JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

THE VIRGINIA GENERAL ASSEMBLY

THE ECONOMIC POTENTIAL AND MANAGEMENT OF VIRGINIA'S SEAFOOD INDUSTRY

REPORT OF THE

JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

ON

THE ECONOMIC POTENTIAL AND MANAGEMENT OF

VIRGINIA'S SEAFOOD INDUSTRY

TO

THE GOVERNOR

AND

THE GENERAL ASSEMBLY OF VIRGINIA

HOUSE DOCUMENT NO. 2

COMMONWEALTH OF VIRGINIA
RICHMOND
1984

MEMBERS OF THE JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

Chairman
Senator Hunter B. Andrews

Vice Chairman
Delegate L. Cleaves Manning

Delegate Richard M. Bagley
Delegate Robert B. Ball, Sr.
Senator Herbert H. Bateman
Senator John C. Buchanan
Delegate Vincent F. Callahan, Jr.
Delegate Theodore V. Morrison, Jr.
Delegate Lacey E. Putney
Delegate Ford C. Quillen
Senator Edward E. Willey
Mr. Charles K. Trible, Auditor of Public Accounts

Director
Ray D. Pethtel

JLARC STAFF FOR THIS REPORT

Joseph H. Maroon, Project Director
Lynn L. Grebenstein
R. Jay Landis
Mary H. Schneider

Susan L. Urofsky, Division Chief

Gary T. Henry, Staff Methodologist

PREFACE

House Joint Resolution 59 of the 1982 session of the General Assembly directed JLARC to study the regulation of the commercial fishing and seafood industries in the Commonwealth and to assess their economic potential. The Commission was requested to develop for legislative consideration policy alternatives that might help foster the State's competitive position nationwide.

Virginia has long been a leader in commercial fishing. The State has an abundance of shellfish and finfish in its waters. Among the largest fishing industries are oysters, hard clams, blue crabs, and menhaden -- the four commercial fisheries upon which this report focuses.

A unique feature of this study is the use of econometric modeling techniques to predict landings and revenues associated with various policy options that are available to the General Assembly. To our knowledge, this is the first time econometric models have been developed and used to aid in making fisheries management decisions. JLARC staff worked closely with researchers at Virginia Polytechnic Institute and State University (VPI&SU) to produce models of the State's oyster and hard clam industries for legislative purposes. Staff consulted with researchers at the Virginia Institute of Marine Science of the College of William and Mary, who were also developing an econometric model of the hard clam fishery.

Subsequent to the staff briefing of the draft report, the Commission introduced a resolution into the 1983 General Assembly session directing the Secretary of Commerce and Resources to report on the specific administrative steps necessary to implement, in full or on a pilot basis, the economic and administrative options contained in the report. The resolution also asks the Secretary to draft for legislative consideration a fisheries policy statement for Virginia. Until such information is prepared, the report and policy options will be pending before a subcommittee of the Commission.

On behalf of the Commission staff, I wish to acknowledge the cooperation provided by the many State agencies and industry groups who helped obtain information for this report. A note of special recognition is appropriate for Dr. Leonard Shabman, Professor of Agricultural Economics, and Richard March, a doctoral candidate at VPI&SU, for their work in developing the econometric models of the oyster and hard clam industries used in this study, and for their assistance in interpreting results for a legislative audience.

Ray D. Pethtel
Director

THE ECONOMIC POTENTIAL AND MANAGEMENT OF VIRGINIA'S SEAFOOD INDUSTRY

January 5, 1983

Joint Legislative Audit and Review Commission

The abundant resources of Virginia's waters and its mid-Atlantic location have contributed to making the Commonwealth a national leader in the commercial harvesting and processing of seafood. In FY 1981, the dockside value of the State's commercial catch exceeded $69,000,000, and the industry employed over 8,000 fishermen and thousands of seasonal workers in processing plants.

Virginia's competitive position, however, has declined in recent years due to several factors: competition from other states, changing consumer demand, fluctuating economic conditions, and legal challenges to residency requirements for fishing licenses.

House Joint Resolution 59 was enacted by the 1982 General Assembly in response to industry and legislative concern that the Commonwealth is not achieving the full economic potential of its marine resources. The resolution directed JLARC to review the nature and scope of the regulation of Virginia's fishing and seafood industries and their economic potential. The Commission was charged with developing policy alternatives to foster the State's competitive position, preserve the socio-economic well-being of those whose livelihood depends on the industry, and enhance State management and regulation.

A JLARC REPORT SUMMARY

Generally, JLARC found that the State's fishing and seafood industries appear to have significant economic potential. The outlook varies, however, with the species under consideration. Moreover, several of the policy options developed for enhancing this potential would require expanded management responsibilities for State agencies and concurrent organizational and program improvements. The viability of the industry is also dependent on the industry's commitment to its own development and to resource preservation.

POTENTIAL OF VIRGINIA'S SEAFOOD INDUSTRIES (pp. 15-64)

JLARC worked closely with industry representatives to assess the status and potential of each fishery. Econometric models were developed to simulate the impact of proposed changes on the oyster and hard clam industries.

Oyster Fishery. Virginia was the national leader in oyster production during the early part of this century. The industry has declined since 1960, however, due to a number of marketing and environmental factors.

Without some changes, the industry is likely to become stagnant. Policy options are available, however, to increase total State production of oysters by one-third over current levels by 1990. These options could maintain the viability of both public and

private segments of the industry, while generating additional jobs and tax revenues.

Option 1: Maintain the status quo. Under this option, production would be allowed to stabilize at recent levels of about 8 million pounds annually. A continued decline would be predicted in production from public grounds and little growth in private production.

Option 2: Aggressively promote Virginia's oyster products. Increasing promotional efforts could increase consumer demand, raise retail prices, and ultimately stimulate increased production on public and private grounds. Aggressive State efforts in this area could increase the annual harvest by 401,000 pounds by 1990. This would represent an increase of $2.7 million in revenues. Results are not assured, however, because of the State's inability to control consumer demand.

Option 3: Double expenditures for repletion of public oyster grounds. Using the current programmatic approach, doubling the State's repletion expenditures would effect a moderate increase in the annual harvest for watermen using traditional tonging methods. A gain of 500,000 pounds, or $670,000 in revenue, is predicted. Increases in special taxes or general funds might be needed to support the program.

Option 4: Lower the market price for seed oysters. This option would encourage increased private investment in oyster production and reduce public repletion costs. Increases in the annual harvest could range from 1.7 to 3 million pounds, and increases in net revenues could range from $2.3 to over $4 million. This option would require active management of seed beds by VMRC and a departure from traditional methods of hand tonging seed oysters in the James River in order to gain price benefits from more efficient dredging methods.

Option 5: Manage unproductive public grounds by State planting of seed and shell, and allow dredging as a harvesting method. This option would increase production from public grounds and make the industry more reliant on State efforts to maintain oyster production. Annual production from public grounds is predicted to increase by 3.4 million pounds, and revenues by $4.7 million. Legislation would be needed to create additional State management areas. VMRC would have to actively replete these areas and monitor the effects of dredging on production and the bottoms.

Option 6: Lease portions of the public grounds. This option, as compared to Option 5, would stimulate additional private investment in the cultivation and harvesting of oysters. By leasing up to 1,000 acres of public grounds, the State could increase annual oyster production by 3.4 million pounds and revenues by $4.6 million. Legislation would be necessary to redefine the constitutionally-protected natural growing areas in order to allow leasing of currently unproductive bottoms.

The six policy options proposed for the oyster fishery are ranked in terms of the degree of State involvement and the amount of change required. Options 1-3 are extensions of current management activities, while options 4-6 constitute new management initiatives. None of the options, however, would restore production to pre-1960 levels. It is also important to note that the proposed policies are not mutually exclusive.

Hard Clam Industry. Despite increases in prices and the number of harvesters, Virginia's share of Atlantic Seaboard production of hard clams declined from ten percent in 1970 to five percent in 1980. Without changes in the management of the fishery, further declines are likely. Policy options are available, however, to increase annual revenues more than 2 1/2 times over the levels otherwise predicted.

Option 1: Maintain the status quo. On the basis of recent trends, the industry will experience a moderate decline and stabilize at an annual harvest of 587,500 pounds.

Option 2: Sustain the harvest from naturally productive hard clam grounds. The downward trend in clam production may be due either to stock reduction or to the high level of harvesting effort. Moreover, the exact number of licenses required to maximize revenues would be difficult to determine because of imprecise methods of measuring effort. Current clam stock may need to be protected until a study can be conducted to determine actual conditions.

Option 3: Cultivate new clam growing areas and allow the use of hydraulic esca-

lator dredges year-round. The use of up to 20 of these dredges could be allowed on grounds managed or leased by the State. If dredging were allowed during the entire year, annual revenues could increase more than 2 1/2 times over the levels otherwise predicted. The application of this option would depend on the success of a current VIMS project to cultivate hard clams in commercial quantities.

Option 4: Cultivate new clam growing areas and allow the use of hydraulic escalator dredges during the summer months only. Under summer-only operation, peak harvesting periods would coincide with peak demand. This would enable Virginia to take advantage of increased supply with the least impact on prices paid to watermen. Total revenues could increase more than 2 1/2 times over the levels otherwise predicted.

Option 5: Cultivate new clam growing areas and allow the use of hydraulic escalator dredges during winter months only. By concentrating dredging efforts in the winter, Virginia could increase its share of national clam production at a time when cold water temperatures prohibit harvesting in many other states. Although prices would decline more than under Options 3 and 4, total revenues would increase nearly 2 1/2 times over the levels otherwise predicted.

Options 1 and 2 emphasize protection and utilization of current hard clam grounds. Options 3-5 call for the creation of new growing areas and the use of hydraulic escalator dredges, which are currently prohibited in Virginia. Analysis has shown that the use of dredges would not have significant negative impacts on clam growing bottoms or on the incomes of watermen.

Blue Crab Industry. The abundance of crabs in the Chesapeake Bay, combined with high consumer demand and new processing techniques, makes the potential of Virginia's blue crab industry favorable. However, recent court decisions have nullified Virginia's residency requirements, allowing unrestricted access into the lucrative winter dredging of crabs. Some industry members fear that their incomes and the future potential of the fishery may be threatened. Further assessment is necessary to determine the impact of these concerns.

Finfish Industry. The State's finfish industry has the potential for considerable growth due to several factors: the nutritional value of fish and the relatively low cost per pound; the accessibility of major seafood ports within the State; new product forms; and new markets. The development of cooperatives or seafood industrial parks may enable processors and harvestors to take advantage of greater efficiencies.

Recommendation: The General Assembly may wish to consider adopting a resolution which requests the Secretary of Commerce and Resources to report on the steps and considerations necessary to implement, in full or on a pilot basis, the economic and administrative policy options presented in this study and to clearly state the administration's point of view on both the adverse and beneficial consequences of each of the various policy options.

Recommendation: After considering the report of the Secretary of Commerce and Resources, the General Assembly may wish to implement one or more policy options contained in this study on a limited, pilot basis to permit evaluation of the actual impacts on biological, social, and economic conditions.

Recommendation: Prior to any increase of harvesting effort in current hard clam growing areas, VMRC and VIMS should conduct a joint study to determine whether the downward trend in clam production is actually due to stock reduction or the level of harvesting effort. On the basis of this study, the State may wish to consider methods of restraining entry or catch, or methods for developing a replenishment program.

Recommendation: Econometric modeling has been shown to be a useful tool for assessing management alternatives and monitoring results in the oyster and clam fisheries. Building on the techniques used in this study, VMRC should take the lead in refining these techniques, giving them broader application, and utilizing them to make fisheries management decisions. In expanding these techniques, VMRC should utilize the fisheries and economics expertise at VIMS and VPI&SU.

FISHERIES MANAGEMENT BY THE VIRGINIA MARINE RESOURCES COMMISSION (pp. 65-105)

The Commonwealth's lead fisheries agency, the Virginia Marine Resources Commission, is responsible for protecting the State's marine resources, promoting the general welfare of the seafood industry, and enforcing all fisheries laws. However, it has not sufficiently used its existing authority. Despite some changes, two of the agency's major functions—oyster ground management and enforcement—continue to suffer from deficiencies identified in earlier management reports.

Agency Structure and Management Capacity. No organizational unit is responsible for managing all fisheries-related responsibilities or for systematic description, evaluation, and monitoring of fisheries conditions. Currently six units with fisheries responsibilities report directly to the Commissioner, who must then synthesize the technical information. The agency's effectiveness could be significantly enhanced by the creation of an all-inclusive fisheries management unit, headed by an individual with strong organizational skills and a background in fisheries management. Further, empowering the Commissioner to appoint all personnel would ensure clarity in reporting relationships and authority.

VMRC does not have a systematic means for meeting its data processing needs or for collecting fisheries information. Although large quantities of data are collected by various VMRC units, most of this data is manually maintained and is not regularly integrated for management purposes.

The agency has not developed the species-specific management plans necessary for quick response to economic and biological threats to each fishery. The lack of such plans has, in part, prevented VMRC from exercising its full authority in recently designated management areas. The agency does not actively plan for the fisheries, monitor conditions, or evalute the impact of regulatory or management actions in these areas.

Currently, all fisheries management parameters (e.g., seasonal restrictions, administrative procedures, fees) are specified in statute. This situation limits VMRC's ability to respond quickly to changing fisheries conditions. Transferring these parameters from statutory provision to administrative regulation would enhance the agency's management capabilities.

Oyster Ground Management. Several problems have been identified with VMRC's programs for repletion and oyster ground leasing. Many of these problems were also identified in JLARC's 1977 study. Although some corrective action has been taken, the problems have not been fully addressed.

The repletion program for public grounds receives general funds and special fund revenues. JLARC found a sizeable balance of special funds – averaging $602,460 – from January 1979 to October 1982. This balance and spending patterns in recent years indicate that general funds are being spent first, and are being supplemented with special funds. This practice appears contrary to legislative intent.

In addition, the agency's accounting practices need revision to ensure that special funds are expended according to statutory provisions.

VMRC continues to have a substantial backlog of applications for oyster ground leases. The agency needs to develop a strategy for reducing this backlog, as well as a strategy for identifying inappropriately used grounds.

Marine Enforcement. Problems relating to the role of the district inspector and patrol activities continue to impede the division's effectiveness. VMRC needs to assess and revise job classifications and patrolling procedures to ensure that the best use is made of enforcement staff and equipment.

Recommendation: VMRC should create a fisheries management unit, to include the statistics section, liaison officer, repletion department, and engineering and survey division.

Recommendation: The General Assembly may wish to amend the *Code of Virginia* to give the Commissioner exclusive authority to appoint Commission employees.

Recommendation: VMRC should

continue its efforts to develop a comprehensive data processing system. The agency should also improve the quality and completeness of its statistical information by methods such as those suggested in this report.

Recommendation: VMRC should develop fishery-specific management plans for species within the Bay and assess the relevancy of interstate plans to Virginia's needs.

Recommendation: The General Assembly may wish to consider amending the *Code of Virginia* to transfer the details of gear and seasonal restrictions, enforcement methods, and licensure fees to administrative regulation. Consideration might be given to granting VMRC regulatory guidelines similar to those granted the Commission of Game and Inland Fisheries.

Recommendation: VMRC should improve its fiscal planning, allocation, and accounting processes to ensure that special repletion funds are used for the purposes intended. In addition, the General Assembly may wish to clarify how the funds may be used for "administration" of the program and for repletion purposes.

Recommendation: VMRC should consider instituting the procedures specified in this report to improve its tax collection efforts while reducing the involvement of enforcement personnel.

Recommendation: VMRC should take steps to ensure that procedures for handling the processing of lease applications are in compliance with *Code* requirements. Further, the agency should take the steps specified in this report for expediting the application process.

Recommendation: The General Assembly may wish to consider raising the rent on oyster leases and requiring more frequent evidence of appropriate use to discourage non-productive holding of private leases.

Recommendation: VMRC should reclassify its enforcement positions and reassess current practices for the deployment of personnel and equipment to ensure that the best use of resources is made.

PROMOTION, ADVISORY SERVICES, AND INSPECTIONS (pp 105-136)

In addition to the VMRC, several other State agencies provide essential support to the Commonwealth's seafood industry. Promotion is the primary goal of the Marine Products Commission, while research and advisory services are the mission of the Virginia Institute of Marine Science (VIMS).

Other agencies involved in research and providing advisory services include Virginia Polytechnic Institute and State University (VPI&SU), Old Dominion University, and the University of Virginia. Responsibility for inspecting shellfish and finfish processing facilities is divided between two agencies: The Bureau of Shellfish Sanitation within the State Department of Health (SDH) and the Department of Agriculture and Consumer Services (DACS).

Although each of these agencies makes a significant contribution within its particular area, there is a general need for better coordination of activities, a more intense focus on industry problems, and clearer avenues of communication. For example, the current sharing of inspection responsibilities between SDH and DACS results in duplication. Moreover, with funding cuts anticipated, VIMS will need to carefully consider its research priorities.

Recommendation: The Marine Products Commission should aggressively pursue new markets and support the industry in developing the capacity to use new opportunities. The agency should work with representatives of VPI&SU, VIMS, and DACS to establish more formal coordination and planning of the State's seafood promotional activities. In addition, the Commission should take steps to ensure that all Seafood processing firms are aware of its services.

Recommendation: As part of its research planning process, VIMS should establish a formal mechanism for soliciting the advice of industry and marine agencies.

