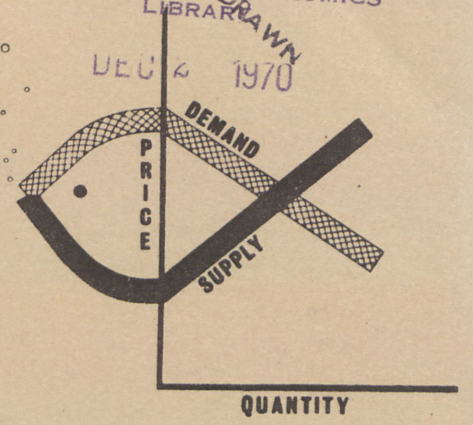


BASIC ECONOMIC INDICATORS

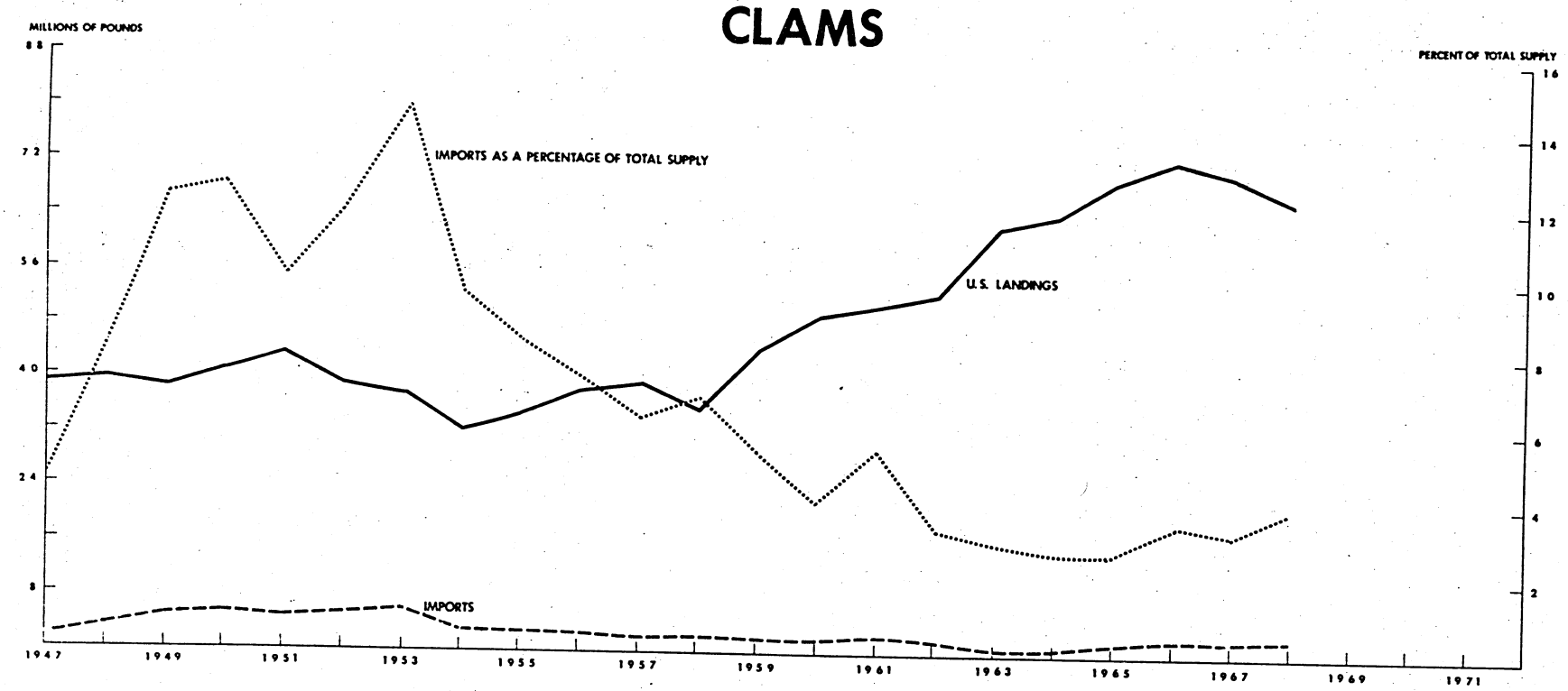
CLAMS

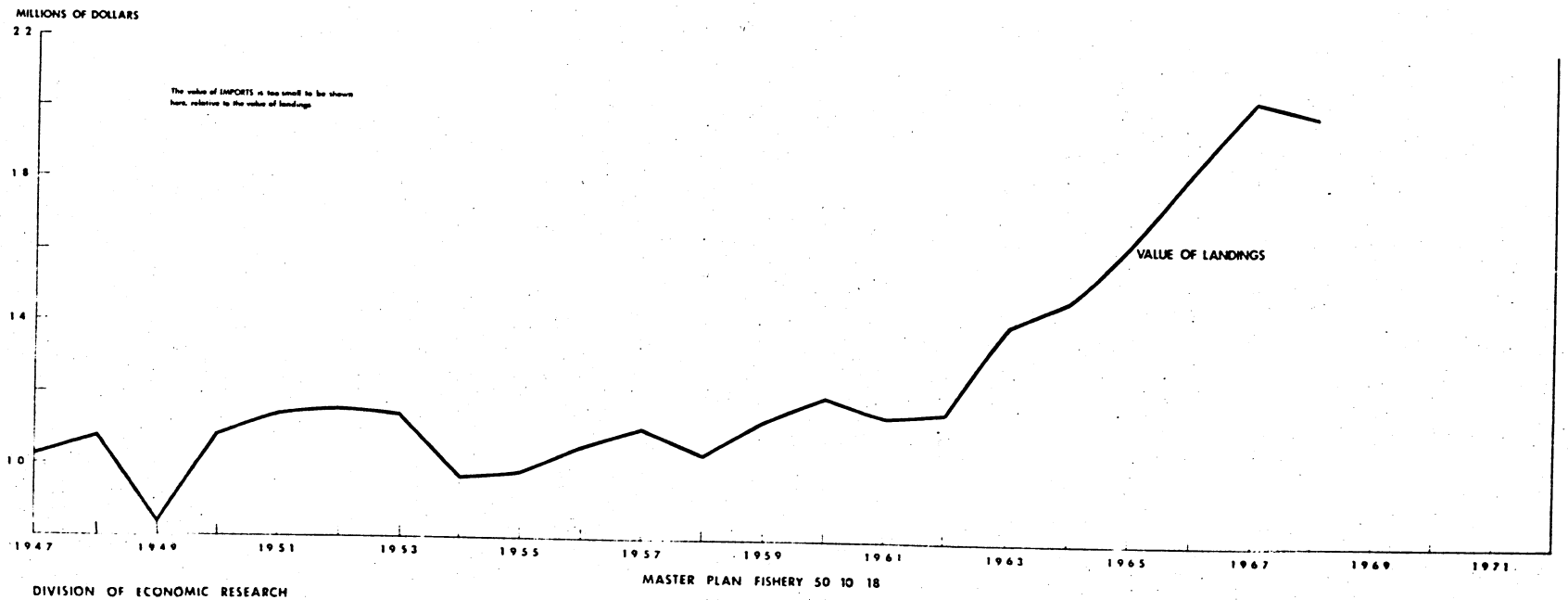
Master Plan Fishery 50 10 18

Working Paper No. 55
April 1970

