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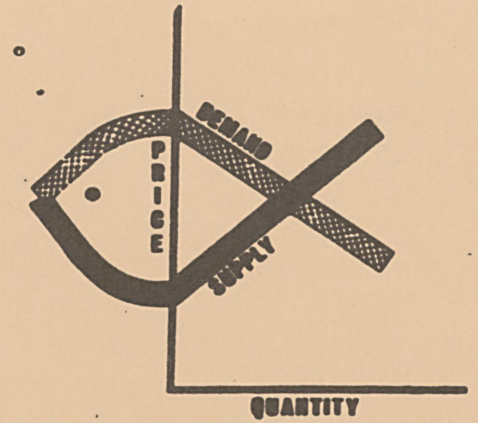
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Background Factors Relating to the
Potential of Crab-Picking Machines

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by

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U.S. National Marine Fisheries Service
Economic Research Division



Preliminary Report for
Review Purposes

Background Factors Relating to
the Potential of Crab-Picking Machines

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U.S. Department of Commerce

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Introduction and Summary*

It would appear that a mechanical crab picking machine could become commercially feasible if the complete installation could reduce cost per unit of output below that for hand picking and if the product proved to be acceptable at a price that would profitably cover this cost. There is a need for such a machine, especially in the Chesapeake area, and potential is present for such machines in other areas of the U.S. seafood industry. Demand for crab products is strong, but crab meats' competition with other seafood products prevents increasing retail prices high enough to cover increasing labor costs. The machine could possibly reduce employment, but the generally older aged work force and the possible aid of a vitalized industry to the area economy would seem to mitigate this problem. Indications are that government support of the development of the Rossnan - Hammel machine is justifiable.

*This report was prepared at the request of the NMFS Associate Director for Resource Utilization. It is intended for possible use by the developers of a vacuum-principle crab-body meat extraction machine in applying for technical assistance services or grants as provided by the Economic Development Administration (EDA) under the Public Works and Economic Development Act of 1965.

Background

Demonstration of a Vacuum Principle Crab Meat Picker Engineering Prototype

Technically, the demonstration involved an engineering prototype machine using a vacuum extraction process applied to blue crab bodies, not an entire plant operation. Economically, the whole plant would be based on the principle of substituting capital for labor in the production process.

Mike Rossnan, Chuck Hammel and associates of Imperial Crab Corporation, Goldsboro, Maryland, demonstrated an engineering prototype of a machine for extracting meat from the bodies of blue crabs for several NMFS, university, industry and other people on September 6, 1972. According to Rossnan and Hammel, this machine would be part of a complement of about 5 such machines in a commercial processing plant, along with other equipment for cooking, cooling, cleaning, storage, packing, leg-meat extraction and other functions. They agreed during the discussion following the demonstration that the extraction machine itself and the incorporating total processing plant unit require further work from a technical standpoint. NMFS personnel of the Fishery Products and Inspection Division indicated that the plant, not just the machine, should be operated and studied on a continuous basis for perhaps a whole fishing season to reveal possible problems and to provide data necessary for costing the operation.

Rossnan and Hammel stated that they believed the cost per unit of output would be below that for hand-picking plants, based apparently on the body-meat extractor's process rate (22 blue crabs per minute, or at 37 crabs per pound of meat, 35.7 pounds of meat per hour). Capital cost and cost per unit of output information was not presented, although Rossnan and Hammel indicated that only larger, well-financed firms would be able to afford such an installation. However, if a complete processing plant was found to be successful, loans may be available.

The Bird Machine Compared to the
Rossnan - Hammel Machine

The Bureau of Commercial Fisheries (now NMFS) was involved in the development of a crab-meat recovery machine called the Bird machine. This machine is basically a recovery machine, not a primary extraction device like the Rossnan - Hammel machine. The Bird machine produces smaller pieces and shreds the meat more than manual picking and the brine flotation it employs may affect the taste of the product. The Bird machine finds its best application in the recovery of meat from pieces of the crab which are not normally picked. Presumably, it would be a complement to a Rossnan - Hammel type machine, but it cannot replace a manual picker, as is claimed to be the case in the Rossnan - Hammel machine.

Employment in the blue crab processing industry
of the Chesapeake Bay area

Perhaps an insight into the labor problems of blue crab processors can be gained by a look at a recent attempt of processors to gain an exemption from child labor laws.

On May 26, 1972 the Shellfish Institute of North America requested an "experimental deviation" from child labor laws which would allow minors of ages 14-16 to work picking blue crabs.^{1/} The response of J.D. Hodgson, Secretary of Labor was: "After consideration of all material submitted in response to the proposal, it is hereby determined that such deviation will not be authorized for lack of a clear showing (1) that such deviation would enure to the well being of such minors and (2) that persons 16 years of age or older are not available for such employment."^{2/}

Why would crab processors attempt to recruit child labor when the Chesapeake Bay area has high adult unemployment? Table 1 shows that the fishing and crab processing areas of Maryland and Virginia are presently experiencing substantial and persistent unemployment problems. However, wages are too low and working conditions are in many cases so poor that labor cannot be attracted.