Recommendation: The General Assembly may wish to create one advisory committee, representative of all major

segments of the industry and marine agencies, to advise and comment on the research activities of Sea Grant, VPI&SU, and VIMS.

Recommendation: The Bureau of Shellfish Sanitation should take steps to formalize and standardize its policies regarding plant certification, inspection procedures, and repeat violations.

Recommendation: To ensure inspection of all finfish processing facilities, the General Assembly may wish to amend current statutes to require registration or certification. In addition, the General Assembly may wish to provide DACS with interim sanctions to enforce compliance with standards.

Recommendation: DACS should develop, where applicable, more specific standards and a checklist for inspections of finfish processing facilities. Further, the agency should develop guidelines for use by regional supervisors in classifying facilities for official action.

Recommendation: The General Assembly may wish to clarify the statutory authority for conducting seafood plant inspections. The Assembly may also wish to consider centralizing this function into one agency.

POLICY AND MANAGEMENT FRAMEWORK (pp. 137-146)

Virginia does not have a clearly stated policy for comprehensive fisheries management. As a result, there has been little consistency in the State's management approach, and different goals have been favored at different times. This report has identified agency- and fishery-specific improvements to strengthen the management and increase the potential of the industry. Broader actions are also possible, however, to address the framework within which the State's fisheries-related activities are carried out.

Major elements for a State fisheries policy have been suggested by the Council of State Governments and in the federal fisheries management act. They include: ensuring the continued existence of species; supporting recreational and commercial usage; and managing on the basis of scientific information, with the objective of optimum utilization.

In addition, because so many agencies carry out activities relating to the seafood industry, coordinative mechanisms are needed to ensure that those activities are not duplicative or conflicting and are placed within the broader context of natural resource management. A coordinating committee composed of agency and industry representatives could be formed by the Secretary of Commerce and Resources to foster communication, establish priorities, and clarify roles. Consideration could also be given to establishing a position of Assistant Secretary for Natural Resources within the Office of the Secretary of Commerce and Resources. The Assistant Secretary could provide a focus for resource issues within the overall span of responsibility assigned to the Secretary.

Another option which has been considered in Virginia is the creation of a unified Department of Natural Resources, to include a Division of Fisheries Management. This organizational structure is used, in somewhat different forms, in Maryland and North Carolina.

Recommendation: The Secretary of Commerce and Resources should be requested to draft for consideration by the 1984 General Assembly a statement of a specific fisheries policy, as outlined in Chapter V of this report, which can serve as a guide to resource managers in their decision-making and facilitate a management approach consistent with long-term State goals and objectives.

Recommendation: The Governor and the General Assembly may wish to consider structural changes to enhance coordination among marine resource agencies and to place marine resources within a broader natural resource context.

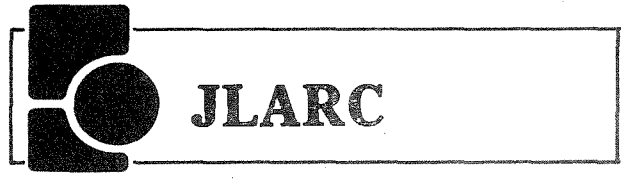


TABLE OF CONTENTS

I. INTRODUCTION

Because of the unique resources of the Chesapeake Bay and the access to the fisheries in the Atlantic Ocean, Virginia is a national leader in the commercial harvesting and processing of seafood. In FY 1981, the dockside value of commercially harvested seafood exceeded $69,000,000, and the industry employed over 8,000 commercial fishermen and thousands of seasonal workers in processing plants. Sport fishing is also popular with tourists and residents.

The outlook for the future, however, varies according to the fishery examined. The production of oysters, for example, has declined significantly since the 1960's. Clams may require cultivation, and there appears to be additional potential for the marketing of edible finfish. In recent years, Virginia's competitive position has declined due to several factors: competition from other states, changing economies and consumer conditions, and legal challenges to residency requirements for fishing licenses.

House Joint Resolution 59 was enacted by the 1982 General Assembly in response to industry and legislative concern that the Commonwealth has not achieved the full economic potential of its abundant marine resources. The resolution directed JLARC to assess the potential and management of the industry and to make policy recommendations to foster the State's competitive position, preserve the socioeconomic well-being of those whose livelihood depends on the industry, and enhance State management and regulation.

JLARC began by assessing the status of each fishery. Econometric modeling and other methods were used to evaluate policy options that included maintaining the status quo, resolving current conflicts, building on established techniques, and initiating aggressive changes in the State's management and regulatory role.

Many of these options would require expanded management responsibilities for State agencies. The designated lead fisheries agency in the Commonwealth is the Virginia Marine Resources Commission, which is responsible for protecting the marine resources, promoting the general welfare of the seafood industry, and enforcing fisheries laws in the tidal waters. Promotion, research, and advisory services are provided to the industry by the Virginia Institute of Marine Science, the Marine Products Commission, and several State universities. In addition, the State Department of Health and the Department of Agriculture and Consumer Services inspect seafood processing plants.

State regulation can serve to protect resources and balance competing economic, social, and biological needs. Oysters are the most

highly regulated fishery, but laws and regulations have also been established for the other fisheries, in such areas as harvesting methods, seasons, catch limitations, and fees. Other State activities affect the marketability of the product and the State's economic position. Thus, the viability of the industry is dependent on effective State management and the industry's commitment to its own development and to resource conservation.

STATUS OF THE SEAFOOD INDUSTRY

Virginia's marine fisheries are composed of two major segments: commercial fisheries and recreational fisheries. The commercial segment includes independent watermen and processors who make their livelihood from the Chesapeake and offshore fisheries. The recreational segment includes the charter and head boat industry, as well as independent sports fishermen.

Several State agencies are involved in managing, regulating, promoting, and researching Virginia's seafood industries. The activities of these agencies directly affect the industries' economic potential. In addition to the committment of personnel and funds, the State's continuing interest in the fishing and seafood industries is expressed in the numerous legislative studies conducted on this industry since 1928.

Commercial and Recreational Fisheries

Virginia has traditionally been a leader among the states in commercial marine fishing. In 1981, the Commonwealth ranked fourth nationally in total commercial catch of finfish and shellfish (487 million pounds) and ninth in dockside value ($69 million).

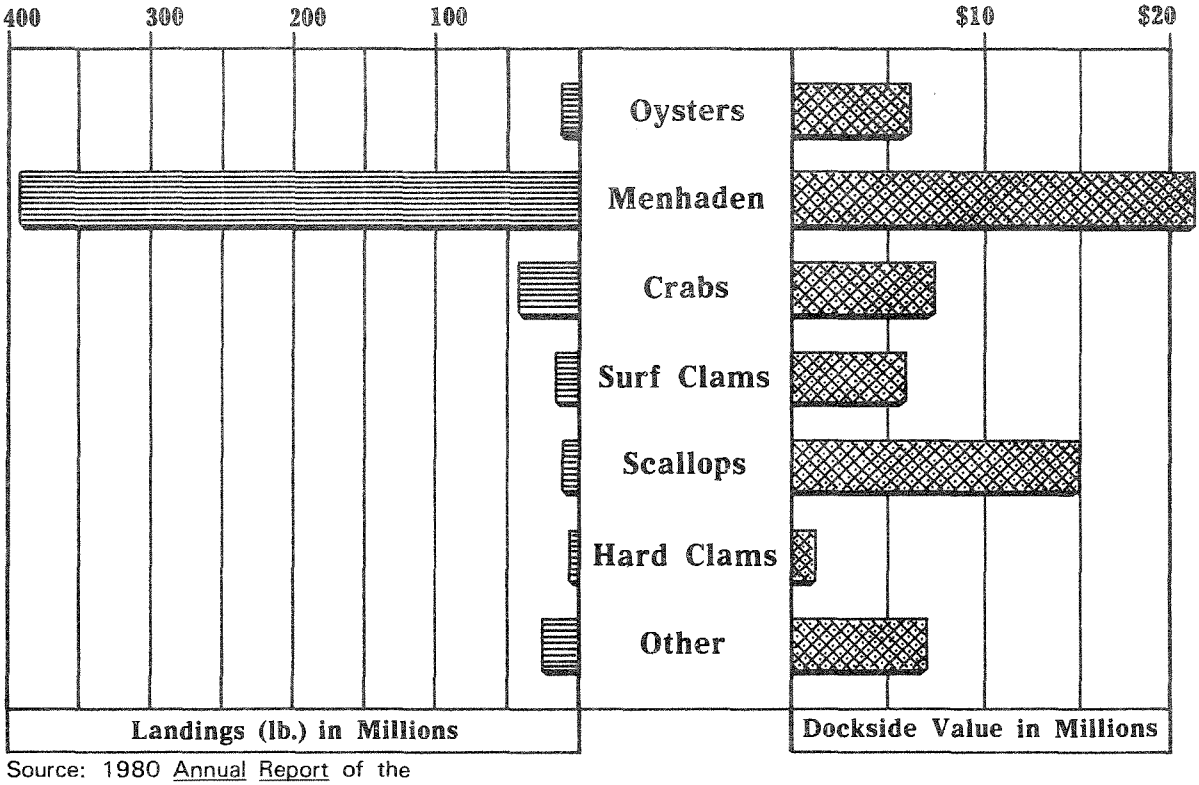
Over 4,400 full-time and 3,800 part-time commercial fishermen were reportedly engaged in seafood harvesting in 1980. In addition, the State's approximately 400 processing and wholesale operations seasonally employ several thousand workers.

Commercial Fisheries. Approximately 80 species of finfish and shellfish constitute the State's commercial marine fishing and seafood industries. However, a few species -- menhaden, sea scallops, surf clams, oysters, and blue crabs -- stand out in economic importance (Figure 1). Over the years there have been shifts in the importance of some of these species.

At one time the Virginia oyster industry was the largest in the world. However, production declined significantly during the 1960's and 1970's due to natural disasters, water pollution and other contaminants, declining profits, and restrictive management practices. Recent increases in total oyster catches are still far below the pre-1960 level.

Figure 1

LANDINGS AND VALUES OF IMPORTANT SPECIES



Source: 1980 Annual Report of the Virginia Marine Resources Commission.

The offshore fisheries are the most actively expanding segment of Virginia's commercial fishing industry. Offshore expansion has occurred as a result of several factors, including the abundance of highly valued sea scallops in the mid-Atlantic and the 1976 passage of federal legislation extending U.S. offshore fishing rights and limiting foreign fishermen.

Sea scallops and surf clams are two important offshore shellfisheries. In 1979, the commercial landings of sea scallops yielded the most valued marine harvest in Virginia. A record of 7.6 million pounds was taken, with a dockside value of $24.1 million. However, concerns have been expressed about possible overharvesting of scallops. Recent data shows that landings of sea scallops declined significantly to only 3.7 million pounds in 1981.

Recreational Fisheries. In addition to its commercial seafood industry, the Commonwealth also has a strong recreational fishery. Virginia's waters provide sport fishing and recreational boating to large numbers of State residents and tourists.

Recreational harvests in the U.S. of four important foodfish species -- bluefish, spot, croaker, and gray sea trout -- meet or

exceed the commercial catch for each. The abundance of these species in Virginia's waters makes them especially important to the State's recreational fishery.

It is clear that sport fishermen rival commercial harvesters as users of the waters. Fisheries research, however, has focused on the commercial sector. Because a systematic statistical base is not available, full impact of the recreational fisheries upon the State's marine biology and economy has not been determined.

State and Local Impacts

The impact of Virginia's fishing and seafood industries on regional economies is strong. The contribution of an industry to the economy of a region extends beyond the dollar value of its own production. A preliminary assessment by agricultural economists at Virginia Polytechnic Institute and State University (VPI&SU) estimates that $216 million in gross economic activity was generated in 1979 for the entire State by Virginia's commercial seafood industry. The net contribution of the seafood industry to the State's economy was estimated to be $109 million, or 1.25 percent of the domestic product in Virginia's coastal region. These figures are significant to the region, since the total includes the urban economies in Hampton Roads. The economic impact attributable to the seafood industry would be higher in the less urbanized areas of the Middle Peninsula and Northern Neck. Refinements to these figures will be made during the coming year by VPI&SU researchers in order to overcome data limitations.

Some Virginia counties located in the Tidewater region and Eastern Shore are largely dependent upon the fisheries for employment and income. For example, the two menhaden plants located near Reedville employ a large segment of Northumberland County's workforce.

The impact on other counties is reflected in the high concentrations of watermen and processing plants. This is particularly true in the Northern Neck region, where the largest number of commercial watermen reside and a majority of shellfish processing plants are located.

Watermen. Virginia's waterways have provided employment to generations of watermen who harvest various species of fish. Most watermen come from families with a tradition of working on the water. The vast majority are independent businessmen who sell their harvests to processors or directly to consumers. Although some modern mechanized techniques are employed, traditional harvesting methods such as oyster hand tongs, crab pots, and fish nets are still widely used today. Although some watermen harvest only one species, many will change fisheries depending on the time of year and the current economic conditions.

Licensing figures in 1979 indicate that 4,400 persons were employed in seafood harvesting full-time. In addition, an estimated

3,800 persons worked on the water part-time, receiving less than fifty percent of their income from seafood harvesting. Most of these individuals are located in Virginia's Northern Neck or Eastern Shore regions (Table 1).

Table 1

REGIONAL EMPLOYMENT OF WATERMEN

Region	Full-Time	Part-Time	Totals
Eastern Shore	1,370	455	1,825
Middle Pennisula	918	944	1,862
Northern Neck	1,454	669	2,123
Hampton Roads	688	1,179	1,867
Other Areas	32	569	601
Totals	4,462	3,816	8,278

Source: VMRC 1981-82 Annual Report.

Processors. Virginia's seafood processing sector contains a wide variety of firms and types. Because the industry is not vertically integrated, most processors purchase the catch from independent watermen. Processors differ considerably in size: they may be wholesalers, retailers, or both, and may handle a single type of seafood or several different species. In addition, firms differ in their manner of processing: they may shuck oysters, clams, or both; fillet or pack finfish; sell raw blue crabs or pick and package the meat. Few plants are mechanized, and therefore they seasonally employ a large number of semi-skilled laborers.

On the basis of various lists of the seafood processors, Virginia has approximately 250 which process shellfish, 156 which handle finfish, and 50 which process crabs. Of these, 49 businesses process more than one type of seafood. In addition, two plants deal strictly with menhaden processing.

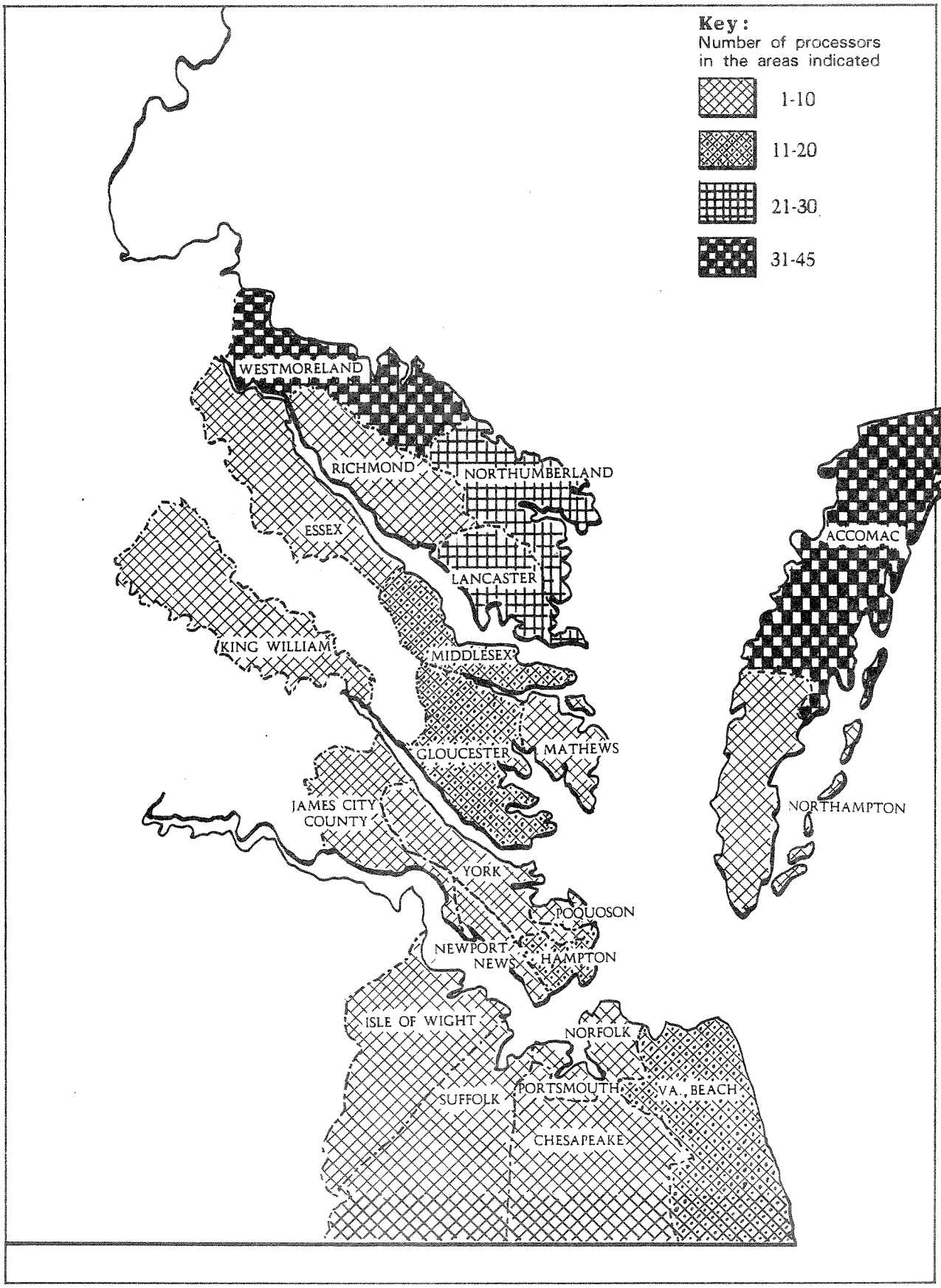
The plants are concentrated in several areas of the coastal zone (Figure 2). Shellfish plants are concentrated on Virginia's Northern Neck and Eastern Shore, while the majority of finfish and crab plants are located in the Hampton Roads area. The two menhaden plants are located in Reedville.

