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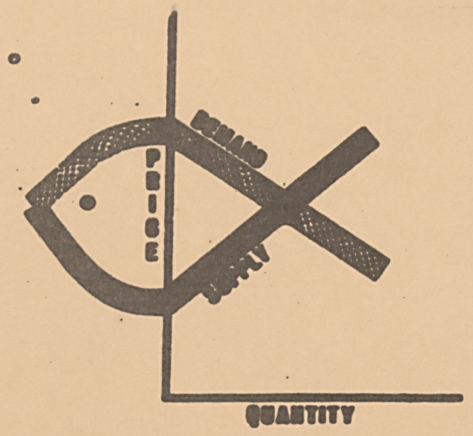

An Economic Analysis of Vessel Costs and Returns in a Red Crab Fishery

by

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AN ECONOMIC ANALYSIS OF VESSEL COSTS AND RETURNS IN A RED CRAB FISHERY

The existence of a deep-water red crab population has long been recognized. Very little is currently known of the biology of this species other than its range of incidence.

Enough preliminary information is available to permit a fairly rough evaluation of the economic performance of a potential fishery based on this resource. It must, however, be recognized that this analysis is based on very preliminary yield/effort results and cost estimates from a hypothetical vessel. The reader should evaluate the validity of the cost assumptions and yield/effort assumptions with respect to their impact on average costs. In addition, it must be recognized that no upward constraints on yield are considered in the analysis. This is, of course, invalid but the important question is the validity of the assumed sustainable yield of 50 pounds per pot haul. For a one vessel fishery it is probably a reasonable assumption.

Costs

The engineering and vessel operations unit of the National Marine Fisheries Service Northeast Fisheries Center reports that conversion costs for an 80' New England dragger will run about $60,000. The estimated costs are given below:

Gear	
400 Pots @ $20	$ 8,000
2,400 Fm. 1/2" wire rope	4,000
24 Buoy units	2,400
4,000+ Fm. buoy line	9,000
Hardware	1,600
Total Gear	$25,000
Deck & winch modification	10,000
Tanking hold	15,000
Refrigeration - Hold & Freezer	10,000
Total Conversion Cost	$60,000

From these data and that provided in the Northern Lobster Joint Master Plan, it is possible to evaluate the operation of such a hypothetical vessel in the red crab fishery.

Operating Statement for an 80' Red Crab Vessel Converted from Trawling

Operating Expenses

Fuel & Oil	$ 25,000	
Bait ($5/pot gear)	2,000	
Insurance	8,400	
Maintenance, Repairs, etc.	12,225	
Supplies	21,500	
Crew Wages (Capt., mate & 3 crewmen)	60,000	
Depreciation:		
Gear	8,300	(a)
Vessel & Equipment	12,500	

Overhead Expenses

Interest on Investment and	9,775	(b)
Administrative costs	1,000	
	$160,700	

(a) $\frac{\$25,000 \text{ value of gear}}{400 \text{ pots}}$ = $62.50/pot unit of gear
($62.50) (133 pots) = $8,300 (assume 1/3 loss)
Most pots lost at sea in lobstering are total losses including rope, buoys, markers, flags, etc.

(b) Assume value of vessel before conversion is $55,000
$55,000 + $60,000 conversion cost = $115,000 investment
at 8.5% equals $9,775 opportunity cost of investment

Returns

The Master Plan for Northern Lobsters assumes that a vessel will spend 150 days fishing on the offshore lobster grounds (see Master Plan, page IV-22). It seems safe to assume that fishing for red crabs will be less efficient, resulting in about 10% fewer days fishing or 135 days in all. However, to simplify the analysis we will assume that the following data provided from the Northern Lobster Master Plan(1) will apply to red crab fishing:

Fishing season	10 months
Fishing trips	2-½ per month
Days at sea	250
Days lost steaming	50
Days lost to weather	50
Fishing days	150
Pots handled daily	100 (2)
Pots handled annually	15,000
Average catch per pot	50 lbs.
Annual production	750,000 lbs.
Production per trip	30,000 lbs.

The 750,000-pound level of production is the minimum you could expect in the first year of operations and does not allow for increasing efficiency on board as experience in handling the pots is attained. By the end of a year's operations one would expect the vessel would be pulling 200 pots per day. Thus, for the first year's operation, to prove profitable, the minimum ex-vessel price will have to be higher than would be true in subsequent years. (3) We estimate the average landings/trip the first year at 45,000 lbs.

Based on the above estimates, the average cost of each trip will approach $7,000 (4). For each trip to prove profitable, the value of the catch must equal or exceed $7,000. If landings per trip average 45,000 pounds, then ex-vessel price must equal at least 15.5¢ per pound. This would be the expectation for the first year's operations. If, on the other hand, landings resulting from 200 pots a day equal 60,000 pounds, then ex-vessel price must equal about 11.66¢/lb.

This assumes no mortality of crabs after being caught. Canadian and the Delaware II experiences suggest we can expect 2% mortality over a period of 8 days. The effect of this factor is to increase the minimum break-even ex-vessel price by less than 5¢ per pound, from 15.5¢ to 15.87¢ and from 11.66¢ to 11.9¢ in the above analysis.

Scientists at the NMFS Tech Lab in Gloucester, Mass. report a 30% yield from live red crabs. Thus, from 60,000 pounds of live crabs, we can expect about 18,000 pounds of red crab meat. Based on a 12-cent ex-vessel price, this represents a cost of 40¢ per pound of crab meat to the processor. Over time it can be expected that the 50 lb. per pot haul estimate will decline, thus increasing the break-even ex-vessel price requirements. Offsetting this factor is the blue crab/red crab yield factor. Blue crabs yield, at best, about 15% meat while red crabs yield about 30%. This means that processing costs could be as much as 50% lower on red crab meat.

(1) and also data from Canadian effort and Delaware II.
(2) After initial year and experience gained this will increase to 200 pots handled per day.
(3) You would expect that required minimum ex-vessel price will decline over time up to the point of maximum efficiency of the vessel and crew.
(4) $160,000 ÷ 25 trips = $6,400. $7,000 includes opt. cost of mgt.

Summary:

Assuming an 80' side trawler is converted to a red crab pot fishing vessel, the average cost of each trip will be around $7,000.

The first year of operations (when the crew is gaining experience and becoming more efficient) the average level of landings per trip will be around 45,000 pounds. At this level of operation, the minimum break-even ex-vessel price will be about 16¢ per pound.

Once the vessel and crew have become experienced in the fishery and are capable of pulling and setting 200 pots per day, yield will increase to 60,000 pounds per trip. At this level the minimum break-even ex-vessel price will be about 12¢ per pound.

Conclusion:

From the analysis set out in this report, it appears that the costs of operating a deep-water potting vessel to produce a product which will probably be competing with an inshore resource, i.e., the blue crab, are prohibitive to make this venture worth the attendant risks. Blue crab is presently selling for about 10¢ ex-vessel on the Atlantic Coast. There may, however, exist a good opportunity for red crab production in conjunction with deep-water lobster potting, where crabs are caught incidental to the lobster effort.

An additional possibility, which needs further research, is that the red crab could produce a product which would be competitive with the Dungeness and Snow crabs of the Pacific Coast. In this case, a higher ex-vessel price could be paid for the red crab, offsetting the higher costs attendant to the harvesting of an offshore deep-water resource.

All of this is quite speculative and depends to a considerable extent on product development and promotion by the industry as well as the availability of other substitute crab products.

An alternative possibility worthy of further research would be a vertically integrated fishery where vessel and plant ownership is vertically integrated and all resources can be considered employed in the common objective of producing processed red crab products.

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