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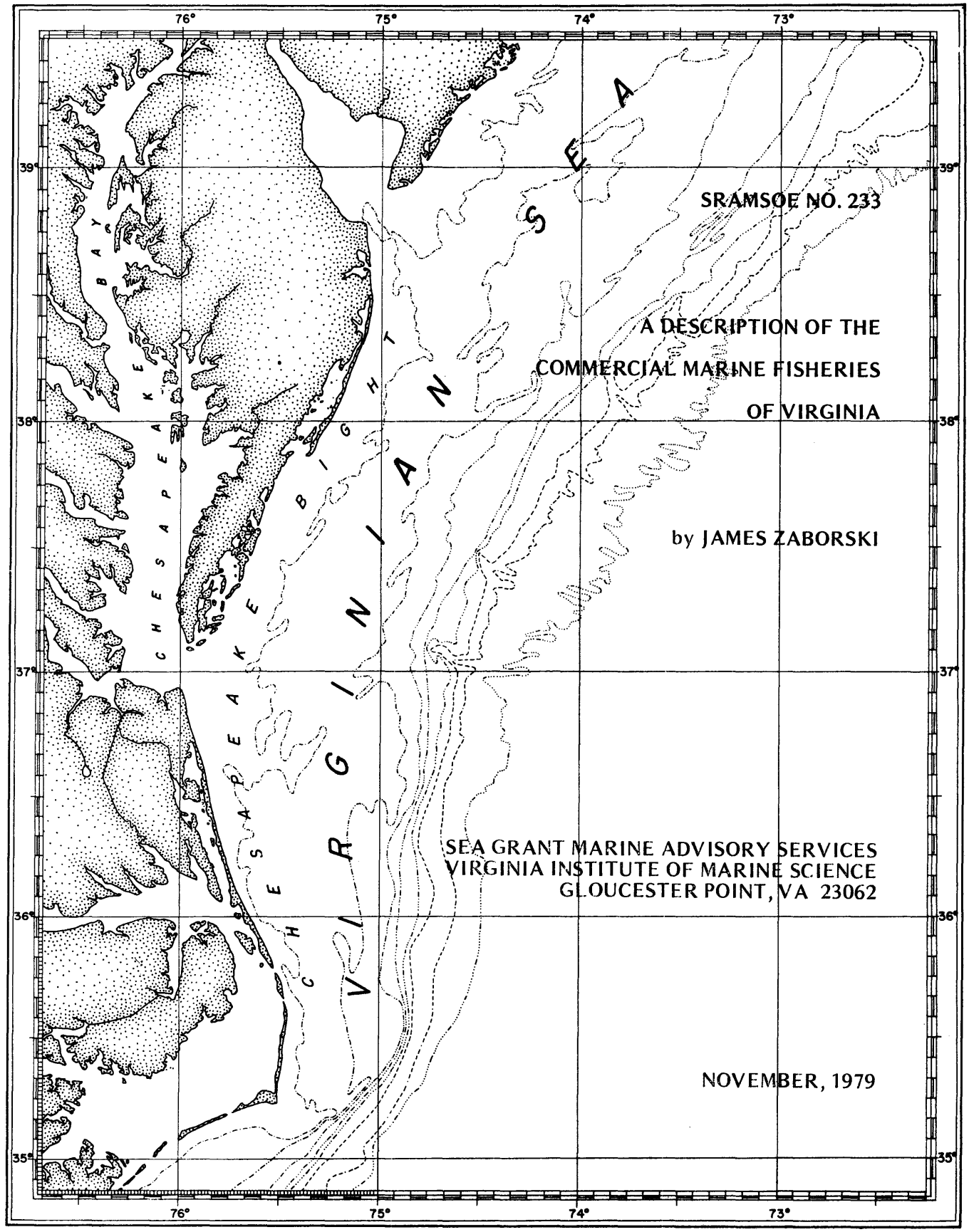

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Analysis of Virginia's Fisheries

The magnitude and value of the fisheries of Virginia are significant. Expansion of some fisheries since 1977 in conjunction with rising prices for fishery products in general has increased the importance of this industry to the Commonwealth. Virginia's fisheries are varied, some segments of the industry such as the oyster fishery have been in existence since colonial days; others, such as the surf clam fishery, are relatively new. The size and composition of the different industries also differ widely. The menhaden fishery exemplifies what might be termed corporate fishing while the blue crab fishery is conducted by numerous individual owner-operators. To best analyze Virginia's multifaceted fishing industry, it has been divided into three subdivisions: the Chesapeake Bay fisheries, excluding menhaden, the offshore fishing industry and the menhaden fishery.