Seafood Marketing Conditions

Overall seafood marketing conditions appear to be favorable. Per capita seafood consumption in the United States was a record 13.6

Figure 2

LOCATIONS OF SEAFOOD PROCESSORS IN VIRGINIA



6 JLARC Representation of Data from the Department of Health and the Department of Agriculture and Consumer Services.

pounds in 1978. Although consumption declined slightly in 1981, experts predict that per capita seafood consumption in the United States will rise to 20 pounds by the year 2000.

Approximately 67 percent of seafood consumption occurs in restaurants and other food service operations. This is a result of several factors, including the lack of available seafood products, the public's inexperience at preparing seafood dishes, and the inadequate marketing of seafood in retail grocery stores. The State has undertaken an aggressive retail marketing program aimed at increasing consumer demand for Virginia seafood.

Nationally, there has been an increase in seafood consumption due to:

- the recognition of seafood as a "health food" because it is generally high in protein, low in fat, and low in calories; and
- the higher prices of beef products, making certain types of seafood a less expensive alternative.

Although overall market conditions for Virginia seafood products are positive, there is still cause for concern. Negative factors include:

- unfavorable conditions which have added to production costs and discouraged private growers from increasing oyster production;
- contamination of the James River, which has resulted in the loss of some soup contracts and the banning of commercial fishing of some species; and
- underutilization of several species of fish abundant in Virginia waters, due in part to appearance and lack of consumer familiarity.

Virginia's fishing and seafood industries should continue to be a viable industry in the future. Even so, the industry and State agencies will need to continue efforts to increase potential and to address specific fishery concerns.

Marine Fisheries Management

Since the late 1890's, the Commonwealth has established a variety of programs to manage, regulate, promote, and conduct research on the State's marine fisheries.

In general, the State's role is to:

- promote the general welfare of the seafood industry;

  conserve and promote the seafood and marine resources of the State;

- protect the public health by regulating the quality of seafood available for marketing; and

- conduct marine science research and education programs.

Six state agencies are directly involved in carrying out these responsibilities:

- *Virginia Marine Resources Commission* -- The Virginia Marine Resources Commission (VMRC) is the lead fisheries management agency in the State. The Commission's jurisdiction extends to the fall-line of all tidal rivers and streams, and covers all commercial fishing and all marine fish, shellfish, and other marine organisms. Agency functions include enforcing the State's marine laws, leasing and replenishing oyster grounds, and promulgating regulations concerning the general welfare of the seafood industry.

- *Virginia Institute of Marine Science* -- The Virginia Institute of Marine Science (VIMS) is the State's primary marine research agency. Specific responsibilities of the Institute include basic and applied research relating to "all phases of the seafood and commercial fishing and sport fishing industries"; advisory services for industry members; and graduate training in areas related to marine science.

- *Marine Products Commission* -- Created by the General Assembly in 1979, the Marine Products Commission consists of eleven representatives of Virginia's seafood industry appointed by the Governor. The Commission is mandated to engage in marketing and promotional activities for Virginia's seafood products. In addition, the Commission may become involved in research activities relating to "catching, processing, conservation, and marketing" of Virginia's seafood and "investigating, studying, and formulating recommendations for regulation, conservation, and management."

- *State Health Department (Bureau of Shellfish Sanitation)* -- The State Health Department's Bureau of Shellfish Sanitation exercises sanitary control over Virginia's shellfish and crab meat industries for the health protection of the consuming public. Bureau activities include certification and inspection of shellfish processing plants, sanitary surveys and classification of shellfish growing areas, and laboratory control of the products. Bureau offices are maintained in Richmond, with area offices and laboratories in Accomack, Norfolk, and White Stone.

- *Department of Agriculture and Consumer Services (Food Inspection Section)* -- The primary objective of the Department of Agriculture and Consumer Services (DACS) is to ensure that all foods, including seafood, manufactured and/or sold in Virginia is free of adulteration, properly labeled, and wholesome. DACS responsibilities include conducting unannounced inspections of the sanitary conditions and product quality in over 5,500 food processing facilities and retail outlets. One hundred and fifty-six of these facilities are finfish processing plants.

- *State Water Control Board* -- The State Water Control Board's activities relating to the seafood industry include monitoring commercial, residential, and other sources of discharges entering or surrounding shellfish growing areas and providing technical and advisory assistance relating to waste disposal and treatment to the seafood processors and to other State agencies. The Division of Special Products in Kilmarnock, created in 1972, is used specifically for the purpose of working with shellfish and seafood interests.

Several State institutions of higher learning, including VPI&SU, Old Dominion University, and the University of Virginia, also have staff engaged in seafood industry-related activities. Their research and advisory activities, along with that of VIMS (College of William and Mary), are coordinated through the Sea Grant office located at the University of Virginia.

- *VPI&SU* -- Three seafood extension agents and an experimental seafood processing facility in Tidewater concentrate on problems related to the processing and utilization of seafood products. Areas of study include product quality, processing plant engineering and energy, underutilized species, and consumer education. Other faculty staff on the Blacksburg campus devote resources to the study of marine pollution, economics, and promotion.

- *Old Dominion University* -- Educational and research programs are geared towards environmental aspects of marine science such as oceanography and marine biology.

- *University of Virginia* -- Research is conducted with respect to marine science in the areas of ecology, microbiology, and other environmental sciences. In addition, educational and research programs are offered in the legal and policy oriented aspects of marine resource management.

Federal, regional, and local agencies also play an important role in protecting and enhancing Virginia marine resources. Many of these agencies involve multi-state participation and are designed to resolve interstate conflicts and provide uniformity of marine and fishery standards. While each agency has varying degrees of authority, the agencies listed below all have a significant impact on the present and future direction of Virginia's management of marine resources:

- *Federal:*

  - Department of Commerce: National Oceanic and Atmospheric Administration, National Marine Fisheries Service
  - Food and Drug Administration
  - Environmental Protection Agency

- *Regional:*

  - Mid-Atlantic Regional Fisheries Council
  - Potomac River Fisheries Commission
  - Chesapeake Bay Commission
  - Atlantic States Marine Fisheries Commission

- *Local:*

  - Wetland Boards

Funding for Seafood-Related Activities

Over $35 million was specifically appropriated for State marine resource management, research, and promotional activities during the 1982-84 biennium. Most of the revenues came from State general and special funds, while federal funds were particularly important to the VIMS research budget. Figure 3 shows the distribution of funding among agencies which receive appropriations directly tied to marine fisheries activities carried out by the Virginia Marine Resources Commission, Virginia Institute of Marine Science, the State Department of Health, the Marine Products Commission, and contributions to regional fisheries commissions. Also included in the chart are allocations to the State Water Control Board and the Department of Agriculture and Consumer Services for activities related to the seafood industry.

Legislative Studies

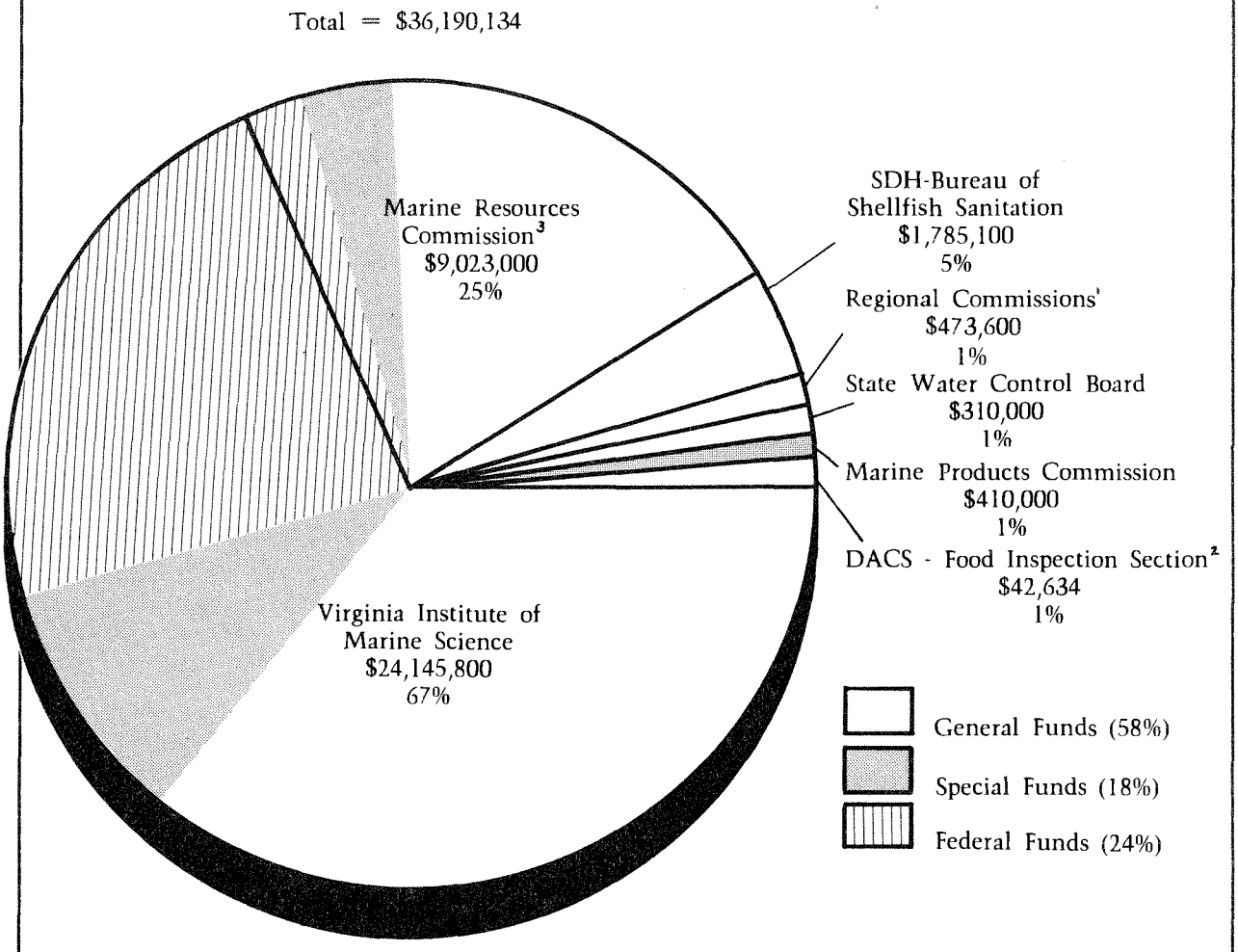
The State's fishing and seafood industries have been the focus of several legislative study commissions:

- 1928 Seafood Industry Study Commission;
- 1951 Virginia Advisory Legislative Council;
- 1961 Code Commission Review of Fisheries Laws;
- 1967 Marine Resources Study Commission; and
- 1977 JLARC study of Marine Resource Management; and
- 1980 Shellfish Industry Subcommittee.

Recommendations made by the various study commissions have centered on several common themes. Areas of reoccurring legislative interest have included strengthening the management of the fisheries and agency roles by designating VMRC as the "lead agency" in marine resource management, improving marine enforcement activities through increased personnel and improved equipment, enhancing conservation and

Figure 3

FISHERIES RESOURCE MANAGEMENT FUNDING
(1982-84 Biennium)



[1] Virginia's contribution to regional fisheries management agencies
[2] Portion of total funding estimated for finfish plant inspections
[3] Does not include Wetlands Management

Source: 1982-84 Appropriations Act and State Agency Budget Data

harvesting methods, and increasing revenues from the seafood industry. Although some steps have been taken, more improvements are needed to strengthen the position of Virginia's fisheries.

JLARC REVIEW

The General Assembly's continuing interest in the State's seafood industry was expressed in House Joint Resolution 59, passed in 1982. HJR 59 directs JLARC to study "the nature and scope of the regulation of the fishing and seafood industries, and the economic potential of these industries." In calling for this study, the General Assembly has charged the Commission with reviewing policy alternatives to manage, regulate, and foster the competitive position of these industries.

This is the second JLARC study conducted in the area of marine fisheries. The first, Marine Resource Management in Virginia, was completed in 1977, and addressed selected management activities associated with Virginia's oyster fishery, administration of the Marine Resources Commission and the Virginia Institute of Marine Science, and marine-related education and advisory services.

Scope of the Review

In accordance with the resolution, this report focuses on the management and economic potential of Virginia's commercial marine fishing and seafood industries. Four major objectives of the study are:

- to assess the economic potential of the State's commercial fishing and seafood industries;
- to propose State policy alternatives to strengthen Virginia's fishing and seafood industries;
- to determine the efficiency and effectiveness of the State's current fisheries management, regulatory, and promotional activities;
- to review the extent to which actions have been taken to correct administrative deficiencies identified in the 1977 JLARC marine resource study.

Methodology

During the course of this review, JLARC staff collected and analyzed data from numerous sources. Interviews were conducted with

over 50 representatives of the seafood industry (watermen and processors) and State agencies. JLARC staff also contacted fisheries management officials from several regional commissions and Maryland and North Carolina. In addition, fiscal and enforcement data were analyzed, relevant *Code* provisions and administrative regulations were reviewed, and several agency meetings and public hearings were attended.

To assess the adequacy of State efforts to protect the consuming public, JLARC staff reviewed a generalizable sample of inspection records for 47 finfish, 39 shellfish, and 12 crab processing plants.

A telephone survey of a representative number of Virginia seafood processors was conducted to analyze the impact of the State's promotional activities on product distribution and sales. Ninety industry members were randomly selected and contacted.

In addition to these methods, JLARC staff carried out special research activities with regard to two efforts: analysis of the economic potential of the seafood industry and follow-up of JLARC's 1977 study.

Analysis of Economic Potential. To assess the economic potential of the State's seafood industry JLARC staff consulted regularly with industry, agency, and academic representatives to identify biological, social, economic, and administrative relationships. Where feasible, econometric models of the seafood industry were developed in order to provide new information on these issues.

Econometric models are computer programs which statistically summarize the relationships and conditions which exist in everyday life. Modeling offers an opportunity to simulate the effects that will likely result from various State management options. More information on JLARC's approach to economic potential issues is contained in Chapter II. A complete discussion of the econometric models used by JLARC is included in the technical appendix to this report, which is available upon request.

Follow-Up of 1977 JLARC Study. JLARC has statutory responsibility under Section 30-58.2, *Code of Virginia*, for conducting supplementary follow-up studies of previous reports. This study of the State's fishing and seafood industries provides an opportunity to reevaluate many of the concerns identified as deficiencies in the 1977 JLARC report Marine Resource Management Programs in Virginia. Follow-up findings are identified in Chapters III and IV of the report.

Report Organization

This chapter has presented a general overview of Virginia's fishing and seafood industries, agencies responsibilities, and legislative interest. Chapter II assesses the economic potential of the

industry and presents policy options to enhance the industry. Chapter III describes the management and regulatory activities of the Virginia Marine Resources Commission. Chapter IV reviews the promotion, research, and inspection functions relating to the seafood industry carried out by other State agencies. Chapter V reviews the need for a State fisheries policy and changes in the management framework.

II. POTENTIAL OF VIRGINIA'S SEAFOOD INDUSTRIES

Virginia's overall position within the national fishing and seafood industry is strong, but the outlook for the future varies according to the type of fishery. Concerned that the full potential of the State's abundant marine resources is not being reached, the 1982 General Assembly directed JLARC to review the economic potential of the industry and to make recommendations on policy alternatives for State management and regulation. The overall thrust of House Joint Resolution 59 was to foster the long-term development, growth and efficiency of the industry and better the State's competitive position in a manner compatible with the socio-economic well-being of those whose livelihood depends on these industries.

JLARC worked closely with industry representatives and fishery and economic researchers to assess the current status of individual fisheries, identify current issues, and determine the probable impact of various policy alternatives. Econometric models were used to simulate the impacts of proposed changes on the oyster and clam industries, and the crab and finfish industries were addressed qualitatively. To the extent possible, options developed for each fishery included continuing the status quo, resolving current conflicts, building on existing techniques, and initiating aggressive changes in the State's regulatory policy and management role.

State action can have a significant impact on the potential of the industry. In some cases inaction will result in losses that will continue present trends. The type of action possible and the potential results vary considerably among fisheries.