LUS BUREAU OF COMMERCIAL FISHERIES
DIVISION OF ECONOMIC RESEARCH

CLAMS





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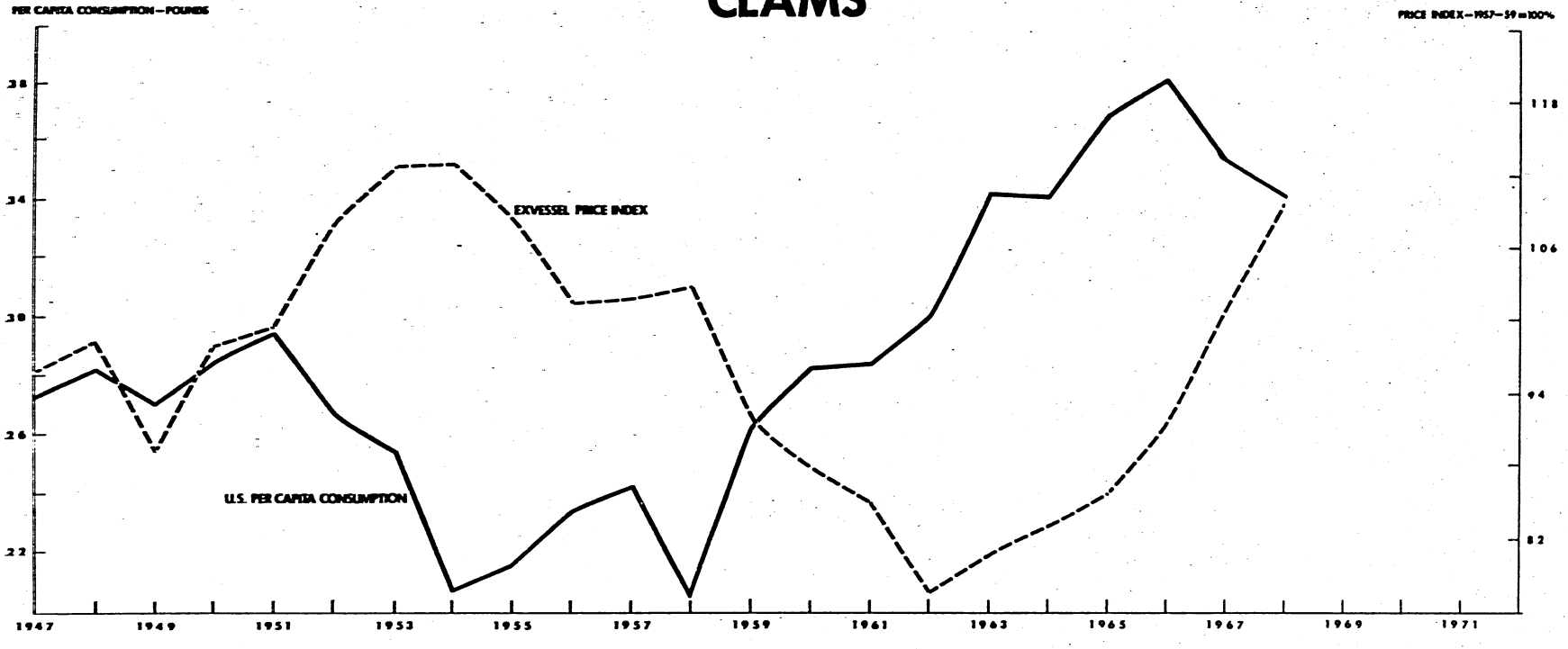
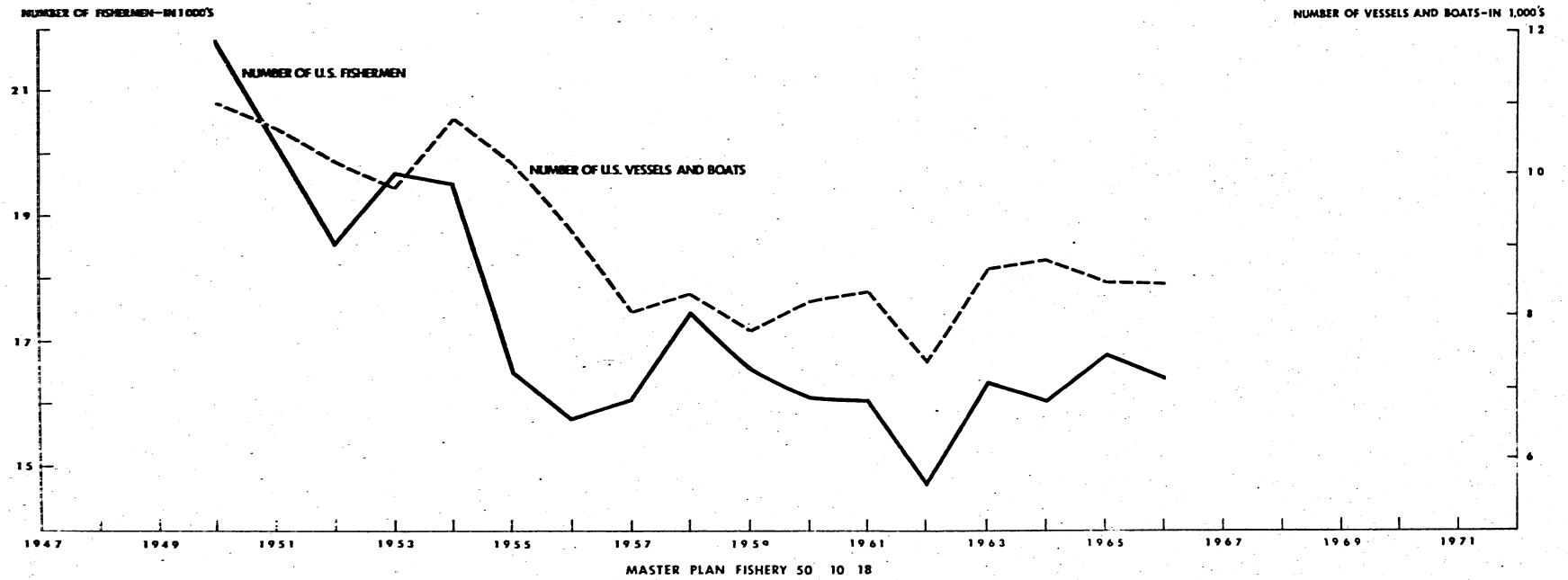
CLAMS





