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Adaptability of Beam Trawling Gear to Mid-Atlantic Waters

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A Preliminary Report to the

Mid-Atlantic Fisheries Development Foundation, Inc.

and

Fass Brothers, Inc.

by

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Fass Brothers, Inc. of Hampton, Virginia, with the aid of an assistance grant from the Mid-Atlantic Fisheries Development Foundation, Inc. has completed a series of three cruises designed to test the adaptability of the beam trawl to the scallop fishery off the Virginia Coast. A scientist from the Virginia Institute of Marine Science was aboard during each trip. The VIMS scientist observed and documented the catches, modifications to the gear, and problems that occurred with the beam trawl.

Two 28 foot beam trawls were fished simultaneously. In order to find the most effective gear arrangement, number and position of the tickler chains, and the rollers on the chain sweep were varied on the port net while the starboard net was kept constant. These modifications were recorded along with start time and end time of tow, start position and end position, warp length, engine RPM's, boat speed, water depth, direction of tow, wind speed and direction, and sea state for each set.

The cod end yield was measured in number of bushels of scallops per net for each set, and in pounds of scallop meat for the pair when shucking was done on board. Commercially valuable fish species yields were measured in bushels, pounds, or numbers for each haul. Since the fish tended to slide together when the catches were dumped on deck, no attempt was made to keep the individual net yields separate. Accurate catch per unit effort calculations have been made based on the gross yields for each trip.

Results:

Trip #1: Depart 2/25/81 - Return 2/26/81 (1 1/2 days)

After three hauls it became apparent that the gear was not rigged correctly. The hydraulic winches were not properly lined up, and the tow cable was cutting into the blocks on the outriggers. The trip was cancelled, and the vessel returned to port for repairs.

Trip #2: Depart 2/28/81 - Return 3/5/81 (5 days)

The winches were realigned, the block systems on the outriggers were changed from a three block system to a two block system. The beams were shortened 40 inches to facilitate ease in deploying the beams overboard and to decrease their weight.

Scallop yields were shell stocked. A total of 38 paired hauls were made over the five day duration of the trip. Trawling was cancelled on 3/3/81 until 1830 hours because of rough weather.

Table 1. Data Summary for Trip #2

Total time on bottom	33.5 hours
Average time per haul	52 minutes
Average time between hauls	18 minutes
Average RPM	1600
Average boat speed	4.7 knots

Scallop Catches:

	Total	Catch Per Hour of Tow
Port Net	61.1 bushels	1.8 bushels/hr
Starboard Net	71.9 bushels	2.1 bushels/hr

Table 1 (concluded)

Gross Stock:

	Total	Catch Per Hour of Tow	Dollar Value
Shucked Scallops	868 lbs	26 lbs/hr	$3,703.05
Fluke	1385 lbs	41 lbs/hr	1,037.00
Dabs	70 lbs	2 lbs/hr	3.50
Monk Fish	440 lbs	13 lbs/hr	220.00
		Total	$4,963.55

Trip Expenses:

	Cost
Ice	$ 375.00
Fuel ($1.19/gal) 3213 gallons	3,823.47
Groceries	752.45
Crew supplies	29.50
Total	$4,980.42

Total Gallons Fuel Consumed/Total Hours Out 27.5

Trip #3: Depart 3/14/81 - Return 3/23/81 (9 days)

Haul-back gear was modified to make retrieval of the cod end easier and safer. A snatch block was welded aft of capstan head to keep the lazy line from chafing against the hull. Gearmatic winches were installed for each outrigger to lift cod end by the cutting strap. For each net a 30 foot rod (1 inch diameter) was hung from the rigging to snatch block for the lazy line. A sliding hook when secured to the cutting strap guided the tail bag up the rod as the catch was brought on board. This controlled the swing of the cod end. Lighter gauge chain was used for the bridle to reduce the weight of the beam.

A total of 52 paired hauls were made over the 9 day period. Due to rough weather, trawling had to be cancelled on the 15th, 16th,

17th, and 19th of March. The ship did not return to port during inclement weather.

Table 2. Data Summary for Trip #3

Total time on bottom	51.5 hours
Average time per haul	56 minutes
Average time between hauls	24 minutes
Average RPM	1550
Average boat speed	4.5 knots

Scallop Catches:

	Total	Catch Per Hour of Tow
Port Net	62.4 bushels	1.2 bushels/hr
Starboard Net	62.0 bushels	1.2 bushels/hr

Gross Stock:

	Total	Catch Per Hour of Tow	Dollar Value
Shucked Scallops	860 lbs	17 lbs/hr	$4,558.00
Fluke	678 lbs	13 lbs/hr	630.10
Dabs	10 lbs	0.2 lbs/hr	.50
Monk Fish	800 lbs	16 lbs/hr	400.00
		Total	$5,588.60

Trip Expenses:

	Cost
Ice	$ 180.00
Fuel ($1.19/gal) 2975 gallons	3,540.25
Hydraulic Oil	332.20
Groceries	464.36
Crew supplies	69.00
Total	$4,585.81