For example, without State action, oyster production will continue declining. Several options, however, could increase the annual harvest by as much as one-third over current levels. Although crabs are abundant, increased regulation of licenses may be necessary in view of recently eliminated residency requirements for harvestors. The status and outlook of each fishery is summarized below:

- The State's oyster industry has declined sharply from its earlier days as a leader in world production. This decline is due to several factors including environmental and economic conditions. The future of this industry is expected to be stagnant with production and revenues showing little growth by 1990. However, several policy options exist which could stimulate growth in the industry.

- Virginia's share of the national hard clam market has also declined over the past several years. Sustaining the harvesting levels of current stocks appears to be a valid

concern for the future. Options are available for new State management techniques which may enable Virginia to recapture an additional share of the market.

- The blue crab fishery has remained a strong industry for Virginia. This trend should continue due to the abundance of crabs in the Chesapeake Bay, high consumer demand and innovations in processing techniques. However, concerns have been raised about future harvests and income as a result of changes in residency requirements for licensing and easy access into the lucrative winter crab dredge fishery.

- The State's finfish industry is an important part of the seafood economy. Non-edible finfish accounted for over 80 percent of the State's total commercial landings in 1981. State experts believe that the edible finfish industry has the potential for further growth. Current and future State and industry efforts should help the industry obtain its full potential.

Some options will require significantly expanded management responsibility for State agencies. The State's lead fisheries agency, the Virginia Marine Resources Commission, is responsible for regulating harvesting techniques and seasons, issuing licenses, leasing areas for growing oysters and clams, and enforcing fishery laws. Other State agencies with promotion, advisory, and inspection responsibilities include the Marine Products Commission, the Virginia Institute of Marine Science, VPI&SU, and the State Departments of Health and Agriculture and Consumer Services.

JLARC's Approach

To assess the economic potential of the State's seafood industry, JLARC attempted to develop a thorough understanding of the biological and economic factors that affect the harvest, market price, and public management of each fishery. Different concepts are necessary to understand each fishery because management decisions must take into account many unique characteristics, such as the current status of the stock, the spawning and migrating patterns of the species, and the type of harvesting gear and season. Industry representatives, scientists, economists, and State agency personnel were systematically interviewed and consulted throughout the study.

Econometric modeling techniques were used to assess the economic potential of the oyster and clam fisheries and to assess issues of current concern, such as the potential impact of allowing more efficient harvesting techniques. Econometric models are one set of tools which allow policy makers to see the most likely impacts of their decisions. Models are computer-generated, statistical summaries of the relationships and conditions which exist in every-day life.

The models developed for the seafood industry simulate the relationship between economic factors such as consumer demand, biological factors such as the maturation period of a marketable product, and management factors such as public repletion efforts on the price and production of seafood. A change in management practices can be simulated and the impacts on price and production estimated.

The role the State has historically taken determines the type of policy options that can be assessed with the model. For example, the State does not participate in the commercial harvesting or processing of oysters; this is a private sector activity. The State does regulate gear used to harvest market and seed oysters, limit the oyster harvest, replete the public beds, and lease grounds that are not naturally productive for private development.

For oysters and other fisheries, State concerns include enhancement of production and revenues from the industry; protection of the natural resource; preservation of traditional cultural patterns; and preservation of the livelihood of the watermen and processors. Proposed changes in State policy options are considered, therefore, in terms of their assumed impact on total production and price, the resource, and the various industry segments. Policy makers must rely, however, on information from the parties involved and the knowledge they have gained through their involvement with the industry. Often the information from one source conflicts with information presented by another, and uncertainty about the actual impact persists.

Econometric modeling, coupled with informed judgment and practical research knowledge, can reduce some of the uncertainty. A model can predict, within specified parameters, the probable impact of policy decisions. Policy makers can then decide whether the impacts are acceptable enough to proceed with the action or develop management strategies to overcome or mitigate unwanted impacts. Models cannot, however, predict the results of radical changes beyond the scope of historical data or predict the effects of an unforeseen ecological or biological factor such as a serious disease for a species of seafood or changes in the lifestyle of watermen or processors. A model can predict the impact of changes in gear, season, repletion, market price, and consumer demand.

The basic supply-and-demand model for the oyster industry was developed under a Sea Grant project by agricultural economists at Virginia Polytechnic Institute and State University. JLARC staff and the VPI&SU researchers cooperatively validated the model and developed methods for using it to assess the impacts of policy options for legislative consideration. The hard clam model was developed by JLARC in cooperation with agricultural economists at VPI&SU during the course of this study. It has conceptual interests similar to a modeling approach developed at VIMS. In order to ensure that the assumptions of the models represent actual conditions and address industry concerns, JLARC has maintained a continuing dialogue with the seafood industry and State agency personnel.

OYSTER FISHERY

Virginia's oyster industry has traditionally held a place of special importance among the Commonwealth's commercial fisheries. Virginia was the leader in oyster production nationally during the early part of this century. Since 1960, however, the oyster industry has suffered a sharp decline in production and employment as a result of several factors: the impact of environmental conditions on Virginia's oyster harvest; the decline of leased oyster ground production; the expansion of Maryland's oyster repletion and marketing program; the relatively high price and limited availability of seed; and problems with product demand for oysters. Since oysters play a major role in the fisheries economy, the General Assembly may wish to consider actions to reverse this trend.

Without some changes, the fishery is likely to become stagnant. However, production could be increased by as much as one-third over anticipated levels by adopting one of several options for State action. The options assessed by JLARC are ranked in terms of the degree of change involved. For example, more active promotion of products would not change the structure of the industry. However, leasing portions of the public grounds currently held for the public trust would be a major change. The economic, social, and biological impacts of these actions on the current status of the industry would have to be taken into account.

STATUS OF VIRGINIA'S OYSTER INDUSTRY

A review of the current status of Virginia's oyster industry (Exhibit A) reveals several trends: a major shift in oyster production has occurred within the State and relative to other states; the number of watermen and large private oyster planters has declined; and the market price of oysters has fluctuated considerably. An understanding of the current status is essential for assessing the impact of various options for change.

Production

Virginia oysters are harvested from two types of tidal bottoms: State-managed public grounds and those leased from the State by private interests (Figure 4). The decline in Virginia's total oyster production since 1960 is largely attributable to the drop in oyster landings from leased grounds, which in the past had produced nearly five times as many oysters as public grounds. While Virginia's production has declined, Maryland's total oyster production has increased significantly, so that today the state produces more oysters than Virginia. Most of the Maryland oysters, however, continue to be shucked in Virginia.

Exhibit A

STATUS OF VIRGINIA'S OYSTER INDUSTRY

Production

Virginia's production of market oysters has declined significantly since 1960. The major decline has occurred in the harvest of oysters from grounds leased from the State. These privately-leased grounds, though not naturally productive and fewer in number than State-managed grounds, accounted for over 80 percent of the State's oyster production until environmental and economic factors combined in the early 1960's to drastically reduce their production. Unfavorable conditions continue to discourage private planting today.

Production from State-managed public grounds has remained fairly stable during the past 20 years and has actually exceeded private production since 1978. During Virginia's period of decline, Maryland's oyster harvest increased significantly, so that Maryland now outproduces Virginia. Nearly 60 percent of Maryland's oysters, however, continue to be shucked by processing plants in Virginia.

	Acres		Harvested Bushels	
	1959	1980	1959	1980
Private Grounds	128,000	107,000	4,231,717	645,589
Public Grounds	243,000	243,000	972,446	885,755
Total	371,000	350,000	5,204,163	1,531,344

Employment

The inability to attract sufficient numbers of younger persons into the traditional hand tong fishery raises serious concerns about the continuance of the public oyster fishery as it exists today. Some mechanized methods of oyster harvesting have, however, attracted more persons. In addition, the number of large private oyster planters has declined since 1960, when three planters near Hampton Roads produced more oysters than the total produced today. Today, private planters are much smaller and are concentrated in areas farther up the Bay.

	Licenses Issued	
	1959	1982
Hand Tong	4,242	1,934
Patent Tong	298	454
Oyster Dredge	-	123

Prices

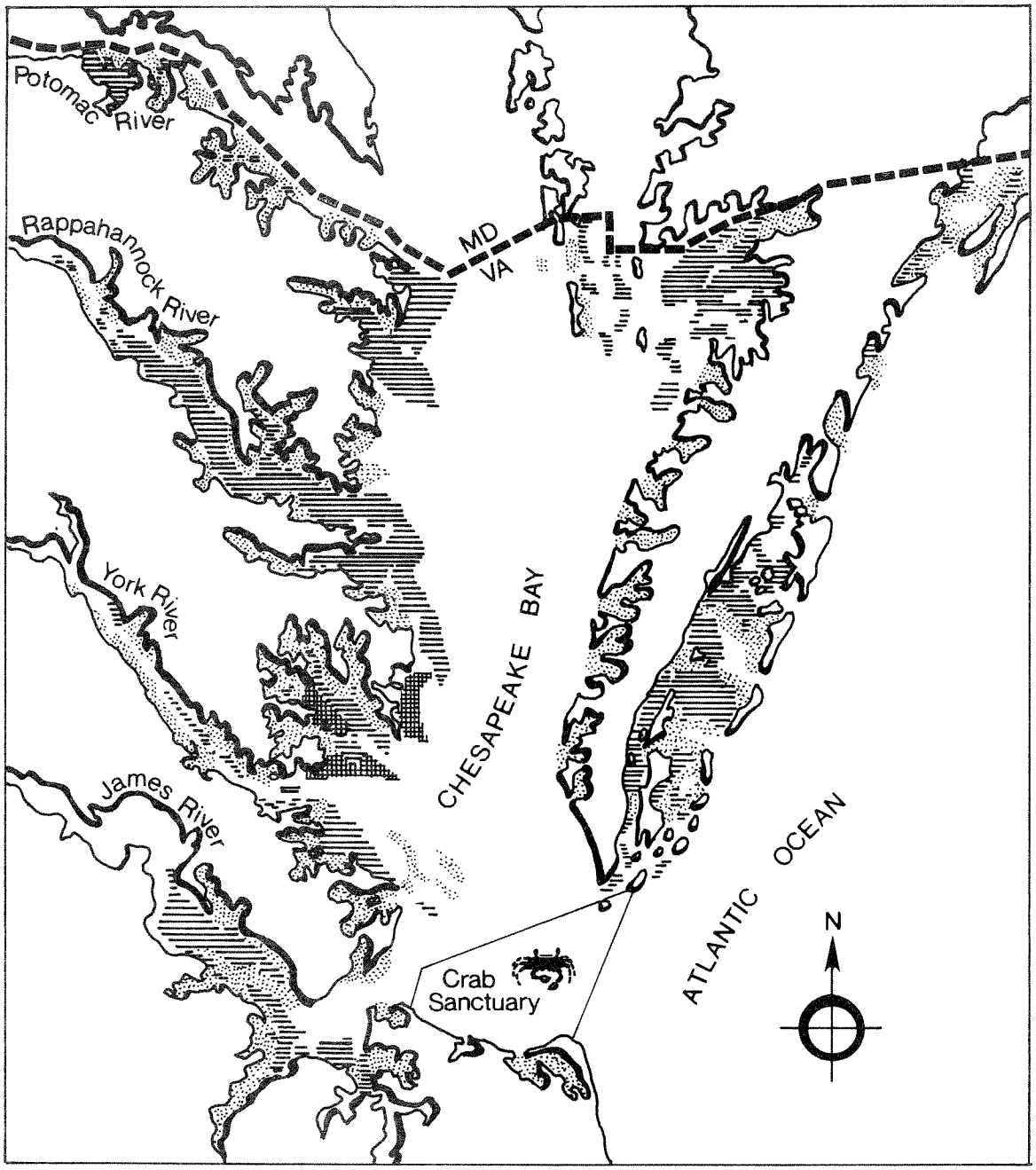
Prices paid to watermen and planters for oysters have fluctuated since 1950. In recent years, the price has risen at a slower rate than inflation, resulting in a loss of buying power for oyster harvesters if the size of their catch has remained about the same. Several factors, such as size, season, growing area, and region, affect the prices received for oysters.

	Prices Paid to Watermen Per Bushel (1981-82)		
Type of Oyster	Low	High	Average
Standards	$7	$12	$10
Selects	12	15	13
Extra Selects	15	20	18

Source: VMRC annual report; VIMS; Virginia Seafood Council.

Figure 4

SHELLFISH GROUNDS IN VIRGINIA



Source: Virginia Marine Resources Commission.

Public Grounds. Public grounds, commonly referred to as "Baylor Survey Grounds," include 243,000 acres of the best natural growing areas for oyster production in the Commonwealth. A recent study by VIMS, however, determined that there is substantial variation in the productive capacity of the Baylors. Much of the ground is not currently productive, but it has greater potential for oyster production than grounds presently available for private leasing.

The State's role is largely limited to managing the public bottoms. The State restricts the method of harvesting public grounds, limits the public harvesting season, places minimum size requirements on harvested public oysters, and replenishes the public bottoms with shell and seed.

Private Grounds. Over 107,000 acres of bottom outside the Baylor Grounds are leased to private oyster planters. The leased bottoms are not natural growing areas; therefore, they require considerable effort and expense by the leaseholders in order to cultivate oysters.

State law grants leaseholders greater freedom for harvesting private grounds than that permitted for public oyster bottoms. Private leaseholders tend to utilize the most efficient means of harvesting available (Figure 5). For example, private grounds are generally harvested with towed dredges or mechanized patent tongs, while State law allows only the traditional hand tongs in most of Virginia's public growing areas. Table 2 compares the differences between public and private grounds on property rights, harvesting seasons, gear restrictions, and maintenance of oyster crop.

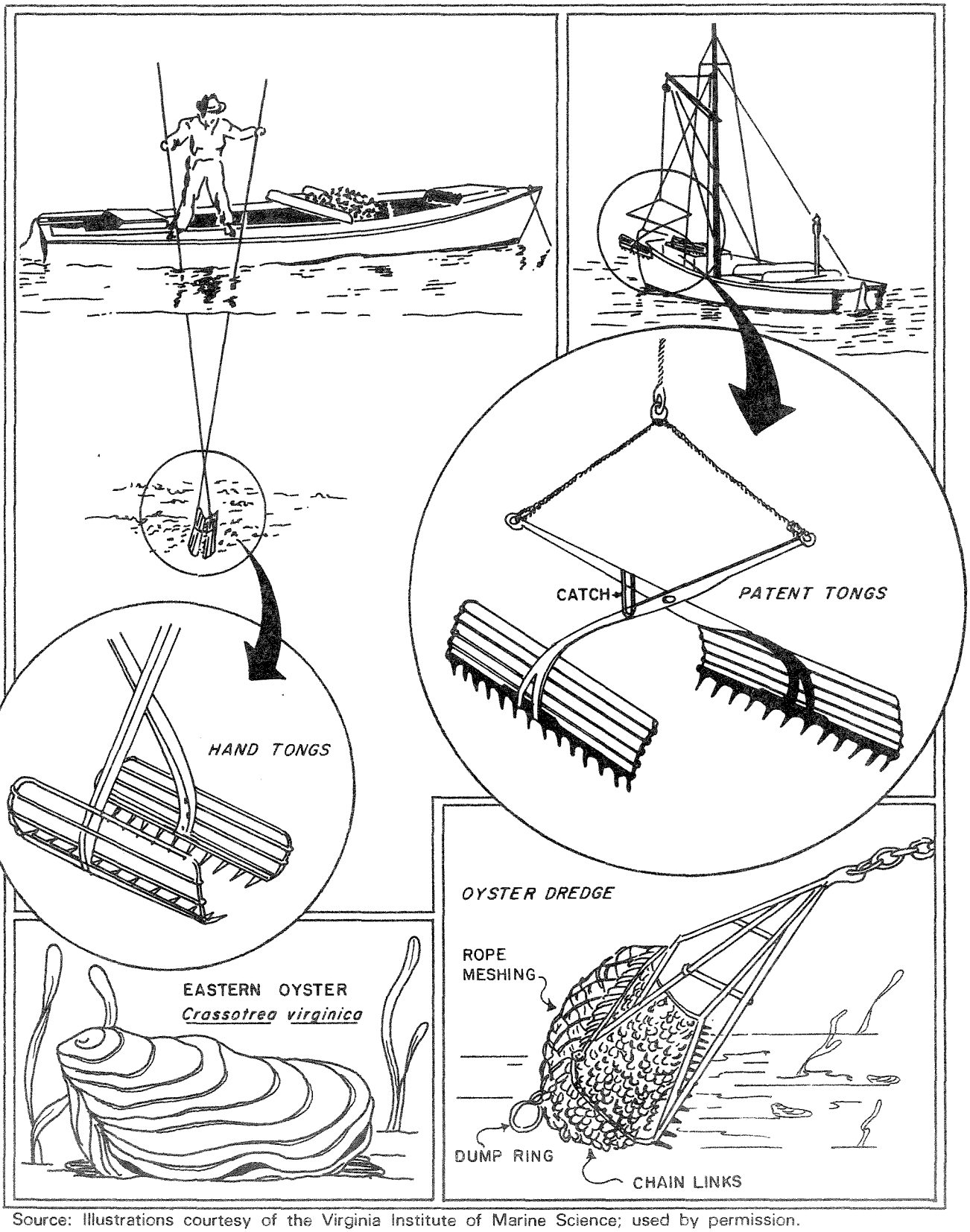
Total State production of oysters prior to 1960 averaged about 3.2 million bushels annually. Public ground production contributed about 0.55 million bushels of the total. Leased bottoms produced the remaining 2.65 million bushels, or nearly five times as much as public grounds.