Offshore Fisheries

Virginia's offshore industry has been the most actively expanding segment of Virginia's fisheries. The impetus behind the expansion has been the abundance of the highly valued sea scallops in the mid-Atlantic. Table I depicts trawler and scallop vessel landings and value between 1970 and 1978. This table demonstrates the dramatic increased

TABLE I

VIRGINIA TRAWLER AND SCALLOP VESSEL LANDINGS - 1970-78

	FINFISH		SCALLOPS*	
	Pounds	Value	Pounds	Value
1970	8,099,700	1,546,542	750,400	991,882
1971	5,625,800	1,060,512	543,400	800,315
1972	4,622,400	972,916	957,700	1,850,712
1973	6,109,300	1,336,168	770,600	1,342,942
1974	5,369,200	1,185,966	837,700	1,224,522
1975	7,575,300	2,147,363	880,900	1,620,895
1976	5,614,910	1,532,103	1,474,700	2,713,457
1977	7,939,000	2,626,936	2,712,800	4,509,023
1978	10,304,800	3,708,316	7,125,090	17,358,614

*Does not include scallop trawl landings.

Sources: Fishery Statistics of the United States, 1970-1974, U.S. Department of Commerce; National Marine Fisheries Service, Hampton, Virginia.

production of scallops by Virginia fishermen. Landings between 1976 and 1978 alone increased by 163%. In addition to increased landings, consumer demand reflected in ex-vessel prices continued to rise. The average ex-vessel price per pound of scallops rose by 68% between 1977 and 1978 from $1.66/lb. to $2.44. Prices continue to rise today. This combination of factors, abundant stocks and rising prices, have accelerated the expansion of the segment of the industry. The extent of the growth is demonstrated in Table II where the number of vessels landing scallops at Virginia ports has risen by 585% from 13 in 1970 to 89 vessels in the first seven months of 1979. Although scallops have been the major motivation behind this growth, other factors have been influential.

The Fishery Conservation and Management Act of 1976 (FCMA) has had the most obvious influence on fisheries expansion. The law was written to conserve the resource and, through proper management, maintain the highest production levels possible. The FCMA also states that only those fish in excess of U.S. harvesting capacity can be taken by foreign fishermen. This has dramatically reduced foreign fishing efforts in U.S. waters. In 1975 there were more than 2,700 foreign fishing vessels off U.S. coasts. By 1978 this number was reduced to 600. The foreign catch within the 200 mile limit has been reduced to 1.7 million

metric tons from 1971's high of 3.5 million. FCMA therefore has influenced expansion in the Mid-Atlantic by eliminating some of the risk involved in the expansion of the industry. It has also enhanced the potential for overseas sales of U.S. fishery products by reducing foreign production.

The FCMA, however, has been a double edged sword in some areas. In the Gulf of Mexico, for example, the FCMA prompted Mexico to establish its own 200 mile limit, displacing that portion of the U.S. shrimp fleet which traditionally worked in Mexican waters. This, in conjunction with poor shrimp production in the Gulf over the past few years, has forced some Gulf shrimpers to look elsewhere for fishery resources. Virginia's offshore resources looked attractive and some Gulf fishing fleets have moved to this area, contributing significantly to the expansion of Virginia's offshore fleet.

Virginia's offshore trawl fisheries have also expanded, although not as dramatically as the scallop fishery. Table II again describes the expansion of this segment of the industry showing an increase of 160% in the number of trawlers landing in Virginia ports between 1970 and 1978. It is likely this expansion was the result primarily of the FCMA either in the form of the favorable climate it produced or for its displacement of Gulf fishermen. This appears to be the case since the rise in average prices for finfish

TABLE II

Numbers of vessels using Otter Trawls and Scallop Dredges landing in Virginia from January 1970 through July 1979.