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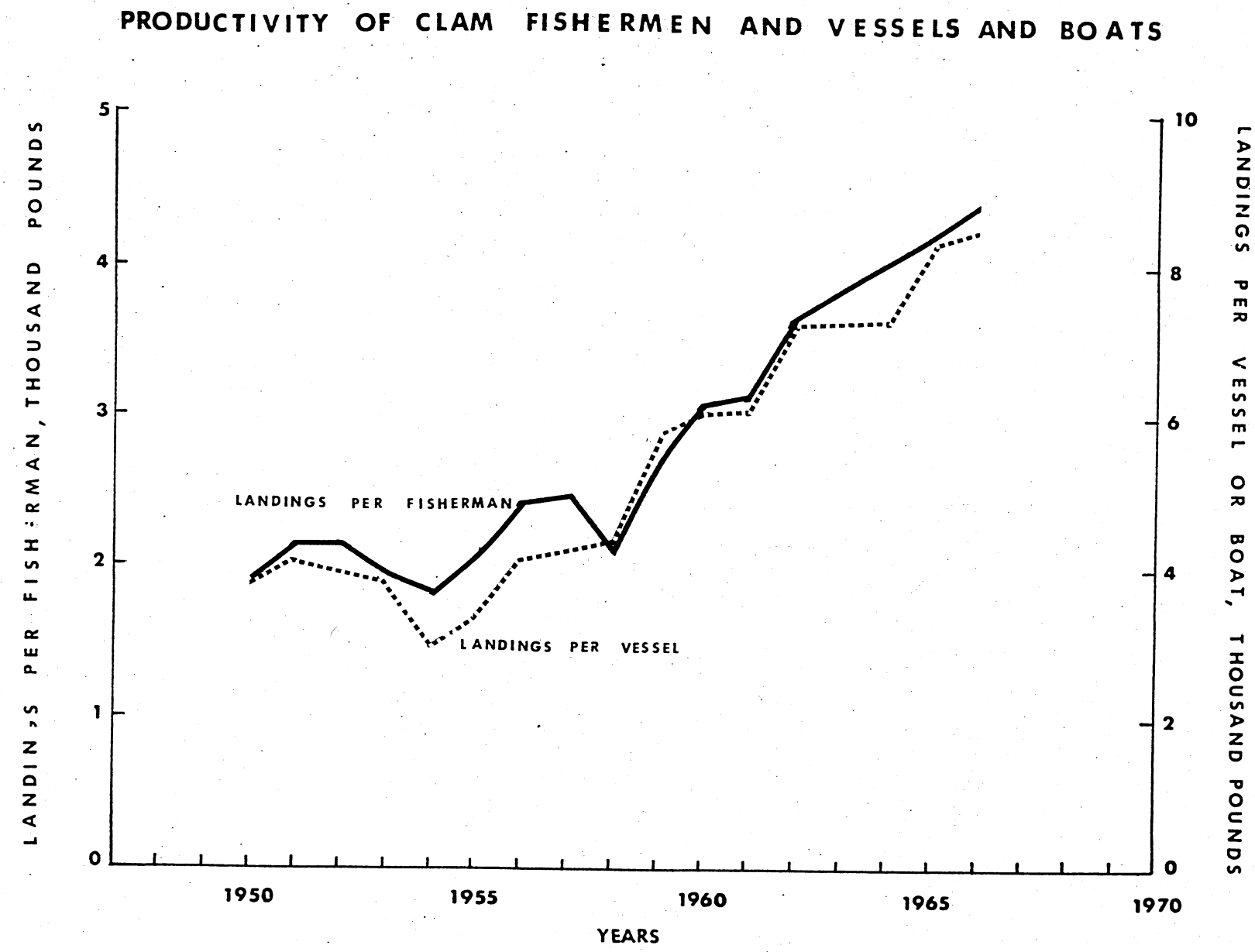
PRODUCTIVITY OF CLAM FISHERMEN AND VESSELS AND BOATS
LANDINGS PER FISHERMAN, THOUSAND POUNDS
LANDINGS PER VESSEL OR BOAT, THOUSAND POUNDS
LANDINGS PER FISHERMAN
LANDINGS PER VESSEL
0
1
2
3
4
5
0
2
4
6
8
10
1950
1955
1960
1965
1970
YEARS

List of Tables

I INDUSTRY PERFORMANCE INDICATORS

- Cost and earnings of vessels
- Earnings of fishermen
- Productivity
  - Vessels
  - Fishermen
  - Fishing effort
- Costs per pound of fish landed
- Historical growth rates
  - landings
  - fishermen
  - vessels

Table I-1.--Cost and earnings of clam vessels

NO DATA AVAILABLE

Table I-2.--Earnings of clam fishermen

NO DATA AVAILABLE

Table I-3.--Productivity of clam (dredges) fishermen and vessels

	Landings per fisherman	Landings per vessel and boat
	Pounds	Pounds
1950	17,523	37,923
1951	26,112	59,862
1952	21,660	44,939
1953	18,989	43,134
1954	18,299	40,866
1955	19,482	45,260
1956	22,879	52,263
1957	23,003	55,316
1958	22,623	46,549
1959	27,310	59,596
1960	32,065	71,293
1961	36,960	74,222
1962	44,551	92,376
1963	48,577	96,963
1964	53,672	112,449
1965	56,853	118,994
1966	54,711	114,848
1967		
1968		
1969		
1970		
1971		
1972		

Source: Original data from Fishery Statistics of the United States.

Table I-4.--Cost per pound of clam

NO DATA AVAILABLE

Table I-5.--Historical growth rate of clams; landings, fishermen, and vessels

	1950-66
Landings 1/	+ 4.25 percent per year
Fishermen 2/	+ 5.70 percent per year
Vessels 3/	- 1.60 percent per year

1/ Log of landings (million lbs.) = 4.4990 + .0184 time (5.98)

2/ Log of number of fishermen (1,000's) = 3.2060 + .0250 time (10.70)

3/ Log of number of vessels (1,000's) = 4.0237 - .0075 time (3.99)

II DEMAND INDICATORS

- Consumption
  - Aggregate
  - Per capita
  - Socio-economic characteristics
- Prices
  - Exvessel
  - Wholesale
  - Retail
- Value
  - Landings
  - Wholesale
  - Retail
- Relative prices
- Seasonal demand
- Price and income elasticities

Table II-1.--U.S. aggregate and per capita consumption of clams

(Meat weight)

	Aggregate	Per capita
	Million pounds	Pounds
1947	38.5	.267
1948	41.8	.285
1949	39.7	.266
1950	43.4	.286
1951	45.2	.294
1952	42.1	.269
1953	40.5	.255
1954	33.9	.209
1955	35.9	.217
1956	39.7	.236
1957	41.4	.242
1958	37.9	.218
1959	46.7	.264
1960	51.0	.283
1961	52.4	.286
1962	55.8	.300
1963	65.0	.345
1964	66.0	.345
1965	72.3	.373
1966	74.9	.382
1967	70.2	.355
1968	68.2	.341
1969		
1970		
1971		
1972		

Source: Division of Current Economic Analysis, Bureau of Commercial Fisheries.

Table II-2 -- U.S. consumption of clams (fresh and frozen) by socio-economic characteristics, 1969 1/
(Retail weight)

Socio-Economic Characteristics	1969				
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
	Pounds per capita				
RACE					
Negro	.006	.007	.002	.000	.015
White	.024	.018	.021	.016	.079
Other	.050	.000	.183	.000	.233
Not specified	.000	.000	.000	.000	.000
RELIGION					
Catholic	.050	.009	.038	.013	.110
Jewish	.012	.026	.000	.020	.058
Protestant	.016	.019	.016	.016	.067
Other	.000	.053	.000	.014	.067
Not specified	.000	.000	.000	.000	.000
INCOME PER CAPITA					
Under 1,000	.000	.000	.000	.002	.002
1,000-1,999	.007	.020	.022	.019	.068
2,000-2,499	.020	.002	.010	.013	.045
2,500-2,999	.062	.007	.065	.005	.139
3,000-3,499	.005	.020	.009	.016	.050
3,500-& over	.060	.031	.017	.021	.129
OCCUPATION					
Prof. & semipro-fessional	.013	.016	.009	.007	.045
Proprietors, managerial	.022	.018	.043	.008	.091
Clerical & sales	.037	.004	.013	.024	.078
Craftsmen, foremen	.006	.010	.002	.003	.021
Head operative	.028	.006	.000	.004	.038
Service workers, & laborers	.030	.044	.043	.043	.160
EDUCATION					
Less than 4 yr. high school	.036	.017	.031	.012	.096
Less than 4 yr college	.018	.019	.018	.019	.074
College grad.	.012	.014	.005	.010	.041
Head, not spec.	.000	.000	.016	.000	.016
REGION					
New England	.149	.123	.291	.075	.638
Middle Atlantic	.038	.014	.004	.016	.072
E. North Cent.	.007	.004	.000	.010	.021
W. North Cent.	.000	.000	.000	.000	.000
South Atlantic	.014	.006	.007	.008	.035
E. South Cent.	.015	.000	.001	.000	.016
W. South Cent.	.000	.003	.000	.000	.003
Mountain	.016	.000	.000	.005	.021
Pacific	.011	.045	.006	.028	.090

Source: Division of Economic Research, Bureau of Commercial Fisheries

1/ Purchases by households for home use.