Decline in Private Production. In 1959, an outbreak of the disease Minchinia nelsoni (MSX) resulted in a high mortality rate among oysters. Virginia's private oyster production was severely affected by the resulting combination of environmental and economic factors. Increased production costs such as high seed costs, problems with product demand, and unsuitable return on investments have continued to discourage private planting in non-MSX areas. Landing figures for 1980 show that only 645,589 bushels were harvested from private grounds. Public ground production, in contrast, has remained relatively stable during the period 1960-1980 and actually increased slightly in recent years to a total of 885,755 bushels in 1980, the highest since 1965. In 1978, public ground production began to exceed landings from private grounds for the first time in over 20 years (Figure 6).

Increase in Maryland Production. While Virginia's total oyster production has declined, Maryland's oyster production has increased significantly since 1960 due to the mild affect of MSX on

Figure 5

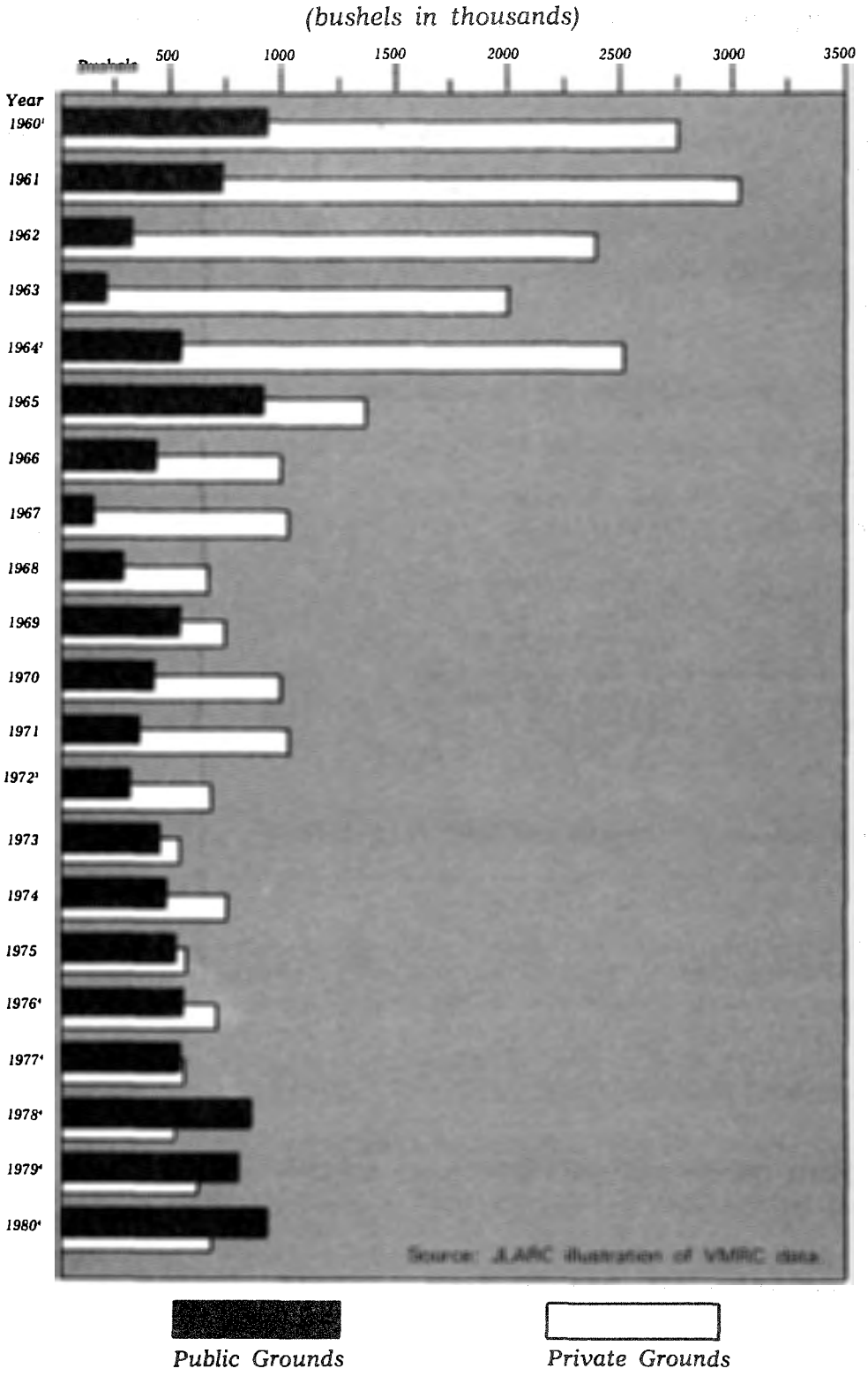
TYPES OF OYSTER GEAR USED ON THE CHESAPEAKE BAY



Source: Illustrations courtesy of the Virginia Institute of Marine Science; used by permission.

Figure 6

VIRGINIA SHUCKING OYSTER PRODUCTION 1960-80



[1]*MSX appears in Chesapeake Bay*
[2]*Massive MRC Replenishment Program begins*
[3]*Tropical Storm Agnes*
[4]*James River loses soup oyster market due to Kepone*

Table 2

COMPARISON OF PUBLIC AND PRIVATE OYSTER GROUND MANAGEMENT

	Public Grounds	Private Grounds
Property Rights	Natural growing areas constitutionally protected for the "public trust"	Leaseholder has property rights for 10 years, which may be renewed
Harvesting Limitations	Commercial season generally runs from October 1 to June 1	No seasonal limitations
	Minimum harvest size of 3" market oysters generally required	No minimum size
Gear Restrictions	Hand tongs are legal harvesting methods for most areas. Some patent tonging permitted. Dredges allowed in VMRC management areas	Use of dredges and patent tongs generally permitted
Resource Maintenance	Natural stock and State-run repletion program paid for by user taxes	Private cultivation efforts necessary

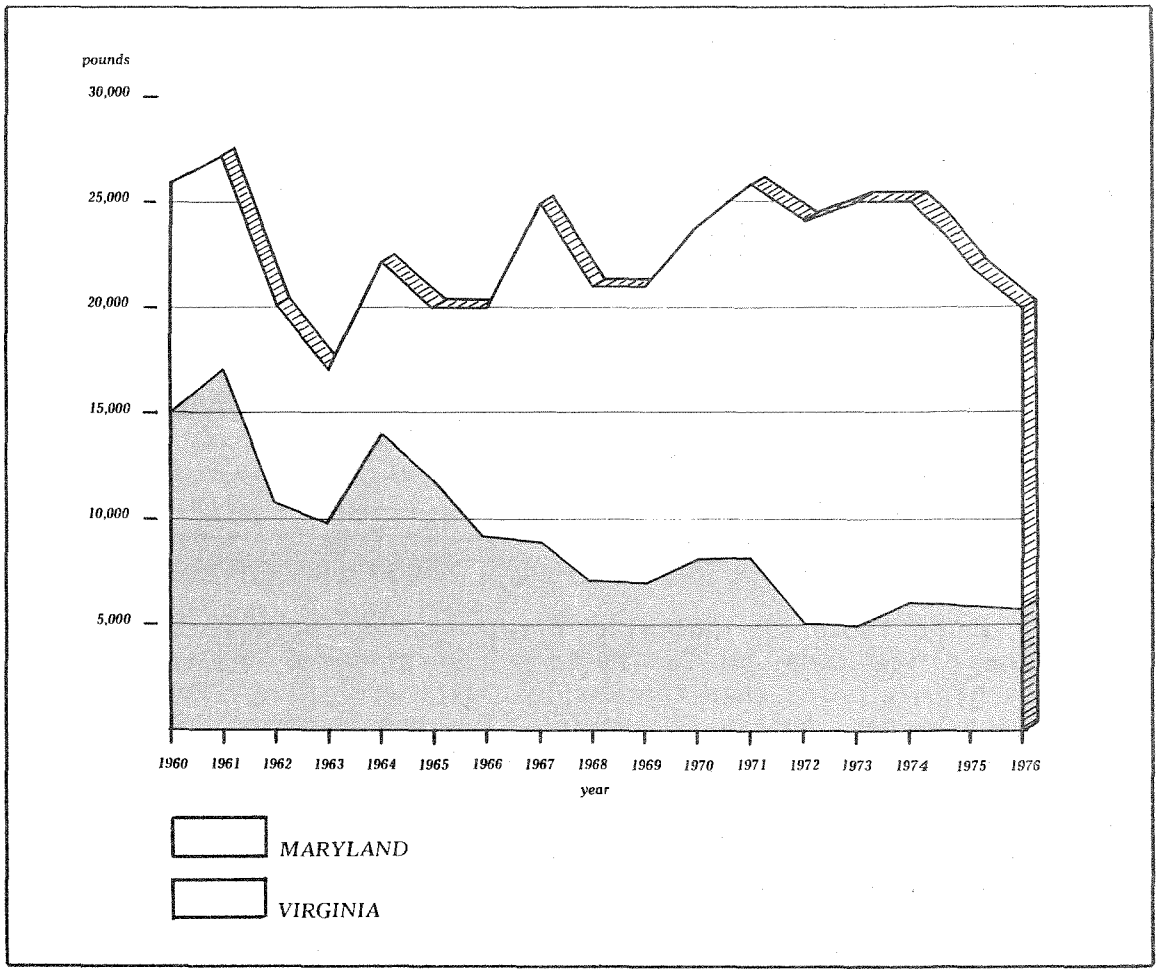
Source: *Code of Virginia* and VMRC regulations.

Maryland oyster beds, the development of an aggressive seafood marketing program, and a greatly expanded oyster repletion program begun during the period. As a result, Maryland was able to take over much of the harvest lost by Virginia during the period. In 1958, Virginia's production was double that of Maryland, but in 1973 Maryland produced four times as many oysters as Virginia (Figure 7).

While Virginia harvesters have certainly been affected by Maryland's dominance, processors have managed to maintain their stronghold on the shucking industry within the Chesapeake Bay. Processors based in Virginia handle most of the oysters landed in Maryland. Over half of the oysters currently shucked in Virginia are imported from other states, primarily Maryland.

Figure 7

STATE SHARES OF CHESAPEAKE BAY OYSTER LANDINGS



Source: JLARC illustration of National Marine Fisheries Service data.

Employment

The decline in the number of licensed oyster tongers and large oyster planters noted in the 1977 JLARC report continues today. The inability to attract significant numbers of younger persons into the hand tong fishery has been cited as a major concern about the continuance of the public oyster industry as it presently exists. Oyster tongers, who have primarily engaged in harvesting the public grounds, have been declining in number due to the hard work, limited future, investment costs, and the increase in other job opportunities.

The number of hand tongers has declined from 14,000 in 1903 to 1,954 in 1982. In contrast, the number of licensed patent tongers has steadily increased since the early 1970s. Between 1973 and 1982, the number of licenses issued rose from seven to 454. This rise may be due to the State's increasing willingness to allow patent tonging on certain areas of the Baylor Grounds where waters are too deep or oysters too scattered to be efficiently harvested by hand tongs.

Prior to 1960, three private oyster planters purchased about 95 percent of the James River seed. These three planters, located in Norfolk and Hampton, produced more oysters than the total amount produced today. However, these planters were forced out of business after suffering extensive financial losses due to the onslaught of MSX in the Bay.

Today, private oyster planters are much smaller than in pre-MSX days because of economic conditions. In addition, the concentration of plantings has moved up from Hampton Roads to the Northern Neck and Rappahannock regions.

Oyster Prices

The price paid to watermen and planters for oysters has fluctuated since 1950. In recent years, the nominal price of oysters has remained relatively stable, with increases lower than the rate of inflation. This indicates that the oyster harvesters have lost buying power and that if the size of their catch has remained about the same, their costs have increased in comparison to the price received.

Many factors, including size, season, ground, and region, affect the price received for oysters. Large-sized "select" oysters command a higher price than the smaller "standard" size. Prices in the fall season, when demand is peaking, are higher than prices in the spring. Oysters taken from private grounds bring a higher price than oysters from public grounds, largely because they are harvested while the public grounds are closed by VMRC. Prices are slightly higher in the Northern Neck and south Rappahannock, less from the northern York River to the North Carolina border, and lowest on the Eastern Shore.

In addition, several standard economic relationships appear to affect the price of oysters. An increase in the quantity of oysters supplied, for example, will be expected to decrease the price. An additional relationship exists between the retail price and the price paid to watermen. As the retail price increases, the price to watermen also increases, but not to the same degree.

POLICY OPTIONS FOR THE OYSTER INDUSTRY

If present trends continue, the oyster industry in the State will become stagnant. Industry and State agency representatives believe that it is possible to increase Virginia's oyster production significantly, thereby reversing current trends. However, uncertainties exist as to whether production could ever again reach pre-1960 levels.

Nevertheless, several policy options are available for State action. These options have the potential to stimulate production by as much as one-third over the production that would occur by 1990 without

a policy change. Six often-mentioned alternatives through which the State can exercise a measure of control were assessed by JLARC using econometric modeling techniques in consultation with industry and economic specialists: (1) maintaining the status quo; (2) promoting the product to increase consumer demand; (3) doubling the State's repletion program; (4) lowering the price of seed oysters to increase plantings; (5) cultivating unproductive public grounds and allowing dredging; and (6) leasing portions of the public grounds.

These options are not mutually exclusive and are open to combination and refinement. They are ranked in terms of the degree of State involvement and change required. Each option is assessed in terms of its economic impact and implementation for resource management as well as its impact on biological conditions and the livelihood of existing independent watermen and private processors. For example, the State may choose not to change the structure of the industry, thereby maintaining the status quo and allowing the industry to continue declining. In contrast, more extensive management of the Baylor Grounds and use of efficient harvesting techniques could have a significant impact on shifting production between the public and private grounds, depending on the options selected.

The results of these options are shown in relative terms as the differences between the expected production if the status quo were maintained and the projected production resulting from the proposed change. The direction and magnitude of change are more significant than the actual numbers. In several instances, the State's management role will have to greatly increase to achieve the desired results.

Projected impacts of the various options are based on the trends which have developed over the past twenty years and must be compared to the projected future of the oyster industry in the absence of change. In addition, a different set of administrative, social, economic, and biological considerations -- such as the availability of oyster seed, the price received by watermen, and the impact on management -- is associated with each of the policy options.

Option 1: Maintain the status quo and allow production to stabilize at recent levels, with a decline predicted in production from public grounds and little growth in private production.

Although the Chesapeake Bay and its tributaries are among the most abundant growing areas in the world and the James River is uniquely suited for natural production of seed oysters, harvests in Virginia have been declining. This decline has been due, in part, to disease and weather conditions, but reduced effort on the public grounds and severely curtailed private investment have had an important impact over the last twenty years. The State maintains and repletes portions of the public grounds for harvest primarily by hand tongers. Other

grounds are made available for private planting and harvesting by dredging and other means. Maintaining the same level of State government management and regulation will allow present trends to continue.

Model Results. Based on the trends of the past twenty years, Virginia's oyster production will remain relatively stable unless a policy change occurs. Little economic growth will be sustained and the State's competitive position is likely to continue to erode. Barring environmental degradation, total market oyster production in the 1990's should hover at levels close to those of the late 1970's (Table 3). There will be a shift away from recent trends and a return to leased grounds producing more oysters than the public grounds.

Table 3

FUTURE OF VIRGINIA'S OYSTER INDUSTRY
WITH NO POLICY CHANGE

Total Production		Total Revenue	
Actual 1981	Projected 1990	Actual 1981	Projected 1990
11.0 million lbs.	8.3 million lbs.	$13.9 million	$11.7 million

Management Considerations		
Biological	Social	Economic
Little or no effect on seed resource	Decline in public fishery	Little growth occurring

Source: JLARC.

Although recent increases have occurred, future public ground production is predicted to continue the downward trend evident over the past 20 years. The decline will be partly due to the failure to recruit more watermen into the hand tonging occupation.

Private landings should experience a slight decline from the 1981 level, but should once again provide over two-thirds of the State's total oyster production. The larger share of private landings is consistent with past trends.

The private sector should increase its production slightly, with some increase coming from the ability to take advantage of the seasonal closing of public grounds as well as the decline in public production. The increase in private production will require more

private investment in the planting of seed oysters. However, the increase of investment required to bring about the predicted production level is minimal.

A recently unexplained drop in the availability of young James River seed could negatively impact on the future production of the private sector. Model predictions are based on the assumption, however, that the seed resource will be available in quantities obtained in the past. VIMS oyster experts feel that the James River seed beds should be able to sustain present levels of seed. However, there is uncertainty about significant increases in the demand for seed unless better cultivation and harvesting of seed areas are introduced.

Ramifications of State Action. Maintaining the status quo will not require any change in the State's role. Repletion will be carried out at present levels, and harvesting gear on the public grounds will be restricted primarily to traditional hand tongs. Commercial planting and harvesting will be dependent on private sector initiatives and determinations of the probable return on investment. While current trends may be reversed by external events, maintaining current State action will not precipitate a change that will either benefit or harm independent watermen or private processors.

Option 2: Aggressively promote Virginia's oyster products in order to increase consumer demand, raise retail prices, and ultimately stimulate increased production.

An increase in consumer demand and retail prices could have a moderate impact on oyster production and revenue, resulting in an increase of about 401,000 pounds and $2.7 million in revenue by 1990. This effect could be accomplished, in part, by greatly increasing the on-going promotional activities of the Marine Products Commission. This form of State intervention would not significantly change the State's role, and harvesters of both public and private grounds would benefit. However, since consumer actions are beyond direct State control, results from a promotion campaign are not assured.