	Otter Trawls	Scallop Dredge
1970	57	13
1971	52	10
1972	49	16
1973	55	16
1974	66	9
1975	84	6
1976	83	8
1977	102	23
1978	145	51
through July* 1979	73	89

*Tentative Data

Source: 1970-75 information from Fishery Statistics of the United States, 1976-79 data from National Marine Fisheries Service, Hampton, Virginia.

between 1977 and 1978 was only 9%, which in itself would probably not attract new investment.

Regardless of reasons, considerable growth has occurred in these offshore industries. Similarly, the employment opportunities provided by these and support industry has grown. In 1978 the income generated by Virginia's industries was estimated to be $41.8 million with a total employment of over 4,000 (DuPaul and Baker, 1979). Clearly these industries are of significant import to the state.

These industries also present great opportunity in terms of their ability to harvest underutilized species. The major underutilized species off the Virginia coast are the two squids, Loligo pealei and Illex illecebrosus, butterfish, Peprilus triacanthus; mackerel, Scomber scrombrus; and river herring of the species Alosa pseudoharengus and A. aestivalis. The magnitude of these resources is described in Table III showing foreign allocation for some Northwest Atlantic species taken within the Fisheries Conservation Zone as well as the quantity landed by the foreign fleet during 1977. The total for the species listed in Table III is in excess of 100,000 metric tons. It is not possible to determine what portion of this catch could be taken by mid-Atlantic fishermen, but the figure does indicate the potential magnitude of the resource.

TABLE III

Total Foreign Allocation for 1979
and Foreign Catch During 1977

Species	FCMA 1979 Allocation	Foreign Catch 1977
Mackerel	857	76,222
Butterfish	2532	3,439
River Herring	372	6,661
Loligo	18165	16,045
Illex	19850	21,389

NOTE: Catch and allocation figures are in metric tons.

SOURCE: National Marine Fisheries Service

The majority of these products would probably be sold overseas since acceptance in the U.S. markets is limited at this time. To compete in the overseas foreign market, large volume production will be necessary. This factor would probably exclude the smaller U.S. vessels from entering these fisheries. The harvesting techniques would vary somewhat between these species, however, typical scallop vessels and larger trawlers could be modified to accommodate these new types of gear.

The opportunities provided by the underutilized species in the mid-Atlantic appear to be occurring at the right time. Virginia scallop and trawler fleets are at an all time high. These vessels are adaptable to harvesting underutilized resources. The U.S. status in the international economy has changed to the point where our products are now competitive in the world market. The resources in question are under our jurisdiction. These factors all seem to point to the ultimate development of these resources. Ironically, however, it appears the single most important factor in this development will again be the sea scallop. Scallop stocks in the mid-Atlantic have historically exhibited a cyclic abundance. The current fishery is based primarily on the large 1972 year class. This year class has been heavily fished since 1976. Recruitment since 1972 is not likely to sustain the current

pressure. Reports from vessel captains and crews indicate reduced landings per trip. Declining returns from the scallop fishery are likely to result in increasing interest on the part of scallop vessel skippers and owners in the potential of underutilized species.

While development of these underutilized species appears imminent, certain problems exist which might retard the rate of expansion. The majority of these problems are related to the fishermen and processors - wholesalers' unfamiliarity with these species. Questions arise with regard to harvesting techniques, shipboard handling, and acceptable quality. Without adequate information on these and other aspects of new fisheries it is difficult for the entrepreneur to evaluate the profitability of these fisheries. Consequently, they may be more likely to continue harvesting traditional species where the rate of return has been established. In the mid-Atlantic area this could mean a substantial increase in fishing pressure on traditional species should the scallop fleet convert to trawling. This could adversely effect the smaller trawl boat operators, and bay fishermen dependent on these species. Additionally, under this situation sport fishermen could react by proposing limitations on commercial catch. Should the fishing pressure exceed the optimum yield it is likely management plans would restrict the harvest of

certain species, affecting all users of the resource. Although this scenario may not be thoroughly accurate some aspects are likely to occur. Rapid development of the underutilized species in the mid-Atlantic is most important to avoid this possibility.