Table II-3.--Clam prices: Exvessel, wholesale, and retail

(Meat Weight)

	Exvessel[1/]	Wholesale[2/]	Retail[2/]
	Cents per pound		
1947	26.8	80.4	112.8
1948	27.5	82.5	115.8
1949	24.9	74.7	104.8
1950	26.7	80.1	112.4
1951	26.7	80.1	112.4
1952	29.7	89.1	125.0
1953	30.6	91.8	128.8
1954	31.1	93.3	130.9
1955	29.8	89.4	125.5
1956	27.8	83.4	117.0
1957	28.0	84.0	117.9
1958	28.7	86.1	120.8
1959	25.3	75.9	106.5
1960	23.9	71.7	100.6
1961	22.6	67.8	95.1
1962	21.3	63.9	89.7
1963	22.1	66.3	93.0
1964	22.8	68.4	96.0
1965	27.4	82.2	115.4
1966	25.5	76.5	107.4
1967	32.5	97.5	136.8
1968	30.4	91.2	128.0
1969			
1970			
1971			
1972			

1/ Weighted average price for all species of clams.
2/ Estimated by applying marketing margins in 1967 to the exvessel price.

Table II-4.--Value of clam landings, wholesale, and retail

	Exvessel[1/]	Wholesale[2/]	Retail[2/]
	Thousand dollars		
1947	9,283	30,954	43,428
1948	9,893	34,485	48,404
1949	8,532	29,656	41,606
1950	10,204	34,763	48,782
1951	10,795	36,205	50,805
1952	11,220	37,511	52,625
1953	10,975	39,731	52,164
1954	9,448	31,629	44,375
1955	9,367	32,095	45,055
1956	10,227	33,110	46,449
1957	10,779	34,776	48,811
1958	10,122	32,632	45,783
1959	10,999	35,445	49,736
1960	11,536	36,567	51,306
1961	11,219	35,527	49,832
1962	11,345	35,656	50,053
1963	13,838	43,095	60,450
1964	14,548	45,144	63,360
1965	19,247	59,431	83,434
1966	18,241	57,299	80,443
1967	20,129	68,445	96,034
1968	20,100	62,198	87,296
1969			
1970			
1971			
1972			

1/ Fishery Statistics of the United States.
2/ Estimated by applying marketing margin in 1967 to the exvessel level.

Table II-5.-- Retail price of clams relative to the consumer price index and the consumer price index for meat, poultry, and fish

	Retail[1/]	Retail/CPI[2/]	Retail/CPImpf[3/]
	Cents per pound		
1947	112.8	145.0	133.0
1948	115.8	138.2	120.4
1949	104.8	126.3	115.0
1950	112.4	134.1	118.2
1951	112.4	124.2	105.7
1952	125.0	135.1	118.7
1953	128.8	138.2	129.3
1954	130.9	139.9	133.7
1955	125.5	134.5	136.3
1956	117.0	123.5	133.0
1957	117.9	120.3	123.6
1958	120.8	120.0	115.7
1959	106.5	104.9	106.1
1960	100.6	97.6	101.5
1961	95.1	91.3	95.8
1962	89.7	85.1	88.2
1963	93.9	87.1	92.8
1964	96.0	88.8	97.4
1965	115.4	105.0	109.8
1966	107.4	95.0	94.1
1967	136.8	117.6	123.0
1968	128.0	105.6	112.6
1969			
1970			
1971			
1972			

Source: Division of Economic Research, BCF

1/ Estimated
2/ Consumer Price Index, 1957-59 = 100
3/ Consumer Price Index for meat, poultry and fish, 1957-59 = 100

Table II-6.--Index of seasonal demand for soft clams by market area1/

Month	Fulton Fish Market
January	101.9
February	100.6
March	99.2
April	98.0
May	97.4
June	97.5
July	98.2
August	99.4
September	100.7
October	101.9
November	102.6
December	102.6

1/ 100 equals average monthly demand.

Source: Frederick V. Waugh and Virgil J. Norton, Some Analyses of Fish Prices, Working Paper No. 22, Division of Economic Research, Bureau of Commercial Fisheries.

Table II-7.--Price and income elasticities for clams

Price elasticity = -0.6072

Income elasticity = 0.2528

Demand Equation for United States

$$C/N = -0.1459 - 0.6072 \text{ Log } \left[\frac{P}{CPI}\right] + 0.2528 \text{ Log } \left[\frac{Y/CPI}{N}\right]$$

C/N = Clam consumption per capita

P/CPI = Price of clams divided by Consumer Price Index (CPI)

$\frac{Y/CPI}{N}$ = Per capita income deflated by CPI.

Source: Division of Economic Research, Bureau of Commercial Fisheries.

III DEMAND PROJECTIONS

- U.S. Consumption
  - Aggregate
  - Per capita

Table III-1.--Demand projections for clams, U.S. and world, to the year 2000[1/]

Year	U.S. per cap. consumption	U.S. population	U.S. aggregate consumption	World aggregate consumption
	Pounds[2/]	Millions	Million pounds[2/]	
1967 (actual)	2.06	197.9	407	1,065
1970	2.46	206.0	506	1,000
1975	2.52	219.4	553	1,400
1980	2.57	235.2	604	1,500
1985	2.60	252.9	658	1,600
1990	2.62	270.8	710	1,700
2000	2.65	307.8	815	1,900

Assumptions:

(1) Declining income elasticity over time;

(2) A Schaefer biological yield curve;

(3) Fishery management instituted when world fishery reaches maximum sustainable yield;

(4) Relative prices of fishery product variable over time (i.e., cost of production derived from (2) allowed to interact with demand);

(5) Projected per capita income and population given by U.S. Department of Agriculture by country;

(6) Constant technology; and

(7) Input prices to fisheries rise at approximately same rate as all consumer prices.

Source: For a fuller description of above assumptions and alternative projections see Working Paper No. 71, "Economic Projections of U.S. and World Demand for Major Fishery Projects," by F. Bell, D. Nash, F. Waugh, and E. Carlson.

1/ For annual projection between five year intervals the reader may interpolate.

2/ Round weight

IV DOMESTIC PRODUCTION

—Landings

—Value

Table IV-1.--Landings and value of Atlantic and Gulf clams[1/]

(Meat Weight)

	Quantity	Value
	Thousand pounds	Thousand dollars
1947	34,680	9,283
1948	35,939	9,893
1949	34,249	8,532
1950	38,214	10,204
1951	40,315	10,795
1952	37,766	11,220
1953	35,252	10,975
1954	30,332	9,448
1955	31,400	9,367
1956	36,787	10,227
1957	38,452	10,779
1958	35,199	10,122
1959	43,554	10,999
1960	48,272	11,536
1961	49,590	11,219
1962	53,247	11,345
1963	62,618	13,838
1964	63,875	14,548
1965	70,180	19,247
1966	72,169	18,241
1967	61,863	20,129
1968	66,200	20,100
1969		
1970		
1971		
1972		

Source: Fishery Statistics of the United States.