^{1/}Federal Register, May 26, 1972, (37 F.R. 10672).

^{2/}Federal Register, September 21, 1972.

Table 1 --Unemployment and Crab Processors in the Chesapeake Bay Area

<u>Maryland Area</u>	<u>Dept. of Labor Classification</u>	<u>Number of Crab Processors</u>
(42 crab processors in 1969)		
Cambridge (Dorchester County)	substantial unemployment	11
Centerville (Queen Annes County)	substantial unemployment	0
Chestertown (Kent County)	persistant unemployment	1
Crisfield (Somerset County)	persistant unemployment	16
Pocomoke City (Worcester County)	substantial unemployment	0
Prince Frederick (Calvert County)	persistant unemployment	1
		total $\frac{1}{29}$ of 42
 <u>Virginia Area</u>		
(29 crab processors in 1969)		
Chincoteague (Accomack & Northampton Counties)	substantial unemployment	1
Colonial Beach (Lancaster, Northumberland, Richmond & Westmoreland Counties)	substantial unemployment	3
		total $\frac{3}{4}$ of 29

Source: U.S. Department of Labor, Manpower Administration Area Trends in Employment and Unemployment, September, 1972.
BCF (now NMFS) Wholesale Dealers in Fishery Products, 1969, Virginia SL-12, Maryland SL-10.

Piece-work rates in crab picking are directly tied to minimum wages. Table 2 shows blue crab production figures along with the associated minimum wage for each year. It can be noted that there has been no significant trend in the quantity of production while the value of that production has increased 45% from 1961 to 1969 (crab processors have been required to pay minimum wages since 1961). At the same time minimum wage has increased 60% (1961-69). Current bills before Congress propose minimum wage increases to \$2.00 or \$2.20 (House and Senate bills respectively). The Senate bill also proposes to remove the exemption seafood processing is presently enjoying and require processors to pay time and one-half for overtime^{3/} NMFS and blue crab processors have expressed a great deal of concern over the proposed minimum wage increases. Many people have predicted the closure of many blue crab processing plants if the higher minimum wages take effect in this highly labor-intensive industry. "The cost of picking accounts for about one-third of the total cost of fresh crab meat"^{4/}. Many crab processors are presently cutting their employment due to high labor costs and inability to attract needed labor. Employment figures are not available for crab processing per se; however, Table 3 shows that for all seafood processing in Maryland and Virginia seasonal average employment has declined since 1962 and the number of establishments has declined since 1963.

^{3/}See John Vondruska and John Commander Impact of Proposed (1972) Fair Labor Standard Act Amendments on the Fishing Industry, NMFS, ERL, File Manuscript No. 109, August, 1972.

^{4/}"Mechanizing the Blue Crab Industry", Commercial Fisheries Review, Vol. 25, No. 7, July, 1963, p. 3.

Table 2.--Blue Crab Production and Minimum Wage

<u>BLUE CRAB PRODUCTS</u>			
	<u>QUANTITY</u> (pounds)	<u>VALUE</u> (dollars)	<u>MINIMUM</u> <u>WAGE</u>
1950	11,063,927	10,632,990	-
1955	14,846,208	14,587,104	-
1960	22,847,911	23,279,240	-
1961	24,345,210	24,392,516	\$1.00
1962	24,018,351	23,329,473	\$1.00
1963	23,032,689	23,763,933	\$1.00
1964	23,956,269	26,058,810	\$1.15
1965	27,923,462	30,667,398	\$1.25
1966	27,125,625	29,981,184	\$1.60
1967	25,404,167	30,795,751	\$1.60
1968	22,098,511	35,189,865	\$1.60
1969	24,612,978	34,943,456	\$1.60

Source: NMFS Fishery Statistics of the United States,
annual editions.