Model Results. This policy option is based on the assumption that if consumer demand for oysters increases, the price will be driven up in the short run because of limited supplies, ultimately resulting in an increase in oyster production over a few years. To simulate this change, an increase of 2 percent in the retail price above the inflation rate was assumed. The yearly increase implies the price of or demand for oysters would increase 22 percent by the end of 1990. Since the increase is assumed to be annual, the impact would possibly not stabilize but continue incrementing upwards.

The public grounds oysters would likely show an increase by 1990 of 7.4 cents per pound in the real price paid to watermen over the price that would otherwise be paid. Real prices for private ground

oysters would increase by a much larger amount, 24.5 cents, by 1990 because private grounds may be harvested when the public tong season is closed.

Policy Ramifications. Underlying the assumed increase in consumer demand and retail prices is an active marketing program for oysters and a receptive public. Additional tools to produce this outcome could include the development of grading or labeling standards for Virginia's oysters to ensure quality control and meat weight per unit, development of new product forms, and new shucking technology to lower processing costs.

The ability to achieve a moderate growth of two percent in real retail prices each year may not be possible. State promotional experts have voiced skepticism over increases of this extent in the consumers demand for oysters.

The tenuousness of the assumptions makes achieving the predicted outcomes of this policy change riskier than the others. In large measure the risk is due to the State's inability to control consumer demand, whereas many other policy options are subject to direct State control. Furthermore, the benefits to the program as measured by the total production and revenue increases are only in the moderate range when compared with other options.

On the positive side, the marketing program would not challenge established practices or relationships in the oyster industry. Benefits would be shared by watermen, private planters, and the processing sector. The Marine Products Commission has targeted 1982-83 for increased efforts in oyster marketing. However, to achieve the 2% per year growth rate, a significant investment in promotional costs would be necessary.

Option 3: Double expenditures for repletion of public oyster grounds in order to increase the harvest for watermen using traditional tonging methods

Doubling the State's repletion expenditure using the current programmatic approach would also have a relatively moderate impact on overall oyster production. This action is predicted to result in an increase of 500,000 pounds and $670,000 in revenue by 1990 over probable levels without this change. The State's repletion program is carried out by the Virginia Marine Resources Commission. The program consists of transplanting small "seed" oysters or covering beds with shells, upon which oyster larvae affix themselves and mature. Funding is primarily from general funds and special oyster taxes.

In implementing this option, the State would expand the expenditure for an ongoing activity. Benefits would primarily accrue to the current beneficiaries of repletion efforts: hand tongers on the public grounds. Private processors would benefit indirectly from the

availability of additional Virginia oysters, which could reduce their importation needs. Conversely, the private ground harvest may be reduced due to competition from additional public ground landings and an increase in seed prices.

The option appears feasible because revenues to the fishery would exceed costs. However, special taxes or the general fund subsidy would have to be substantially increased to support the expanded repletion programs.

Model Results. To assess the impact of an expanded repletion program it was assumed that the shelling and seeding would continue in the same proportions as the current program, that current program management strategies would continue, and that seed prices would not increase. Program expenditures were doubled from the 1980 level of $240,000 to $480,000 in real 1962 repletion dollars, and expenditures were maintained at this level through 1990. The net increase in the yearly harvest would be 500,000 pounds. This increase would be generated from the public ground.

A total revenue increase of $640,000 would accrue to the public grounds harvesters, while private oyster producers would actually experience a small decrease of $34,000. The increase in total revenue would be greater than the increase in program costs. However, the current tax on oysters is not sufficient to make the program self-supporting.

Increasing the repletion program would place greater demands on the seed supply. Approximately 54,000 bushels of additional seed would be needed above otherwise projected 1990 seed harvest levels. The increased demand could drive up costs considerably and lower the amount of seed used on both the public and private grounds. If the cost of seed were driven up 10%, the public grounds revenue would increase by approximately $687,000 while the private grounds revenue would decline by $580,000. Thus, doubling the repletion expenditure would yield a net revenue gain of $107,000 not including the program costs. If the cost of seed were driven up 20% a revenue loss of $440,000 could be expected.

Policy Ramifications. Although total repletion expenditures have increased gradually during the past few years, the amount adjusted for inflation actually fell from $563,600 ($948,200 equivalent) in 1975-76 to only $242,500 ($617,350 equivalent) for the 1980-81 season. Because of the limited funds designated for repletion purposes, seed and shell have typically been planted on less than one percent of the total acres in the Baylor Survey annually. The rest of the ground is either naturally productive or is left barren or marginally productive.

Even though not all of the Baylor Grounds could be developed for oyster production without a great expense to the State, some currently non-productive acres could possibly be redeveloped for growing seed and market oysters if repletion expenditures were increased. Priority could be given to developing bottoms classified by VIMS as

potentially moderate to heavy growing areas. The demand on the State's oyster seed supply would be relatively small because of the State's traditional reliance on shell planting for repletion.

Increased expenditures for the public repletion program could produce more efficient harvesting on the Baylor Grounds with hand tongs by increasing the resource on the bottoms. Watermen's daily wages could increase due to the greater landings. A major question exists, however, as to whether sufficient labor will be recruited into the public hand tong fishery by 1990. A decrease in the labor supply without the use of more efficient harvesting methods could result in a depressed impact on the predicted public oyster production.

If State repletion activities are to be increased, new funding sources may be needed so as not to impact on State general funds. One option would involve increasing direct oyster taxes so that buyers and processors would provide more of the total share of repletion funding. Rates could be adjusted annually according to the levels of expenditures anticipated, or a single rate could be set to cover expenditures projected over several years.

Better records of depleted areas and monitoring of oyster stock in those areas would also be necessary to assess the effects of planting shell and seed on production. Current VMRC repletion data is inadequate for use as an evaluation tool. If additional improvements were made in the State's repletion program, greater results than those predicted in the model could occur.

Should the State choose to embark on an expanded public repletion program, decision-makers should consider an implementation approach that would provide them with an opportunity to evaluate the cost and benefits of the program without committing a substantial investment of State revenues.

Option 4: Lower the market price for seed oysters in order to encourage increased private investment in oyster production and reduce public repletion costs.

Lowering seed costs has the potential for stimulating overall oyster production by as much as one-third over the levels to be expected without a policy change. Increases in the annual harvest ranging between 1.7 and 3 million pounds of marketable oysters could occur by 1990, and increases in net revenues could range from $2.3 to over $4 million. This policy option requires active management of seed beds by VMRC and departure from traditional methods of hand tonging seed oysters in the James River in order to gain price benefits from more efficient dredging methods. According to VIMS scientists, the James River seed area is much more suited for dredging operations than most other State bottoms.

Dredging could be done on current seed beds or new areas. The structure of the industry would only be minimally affected, because

changed procedures would be limited to seed production. Nevertheless, this option would likely require employment in other aspects of the industry for at least some of the 35 tongers who currently harvest and transplant seed. A 1980 legislative proposal to initiate a pilot project for seed dredging generated considerable controversy over whether independent watermen or watermen working for private planters would harvest the seed. However, the large increase in production and revenues would benefit the entire industry, with the potential for creating new jobs and tax revenues for the State.

Private planters are dependent upon seed for production because leased grounds are not naturally productive. They would gain increased return on their investment for seed and plant more seed if prices were lower. Repletion of public grounds would be increased because of the additional seed that could be purchased for a given level of expenditure. However, the impact of this option on public ground production would be slight under present repletion methods, which rely on shell planting. Eventually, competition from private grounds would push the price of public ground oysters down and result in less harvesting of these grounds.

Model Results. To test the relationship between the price of seed and the extent of private planting, the two prices of seed oysters were incorporated into the model: the level equivalent to that paid by the Potomac River Fisheries Commission and a more moderate drop in Virginia seed prices to $1.40 per bushel. Potomac River prices are considerably lower than the $2 per bushel price in Virginia because seed oysters are harvested by dredging at competitively bid prices.

Lowering seed prices would increase production and revenues from the private grounds substantially. The three million pound increase would result from lowering seed to 46 cents per U.S. standard bushel, equivalent to the 1982 Potomac River Fisheries price. If the seed price were decreased to $1.40 per bushel, production would increase by 1.7 million pounds, with a corresponding increase in revenue of $2.3 million. According to VIMS biologists, the $1.40 price would recover the cost of the programs in Virginia, although buyers might incur some additional transportation costs.

Additional production would obviously require the planting of more seed than is currently planted. To produce an increase in the annual harvest amounting to three million pounds of oyster meat, an increase of approximately 450,000 bushels of seed would be needed above projected 1990 seed harvest levels. This action would drive the total demand for all seed to 1,190,000 bushels, or a 61 percent increase in otherwise expected production. This level of seed production has not been achieved in the post-MSX period. However, the achievement of production levels which fall into the range of post-MSX experience would still yield significant gains for the industry as a whole. For example, the increase in seed demand corresponding to $1.40 price per bushel would require a more moderate increase in annual seed harvests of 262,000 bushels by 1990.

However, there are concerns about the overall productivity of current seed beds in the James River. Since 1960, the number of seed oysters per bushel has declined. This indicates, according to VIMS scientists, that the density of seed found on the oyster grounds is lower than pre-1960 levels. Additional public and private seed areas may be necessary to achieve an adequate supply.

Policy Ramifications. If public dredging for seed oysters is permitted in order to reduce costs, State management efforts for the oyster fishery will need to improve. It will be necessary, for example, for VMRC to develop effective mechanisms for determining when to open and close dredged areas so as not to deplete the bottoms. Also, better management of seed beds, including accurate statistics, will be needed in order to determine harvesting allowances and repletion decisions. A major commitment to repleting the dredged seed areas will also be necessary.

There are at least two options available to the State for lowering oyster seed costs: establishing additional State-managed seed grounds or leasing some seed beds to private planters. Both would likely stimulate total production, however, one involves a committment of State funds and personnel and the other relies on private investment. In either case, permitting the dredging of privately or publicly managed seed bottoms would decrease costs through harvesting efficiencies.

Strategies for implementing either option are presented below.

- *State-managed seed sector* -- This option would require designating some areas in the James River that currently have low oyster seed production as public management areas where dredging of seed would be permitted. Preference for harvesting seed could be given to public ground watermen currently engaged in the seed tong fishery in order to reduce the impact on their livelihood.

  An expanded State management program would require a corresponding expansion of the public repletion program to ensure that seed bottoms are not depleted or damaged. One possible funding source for these activities would be to use fees and taxes derived from seed dredging to replete seed beds.

- *Private seed sector* -- Increasing private seed production would likely require the leasing of some currently unproductive seed beds. The State could consider leasing seed bottoms which it is not planning to use and which have high to moderate capabilities for production. Strict leasing restrictions such as annual proof-of-use requirements would need to be placed on these leases to protect future use of these beds.

Before choosing either of these strategies, the legislature may wish to consider establishing a closely monitored pilot project in order to determine the effects of dredging on resource depletion and bottom conditions. Another possibility would be to phase-in the dredging for seed to minimize the impact on current seed tongers.

Option 5: Manage unproductive public grounds by State planting of seed and shell, and allow dredging as a harvesting method.

The State could also stimulate oyster production by as much as one-third over expected production levels by active management of a portion of the public grounds that is not naturally productive. Legislation would be needed to create an additional State management area. Two such areas currently exist. This policy option requires more active management by VMRC than is carried out in the other areas and intensive repletion efforts. It would require more emphasis on the transplanting of seed rather than shells, which is currently the major repletion method used on public grounds. The option would have the effect of increasing production from public grounds and making the industry more reliant on State efforts to maintain oyster production. It would also likely increase the use of dredges on the public grounds and may reduce the number of traditional hand tongers. Since the number of hand tongers has decreased over the years and recruitment of new tongers is uncertain, more efficient harvesting methods are likely to be needed in any event.

Model Results. The projected increases in production are based on the assumption that 1,000 acres of currently unproductive public grounds could be made to produce oysters at a rate equal to the pre-1960 period for leased grounds. These grounds could be actively repleted by the State at a rate of 500 bushels of seed per acre and harvested by dredging. It also assumed that the State would continue its current repletion program on other parts of the public grounds in the same proportion as usual.

Total public grounds, including the managed Baylors, are predicted to increase annual production by 3.4 million pounds of oyster meat and revenues by $4.7 million by 1990. Taking into account a corresponding loss in revenue to private planters due to competition and price decreases of 2.7 cents per pound, the State's net total increase would be $4.6 million. This represents a 40 percent increase in the revenues expected in 1990 without a policy change.

The impact on Virginia's seed resource to undertake this activity would be significant. The increased demand for seed above projected harvests would be approximately 370,000 bushels per year by 1990. The additional demand should increase seed prices due to the competition for seed with the private sector. In simulating the outcomes of this policy change, JLARC assumed seed prices would increase by 20 percent because demand for seed would increase. Such an increase is not an unreasonable expectation, however, since a 51% increase in

seed demand has occurred during the post-MSX period. If seed prices do not increase by as much as 20 percent, then total production and revenues should increase even more.

The total acreage to be managed by the State could be altered to test the actual impacts on public ground production. As little as 400 managed acres could still increase overall production by 1.6 million pounds and revenues by $2.3 million.

Policy Ramifications. If a public management approach to developing unproductive Baylor Grounds is taken, VMRC would be given responsibilities similar to those it has already received in two other management areas. However, the Commission will need to manage the new areas much more actively. Currently, dredging is permitted in the existing management areas to reach accumulated stock that is not accessible by tongs. However, the effort is not being closely monitored, and the grounds are not being fully replenished. In order to produce the potential level of results, an active seed and shell program for repleting the 1,000 acres will be necessary. In addition, active monitoring of the grounds by VMRC would be needed to determine the number of dredge operators to permit and to observe possible damage to the bottoms. Increased costs in program administration and expenses would likely occur. The dredge permit fees could be set at a level to recover much of the costs.

Option 6: Lease portions of the public grounds in order to stimulate additional private investment in the cultivation and harvesting of oysters.

This option can be viewed as an alternative method to option five for producing harvesting increases, although the two options are not mutually exclusive. Instead of the State assuming active management of a portion of the public grounds that is currently unproductive, the grounds could be leased to the private sector for cultivation and harvesting of oysters. These grounds would probably be attractive to private planters because, in general, the public grounds are far superior growing areas to those non-Baylor grounds currently available for leasing. The State would benefit from additional production in grounds which it would be unable to replete under a public program due to costs.

Although only 1,000 acres out of a total of 243,000 public acres would be leased, this policy option represents the most dramatic departure from the traditional structure of the industry. For the first time, grounds classified as public grounds would be leased for private use. Legislation would be necessary to redefine the constitutionally protected natural growing areas in order to permit leasing.

Implementation of this option is likely to be controversial because tongers and other proponents of maintaining the public grounds intact may see this action as a first step toward private encroachment on the public grounds. Constitutional issues may also be raised. An

additional concern would be that leasors could merely substitute cultivation of these grounds for those they currently hold, thereby reducing the total grounds anticipated to remain under production. Moreover, while the Baylor grounds may be attractive, leasing decisions by the private sector will also depend on several factors which will impact on investment decisions, including expectations of economic return on investment, quality of grounds available for lease, individual perceptions of Baylor Ground potential, consumer demand, and seed prices. These concerns are similar to private investment decisions on currently leased grounds.

Model Results. Leasing 1,000 acres of currently unproductive Baylor bottom could increase total State oyster production by over 3.4 million pounds by 1990, assuming that the grounds selected for leasing have the potential to produce oysters at the pre-MSX rate, are planted at a rate of 500 bushels per acre, and are harvested using conventional oyster dredges. Revenues to the oyster industry would increase by $4.6 million even in light of anticipated declines in oyster prices.

A decline in public production of 39,000 pounds would likely occur, along with a drop of less than one cent in the price of oysters from public grounds. The price depressing effect of increased supply would be greater on the private grounds than for public ground oysters. This is because the increased private harvest would likely compete with existing private landings during the summer months when the public harvesting season is legally closed. Prices for private ground oysters are predicted to fall by almost three cents.

Even with the drop in oyster prices, total increases in dockside value from leasing 1000 acres of the Baylor Survey would amount to $4.6 million by 1990. This total represents a 40 percent increase in the revenues expected to be generated without such a policy change. Incorporated into that total, however, is an expected revenue decline of approximately $120,000 in the annual public grounds harvest due to the increased landings from private grounds.

The availability of seed resource at a reasonable price is an important factor in this analysis. Assuming a 20 percent increase in seed prices due to increased demand from private planters, the additional seed requirement would be approximately 370,000 bushels per year by 1990. While this represents a 51 percent increase in current seed production, the total production level of 1.1 million bushels has been achieved since MSX struck. If the increased demand does not produce such an increase in seed prices, then total production and revenue should increase even more than presented above.

Policy Ramifications. Although the natural oyster bottoms are protected by the State Constitution, the General Assembly has sufficient authority to legislate the leasing of the areas of the Baylor Grounds that are not naturally productive oyster ground. An Attorney General's opinion issued in 1969 stated that the legislature can redefine the boundaries of the natural rock established by the Baylor Survey and the *Code* and may authorize the leasing of non-natural areas to the public.