The surf clam fishery was excluded in this discussion of Virginia's other offshore fisheries because of special problems related to the fishery. The surf clam fishery has been regulated by the Mid Atlantic Fisheries Management Council Fishery Management Plan (FMP) for Surf Clams and Ocean Quahogs since November of 1977.[1] The management plan for this fishery have established quotas, limited effort (in terms of number of fishing days) and closed the fishery to new entrants until December 1980. The regulations have limited fishing effort to as little as 24 hours of fishing time per vessel per week. Under the restrictions and quotas established by the FMP the surf clam fishery continues to contribute significantly to Virginia's economy. Preliminary data from the National Marine Fisheries Service for 1978 indicate that over 12.7 million pounds of meats were landed and were valued at over $7 million. Surf clams accounted

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[1] Final Environmental Impact Statement/Fisheries Management Plan For Surf Clam and Ocean Quahog Fisheries 1977. Mid Atlantic Fishery Management Council in consultation with the New England and South Atlantic Fishery Management Councils.

for 16% of the total value of all fisheries products landed in Virginia in 1977.

The present regulation intentionally limits the potential harvest in the fishery in order to permit the stocks to rebuild for greater future yield. Unfortunately, the specialized equipment used in this fishery does not allow easy conversion to other offshore fisheries unless the ocean quahog is sought.

Currently, the optimum yield for ocean quahogs is 40 million pounds. Total landings in 1977 were 8.4 million pounds and accounted for 20% by weight and 7.5% by ex-vessel value of all clams harvested in the U.S. This is up from the early 1970's when ocean quanogs accounted for only about 1% of the total weight and less than 1% of the total ex-vessel value. The industry has made some progress toward developing this fishery but tnere is still substantial room for expansion.

Chesapeake Bay Fisheries

The fisheries of the Chesapeake Bay are numerous and varied exploiting over 50 species of fishes, mollusks, and crustaceans. Over 73 million pounds of seafood, valued at over 16 million dollars, were harvested from the Bay during 1977. According to the Virginia Marine Resources Commission, 3471 people earned 50% of their income from

Chesapeake Bay resources and an additional 2965 people obtained a portion of their income as casual participants during that period.

The oyster and blue crab are the most important commercial species to the Chesapeake Bay fisheries, accounting for over 74% of the total value of seafood landed excluding menhaden (Table IV). Together they provide year round employment. Oysters are generally harvested in the fall, winter and early spring, whereas the majority of the blue crab catch is made from June through September. Many fishermen are dependent on these resources during different times of the year.

Clearly, these species are important to the Chesapeake Bay fisheries. There are problems, however, which plague both these fisheries. Some of these problems are common to both fisheries some are quite different.

Common to both fisheries is the problem of labor intensive processing. Hand picked crab meat and hand shucked oysters remain the major product form of these species. The demand for these products is highly elastic. Increasing prices to cover the cost of increased labor drives demand and, subsequently, sales down. Processors therefore find it difficult to compete with other industries for labor particularly during times of increasing minimum

TABLE IV

1977 Chesapeake Bay Landings and Value of Major species of Finfish and Shellfish including Percent of Total Value of each Species excluding Menhaden*

Species	Pounds Landed	Dollar Value	% of Value of finfish	% of Value of Total Ches. landings
Croaker	7,044,189	697,803	18.50	4.25
Seatrout (gray)	3,564,886	579,827	15.38	3.53
Shad	1,409,800	489,363	12.98	2.98
Striped Bass	821,878	429,339	11.38	2.61
Catfish and Bullheads	1,666,716	348,910	9.25	2.12
Spot	1,549,164	321,787	8.53	1.96
Bluefish	2,874,649	194,783	5.16	1.18
Fluke	280,972	113,909	3.02	.69
Eels	358,745	107,302	2.84	.65
Alewives	1,390,075	54,082	1.43	.33
Unclassified for Ind.use	10,922,990	339,809	9.01	2.07
39 other species	502,818	94,130	2.50	.57
Total Finfish	32,465,480	3,771,044		22.94
			% of Value of Shellfish	
Blue Crab	36,100,423	7,025,156	55.50	42.76
Oysters	4,615,317	5,257,174	41.53	32.00
Hard Clam	398,650	299,248	2.36	1.82
Other Shellfish	260,499	77,023	.61	.47
Total Shellfish	41,374.889	12,658.645		77.05
Total Shellfish and Finfish	73,840,396	16,429,689		

Sources Virginia Landings Annual Summary 1977, NMFS
Current Fisheries Statistics No. 7513

*Data includes Virginia landings from the Potomac River, Chesapeake Bay and Tributaries.

wages. Mechanization of the processing sector of these industries which would reduce production costs and prices should stimulate demands for these products. Although work on these machines has been done in the past and some prototypes have been constructed, lack of production models would indicate these efforts should continue.

