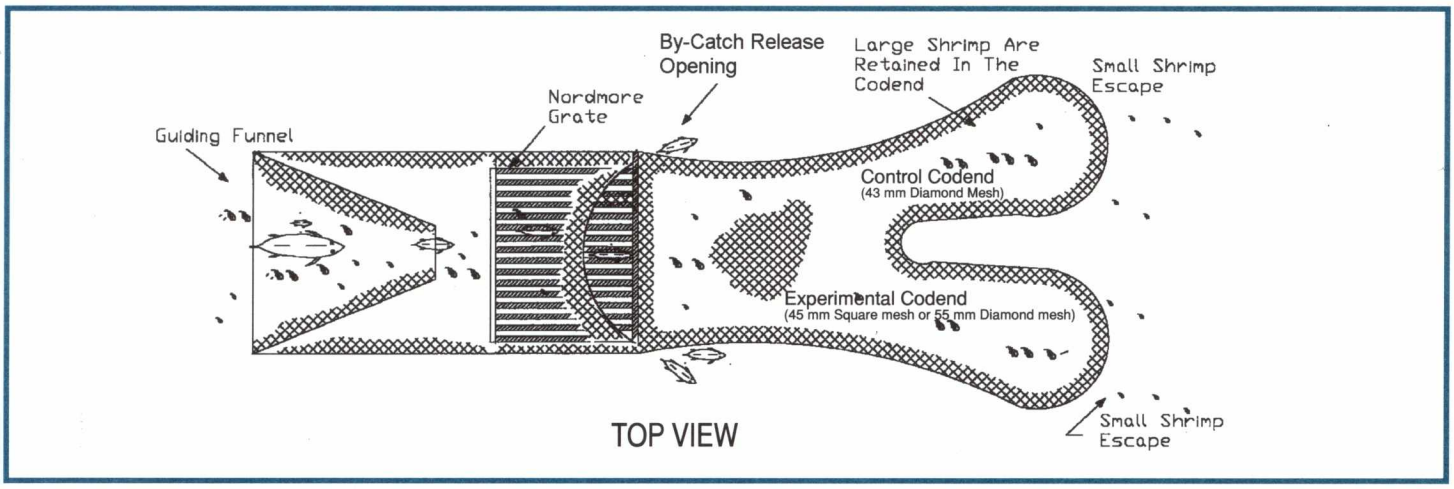


Figure 5: Shrimp size selectivity using square and diamond mesh in the codend of an 1168 shrimp trawl.

Table 1: Fishing results with various mesh types in a trouser type codend of a standard 1168 shrimp trawl.

EXPERIMENT #	CODEND TYPE	NO. OF SETS	HOURS FISHED	CATCH lb/hour	CATCH				VALUE $/Hour
					LARGE		SMALL		
					%	VALUE ($/hr)	%	VALUE ($/hr)	
1	44mm Diamond	4	14.3	245	48.5	48.93	51.5	8.82	57.75
	45mm Square	4	14.3	354	59.5	57.1	40.5	10.03	67.17
2	43mm Diamond	46	225.9	94	46	92.54	64	33.09	124.02
	55mm Diamond	44	211.3	72.8	50	77.99	50	20.04	98.04
			TOTAL CATCH	765.8				TOTAL VALUE	50,518.32

an extra $0.09/lb. to the fishermen. A shrimp trawl with 45mm square mesh codend appears to catch 9% more large shrimp than a 55mm diamond mesh codend and 13.5% more than a 43mm control diamond codend. The square mesh codends were more difficult to repair and handle onboard. There was no reduction in overall catch rates with any of the size sorting technology used. More work is required to refine the operating conditions used during the projects.

THE CAFID PROGRAM

The Cooperation Agreement for Fishing Industry Development (CAFID) is a multi-year development agreement jointly administered and delivered through the Federal Department of Fisheries and Oceans (DFO) and the Provincial Department of Fisheries, Food and Agriculture (DFFA). The objective of this Agreement is to assist the Newfoundland fishing industry to be self-sustaining and viable in the present resource short environment.

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