1/ Excludes South Atlantic and Gulf for 1947-49

Table IV-2.--Landings of Atlantic and Gulf clams, by states

	New Jersey	New York	Maryland	Virginia	Maine
	Thousand pounds				
1947	5,194	13,829	255	879	7,994
1948	7,434	11,014	200	1,567	9,258
1949	5,390	12,272	238	1,496	9,213
1950	9,833	11,040	322	1,378	7,380
1951	11,168	11,157	1,830	1,267	5,690
1952	10,342	9,687	2,502	1,128	5,947
1953	10,411	7,427	2,899	873	4,483
1954	9,995	5,850	1,693	729	4,014
1955	11,509	4,718	3,047	903	2,872
1956	14,564	6,098	4,753	834	2,516
1957	17,704	5,344	4,051	748	2,324
1958	15,129	4,380	4,985	718	1,887
1959	22,269	4,198	5,574	1,719	1,611
1960	26,045	4,767	6,161	1,622	2,138
1961	28,405	5,170	5,220	1,864	1,857
1962	31,187	5,784	7,255	1,693	1,982
1963	39,147	6,392	7,412	2,096	1,834
1964	38,791	6,807	8,534	2,453	1,800
1965	44,214	7,663	8,171	2,707	1,966
1966	45,926	8,705	7,243	2,258	3,008
1967					
1968					
1969					
1970					
1971					
1972					

Table IV-2.--Landings of Atlantic and Gulf clams, by states (Continued)

	Mass.	Rhode Island	Other	Total[1/]
	----------	Thousand pounds	----------	
1947	2,914	3,615	n.a.	34,680
1948	2,177	4,289	n.a.	35,939
1949	2,800	2,840	n.a.	34,249
1950	3,632	2,952	1,677	38,214
1951	3,936	3,433	1,834	40,315
1952	3,061	3,815	1,284	37,766
1953	3,105	5,083	971	35,252
1954	2,578	4,690	778	30,332
1955	2,436	5,188	727	31,400
1956	2,434	4,538	1,050	36,787
1957	3,024	4,039	1,128	38,452
1958	2,751	3,356	1,993	35,199
1959	2,468	2,836	2,878	43,554
1960	2,213	3,401	1,524	48,272
1961	2,354	2,739	1,980	49,590
1962	1,890	2,212	1,244	53,247
1963	2,466	2,329	941	62,618
1964	2,263	2,004	863	63,875
1965	2,120	2,298	1,032	70,180
1966	2,408	1,798	823	72,169
1967				
1968				
1969				
1970				
1971				
1972				

Source: Fishery Statistics of the U.S.

1/ Excludes South Atlantic and Gulf for 1947-49.

Table IV-3.--Supply and disposition of clams (all forms) in the U.S.

	Landings	Imports[1/]	Total	Exports[2/]	Apparent total consumption[3/]
	Million pounds, meat weight				
1947	37.9	.9	38.8	.3	38.5
1948	39.6	2.5	42.1	.3	41.8
1949	37.6	2.3	39.9	.2	39.7
1950	41.1	2.5	43.6	.2	43.4
1951	43.4	2.1	45.5	.3	45.2
1952	39.8	2.4	42.2	.1	42.1
1953	37.6	2.9	40.5	-	40.5
1954	32.3	1.6	33.9	-	33.9
1955	34.4	1.5	35.9	-	35.9
1956	38.2	1.6	39.8	.1	39.7
1957	39.9	1.5	41.4	-	41.4
1958	36.4	1.5	37.9	-	37.9
1959	45.0	1.7	46.7	-	46.7
1960	49.6	1.4	51.0	-	51.0
1961	50.3	2.1	52.4	-	52.4
1962	54.2	1.6	55.8	-	55.8
1963	63.4	1.6	65.0	-	65.0
1964	64.5	1.5	66.0	-	66.0
1965	70.8	1.5	72.3	-	72.3
1966	72.8	2.1	74.9	-	74.9
1967	68.4	1.8	70.2	-	70.2
1968	66.2	2.0	68.2	-	68.2
1969					
1970					
1971					
1972					

Source: Division of Current Economic Analysis

1/ In shell or shucked clams, canned clams, and canned chowder converted to meat weights.
2/ Beginning 1952, canned clam exports included with other shellfish exports. Beginning 1958, in shell or shucked clam exports included with other shellfish exports.
3/ Apparent consumption does not include stocks.

V DOMESTIC EMPLOYMENT, VESSELS AND EFFORT

- Fishermen
- Vessels
- Trips
- Days at sea
- Days fishing

Table V-1.--Number of fishermen and vessels for clams

	Fishermen 1/		Vessels	
	Total	Dredges 2/	Total	Dredges 2/
	Number			
1950	21,856	374	11,071	274
1951	20,142	382	10,773	253
1952	18,671	429	10,288	361
1953	19,732	404	9,969	372
1954	17,577	425	10,913	343
1955	16,667	507	10,270	362
1956	15,797	591	9,303	429
1957	16,020	768	8,064	462
1958	17,452	682	8,418	486
1959	16,645	663	7,900	527
1960	16,094	632	8,249	488
1961	16,080	522	8,316	489
1962	14,716	495	7,488	449
1963	16,341	545	8,777	510
1964	16,013	548	8,877	452
1965	16,884	572	8,582	473
1966	16,459	645	8,571	494
1967				
1968				
1969				
1970				
1971				
1972				

Source: Fishery Statistics of the United States

1/ Estimated for Alaska, 1950-58
2/ Included in total

Table V-2.--Vessels and boats in U.S. clam dredge fishery[1/]

	Vessels					Boats	
	North Atlantic	South Atlantic	Gulf	Pacific	Total	North Atlantic	South Atlantic
	Number						
1947	57	n.a.	n.a.	-	n.a.	79	n.a.
1948	57	n.a.	n.a.	-	n.a.	58	n.a.
1949	78	n.a.	-	-	n.a.	63	n.a.
1950	126	18	-	-	144	90	40
1951	108	39	-	-	147	76	30
1952	144	29	-	-	173	159	29
1953	145	12	-	-	157	188	27
1954	165	10	-	-	175	153	15
1955	187	7	-	-	194	158	10
1956	230	6	-	-	236	183	10
1957	289	6	-	-	295	156	11
1958	268	-	-	-	268	208	10
1959	264	-	-	2	266	251	10
1960	243	9	-	2	254	223	10
1961	206	9	-	1	216	259	12
1962	190	4	-	3	197	239	12
1963	216	2	-	2	220	264	24
1964	214	-	-	2	216	213	21
1965	223	-	-	1	225	226	21
1966	247	3	-	1	251	234	8
1967			-				
1968							
1969							
1970							
1971							
1972							

1/ Includes only data from clam dredge fishery

Table V-2.--Vessels and boats in U.S. clam dredge fishery[1/]
(Continued)

	Boats		
	Gulf	Pacific	Total
	----------Number----------		
1947	n.a.	-	n.a.
1948	n.a.	-	n.a.
1949	2	-	n.a.
1950	-	-	130
1951	-	-	106
1952	-	-	188
1953	-	-	215
1954	-	-	168
1955	-	-	168
1956	-	-	193
1957	-	-	167
1958	-	-	218
1959	-	-	261
1960	-	1	234
1961	-	2	273
1962	-	1	252
1963	-	2	290
1964	-	2	236
1965	-	2	249
1966	-	1	243
1967			
1968			
1969			
1970			
1971			
1972			