Table 3. --Employment and number of establishments in the Maryland-Virginia seafood wholesaling and processing industry, by state, 1939-1940, and 1953-1969.¹

Year	Persons engaged						Establishments		
	Average for season			Average for year			Maryland	Virginia	Total
	Maryland	Virginia	Total	Maryland	Virginia	Total			
-----Number-----									
1939	5,828	5,647	11,475	2,654	2,158	4,812	303	234	537
1940	5,507	5,938	11,445	2,471	2,079	4,550	282	243	525
1941-52 ²	/2	/2	/2	/2	/2	/2	/2	/2	/2
1953	6,159	6,492	12,651	3,292	2,798	6,090	317	358	675
1954	6,308	6,542	12,850	3,758	3,063	6,821	301	347	648
1955	6,545	6,104	12,649	4,039	2,405	6,444	389	353	742
1956	6,387	6,288	12,675	4,120	2,329	6,449	385	348	733
1957	6,399	6,658	13,057	4,302	2,632	6,934	357	377	734
1958	6,513	6,662	13,175	4,337	2,720	7,057	304	393	697
1959	6,849	6,866	13,715	4,632	2,582	7,214	270	382	652
1960	6,687	7,123	13,810	4,271	2,726	6,997	253	378	631
1961	6,532	6,974	13,506	4,419	2,725	7,144	256	341	597
1962	6,491	6,638	13,129	4,243	3,916	8,159	239	341	580
1963	6,096	4,853	10,949	4,254	3,130	7,384	298	357	655
1964	5,042	5,242	10,284	4,385	3,069	7,454	272	350	622
1965	4,965	4,714	9,679	4,112	2,914	7,026	285	336	621
1966	5,165	5,233	10,398	3,809	3,109	6,918	283	304	587
1967	4,805	5,946	10,751	3,620	3,845	7,465	276	314	590
1968	4,919	5,417	10,336	3,878	3,522	7,400	271	310	581
1969	4,937	5,328	10,265	3,695	3,565	7,260	250	306	556

(Footnotes and Source on next page)

- 1/ The seafood "wholesaling and processing industry" includes firms engaged solely in wholesaaaemarketing (i.e., wholesale dealers and distributors) of fresh and processed seafood products but who perform no actual processing funtions (packaging, freezing, preparing, canning, curing, reducing, etc.) themselves as well as seafood processors per se; thus, figures appearing in this table represent a somewhat different industry then processing itself and the data do not directly correspond to other tables and information appearing elsewhere in this bulletin which may refer to "seafood processing" in the strict sense of the word.
- 2/ Incomplete data invalidates use during this period.

Source: NMFS Fishery Statistics of the United States, annual editions.

In 1965 Maryland had a total of 45 crab processing plants and Virginia had 31. However, in 1969 Maryland had 42 and Virginia 29^{5/}.
Dorchester County, Maryland which presently is experiencing substantial unemployment, has declined from 16 plants to 11 (1965-69). Somerset County, with persistent unemployment has declined from 18 to 16 plants (1965-69). In Virginia, the Chincoteague area (substantial unemployment) declined from two to one plants and the Colonial Beach area (substantial unemployment) declined from four to three plants^{6/}.

^{5/}Suttor, Corrigan and Wuhrman, The Commercial Fishing and Seafood Processing Industries of the Chesapeake Bay Area, Agricultural Experiment Station, University of Maryland, November, 1968.

^{6/}See table 1.

According to one Chesapeake Bay area processor who commented at the Rossman-Hammel demonstration, his plant situation represents the labor problems of the blue crab processing industry. Ten years ago he employed 90 pickers; 5 years ago, 60; and now, 30. Even these 30 pickers implies having about 45 on the payroll. He indicated that proposed increases in minimum wage rate under the Fair Labor Standards Act would impose further hardships on the industry. Pickers are paid on a piece-rate basis, but this rate must be such that the workers receive the minimum hourly-rate equivalent. It is said that "productive" workers are able to earn well above the minimum.

Demand and Marketability

While it is no assurance of the marketability of a given crab product, crab in general enjoys strong economic demand in the United States; that is, it is expected that per capita consumption by weight will increase faster than per capita real income over time, given certain assumptions.^{7/} Of course, crab is consumed in several products forms, each of which commands a different price depending on the species, season, region, meat-piece size (e.g., large pieces, chunks, shreds,

^{7/}In the following ordinary least squares demand equation, income elasticity is 1.9; that is, with a 1 percent rise in real per capita income (Y/NxCPI), U.S. per capita consumption (C/N) was found to increase 1.9 percent, holding real crab price (P/CPI) constant.

$$\text{Log}(C/N) = 5.99 - 0.15 \text{Log}(P/CPI) + 1.88 \text{Log}(Y/CPI \times N)$$

Source: NMFS, Economic Research Laboratory, Basic Economic Indicators, Blue Crabs (forthcoming: draft of May 1970).

etc.), degree of preparation, related product components, prices of competing goods, and other factors. The applicable price in the range of crab meat prices may or may not sufficiently reward the production of a given item. For example, Alaskan crab processors have varied between extracting tanner crab body meat and discarding the bodies due to price variations. If an alternate means of extraction, such as by a Rossman vacuum extractor, offered low enough costs of production, presumably the product could be marketed regularly. However, the basis of comparison to determine economic feasibility is not the sometimes unprofitable cost of production by present roller and hand-picking methods, but the range of applicable market prices.