Likewise, both these industries could benefit from marketing or public awareness programs. However, the cost of such programs would probably be prohibative for the size of the firms currently operating in these industries. Consequently, it is unlikely that any extensive marketing activities will be developed by individual firms. Responsibility for these types of programs will probably remain with industry organizations, state marketing authorities and government-industry sponsored programs through Development Foundations.

Other problems associated with the Chesapeake oyster and crab fisheries are more specific to each. The differences stem from the fact that the crab fishery is based on a totally wild population, whereas oysters can be cultured by man. The abundance of crabs is therefore a function of conditions over which man has little or no control.

Although studied for many years, the factors influencing the cyclic nature of the abundance of blue crabs are not yet understood. One theory today suggests that the size of the Chesapeake Bay crab population may be influenced by meteorological conditions during critical phases of the life cycle of the crab. As an example, it is believed that northwesterly winds combined with heavy freshwater runoff, when crab larvae are abundant in the surface waters near the mouth of the Bay, will drive the larvae out of the Bay and into the ocean where they are caught up in littoral currents, never to return. Scientists are currently reviewing historical weather and landings data to ses if any cause and effect relationships have occurred.

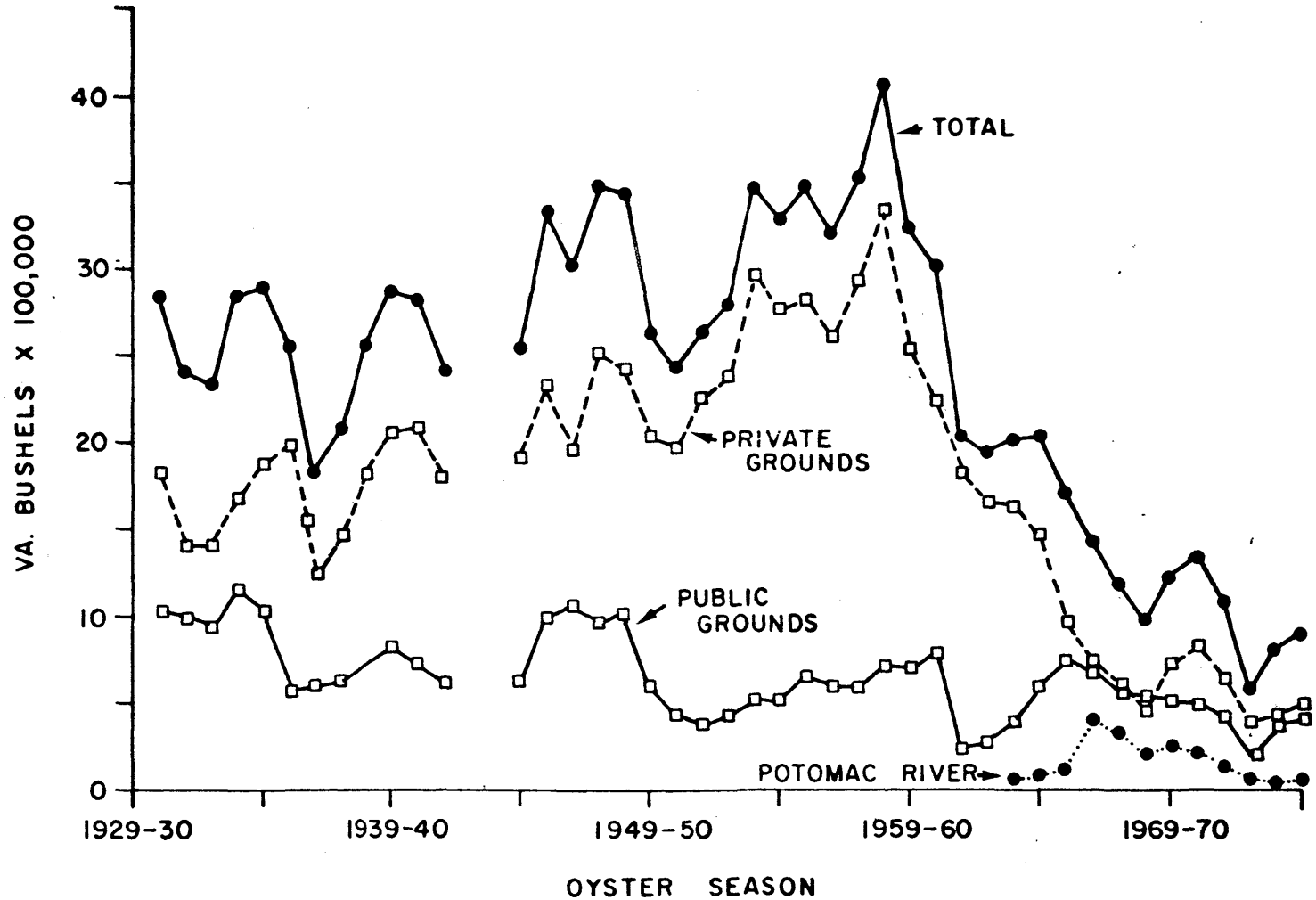
Even if such relationships have occurred, we cannot use that information to increase the abundance of crabs in the Bay. However, predictability of the size of the population will be significantly enhanced. Forecasts of the size of the commercial catch could be made well in advance. This would help processors or wholesalers in making decisions regarding expansion of their plants, marketing efforts, purchase of new equipment and the like. Similarly, it would enable fishermen to decide in advance whether or not to go crabbing or to consider some alternate fishery.