Total Gallons Fuel Consumed/Total Hours Out 12.5

Fuel Efficiency

Since the vessel did not return to port each day to refuel, the analysis of the fuel efficiency will be difficult. There were no fuel gauges on the vessel, and vessel use varied throughout the trips. After the first trip the fuel tanks were filled, but the boat sat at

the dock for several days with the generators running while repairs were done. After the modifications were completed, the vessel was taken out for a trial run and returned without topping off the tanks. Upon return from the second run the tanks were refilled, and again the boat's generators remained on while gear changes were accomplished. Four out of ten days was spent holding to the wind during the third run, sometimes near shore with the engines off. The total gallons consumed per total hours out to sea was 27.5 for trip 2 and 12.5 for trip 3; these figures are of little use for fuel efficiency measurements.

Discussion

Experimentation was conducted with several tickler chain configurations. They varied from one tickler a few feet forward of the chain sweep, to two ticklers forward of the chain sweep, to three ticklers (two in front of the chain sweep and one straight across the skids). These modifications had little or no effect on catches. The most significant increase in yield was obtained during trip 2 when the rubber roller chain sweep on the port net was changed to a rope roller similar to the starboard net. Up to that time the starboard net was catching 65% more scallops than the port net. After the change, both nets caught equivalent amounts of scallops.

The beam trawls used for this evaluation were made in the Netherlands, and were designed for use in firm bottom environments found in the North Sea. The Mid-Atlantic bottom is much softer. The weight of the beam and the soft bottom of the area made the beam bog

down and pick up many shells, starfish and sand. We tried to compensate by using slightly less than a 3 to 1 warp length to bottom depth ratio. This helped to lift the beam off the bottom, but it still dredged up considerable amounts of sediment and shell. Beam trawls for Mid-Atlantic use should be designed to be lighter than the Netherland trawls.

Because of the dredging problems, fishing was restricted to harder shell type bottoms. Bogging down occurred less frequently, but sharp shell fragments tended to chafe the tail bag (more chafing gear had to be added several times during the trips). Strong chafing gear such as leather flaps attached to the underside of the cod end could alleviate this problem.

Unfortunately Fass Brothers had no other boats engaged in scallop fishing during the beam trawl study, so no accurate comparison to traditional gear can be made. Several scallop boats from other companies were in the area from time to time, and the few captains who would converse indicated that the beam trawl was catching almost twice as much as the traditional gear.

Although scallops were the major species sought, the beam trawl did catch flounder, monk fish, and dog fish. Flounder catches contributed 21% to the total dollar value of the gross stock on the second trip, and 11% on the third. Monk fish comprised only 4% of the total dollar value on the second trip, and 7% on the third. Dog fish were thrown back, but were abundant and could have increased the gross stock if the market price was sufficiently high.

The gross stock minus the trip expenses (excluding crew payment) came to -$16.87 for trip 2 and +$1,002.79 for trip 3. After funding expired, Fass Brothers, Inc. continued their beam trawling efforts. Trip number 4 to the Virginia sea was profitable (see Table 3). The gross stock for trip 4 was $22,917.32, total trip expenses were $6,978.69, for a gross profit of $15,938.63.

Table 3. Data Summary for Trip #4 (11 days)

Depart 3/31/81 - Return 4/10/81

Gross Stock:

	Total		Dollar Value
Shucked Scallops	3272 lbs		$16,520.57
Fluke	5260 lbs		4,708.25
Dabs	450 lbs		22.50
Monk Fish	1660 lbs		830.00
Sea Bass	790 lbs		836.00
		Total	$22,917.32

Trip Expenses:

		Cost
Ice		$ 120.00
Fuel ($1.15/gal) 5455 gallons		6,273.25
Groceries		551.84
Crew supplies		33.60
	Total	$6,978.69

However, a subsequent trip to the same area (trip 5) was unsuccessful. The gross stock for trip 5 was $1,441.55, trip expenses totaled $4,397.62, for a net loss of $2,956.07 (see Table 4).

Table 4. Data Summary for Trip #5 (9 days)
Depart 4/17/81 - Return 4/25/81

Gross Stock:

	Total		Dollar Value
Shucked Scallops	239 lbs		$1,195.00
Fluke	145 lbs		116.45
Dabs	35 lbs		1.75
Yellow Tail	30 lbs		10.50
Monk Fish	200 lbs		100.00
Sea Bass	41 lbs		17.85
		Total	$1,441.55

Trip Expenses:

		Cost
Ice		$ 555.00
Fuel ($1.15/gal) 2992 gallons		3,440.80
Groceries		396.50
Crew supplies		5.32
	Total	$4,397.62

Because of these erratic yields and high trip expenses, Fass Brothers, Inc. is presently unable to risk another trip with the beam trawl. The vessel used for beam trawling is being converted back to its original scalloping gear.

Our complete analysis and recommendations will be published in a final report based on the results of this study, and other beam trawling efforts on the east coast.