While specific marketing problems have not been identified as being beyond solution by the private sector, it would seem reasonable to suggest that the NMFS Market Research and Services Division could be requested to assist the industry in helping to test and to achieve acceptance of new or different crab product forms. Market development can help establish acceptable product prices and sales volume.

Labor Intensity vs. Mechanization

One of the arguments for the adoption of mechanized crab meat extraction as opposed to manual picking is that labor costs are reduced. Since

the change involves substitution of rather costly capital equipment for labor in the production process, it is essential that total costs for the mechanized plant be lower per unit of output, and that, if product value differs ~~the price-price relationship~~ proves sufficiently profitable to justify the capital investment.

If capital is substituted for labor in the production process, it follows that labor use will decline unless output is expanded. Also, one would expect an upgrading in the average skill level of workers in a plant. Without more precise information, it is not possible to say whether overall employment would increase or decrease with a shift from manual to mechanical crab meat extraction, but it seems likely that low-skill group employment would decrease. However, it is quite possible that middle-skill wages can be paid and some lower-skill employees upgraded.

U.S. Crab Resource and Processing Situation

Internal studies by the Economic Research Laboratory have found that there is a possibility of expansion in the harvesting of blue crab, both on the Atlantic and the Gulf coasts. In the Chesapeake Bay area, however, the present fishing effort may be the maximum desirable from a biological point of view. The rest of the Atlantic and Gulf areas could probably expand fishing effort without damage to the ability of crab stocks to replace losses due to fishing. Pages 17 through 23 present a complete data summary of the U.S. crab harvesting sector in 1969. Note that the Chesapeake Bay area had 6,065 crab fishermen who landed 60,876,000 pounds of blue crabs worth \$7,013,000. A decline in the processing sector due to increasing labor costs would seriously affect this fishery. Presently, during peak harvesting months the price of blue crab to the fisherman is depressed due to the inability of processors to handle the seasonal characteristics of landings. However, there is the strong possibility that a machine would be able to handle seasonal peaks with more efficiency thereby mitigating some of the price depression. This would result in a higher income to fishermen.

On the Pacific Coast, king, dungeness, and snow (tanner) crabs are the most important species. King and dungeness crab processing presently attracts skilled labor with attractive wages due to the value of the product. While a machine, if adapted to these species, would probably be used, there is not as great a "need" for a machine as there is in the blue crab industry. However, due to decreased landings of king crab, the snow crab has increased in importance to both fishermen and processors. The snow crab, however, presents several problems to processors. The body of the snow crab is constructed in such a manner that it is extremely difficult and costly (labor-intensive) to pick the body meat. Until recently, processors would pay careful attention to wholesale prices and if high, the body meat would be picked; if low, the body would be discarded and a severe pollution problem has resulted. Labor costs for the skilled workers used made picking body meat a marginal operation at best, with little or no profits. Fortunately, the wholesale prices for snow meat was high enough this year to offset labor costs and the pollution problem has been avoided. A machine that will pick snow crab body meat would probably have a slight upward effect on prices paid to fishermen and would most certainly mitigate the pollution problem.^{9/}

^{9/}Information on the tanner crab problem was obtained from Jeff Collins, Director, Kodiak Fishery Products Technology Laboratory, Kodiak, Alaska.

In New England many sectors of the fishery are experiencing a severe decline. A striking example is haddock. Landings of haddock in New England averaged 120-135 million pounds in the 50's and early 60's. However, in 1970 New England landed only 27 million pounds. The decline is probably due to heavy harvesting by foreign fleets. Nevertheless, in several major fisheries, New England fishermen are faced with severely declining resources.^{10/} A large amount of the NMFS budget has been allotted to this area. One possible aid to the fishermen is the development of underutilized or non-utilized species. Several crab species are found in New England that could support fishermen that are presently experiencing declining landings. However, to attract processors to these crabs, the problems facing blue crab processing must be solved. If a machine is found to work efficiently and is adaptable to these species, then jobs will be produced in both processing and harvesting sectors.

^{10/}For a more detailed description of this problem see John Vondruska, NMFS, Conditions and Recent Changes in the New England Fishing Industry, July 27, 1972 draft.

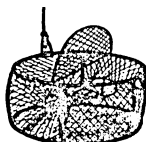
REVIEW OF CERTAIN MAJOR FISHERIES

U.S. CRAB FISHERY, 1969

Crab landings of 257.3 million pounds worth \$43.1 million increased 2.8 million pounds but declined \$1.3 million compared with 1968.