Unlike the blue crab fishery, the oyster industry can influence the abundance of oysters produced in Chesapeake

Bay. However, problems in the recent past have adversely effected this industry. Perhaps the most extensive reference on the subject is the publication by Dexter Haven entitled "The Oyster Industry of Virginia: Its Status, Problems and Promise." While duplication of his findings in this report are not possible, some of what he believes to be the major factors which influence the decline in the past and thwart expanded production today can be brought to light.

Perhaps the most devastating problem to effect Virginia's oyster industry was the occurrance of the disease MSX in the early 1960's. The disease which was most prevelant in the higher salinity areas, rendered extensive areas of leased bottom unproductive for oyster culture. Annual production fell from around 3.5 million bushels in the 1950's to 850 thousand bushels in 1972. Figure I depicts oyster production on leased and public grounds from 1931 to 1972. The decline beginning in 1962 was primarily on leased grounds. Lease holders of grounds plagued by MSX were unable to relocate because areas remaining for lease would not be profitable for oyster production, under the market value and production costs at that time. This situation, according to Haven, persists as the single most important factor limiting increased production.

Figure I



Virginia catch of market oysters 1930-1 thru 1974-5. Date for "Total", "Public" and "Private" thru 1971-2 from Fish. Stat. U.S. NMFS; other date from VMRC. The "Potomac River" curve shows the quantity which was taken from that river where the PRFC has jurisdiction and was credited to Virginia by NMFS. (From Haven et al)

To increase production Haven contends, that either the value of the product will have to be increased or the cost of production will have to be reduced. The value of oysters, to the consumer, could be increased through marketing and public awareness programs addressed above.

The reduction of production costs is the other factor which could lead to overall increased production of Virginia oysters. This aspect is practical and should be pursued. Recommendations for reducing these costs include mechanization of certain phases of the industry. The need for mechanized shucking has already been discussed. In addition, mechanization of seed harvesting and planting could also reduce production costs.

Mechanization of these segments of the oyster industry is quite possible using the present technology. This is particularly applicable in the produciton of seed oysters. Currently, Virginia law mandates that seed from public grounds be harvested by hand tongs. If these laws were changed to permit mechanized seed harvesting, the per bushel price of seed could be reduced considerably. This would provide incentives for growers to plant on marginally productive leased bottoms. Reduced seed prices would likewise increase the quantity of seed oysters that would be planted by the Marine Resources Commission on public bottom.

Another recommendation for increasing production also involves a legislative change. This would entail the reassignment of some of the less productive State Bottoms (Baylor Bottoms), making them available for lease. Although some of these areas could be productive if planted with shell or seed by the State, budget contraints in the state oyster replenishment program dictates that these marginal grounds will never be planted. They therefore remain unproductive. If these grounds were made available to private growers, willing to invest in seed or shell, they could produce oysters. A joint legislative subcommittee is currently reviewing these and other recommendations to increase the production of oysters in Virginia and is scheduled to make its recommendations known during the 1980 Assembly.