Although many of the best grounds are contained within the Baylor Survey, recent studies by the Virginia Institute of Marine Science indicate that a substantial portion of the public bottoms are not conducive to growing oysters. A large part of the grounds was found to be unproductive, while other parts were not being used to their full capacity.

Industry spokespersons note, however, that no one would want to lease totally unproductive grounds. Therefore, a proposal recommended by VIMS involves leasing portions of the Baylor bottoms in 50- to 60-acre blocks. These blocks would contain bottoms of varying qualities for growing market oysters and could encourage investment by private planters.

The dependence of private growers upon a declining public seed harvest could also be lessened by leasing some Baylor bottoms for use as private seed areas. According to VIMS, only five- to six-acre blocks may be necessary for private seed beds. The constitutionality of leasing grounds with differing levels of productivity would need to be explored.

If leasing portions of the Baylors is determined to be a viable management action, then safeguards should be incorporated into the program in order to preserve the conditions of the leased bottoms and to discourage "idle leasing." Safeguards not currently in place might include higher rental fees, shorter lease duration, stricter proof-of-use requirements, and easier means for having improperly used grounds revert back to the State. Fees collected from leased Baylors could be designated for use in repleting the remaining public bottoms.

The legislature may wish to establish a new method of leasing this ground outside of the current process in order to expedite the process and minimize the impact on VMRC's current backlog of lease applications. Possibilities include the creation of a public bidding process and the required use of a private surveyor. Preference could be given to leasing to tongers who wish to cultivate their own grounds.

Summary of Policy Options

Changes can be made to increase total State production of oysters and to maintain the viability of both the public and private segments of the industry. A high potential for growth exists in the private segment of the industry because of the efficiencies in harvesting, the investment potential, and the previous production levels of this sector. Additional State efforts would be required to increase public ground production.

Barring future environmental degradation, the likely changes in production and revenue as well as the biological, social, and economic considerations associated with the policy options addressed in this report are summarized in Table 4. Results of the policy options are presented as changes in the revenue and production likely to exist

Table 4

SUMMARY OF POLICY OPTIONS FOR VIRGINIA'S OYSTER INDUSTRY

Option	Increase in Total Production[1] 1990	Increase in Total Revenue[1] 1990	Considerations: Biological	Considerations: Social	Considerations: Economic	Assumptions
Raising Retail Prices	.4	$2.7	Little or no effect	Little or no effect	Prices received by both groups would rise. Doubtful that full prediction would be achieved.	Based on an annual two percent increase in retail prices.
Increasing Public Repletion Efforts	.5	$.64	Slight increase of 54,000 bu. per yr. seed required above projected 1990 harvest.	No change	Minimal benefits to public sector at large cost.	Assumes one-time doubling of repletion expenditures in 1982 and maintaining that level throughout forecast period.
Lowering Seed Costs	3.0	$4.0	Significant demand on seed resource (450,000 bu. extra per year)	Number of public watermen tonging for seed may decline	Private harvesting sector benefits by low investment costs. Public sector may benefit if more seed is purchased for repletion	Based on dredging permitted; drop in seed price to equivalent paid by Potomac Rivers Fisheries Commission in 1982.
Managing Unproductive Baylors	3.4	$4.6	Requires 370,000 bu. of additional seed per year above projected 1990 harvest. Possible damage to Baylor bottoms from dredging must be monitored.	Dredging permitted on designated areas in order to increase harvest. May impact number of oystermen.	Public harvesting sector would benefit. Large cost to the State. Price to private sector would be reduced because of overall increase in quantity.	Based on 1000 acres managed; productivity level at Pre-MSX rate; dredging permitted; seed planting rate 500 bu/acre; demand for seed would increase price by 20%
Leasing Portions of the Baylors	3.3	$4.6	Requires 370,000 bu. of additional seed per year above projected 1990 harvest.	Reflects change in traditional pattern by leasing Baylors	Private sector benefits. Effects on public sector less severe than associated with managing Baylors.	

[1]Reflects forecasted increases above the predicted "future with no change" due to implementation of policy option.

Source: JLARC.

by 1990 without management changes, rather than in absolute terms. This approach shows more clearly the impact of the policy changes in the industry.

The policy options differ as to which industry segment would primarily benefit from the change. Policies that would increase the oyster repletion program and designate management areas for developing unproductive Baylor Grounds would primarily benefit production on the public grounds by watermen. Leasing portions of the Baylor Grounds would benefit private planters by providing them with grounds better suited for young oysters. Only an increase in consumer demand would benefit both groups, but the State's ability to affect this change is the most uncertain of all the policy options presented.

The most significant conclusion is the magnitude of the impacts. None of the options would restore production to the pre-1960 level. The policy options do, however, represent ways of expanding the potential of the oyster industry. Viewed in this way, the options could be implemented gradually as experiments toward restoring the industry. The model forecasts clearly indicate that benefits in terms of overall harvest can come from these public interventions.

The options could increase the oyster industry's value to the State, and could generate additional jobs and taxes. In addition, several of the options could draw the industry into more efficient means of production. Without the test of new methods and management techniques, Virginia's production may continue to drop further behind the production of other states.

Conclusion

While the State could choose to maintain the status quo and allow the oyster industry to stabilize at current production levels, several options are available to stimulate its growth. These options could be accomplished without major dislocations of the industry's basic structure. They could be implemented on a limited, pilot basis initially. This approach would permit an evaluation of the actual impacts produced by the changes on biological, social, and economic conditions before proceeding fully.

Regardless of the option selected, policy makers may wish to actively encourage the use of econometric modeling as a fisheries management tool. This tool, and others that support systematic assessment of policy options in terms of their biological and economic impacts can reduce the uncertainty in management and policy decisions. Fisheries and economic experts from VMRC, VIMS, and VPI&SU should take the lead in developing these techniques.

HARD CLAM INDUSTRY

Although among the smallest of the State's commercial shellfish industries, Virginia's hard clam fishery is important to the seafood economy, bringing in over $1.8 million in revenue during 1981. However, Virginia's hard clam industry has shown considerable decline since 1965. Virginia's share of the total Atlantic seaboard production has fallen from ten percent in 1970 to five percent in 1980. This has occurred even though prices and the number of harvesters have increased during the period. Several industry and agency representatives feel, however, that Virginia can increase its share of the national hard clam harvest.

Given the decline of the industry, JLARC examined the potential for reviving the hard clam fishery and assessed policy options for the State which could foster Virginia's competitive position. The options addressed range from maintaining the status quo to sustaining current production levels to cultivating and efficiently harvesting new growing areas. Without some changes in the fishery, Virginia's future hard clam production will likely stabilize at lower than current levels. However, total production could be increased by over 240 percent above otherwise predicted levels by adopting one of several options for State action. Implementation of any option would have to take into account the economic, social, and biological impacts on the industry.

STATUS OF VIRGINIA'S HARD CLAM INDUSTRY

Several trends emerged from JLARC's review of the State's hard clam industry: Virginia's production of hard clams has decreased significantly since 1965; prices for hard clams have fluctuated widely since 1976; and the use of more efficient gear could increase Virginia's share of the hard clam market dramatically, but has resulted in controversy within the industry itself. A review of the industry's current status provides the basis for evaluating the feasibility and desirability of implementing available policy options aimed at enhancing the industry's economic potential.

Production

Virginia's share of the total U.S. hard clam landings has declined significantly during the past 17 years. Virginia's annual hard clam landings fell from 2.4 million pounds in 1965 to less than half a million pounds of meat in 1978. In 1980, for example, total U.S. hard clam landings were 13.4 million pounds of meat valued at $44.1 million. Virginia's contribution to that total was 753,200 pounds of meat, or approximately six percent, valued at $1.7 million. Between 1976 and 1979, the Commonwealth's rank fell from fifth to sixth among hard clam producing states along the Atlantic Coast. In recent

years, a slight increase in annual hard clam landings has occurred so that 1981 was the first time since 1977 that Virginia production exceeded one million pounds. The downward trend in Virginia's hard clam production may be due to a decrease in harvesting effort by clammers or to a lower level of stock availability.

Hard clams, which grow primarily in high salinity waters, are harvested most heavily from the seaside of Virginia's Eastern Shore and the lower York and James Rivers, including Mobjack Bay and Back and Poquoson Rivers. Hard clams can be harvested throughout the year except in polluted areas such as the James River. During the summer months, contaminated clams may be fished from the James River and other condemned areas and "relayed" to clean waters for a minimum of 15 days, where the clams cleanse their tissues and become suitable for human consumption. Harvesting from polluted areas, along with greater consumer demand for clams during the summer, accounts for the fact that between 52 and 79 percent of Virginia's annual hard clam landings are produced between April and August of each year (Table 5).

Table 5

SUMMER HARVEST AS A PERCENTAGE OF THE TOTAL ANNUAL HARD CLAM CATCH IN VIRGINIA

Year	Total Annual Catch	Catch Between April and August	Percentage Of Total Catch Produced in Summer
1973	1,355,455	845,720	62%
1974	1,198,051	937,838	78%
1975	1,088,359	719,520	66%
1976	893,304	502,700	56%
1977	1,020,690	658,151	64%
1978	497,238	326,356	66%
1979	619,712	492,010	79%
1980	753,078	531,114	71%
1981	1,110,530	575,757	52%

Source: National Marine Fisheries Service.

Private Grounds. Individuals and corporations may lease available grounds for the private propagation and purification of clams. However, since the application form for leasing private grounds does not distinguish whether the lease is to be used for oyster or clam propagation, the Virginia Marine Resources Commission is unable to determine how many of the existing private leases are used exclusively for clams. VMRC officials indicate, though, that location of the lease is often the best available indicator of how the ground is used, since clams grow better in high salinity areas than do oysters.

Public Grounds. Approximately 22,300 acres of the State's water bottoms have been designated as public clamming grounds. Section 28.1-162, *Code of Virginia*, allows VMRC to designate unassigned grounds as public clamming grounds when petitioned by 20 or more citizens. The Commission is further empowered to initiate this action without a petition, "if in its judgement it is expedient, and provided in its opinion no oyster interests will suffer thereby and the clams ... are of sufficient quantity" as defined in the *Code*.

Hard Clam Prices

Three commercial grades of hard clams, defined by size, are harvested from Virginia's territorial waters. Unlike many seafood products, the smaller the clam size above a certain point, the greater the value to consumers. The largest and least valuable of the three is the "chowder" clam. Harvested at widths of over three-and-a-half inches, the chowder clam is used primarily in soups, stuffings, and fritters. The average wholesale price per chowder was 5 cents in 1981.

"Cherrystones," harvested when they have grown between 2½ and 3½ inches in width, are often featured at clam bakes or served raw on the half shell. The wholesale price for each cherrystone was 8 cents in 1981. "Little necks," the smallest and most valuable of the three, measure 2 inches in width when harvested and are served steamed or raw. Consumer demand is highest for this grade of hard clams and, therefore, wholesale prices for little necks are higher than the other two types, averaging 10½ cents each in 1981.

Although wholesale and retail prices are determined by the size of individual clams, hard clam prices paid to harvesters reflect the fact that all three grades are landed and sold together in a single bushel. Harvesters received an average of $1.68 per pound for hard clams during 1981. Prices for hard clams have been extremely volatile both in Virginia and along the Atlantic seaboard in recent years. The price trend shows annual increases in both cases since 1975. However, the monthly price data show that fluctuations of up to 50 percent have occurred within several recent years (Figure 8).

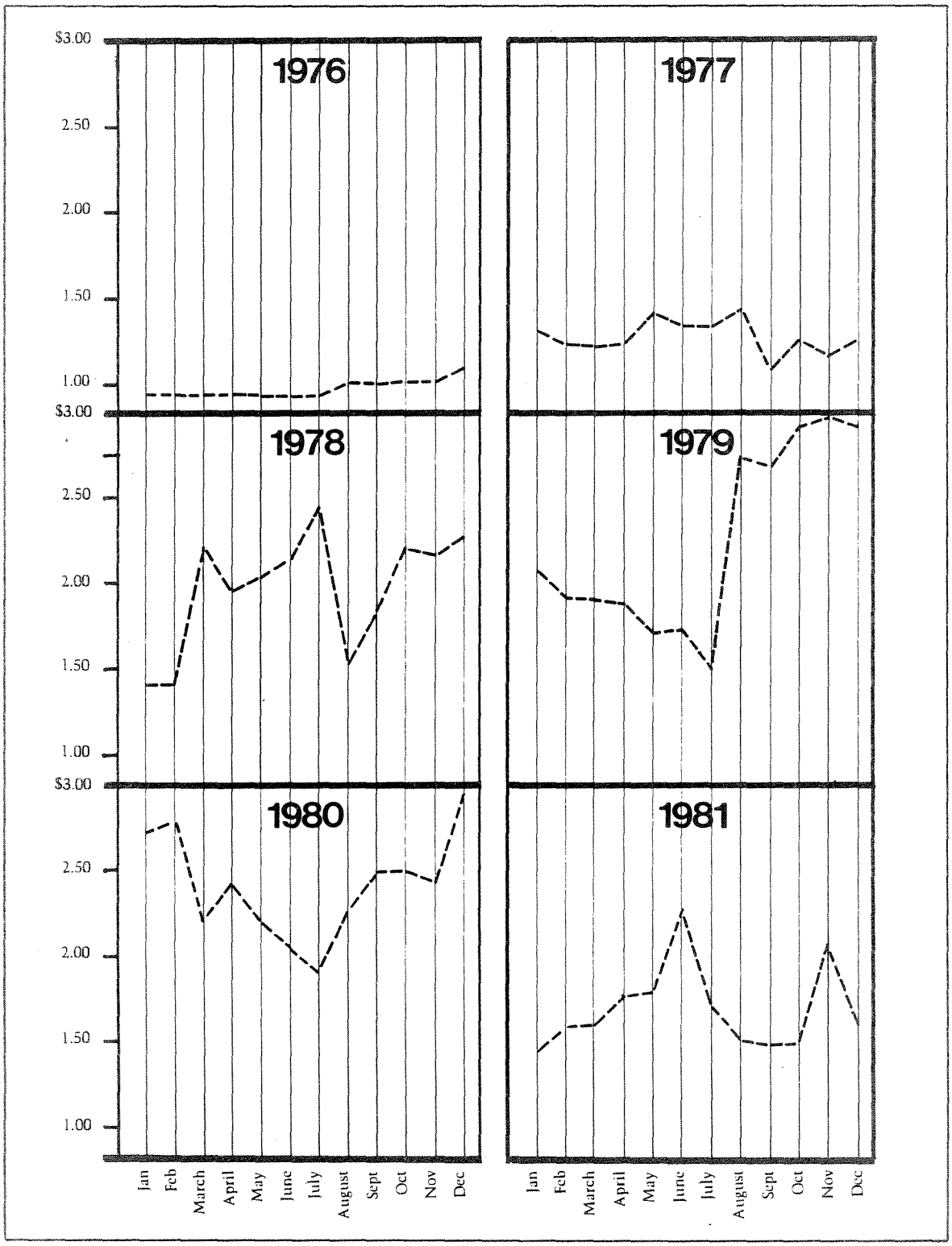
Harvesting Techniques

Although a variety of gears are used in harvesting the hard clam, a VIMS expert estimates that 95 percent of Bay clams are currently harvested with patent tongs. In 1982, VMRC issued 178 licenses for clam patent tongs, a number substantially greater than in any previous year. In addition, 466 hand tong and 19 clam dredge licenses were issued by VMRC. Other methods used to a lesser degree by clammers include clam rakes and treading by foot.

Recently, controversy has surrounded the use of the more efficient hydraulic escalator dredge (Figure 9). Consisting of a large rectangular steel box with a conveyor belt type escalator attached to

Figure 8

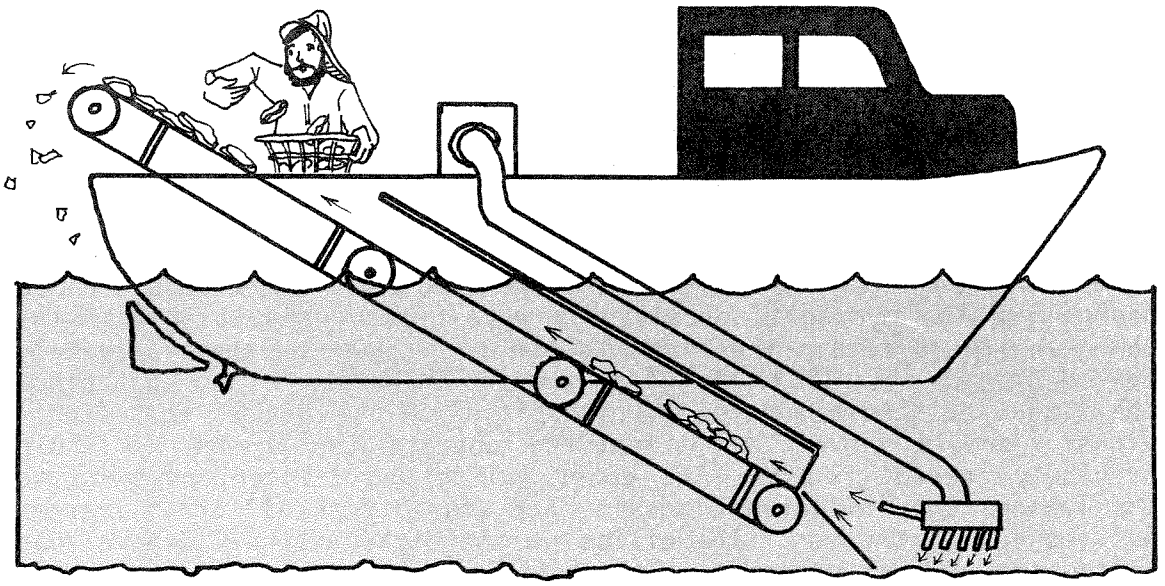
CLAM PRICES PAID TO VIRGINIA WATERMEN
(Price Per Pound)



Source: JLARC illustration of National Marine Fisheries Service data.