The harvest was greater in all major areas except the Pacific Coast States where landings of king crabs (57.7 million pounds) declined 70 percent and Dungeness crabs (48.1 million pounds) declined 4 percent compared with the previous year. A record 11.2-million-pound production of snow crabs was 245 percent more than in 1968. Along the Atlantic and Gulf coasts, landings of hard blue crabs (132.2 million pounds) increased 18.6 million and soft blue crabs (4.5 million) increased 2.3 million pounds compared with 1968.

The Pacific Coast States led in volume with 117.5 million pounds (46 percent) followed by the Chesapeake States with 60.9 million (24 percent); South Atlantic States, 41.5 million (16 percent); and Gulf States, 34.6 million (13 percent). The rest was landed in the New England and Middle Atlantic States, and Hawaii.



DUNGENESS CRAB POT

SUMMARY OF CRAB POT OPERATING UNITS, 1969

ITEM	NEW ENGLAND					TOTAL, EXCLUSIVE OF DUPLI- CATION
	NEW HAMPSHIRE	MASSA- CHUSETTS	RHODE ISLAND	CONNEC- TICUT		
FISHERMEN, ON BOATS AND SHORE.	NUMBER 16	NUMBER 2	NUMBER 1	NUMBER 3	NUMBER 22	
BOATS, MOTOR. GEAR, NUMBER.	12 280	2 50	1 140	2 50	17 520	
ITEM	MIDDLE ATLANTIC			CHESAPEAKE		
	NEW JERSEY	DELAWARE	TOTAL, EXCLUSIVE OF DUPLI- CATION	MARYLAND	VIRGINIA	TOTAL, EXCLUSIVE OF DUPLI- CATION
FISHERMEN: ON VESSELS.	NUMBER 3	NUMBER -	NUMBER 3	NUMBER 201	NUMBER 357	NUMBER 556
ON BOATS AND SHORE.	39	32	71	683	1,115	1,798
TOTAL FISHERMEN	42	32	74	884	1,472	2,354
VESSELS, MOTOR: 5 - 9 TONS	2	-	2	158	213	369
10 - 19 TONS	-	-	-	32	22	54
20 - 29 TONS	-	-	-	-	1	1
TOTAL VESSELS	2	-	2	190	236	424
TOTAL GROSS TONNAGE	15	-	15	1,512	1,736	3,232
BOATS, MOTOR. GEAR, NUMBER.	39 2,561	20 1,877	59 4,438	653 77,150	971 153,045	1,624 229,995

(CONTINUED ON NEXT PAGE)

Source: NMFS, Fishery Statistics of the United States, 1969, Statistical Digest 63 (Washington, D.C.: NMFS, 1972), for pages 17 of this report.

REVIEW OF CERTAIN MAJOR FISHERIES

SUMMARY OF CRAB POT OPERATING UNITS, 1969 - Continued

ITEM	SOUTH ATLANTIC				
	NORTH CAROLINA	SOUTH CAROLINA	GEORGIA	FLORIDA, EAST COAST	TOTAL, EXCLUSIVE OF DUPLICATION
	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER
FISHERMEN:					
ON VESSELS	12	-	-	2	14
ON BOATS AND SHORE	359	150	151	197	857
TOTAL FISHERMEN	371	150	151	199	871
VESSELS, MOTOR:					
5 - 9 TONS	7	-	-	-	7
10 - 19 TONS	1	-	-	1	2
TOTAL VESSELS	8	-	-	1	9
TOTAL GROSS TONNAGE	61	-	-	14	75
BOATS, MOTOR	359	150	104	192	805
GEAR, NUMBER	24,740	8,680	6,595	32,300	72,315

ITEM	GULF					
	FLORIDA, WEST COAST	ALABAMA	MISSISSIPPI	LOUISIANA	TEXAS	TOTAL, EXCLUSIVE OF DUPLICATION
	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER
FISHERMEN:						
ON VESSELS	30	-	-	-	-	30
ON BOATS AND SHORE	359	85	71	594	95	1,204
TOTAL FISHERMEN	389	85	71	594	95	1,234
VESSELS, MOTOR:						
5 - 9 TONS	5	-	-	-	-	5
10 - 19 TONS	6	-	-	-	-	6
30 - 39 TONS	2	-	-	-	-	2
40 - 49 TONS	2	-	-	-	-	2
TOTAL VESSELS	15	-	-	-	-	15
TOTAL GROSS TONNAGE	270	-	-	-	-	270
BOATS, MOTOR	314	77	54	480	95	1,020
GEAR, NUMBER	64,896	13,490	4,250	67,925	14,440	165,001