Source: Fishery Statistics of the United States, BCF

1/ Includes only date from clam dredge fishery

Table V-3.--Fishermen in U.S. clam dredge fishery

	On Vessels					On Boats and Shore	
	N. Atlantic	S. Atlantic	Gulf	Pacific	Total	N. Atlantic	S. Atlantic
	----------	----------	----------	Number	----------	----------	----------
1947	132	n.a.	n.a.	-	n.a.	173	n.a.
1948	130	n.a.	n.a.	-	n.a.	124	n.a.
1949	170	n.a.	-	-	n.a.	129	n.a.
1950	338	36	-	-	374	167	52
1951	304	78	-	-	382	153	45
1952	371	58	-	-	429	262	58
1953	380	24	-	-	404	387	54
1954	405	20	-	-	425	311	30
1955	493	14	-	-	507	314	20
1956	579	12	-	-	591	369	20
1957	756	12	-	-	768	321	22
1958	682	-	-	-	682	298	20
1959	657	-	-	6	663	467	20
1960	610	18	-	4	632	431	20
1961	499	21	-	2	522	438	18
1962	480	9	-	6	495	416	18
1963	535	5	-	5	545	433	36
1964	544	-	-	4	548	364	31
1965	570	-	-	2	572	383	31
1966	640	3	-	2	645	382	8
1967							
1968							
1969							
1970							
1971							
1972							

Table V-3.--Fishermen in U.S. clam dredge fishery (Continued)

	On Boats and Shore		
	Gulf	Pacific	Total
	----------Number----------		
1947	n.a.	n.a.	n.a.
1948	n.a.	-	n.a.
1949	5	-	n.a.
1950	-	-	219
1951	-	-	198
1952	-	-	320
1953	-	-	441
1954	-	-	341
1955	-	-	334
1956	-	-	389
1957	-	-	343
1958	-	-	318
1959	-	-	487
1960	-	2	453
1961	-	4	460
1962	-	2	436
1963	-	4	473
1964	-	4	399
1965	-	4	418
1966	-	2	392
1967			
1968			
1969			
1970			
1971			
1972			

Source: Fishery Statistics of the United States, BCF

VI BIOLOGICAL STOCK ASSESSMENT

Table VI-1.--Estimate of maximum sustainable yield from world stock of clams

Region	MSY
	Thousand metric tons
I. Atlantic	
A. Northeast Atlantic[1]	
1. Hard clams	39.4
2. Cockles	60.6
Total	100.0
B. Mediterranean and Black Sea	
Total	30.0[2]
C. Northwest and West Central Atlantic	
1. Hard clams	102.4[3]
2. Soft clams	50.0
3. Surf clams	150.0[4]
4. Ocean quahog	50.0
Total	352.4
D. Caribbean	
1. Hard clams	4.3[5]
E. Central and Southeast Atlantic	
Total	no information
F. Southwest Atlantic	
Total	4.0[6]

Table VI-1.--Estimate of maximum sustainable yield from world stocks of clams (Continued)

Region	MSY
	Thousand metric tons
II. Indian Ocean	
Total	unknown
We know which species are present, but no estimates are available of MSY.	
III. Pacific	
A. Northeast Pacific	
1. Alaska	
a. Butter clams	6.0
b. Razor clams	
2. British Columbia	
a. Butter clams	1.8
b. Little neck clams	.6
c. Razor clams	.2
Total	2.6[7]
3. U.S.A.	
Butter clams, razor clams, little neck, Japanese or Manila, pismo clam, gapers, soft clam, etc.	20.0
Total	28.6
B. Northwest and West Central Pacific	
1. Japan	203.5[8]

Table VI-1.--Estimate of maximum sustainable yield from world stocks of clams (Continued)

Region	MSY
	Thousand metric tons
III. Pacific (Cont.)	
B. Northwest and West Central Pacific (Cont.)	
2. Korea	31.3[8]
3. Malaysia	24.5[8]
4. China	1.7
Total	261.0
C. Southeast Pacific	
1. Hard clams (several species), and soft clams	
Total	19.4[9]
D. Australia and New Zealand	
1. Australia	No information, exploitation necessary. Stocks of clams are probably present.
2. New Zealand	.1[10]
Total	.1
Grand total	799.8

Source: Simpson, A. C. "Molluscan Resources," Area Reviews on Living Resources of the World's Oceans, FAO Indicated World Plan for Agricultural Development Fisheries Lab, Burnham-on-Crounch, 1969.

Note: Simpson says, "The fullest utilization of existing stocks could increase production very greatly to many parts of the world, and 4,000,000 tons is probably an underestimate of the production that could be achieved if mechanical methods of harvesting become widely used." (p. 36)

The following regional breakdown for clams gives 20 percent of the total. The nature of the MSY figure for this category makes this the most tenuous estimate of all. In other words, MSY is not independent of changes in technology in all cases.

The other 80 percent not in the regional breakdown can be accounted for by factors explained in the footnotes.

However, two factors would tend to reconcile the difference between the world estimate and the sum of all regional estimates: (1) the introduction of cultivation technique has not been regionally refined; (2) the discovery of new stocks has not been taken into quantitative account.

---

[1] MSY for this area was given as 100,000 tons. It was distributed between hard clams and cockles according to the proportion each had with respect to production.

[2] The author states that production could be increased "several-fold." He did not venture an estimate. Thus, a conservative factor of 3 was applied to the production figure.

[3] Through increased exploitation, and also by artificial rearing.

[4] There is no MSY estimate for surf clams. The latter cannot be artificially cultivated, but there are exploitable resources yet to be uncovered. Simpson does not give a figure, but given that landings amounted to 108,000 tons in 1966, the above number is probably a low approximation of MSY.

[5] This is the landings figure. More can be produced through increased exploitation and artificial cultivation.

[6] Simpson does not give a figure here for MSY. However, he states that landings in Brazil were 2,000 tons, and more could be produced there; also, there are "very substantial unexploited stocks along the coast of Argentina." Thus, the 4,000 ton estimate is a very low one.

[7] This estimate represents a compromise between a lower estimate of 2,300 tons and a higher one of 3,000 tons. The MSY's of the three species of clams were broken down according to the proportions contained in the lower estimates.

[8] Simpson gives no MSY estimates for any nations in the Northwest and West Central Pacific. Most of the output is the result of cultivation. The figures represent the highest level of landings for each country during the 1960-1966 period. This is probably allow approximation.

[9] Simpson does not give an estimate of MSY for this area, but claims that the potential for the coastline of Chile is far greater than present production (9.700 tons). He also states that unexploited potential exists along the coastline of Peru, Ecuador, and Columbia. A conservative factor of 2 was applied to the present production of the area.

[10] There are several species of clams landed in small amounts in New Zealand about which no information is available.

Table VI-2.--Estimate of maximum sustainable yield for clams in waters fished by U.S. fishermen

Region	MSY (Thous. metric tons)
I. Northwest and West-Central Atlantic	1,784.0
II. Northeast Pacific	144.0
Total	1,928.0

Source: Bureau of Commercial Fisheries, Division of Economic Research. Simpson, A. C. "Molluscan Resources," Area Reviews on Living Resources of the World's Oceans, FAO Indicative World Plan for Agricultural Development, Fisheries Laboratory, Burnham-on-Crounch, 1969.

VII INTERNATIONAL TRADE

- Imports
  - Quantity
  - Value
  - Price

Table VII-1.--U.S. clam imports

	Fresh or frozen 1/		Canned 2/	
	Quantity	Value	Quantity	Value
	Thou. pounds	Thou. dollars	Thou. pounds	Thou. dollars.
1947	2,124	472	39	20
1948	3,572	647	32	18
1949	4,958	853	306	138
1950	5,368	1,121	406	123
1951	4,258	964	474	170
1952	4,912	858	395	156
1953	5,759	1,070	599	277
1954	2,975	592	467	221
1955	2,640	548	485	265
1956	2,362	552	755	411
1957	1,918	390	762	470
1958	1,829	298	865	514
1959	1,218	259	1,352	791
1960	969	195	1,095	672
1961	1,119	269	1,799	1,118
1962	640	159	1,459	864
1963	469	97	1,507	879
1964	411	80	1,430	928
1965	573	97	1,376	864
1966	703	125	1,938	1,244
1967	708	171	1,676	1,060
1968	749	271	1,850	1,107
1969				
1970				
1971				
1972				

Source: Fishery Statistics of the United States.
1/ May include some preserved or prepared in 1947-53.
2/ Includes whole and minced clams and does not include chowder and juices.