Other possible avenues for increasing oyster production would be the establishment of oyster seed hatcheries, either public or private. Here again the emphasis must be on reducing production costs. Hatchery raised seed oysters must be competative with natural seed. While pilot hatcheries in Chesapeake Bay have shown that oysters can be propogated under controlled systems, the feasibility of a commercial scale hatchery has not yet been demonstrated. The high capital investment necessary for hatchery construction and operation causes private growers to be

conservative about investing in hatcheries. Consequently, no commercial oyster seed hatcheries exist in Chesapeake Bay.

The finfisheries of Chesapeake Bay, excluding menhaden, are conducted by three types of gear: gill nets, pound nets and haul seines. This gear appears to be effective, since in 1977, over 32 million pounds of finfish were landed in Chesapeake Bay. Table IV indicates the species of greatest value to the fishery during 1977. The relative position of the species on this list is likely to change from year to year as the result of several factors. Certainly, the biological factors influencing their abundance of the individual species would effect the composition of the list from year to year. There appears to be little that can be done at this time to increase the abundance and consequently the value of these species to the fisheries. Another factor affecting the value of a species to the fisheries is its marketability. The marketability is dependent upon the consumers demand for the product or product form.

McHugh et al. cited changes in the consumer pallet as a major factor influencing economic decline in the Chesapeake finfisheries in the early 1950's.[2] Referring to the status of the stocks he states, "Returns to former levels of

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[2]McHugh, J. L. and R. S. Bailey (1957). "History of Virginia's Commercial Fisheries," Va. Journal of Science: (8) (No. 2) 42-64.

abundance brought no benefit to the industry, probably because frozen products, such as fish sticks, from other areas have not captured the market." He goes on to say that, "Most Chesapeake fishes, because they are small and contain proportionally little meat, cannot be prepared economically as fillets, fishsticks or blocks." It appears this situation persists today. Marketing efforts or the development of new product forms could offset this situation. Here again, as with oysters and crabs, it is unlikely that major efforts in these activities will come from within the industry because of the size of the firms involved. Industry organizations and quasi-government institutions will probably have to take up the lack in these areas.

In addition to expanding acceptance of Chesapeake finfish products domestically, the potential for increased sales overseas should not be ignored. The acceptance of the concept of fishery conservation zones by coastal states, coupled with rising fuel costs, will eventually lead to the demise of distant water fleets. The products which were once supplied by these fleets will become scarce and afford new opportunities for overseas sale of U.S. produced fishery products. It is likely that Chesapeake fishery products and product forms will find acceptance in this expanding market. However, before this potential can be realized, U.S.

fishermen and processors will have to better understand the demands of overseas markets. They will need to learn handling, processing, and packaging techniques acceptable to these markets. Additionally, they will need to learn the mechanics of overseas trade. It is likely that this will evolve on its own as the opportunities present themselves. However, in light of the fact that an accelerated expansion is desirable, government participation becomes necessary.

The government can assist by providing information about potential markets and by supplying the information needs stated above. Clearly, efforts of this type could provide benefits to all segments of Virginia's fishing industry and are not limited to Chesapeake Bay finfisheries.

Menhaden Fishery

Virginia's menhaden fishery has for years been the single most valuable fishery in the state. Preliminary data indicates that in 1979 it will be surpassed by the sea scallop fishery. Even in this reduced stature, the menhaden industry contributes significantly to the economy and well being of the Commonwealth. During 1977, over 501 million pounds of menhaden were landed, valued at over 19 million dollars. The industry provides employment for about 900 people.

The menhaden fishery is an extremely efficient operation. Purse seines, puretic blocks and fish pumps enable the industry to produce the large volume, low priced product it requires. While an extremely efficient and profitable industry there are areas where improvement can be made.

These have to do with the product forms and uses of these product forms. The products to which menhaden are reduced find a myriad of industrial and agricultural applications. However, the single most efficient use, as a high protein source available to humans, has been effectively blocked by Food and Drug Administration (FDA) rulings against the product. In a world where famine is still widespread, the inefficient use of this protein, as animal feed, must be reexamined. A change in position by FDA on this matter would mean increased revenues for the menhaden industry in return for a product suitable for human consumption. More importantly, however, would be the considerable quantity of inexpensive protein that could be made available to a protein poor world.

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