ITEM	PACIFIC				
	ALASKA	WASHINGTON	OREGON	CALIFORNIA	TOTAL, EXCLUSIVE OF DUPLICATION
	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER
FISHERMEN:					
ON VESSELS	780	248	363	1,066	2,274
ON BOATS AND SHORE	383	108	68	206	765
TOTAL FISHERMEN	1,163	356	431	1,272	3,039
VESSELS, MOTOR:					
5 - 9 TONS	7	10	13	41	69
10 - 19 TONS	37	35	67	201	322
20 - 29 TONS	27	20	32	75	136
30 - 39 TONS	19	18	25	24	75
40 - 49 TONS	28	7	4	17	51
50 - 59 TONS	19	3	5	6	30
60 - 69 TONS	8	2	-	-	10
70 - 79 TONS	6	-	-	3	9
80 - 89 TONS	10	1	1	-	10
90 - 99 TONS	8	-	-	1	9
100 - 109 TONS	13	1	-	-	13
110 - 119 TONS	8	2	-	-	9
120 - 129 TONS	7	-	-	-	7
130 - 139 TONS	5	-	-	-	5
140 - 149 TONS	9	-	-	-	9
150 - 159 TONS	3	-	-	-	3
160 - 169 TONS	10	-	-	-	10
170 - 179 TONS	7	-	-	-	7
180 - 189 TONS	9	-	-	-	9
190 - 199 TONS	13	-	-	-	13

(CONTINUED ON NEXT PAGE)

REVIEW OF CERTAIN MAJOR FISHERIES

SUMMARY OF CRAB POT OPERATING UNITS, 1969 - Continued

ITEM	PACIFIC				TOTAL, EXCLUSIVE OF DUPLICATION
	ALASKA	WASHINGTON	OREGON	CALIFORNIA	
	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>
280 - 289 TONS	1	-	-	-	1
290 - 299 TONS	1	-	-	-	1
320 - 329 TONS	1	-	-	-	1
340 - 349 TONS	1	-	-	-	1
430 - 439 TONS	1	-	-	-	1
480 - 489 TONS	1	-	-	-	1
490 - 499 TONS	1	-	-	-	1
TOTAL VESSELS	260	99	147	368	813
TOTAL GROSS TONNAGE	22,171	2,672	3,176	7,014	33,160
BOATS:					
MOTOR	151	67	43	103	364
OTHER	-	1	-	-	1
GEAR, NUMBER	45,528	29,950	44,900	44,514	173,597

SUMMARY OF CRAB TROT LINE OPERATING UNITS, 1969

ITEM	CHESAPEAKE		SOUTH ATLANTIC	
	MARYLAND	VIRGINIA	NORTH CAROLINA	SOUTH CAROLINA
	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>
FISHERMEN:				
ON VESSELS	140	7	2	-
ON BOATS AND SHORE	3,079	43	146	6
TOTAL FISHERMEN	3,219	50	148	6
VESSELS, MOTOR:				
5 - 9 TONS	115	3	2	-
10 - 19 TONS	22	1	-	-
TOTAL VESSELS	137	4	2	-
TOTAL GROSS TONNAGE	1,058	30	14	-
BOATS, MOTOR	2,781	41	146	6
GEAR:				
NUMBER	3,216	47	148	12
BAITS	1,011,445	27,900	106,000	4,888

ITEM	GULF		TOTAL, EXCLUSIVE OF DUPLICATION
	MISSISSIPPI	LOUISIANA	
	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>
FISHERMEN:			
ON VESSELS	-	-	149
ON BOATS AND SHORE	4	571	3,849
TOTAL FISHERMEN	4	571	3,998
VESSELS, MOTOR:			
5 - 9 TONS	-	-	120
10 - 19 TONS	-	-	23
TOTAL VESSELS	-	-	143
TOTAL GROSS TONNAGE	-	-	1,102
BOATS, MOTOR	4	571	3,549
GEAR:			
NUMBER	4	571	3,998
BAITS	2,400	375,530	1,528,163

REVIEW OF CERTAIN MAJOR FISHERIES

SUMMARY OF CRAB OTTER TRAWL OPERATING UNITS, 1969

ITEM	SOUTH ATLANTIC			TOTAL, EXCLUSIVE OF DUPLI- CATION
	NORTH CAROLINA	SOUTH CAROLINA	GEORGIA	
	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>
FISHERMEN: ON VESSELS	190	14	46	250
ON BOATS AND SHORE	166	14	40	220
TOTAL FISHERMEN	356	28	86	470
VESSLS, MOTOR:				
5 - 9 TONS	40	-	3	43
10 - 19 TONS	27	3	6	36
20 - 29 TONS	15	-	3	18
30 - 39 TONS	7	-	3	10
40 - 49 TONS	4	2	3	9
50 - 59 TONS	1	1	3	5
60 - 69 TONS	2	1	1	4
70 - 79 TONS	1	-	-	1
80 - 89 TONS	1	-	-	1
90 - 99 TONS	-	-	1	1
TOTAL VESSELS	98	7	23	128
TOTAL GROSS TONNAGE	1,819	257	730	2,806
BOATS, MOTOR	135	12	26	173
GEAR:				
NUMBER	290	26	70	386
YARDS AT MOUTH	3,543	451	1,076	5,070