VIII FOREIGN PRODUCTION

—Landings

Table VIII-1.--World clam landings by country

	U.S.	U.K.	Spain	Malaysia	Korea	Japan
	Million pounds, round weight					
1947	158.3	n.a.	n.a.	n.a.	n.a.	n.a.
1948	167.1	17.6	7.7	n.a.	n.a.	n.a.
1949	158.3	17.4	14.8	n.a.	n.a.	n.a.
1950	170.2	15.4	12.6	n.a.	n.a.	n.a.
1951	179.2	18.5	4.6	n.a.	n.a.	n.a.
1952	162.9	17.0	10.1	n.a.	n.a.	n.a.
1953	n.a.	18.1	11.0	n.a.	2.0	243.9
1954	n.a.	15.7	20.5	n.a.	4.4	223.4
1955	207.2	17.0	9.0	n.a.	2.4	232.2
1956	241.0	15.2	11.2	n.a.	2.4	339.8
1957	254.0	15.0	8.6	n.a.	2.9	399.3
1958	234.1	12.1	21.2	18.7	7.1	375.3
1959	255.3	13.2	19.6	n.a.	8.2	342.7
1960	285.5	17.6	14.6	n.a.	10.6	344.9
1961	291.2	18.3	26.5	13.2	22.3	347.7
1962	303.8	21.0	43.9	17.6	15.2	349.1
1963	365.1	14.3	40.4	43.2	30.2	448.7
1964	373.5	12.4	56.5	42.6	62.2	378.8
1965	405.4	15.7	66.2	42.8	38.6	378.6
1966	413.4	21.0	65.7	54.0	53.4	429.3
1967	389.6	34.2	90.6	59.3	65.1	383.7
1968						
1969						
1970						
1971						
1972						

Table VIII-1.--World clam landings by country (Continued)

	Other	Total
	----Million pounds round weight------	
1947	30.1	213.8
1948	25.8	218.3
1949	12.3	224.9
1950	35.5	233.7
1951	29.1	231.5
1952	43.7	233.7
1953	37.2	n.a.
1954	23.8	n.a.
1955	32.6	500.4
1956	23.1	632.7
1957	28.0	707.7
1958	28.2	696.7
1959	31.3	670.2
1960	30.2	703.3
1961	26.0	745.2
1962	43.2	793.7
1963	30.4	972.2
1964	48.7	974.4
1965	53.8	1000.9
1966	59.1	1095.7
1967	42.5	1064.8
1968		
1969		
1970		
1971		
1972		

Source: FAO Yearbook of Fishery Statistics

IX FOREIGN CONSUMPTION

—Consumption
  Aggregate
  Per capita

--Prices

Table IX-1.--World aggregate consumption of clams, by country, 1947-67

	U.S.	U.K.	Spain	Malaysia	Korea	Japan
	Million pounds, round weight					
1947	158.3	n.a.	n.a.	n.a.	n.a.	n.a.
1948	167.1	17.6	7.7	n.a.	n.a.	n.a.
1949	158.3	17.4	14.8	n.a.	n.a.	n.a.
1950	170.2	15.4	12.6	n.a.	n.a.	n.a.
1951	179.2	18.5	4.6	n.a.	n.a.	n.a.
1952	162.8	17.0	10.1	n.a.	n.a.	n.a.
1953	n.a.	18.1	11.0	n.a.	2.0	243.9
1954	n.a.	15.7	20.5	n.a.	4.4	223.4
1955	207.2	17.1	9.0	n.a.	2.4	232.2
1956	241.0	15.2	11.2	n.a.	2.4	323.3
1957	254.0	15.1	8.6	n.a.	2.9	390.1
1958	234.1	12.1	21.1	18.7	7.1	356.9
1959	255.3	13.2	19.6	n.a.	8.2	322.4
1960	285.5	17.6	14.6	n.a.	10.6	317.3
1961	291.2	18.3	26.5	13.2	22.3	320.2
1962	303.7	21.1	43.9	17.6	15.2	317.7
1963	365.1	14.3	40.4	43.2	30.2	424.9
1964	373.4	12.4	56.5	42.6	62.7	345.7
1965	405.4	15.7	66.2	42.8	38.6	341.8
1966	413.4	21.0	65.7	54.0	53.4	368.7
1967	389.6	34.1	90.6	59.3	65.1	345.1
1968						
1969						
1970						
1971						
1972						

Table IX-1.--World aggregate consumption of clams, by country, 1947-67 (Continued)

	Other	Total
	---Million pounds, round weight---	
1947	55.5	213.8
1948	35.8	218.4
1949	34.4	225.0
1950	35.5	233.7
1951	29.1	231.5
1952	43.8	233.8
1953	n.a.	n.a.
1954	n.a.	n.a.
1955	32.6	500.4
1956	39.6	632.7
1957	37.2	707.7
1958	53.6	696.7
1959	51.5	670.2
1960	57.8	703.3
1961	53.5	745.2
1962	74.5	793.7
1963	54.1	972.2
1964	81.7	974.4
1965	90.6	1000.9
1966	119.6	1095.7
1967	81.0	1064.8
1968		
1969		
1970		
1971		
1972		

Source: Original data from FAO Yearbook of Fishery Statistics.

Table IX-2.--World per capita consumption of clams, by country.

	Malaysia	Korea	Japan	Spain
	----------Pounds, round weight----------			
1947	n.a.	n.a.	n.a.	n.a.
1948	n.a.	n.a.	n.a.	.127
1949	n.a.	n.a.	n.a.	.242
1950	n.a.	n.a.	n.a.	.204
1951	n.a.	n.a.	n.a.	.074
1952	n.a.	n.a.	n.a.	.357
1953	n.a.	.094	2.814	.385
1954	n.a.	.221	2.538	.710
1955	n.a.	.112	2.609	.310
1956	n.a.	.110	3.594	.383
1957	n.a.	.126	4.293	.290
1958	2.456	.302	3.901	.709
1959	n.a.	.339	3.488	.652
1960	n.a.	.428	3.405	.479
1961	1.581	.875	3.405	.864
1962	2.042	.581	3.347	1.417
1963	4.855	1.122	4.430	1.292
1964	4.657	2.245	3.568	1.797
1965	4.549	1.357	3.488	2.088
1966	5.568	1.830	3.729	2.057
1967	5.879	2.179	3.453	2.813
1968				
1969				
1970				
1971				
1972				

Table IX-2.--World per capita consumption of clams, by country, (Continued)

	United States	United Kingdom
	-------Pounds, round weight---------	
1947	1.549	
1948	1.653	.353
1949	1.543	.346
1950	1.659	.306
1951	1.705	.366
1952	1.560	.335
1953	1.479	.335
1954	1.212	.306
1955	1.259	.331
1956	1.369	.295
1957	1.404	.291
1958	1.264	.234
1959	1.531	.254
1960	1.641	.335
1961	1.659	.346
1962	1.740	.392
1963	2.001	.267
1964	2.001	.227
1965	2.163	.287
1966	2.216	.450
1967	2.06	.717
1968	1.978	
1969		
1970		
1971		
1972		

Source: Original data from FAO Yearbook of Fishery Statistics.