SUMMARY OF CRAB DREDGE OPERATING UNITS, 1969

ITEM	MIDDLE ATLANTIC		CHESAPEAKE, VIRGINIA	TOTAL, EXCLUSIVE OF DUPLI- CATION
	NEW JERSEY	DELAWARE		
	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>	<u>NUMBER</u>
FISHERMEN: ON VESSELS	10	4	434	448
ON BOATS AND SHORE	4	-	8	12
TOTAL FISHERMEN	14	4	442	460
VESSLS, MOTOR:				
5 - 9 TONS	1	-	48	49
10 - 19 TONS	3	-	66	69
20 - 29 TONS	-	-	32	32
30 - 39 TONS	-	1	12	13
40 - 49 TONS	-	-	6	6
50 - 59 TONS	-	-	1	1
60 - 69 TONS	-	-	2	2
TOTAL VESSELS	4	1	167	172
TOTAL GROSS TONNAGE	49	30	2,857	2,936
BOATS, MOTOR	2	-	8	10
GEAR:				
NUMBER	10	2	300	312
YARDS AT MOUTH	18	3	511	532

REVIEW OF CERTAIN MAJOR FISHERIES

SUMMARY OF CRAB LANDINGS, 1969

(THOUSANDS OF POUNDS AND THOUSANDS OF DOLLARS)

AREA AND STATE	BLUE				DUNGENESS	
	HARD		SOFT AND PEELER		QUANTITY	VALUE
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
MIDDLE ATLANTIC:						
NEW JERSEY	622	83	9	2	-	-
DELAWARE	510	62	3	2	-	-
TOTAL	1,132	145	12	4	-	-
CHESAPEAKE:						
MARYLAND	23,014	2,197	2,251	933	-	-
VIRGINIA	33,640	3,177	1,971	706	-	-
TOTAL	56,654	5,374	4,222	1,639	-	-
SOUTH ATLANTIC:						
NORTH CAROLINA	22,159	2,125	93	42	-	-
SOUTH CAROLINA	8,250	675	-	-	-	-
GEORGIA	5,147	438	-	-	-	-
FLORIDA, EAST COAST	5,724	557	(1)	(1)	-	-
TOTAL	41,280	3,795	93	42	-	-
GULF:						
FLORIDA, WEST COAST	11,584	1,074	(1)	(1)	-	-
ALABAMA	1,920	223	-	-	-	-
MISSISSIPPI	1,740	177	(1)	(1)	-	-
LOUISIANA	11,602	1,072	197	161	-	-
TEXAS	6,343	599	-	-	-	-
TOTAL	33,189	3,145	197	161	-	-
PACIFIC COAST:						
ALASKA	-	-	-	-	11,304	1,620
WASHINGTON	-	-	-	-	19,028	4,477
OREGON	-	-	-	-	9,784	2,655
CALIFORNIA	-	-	-	-	7,939	2,295
TOTAL	-	-	-	-	48,055	11,047
GRAND TOTAL	132,255	12,459	4,524	1,846	48,055	11,047
AREA AND STATE	GREEN		KING		ROCK	
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
NEW ENGLAND:						
MAINE	-	-	-	-	1,185	66
NEW HAMPSHIRE	38	4	-	-	10	1
MASSACHUSETTS	4	1	-	-	-	-
RHODE ISLAND	8	1	-	-	297	37
CONNECTICUT	4	(1)	-	-	-	-
TOTAL	54	6	-	-	1,492	104
MIDDLE ATLANTIC, NEW JERSEY	-	-	-	-	83	4
PACIFIC COAST:						
ALASKA	-	-	57,730	15,644	-	-
CALIFORNIA	-	-	-	-	500	55
TOTAL	-	-	57,730	15,644	500	55
GRAND TOTAL	54	6	57,730	15,644	2,075	163

SEE FOOTNOTE AT END OF TABLE.