Table IX-3.--Clam exvessel prices, by selected countries

	U.S.	Korea	Japan
	----------	Cents per pound	----------
1947	26.8	n.a.	n.a.
1948	27.5	n.a.	n.a.
1949	24.9	n.a.	n.a.
1950	26.7	n.a.	n.a.
1951	26.7	n.a.	n.a.
1952	29.7	n.a.	n.a.
1953	30.6	n.a.	n.a.
1954	31.1	n.a.	n.a.
1955	29.8	n.a.	5.19
1956	27.8	n.a.	4.81
1957	28.0	n.a.	3.81
1958	28.7	n.a.	2.62
1959	25.3	n.a.	2.65
1960	23.9	n.a.	2.58
1961	22.6	n.a.	3.03
1962	21.3	2.83	2.53
1963	22.1	3.50	3.50
1964	22.8	1.44	1.79
1965	27.4	1.90	2.51
1966	25.5	1.82	2.54
1967	32.5	2.64	n.a.
1968	30.4	n.a.	n.a.
1969			
1970			
1971			
1972			

Source: FAO Yearbook of Fishery Statistics

X U.S. TRADE BARRIERS

Table X-1.--Present U.S. tariff structure for clams

Item	Stat. Suffix	Product Description	Rates of Duty: June 30, 1967	Rates of Duty: Jan. 1, 1969	Rates of Duty: K-R Concession (Jan. 1, 1972)	U.S. Imports-1968: Quantity	U.S. Imports-1968: Value
		Clams: In airtight containers					
114.01	00	Razor clams (siliqua Patula)	7.5% ad. val.	6% ad. val.	3.5% ad. val.	266	385
114.05	00	Other	20% ad. val.*	17.5% ad. val.*	15% ad. val.	1,850,466	1,107,298
114.10	00	Other (not in airtight containers)	Free	Free	Free	748,692	270,994
114.50	00	Clam juice, canned	17.5% ad. val.	14% ad. val.	8.5% ad. val.	37,188	4,334

*Subject to the provisions of Section 336(F) of this act, the merchandise provided for in Item 114.05 shall be subject to duty upon the basis of the American selling price of like or similar articles produced in the United States.

Table X-2.--Historical synopsis of trade investigations on clams[1/]

1. Section 9(b) of the Fish and Wildlife Act of 1956	None
2. Escape Clause under Executive Orders and the T.E.A. of 1951, as amended (T.C.)	None
3. Section 301 of the T.E.A. of 1962 (T.C.)	None
4. Section 332 of the T.E.A. of 1930 (Investigations by the Tariff Commission)	None
5. Antidumping under Antidumping Act of 1921 (Customs Bureau)	None
6. Countervailing (Section 303 of T.E.A. of 1930 Customs Bureau)	None

1/ Antidumping information checked since 1954; for Section 332 and countervailing no summary lists available and an inquiry into a number of cases has not been completed.

XI GOVERNMENT PROGRAMS

—Subsidies

—Mortgage insurance

—Loans

—EDA projects

—BCF expenditures

—Federal aid to states

Table XI-1.--Bureau of Commercial Fisheries programs and expenditures on clams, fiscal years 1960-69

Bureau of Commercial Fisheries programs	1965	1966	1967	1968	1969
1960 and 1964 Fishing Fleet Improvement Act					
a) Number of vessels constructed	-	-	-	-	-
b) Total government subsidies to vessels constructed (dollars)	-	-	-	-	-
Mortgage Insurance Program					
a) Number of vessels	-	-	-	-	-
b) Value of mortgages (dollars)	-	-	-	-	-
Fisheries Loan Fund					
a) Number of vessels receiving loans	-	-	-	1	1
b) Total value of loans (dollars)	-	-	-	18,200	8,805
Other BCF programs (dollars) 1/	n.a.	n.a..	500,000	400,000	400,000

Source: Division of Financial Assistance, Bureau of Commercial Fisheries

1/ 1971 Program Memorandum, Department of the Interior, Living Aquatic Resources.

Table XI-2.--Estimated Economic Development Administration expenditures on clams by program, May 1961 - May 1969[1/]

Program/Project	Amount
Public Works Loans & Grants	0
Business Loans:	
Chesapeake Clam Chip Co. Cambridge, Maryland	$ 82,000
Cape May Canners Burleigh, New Jersey	54,000
Total Business Loans	$ 136,000
Technical Assistance Grants:	
Chesapeake Clamchip Co. (Mgt. asst.)	$ 5,000
Maine Sea & Shore Clam Cleansing	44,000
Dukes County, Mass. shellfish study	30,000
Maryland U. Softshell clam study	89,000
Total Technical Assist.	$ 168,000
Grand Total	$ 304,000

1/ Includes available information on expenditures under the predecessor agency, the Area Redevelopment Administration. Estimates represent an attempt to prorate the total amount of EDA funding applicable to the fishing industry in multi-industry projects and to a particular fishery in multi-fishery projects.

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37. Major Economic Trends in Selected U.S. Master Plan Fisheries: A graphical Survey by R. Kinoshita and F. Bell.

38. Market Potential for the San Pedro Wetfish Fishery by D. Nash.

39. Pertinent U.S. Trade Barrier Information by "Master Plan" Fisheries by J. Micuta.

40. An Analysis to Determine Optimum Shrimp Fishing Effort by Area by V. Arnold.

41. A Survey of Fish Purchases by Socio-Economic Characteristics, Third Quarterly Report - August, September, October, 1969 by D. Nash.

42. Investigation of Fish Landing Patterns at Stonington, Connecticut with a View to Development of New Markets by D. Nash.

43. A Survey of Maximum Sustainable Yield Estimates on a World Basis for Selected Fisheries by R. Fullenbaum.

44. Methods for Calculating Civilian Per Capita Consumption of Fresh and Frozen Shellfish by S. Erickson.

45. The Organization of the California Tuna Industry: An Economic Analysis of the Relations Between Performance and Conservation in the Fisheries by R. Marasco.

46. Who Buys Fresh and Frozen Seafoods in the United States-A Quantitative Survey of Fish Buying Patterns by Darrel A. Nash.

47. Projections of Certain Fishery Products of Commercial Importance in Louisiana by D. Nash.

48. The Productivity of the Sea and Malthusian Scarcity by F. Bell and E. Carlson.

49. A Survey of Fish Purchases by Socio-Economic Characteristics - Fourth Quarterly Report - November, December 1969, and January 1970 by Darrel A. Nash.

50. A Survey of Fish Purchases by Socio-Economic Characteristics - Annual Report by Darrel A. Nash.

51. Basic Economic Indicators-Atlantic Groundfish.

52. Basic Economic Indicators-Halibut.

53. Basic Economic Indicators-Northern Lobsters.

54. Basic Economic Indicators-Sea Scallops.

55. Basic Economic Indicators-Clams.

56. Basic Economic Indicators-Oysters.

57. Basic Economic Indicators-Shrimp.

58. Basic Economic Indicators-Blue Crabs.

59. Basic Economic Indicators-King and Dungeness Crabs.

60. Basic Economic Indicators-Menhaden.

61. Basic Economic Indicators-Tuna.

62. Basic Economic Indicators-Salmon.

The goal of the Division of Economic Research is to engage in economic studies which will provide industry and government with costs, production and earnings analyses; furnish projections and forecasts of food fish and industrial fish needs for the U. S.; develop an overall plan to develop each U. S. fishery to its maximum economic potential and serve as an advisory service in evaluating alternative programs within the Bureau of Commercial Fisheries.

In the process of working towards these goals an array of written materials has been generated representing items ranging from interim discussion papers to contract reports. These items are available to interested professionals in limited quantities of offset reproduction. These "Working Papers" are not to be construed as official BCF publications and the analytical techniques used and conclusions reached in no way represent a final policy determination endorsed by the U. S. Bureau of Commercial Fisheries.