(CONTINUED ON NEXT PAGE)



DUNGENESS CRAB

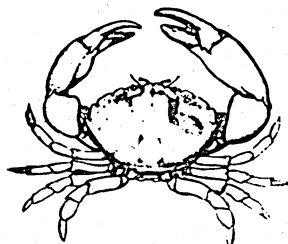
REVIEW OF CERTAIN MAJOR FISHERIES

SUMMARY OF CRAB LANDINGS, 1969 - Continued

(THOUSANDS OF POUNDS AND THOUSANDS OF DOLLARS)

AREA AND STATE	SNOW		STONE		OTHER		TOTAL	
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
NEW ENGLAND:								
MAINE	-	-	-	-	-	-	1,185	66
NEW HAMPSHIRE	-	-	-	-	-	-	48	5
MASSACHUSETTS	-	-	-	-	-	-	4	1
RHODE ISLAND	-	-	-	-	-	-	305	38
CONNECTICUT	-	-	-	-	-	-	4	(1)
TOTAL	-	-	-	-	-	-	1,546	110
MIDDLE ATLANTIC:								
NEW JERSEY	-	-	-	-	-	-	714	89
DELAWARE	-	-	-	-	-	-	513	64
TOTAL	-	-	-	-	-	-	1,227	153
CHESAPEAKE:								
MARYLAND	-	-	-	-	-	-	25,265	3,130
VIRGINIA	-	-	-	-	-	-	35,611	3,883
TOTAL	-	-	-	-	-	-	60,876	7,013
SOUTH ATLANTIC:								
NORTH CAROLINA	-	-	-	-	-	-	22,252	2,167
SOUTH CAROLINA	-	-	-	-	-	-	8,250	675
GEORGIA	-	-	-	-	-	-	5,147	438
FLORIDA, EAST COAST	-	-	108	60	-	-	5,832	617
TOTAL	-	-	108	60	-	-	41,481	3,897
GLUF:								
FLORIDA, WEST COAST	-	-	1,258	696	-	-	12,842	1,770
ALABAMA	-	-	-	-	-	-	1,920	223
MISSISSIPPI	-	-	-	-	-	-	1,740	177
LOUISIANA	-	-	-	-	-	-	11,799	1,233
TEXAS	-	-	-	-	-	-	6,343	599
TOTAL	-	-	1,258	696	-	-	34,644	4,002
PACIFIC COAST:								
ALASKA	11,207	1,133	-	-	-	-	80,241	18,397
WASHINGTON	-	-	-	-	-	-	19,028	4,477
OREGON	-	-	-	-	-	-	9,784	2,655
CALIFORNIA	-	-	-	-	-	-	8,439	2,350
TOTAL	11,207	1,133	-	-	-	-	117,492	27,879
HAWAII	-	-	-	-	59	65	59	65
GRAND TOTAL	11,207	1,133	1,366	756	59	65	257,325	43,119

1/ LESS THAN 500 POUNDS OR \$500.



STONE CRAB

REVIEW OF CERTAIN MAJOR FISHERIES

SUMMARY OF CRAB LANDINGS OF CATCH BY GEAR, 1969

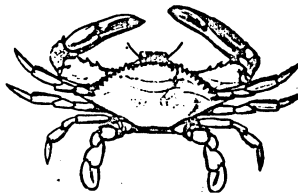
(THOUSANDS OF POUNDS AND THOUSANDS OF DOLLARS)

GEAR	BLUE				DUNGNESS	
	HARD		SOFT AND PEELER		QUANTITY	VALUE
	QUANTITY	VALUE	QUANTITY	VALUE		
HAUL SEINES, COMMON	7	1	-	-	-	-
OTTER TRAWLS	11,588	1,095	71	31	38	12
POUND NETS	972	86	470	183	-	-
POTS	92,918	8,574	1,329	521	48,017	11,035
LINES, TROT WITH BAITS	18,033	1,854	188	81	-	-
DIP NETS	849	78	126	67	-	-
SCRAPES	130	10	1,741	717	-	-
DREDGES	7,758	761	500	170	-	-
BUSH TRAPS	-	-	78	64	-	-
BY HAND	-	-	21	12	-	-
TOTAL	132,255	12,459	4,524	1,846	48,055	11,047

GEAR	GREEN		KING		ROCK	
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
	OTTER TRAWLS	-	-	-	-	84
POTS	54	6	57,730	15,644	1,991	159
TOTAL	54	6	57,730	15,644	2,075	163

GEAR	SNOW		STONE	
	QUANTITY	VALUE	QUANTITY	VALUE
	POTS, TOTAL	11,207	1,133	1,366

GEAR	OTHER		TOTAL	
	QUANTITY	VALUE	QUANTITY	VALUE
	HAUL SEINES, COMMON	3	3	10
OTTER TRAWLS	-	-	11,781	1,142
POUND NETS	-	-	1,442	269
POTS	5	4	214,617	37,832
LINES, TROT WITH BAITS	-	-	18,221	1,935
DIP NETS	-	-	975	145
LIFT NETS	40	46	40	46
SCRAPES	-	-	1,871	727
DREDGES	-	-	8,258	931
BUSH TRAPS	-	-	78	64
BY HAND	-	-	21	12
UNCLASSIFIED	11	12	11	12
TOTAL	59	65	257,325	43,119



BLUE CRAB