Figure 9

HYDRAULIC ESCALATOR DREDGE



JLARC Staff Illustration

the back side, the dredge moves over the bottoms while flexible prongs inside the box swoop clams up. The clams are carried out to the escalator and up to the surface by a horizontal jet of water.

A VIMS study of the operation of the hydraulic escalator dredge found that this dredge is less destructive of the ecology of the bottoms than are the traditional patent tongs. Specifically, VIMS found that damage to the bottoms caused by patent tongs was more extensive and longer lasting than the damage caused by the escalator dredge. In addition, VIMS researchers found that a lower clam mortality rate resulted from use of the hydraulic dredge than from patent tongs. Subsequent research by VIMS revealed that the catch rate is seven to ten times greater for the hydraulic dredge than for patent tongs. The hydraulic dredge caught in one hour the amount typically harvested in eight hours of patent tonging.

During 1979, approximately 1800 acres of grounds in the Hampton Roads area were leased by the Marine Resources Commission. These grounds had been under lease for oysters in previous years, but the leases had been dropped after the oyster disease MSX struck the area. Some of the grounds were being used by independent clammers when the applications were made to lease the grounds. The leasees were also subsequently licensed to use the hydraulic escalator dredge on their

leased grounds. Large numbers of public clammers opposed this action because good clamming areas would no longer be available for public use. Further, public clammers contended that use of the more efficient hydraulic escalator dredge would result in unemployment of clammers using patent tongs, depress hard clam prices, and damage or deplete clam beds for future harvesting. Clammers also expressed concern that further leasing of grounds formerly available for public use might occur.

In 1981, in response to industry concerns, the General Assembly passed Section 28.1-128.01, prohibiting the use of hydraulic escalator dredges for harvesting hard clams on public and private grounds. Other coastal states, including North Carolina, continue to allow the use of the escalator dredge for harvesting hard clams in their waters, and the dredge can be used in Virginia for landing oysters and soft-shell clams.

Soon after the law became effective, two leaseholders who had been using the hydraulic escalator dredge brought a suit against the Commonwealth to retain the right to use the dredge on their privately leased grounds. In 1982, the Circuit Court in Hampton ruled that since the leases existed prior to the prohibition on the dredge, these individuals should retain the right to operate the dredge on their privately leased grounds. The court ruling was limited, however, to the leasees who initiated the suit, and stated that all other leasees are subject to the ban. The office of the State Attorney General has joined the Working Waterman's Association in filing an appeal of this decision.

POLICY OPTIONS FOR THE HARD CLAM INDUSTRY

If present trends continue, Virginia's hard clam production will experience a moderate decline. Many industry and State representatives feel that the potential exists to reverse this trend and increase Virginia's standing in the national clam industry. However, future increases in production appear to require the development of new growing areas.

In contrast to oysters, there is no State repletion program for hard clams. Therefore, predicted production levels are largely dependent upon the natural abundance of clam resources. However, methods for cultivating hard clam stock, which are currently under development at VIMS, could lessen the State's reliance on natural resources. If successful for commercial purposes, the cultivation of new growing areas by the State or private planters could significantly increase the potential of Virginia's hard clam industry. More efficient harvesting methods may be required, however, to make the investment in clam cultivation profitable.

JLARC's review of the clam fishery focused on five policy options over which the State can exert some measure of control:

- maintaining the status quo;
- sustaining the harvest from current hard clam grounds;
- cultivating new hard clam growing areas and harvesting with the hydraulic escalator dredge year-round;
- cultivating new hard clam growing areas and harvesting with the hydraulic escalator dredge during summer months only; and
- cultivating new hard clam growing areas and harvesting with the hydraulic escalator dredge during winter months only.

JLARC's approach included the development of an econometric model for the hard clam industry as well as discussions with industry and agency representatives. Since much less information is available for hard clams than for oysters, refinements to the analysis may be necessary. The options, which are not mutually exclusive, do provide a means for determining the likely impact of State action and must be considered in terms of their impact on the industry. As with the oyster analysis, the direction and magnitude of predicted outcomes are more significant than the actual numbers.

OPTION 1: Maintain the status quo and allow production levels to experience a moderate decline in the future.

Hard clam landings in Virginia have experienced a significant decline during the past several years. This has occurred even though the number of licensed harvesters has increased during the same period. This trend indicates that either the licensed patent tongers are not expending as much effort harvesting hard clams as in the past, or their efforts are producing fewer clams due to stock reductions. Analysis seems to support both possibilities. In either case, maintaining the same level of State management will permit present trends to continue.

Model Results. Projections based on the trends during the period 1955 to 1978 indicate that Virginia's hard clam industry will experience a moderate decline in annual production in the future. Assuming that the equivalent of 110 patent tong licensees continue to harvest natural stocks; at levels of the recent past, annual landings are predicted to stabilize at 587,500 pounds of clams over the long run. This level of production is low in comparison to harvests of ten years ago and is also lower than recent harvests of the past five years, which averaged 800,000 pounds annually.

After several years of harvesting at this level, the price received by public watermen for the hard clams is predicted to be about $3.19 per pound, assuming that seasonal patterns of clam harvesting remain the same. Total revenues to the industry generated from this production level would be about $1.9 million annually.

Ramifications of State Action. Maintaining the status quo will not require any change in the State's role. The State will continue to have a limited involvement in the hard clam fishery. Virginia's clam processors will remain largely dependent upon imports to fill supply needs, while clammers annual landings are likely to decline. Unless an external change occurs, Virginia's relative position within the national hard clam industry is unlikely to improve since no State action would be taken.

OPTION 2: Sustain the harvest from naturally productive hard clam grounds.

Since continued viability of Virginia's hard clam harvest is largely dependent upon the availability of naturally-produced resources, consideration must be given to sustaining the current harvesting levels over the long run. This effect could be partially accomplished by reducing the amount of harvesting effort currently being placed upon natural stocks. However, data limitations on the amount of effort actually being expended by the current number of licensed tongers make it difficult to determine the degree of reduction that might be necessary to prevent substantial declines in future harvests.

Model Results. JLARC's analysis found that the maximum harvest and the maximum dockside revenues are reached when 63 patent tong licenses are operating at the same level of harvesting activity as in the past. However, over 170 licenses -- the most in history -- are currently in effect. Apparently, the value of the current clam harvest is less than it could be because of the level of harvesting taking place. The exact number of licenses required to maximize revenues is difficult to determine because of imprecise methods of measuring effort.

The predicted long-range impact of continuing various harvesting levels over a sustained period of at least five years is shown in Table 6. The increased fishing pressure associated with more licenses or harvesting efficiencies would likely cause a reduction in hard clam harvests. In turn, stock reductions would likely force subsequent landings and total revenues to decrease due to a reduction in brood stock. Prices would increase only slightly due to the reduction in harvest.

Policy Ramifications. Results of JLARC's analysis suggests that no action should be taken to encourage any increase in harvesting effort on current stocks. Use of more efficient harvesting gear, such as the hydraulic escalator dredge, on current stocks should not be permitted except on a very limited, research basis. Rather, the State may wish to consider methods of restraining entry or catch. In addition, establishment of a cull law for hard clams should be considered, which would require the patent tong operators to throw back any of the very young "button" clams, which have no market value and could be used as natural brood stock for the fishery.

Table 6

IMPACT OF VARIOUS LEVELS OF HARVESTING EFFORTS ON THE HARD CLAM FISHERY

Patent Tong Licenses	Price (per pound)	Harvest (in pounds)	Total Revenue
60	$2.83	1,352,460	$3,825,140
63	2.83	1,355,070	$3,831,060
70	2.83	1,337,070	$3,790,070
80	2.87	1,252,880	$3,594,800
100	3.02	878,810	$2,654,810

Source: JLARC hard clam model.

A joint VMRC-VIMS study should be conducted to determine the extent to which the decline in clam production is due to stock reduction or the level of harvesting effort. If a significant portion is due to stock reduction, the State could consider developing a replenishment program for hard clams. A replenishment program could include the planting of stone aggregate or shells on the bottom for young clams to hide under to escape predators. This type of bottom modification is currently being done by some private clam growers. Another possible replenishment method is the use of a hatchery to develop clam seed. This is currently being done on an experimental basis by VIMS. Since the undertaking of a clam replenishment program would involve a monetary commitment by the State, the VMRC-VIMS study should also review the cost-effectiveness of such a program and report its findings to the General Assembly.

OPTION 3: Cultivate new clam growing areas and allow the use of hydraulic escalator dredges year-round.

Rather than risk depleting current natural stocks, increased hard clam production could be achieved by cultivating new clam growing areas. A process for cultivating hard clams is being developed by VIMS. If this "mariculture" project proves successful in sustaining commercial quantities, cultivation could be encouraged on State or privately managed areas. Among the options then available would be allowing the use of up to 20 hydraulic escalator dredges during the entire year on limited acres of grounds managed or leased by the State. These activities would be in addition to the patent tonging currently being done on existing clam resources. This option could increase total annual revenues to the industry by 259 percent over the levels otherwise predicted.

Model Results. Total harvests would increase dramatically for each additional dredge in operation. According to JLARC's

analysis, four to 20 dredges could result in harvests of 790,000 to 1,600,00 pounds annually, when the patent tong harvest of existing stocks is included.

JLARC's analysis shows that several factors affect Virginia prices, including Virginia landings, total eastern seaboard landings, season, and consumer demand. The most striking result of the analysis on Virginia clam prices is the relative lack of impact of increased hard clam landings on price. Because Virginia's share of total eastern seaboard landings is relatively small, the impact of Virginia landings on national and State hard clam prices is minimal. Because Virginia's clam production was found to be a part of the same market as the dominant New York and New England production, the change in Virginia's clam prices due to a change in Virginia catch would be slight. A recent study by VIMS supports this finding.

However, the prices paid to all clammers tend to drop as the harvests of this magnitude increase. For the average patent tong operator, the introduction of four, ten, and 20 dredges would result in a drop in income of 1.1%, 2.7%, and 5.4% respectively, due to the decrease in prices resulting from increased competition. Each dredge adds about $156,000 to the total revenue for the fishery.

Several assumptions were required to estimate the impacts of this approach. First, the harvesting efforts on prospective grounds to be used for clam cultivation were assumed to be as productive as harvesting efforts on current stock. Second it was assumed that 110 patent tongers would continue to harvest an average of 6,000 pounds each per year of natural stock and that the use of four, ten, or 20 hydraulic escalator dredges would each conservatively harvest 51,000 pounds per year, or 8.5 times more than the patent tong, on newly cultivated stock. Third, the future wholesale price of hard clams was assumed to be close to the current level in order to interpret the results in 1982 dollars. In addition, the wholesale prices were reduced by 3 percent for the summer harvest because the historical monthly data showed a decline in price during that period. (These same assumptions were also made for Options 4 and 5).

Policy Ramifications. Implementation of this option would require a legislative change to permit the issuance of licenses for hydraulic escalator dredges. In addition, the establishment of limited acres of State-managed grounds or leased grounds explicitly for the hard clam harvest would be necessary. These areas should not include grounds where stocks are naturally abundant.

Cultivation of new grounds and year-round harvesting should stabilize domestic supply so that both harvesters and processors would benefit. Year-round operation of the dredges on cultivated areas only would be a less restrictive regulation of their use than if seasonal limitations were mandated.

Consideration would need to be given as to how to limit the total landings from hydraulic escalator dredges in order to minimize

the impact on the income of existing patent tongers. Limiting the number of licenses issued or setting catch limitations could be explored. In either case, legal and enforcement concerns would need to be addressed. The impact of over 20 dredges on the fishery is difficult to predict because it pushes production levels far outside the range of the historical data; therefore, such an impact cannot be adequately modeled.

Should the State choose to embark on this option, decision-makers should consider an implementation approach that would enable them to evaluate the actual impacts of this program.

OPTION 4: Cultivate new clam growing areas and allow the use of hydraulic escalator dredges during summer months only.

One way of restricting the impact of increased landings due to the use of the hydraulic dredges on newly cultivated grounds is to limit their operation to a particular season. By allowing the use of the hydraulic dredge during the summer only, the negative impact on the income of patent tongers would be minimized, while total revenues could increase by as much as 267 percent over otherwise expected yields.

Model Results. For comparative purposes, harvests for summer-only use of escalator dredges would be the same as under full-year operation (Option 3), because it is assumed that mariculture will increase the concentration of stocks and allow more intensive dredging. However, prices paid to all clammers and total revenues to the industry would be higher, since increased Virginia landings have the least effect on price in the summer. The net effect would be a small reduction in prices of 0.7%, 1.4%, and 2.4% when four, ten, and 20 dredges are added.

Policy Ramifications. This option would have ramifications similar to Option 3. However, under summer-only operation, peak harvesting periods would coincide with the peak demand season for hard clams. This would enable Virginia to take advantage of increased supply with the least impact on prices paid to watermen. This increased supply could also help to expand the hard clam processing sector in Virginia.

OPTION 5: Cultivate new clam growing areas and allow the use of hydraulic escalator dredges during winter months only.

One way of taking advantage of the harvesting conditions in Virginia and the efficiency of the hydraulic escalator dredge would be to concentrate effort in the winter, when the production of many other clam-producing states such as those in New England is lower. Virginia could supply a larger share of the total U.S. production of hard clams during the winter, stabilize domestic supply for processors year-round, and provide year-round employment for some clammers willing to shift

from summer patent tonging to winter dredging. However, the increased winter production would likely produce a larger decline in prices paid to Virginia clammers in comparison to Options 3 and 4. This is because Virginia's production in the winter has a greater effect on clam prices and, therefore, as State landings increased, prices paid to all clammers would decrease. However, winter-only operation would likely still increase total revenues to the industry by up to 242 percent if 20 dredges operated continuously on cultivated grounds during the period.

Model Results. During winter-only operations, the quantities generated by the dredges would be the same as full-year and summer-only operations. However, prices paid to dredgers and patent tongers would drop by 1.9%, 4.9%, and 11.3% when four, ten, and 20 dredges were added, respectively. Compared to Options 3 and 4, winter-only operations would produce the greatest decline in prices paid to watermen. Total revenues to the industry, however, would still show a significant increase of up to 242 percent above the levels otherwise predicted.

Policy Ramifications. Although adoption of this option would not maximize watermen's income, it would provide the State with a vehicle for increasing its share of the national clam production during the winter months. Winter-only operation of the dredges would also minimize the direct competitive impact of increased landings on patent tongers and might stabilize processing needs during the entire year. An aggressive promotional campaign by the Marine Products Commission could help to identify additional markets for Virginia's increased winter clam production.

Summary of Policy Options

Changes are available to increase Virginia hard clam production. However, consideration must also be given to sustaining harvesting levels on current stocks and to the effect of increased production on the prices received by all clammers.

Since it is plausible that the current hard clam stock is being depleted, especially in light of such adverse environmental conditions as Hurricane Agnes and increased pollution, it is in the public interest to assess the adoption of new State management efforts carefully in order to protect current stock. The most negligible impact on current stock would result from only allowing more efficient harvesting technologies on a limited number of newly-cultivated State-managed or leased clam grounds.

A reduction in current harvesting levels on existing clam grounds may be necessary in order to ensure the continued levels of Virginia's hard clam production. Without a reduction, harvesting levels are likely to decline to even lower levels over time.

Cultivation methods being developed by VIMS are an important element in the potential growth of Virginia's hard clam industry. Without the success of this or other mariculture programs, the industry will remain dependent upon naturally occurring stocks and imports from other states.

The hydraulic escalator dredge is the most efficient harvesting method available, but is prohibited for widespread use in Virginia. A statutory change would be necessary in order to permit the use of the dredge. Should the State choose to allow the use of hydraulic escalator dredges on newly cultivated State areas or leased grounds, likely opposition from current patent tong harvesters will have to be balanced against processors' needs for increased domestic supply. Increased domestic supply should cut processing costs by reducing the dependence on imports and the additional transportation costs associated with purchasing supplies from other states. New job opportunities at clam processing houses might also be created if a stable supply resulted from using the dredges.

Analysis by JLARC and VIMS indicates that prices paid to clammers are largely unaffected by the quantity of Virginia landings that would be added by up to 20 dredges. However, additional analysis beyond the scope of JLARC's econometric model would be necessary to determine the impact of the use of more than 20 dredges.

Consideration could be given to a pilot project that would allow dredging only on State cultivated or leased grounds in order to further study the economic, social, and biological impacts of this approach. Strict restrictions on the use of the escalator dredge and on possible leasing of clam grounds would be necessary. Industry members and fisheries experts should be consulted as to the specific restrictions necessary to carry out a pilot project.

Seasonal limitations on the use of the hydraulic dredge should also be considered. Restricting the use of the hydraulic dredge to summer-only operation would increase Virginia production at a time when most patent tonging is done and consumer demand and retail prices are highest. Winter-only operation of the dredge on cultivated grounds would ensure a more stable domestic supply of hard clams year-round and could increase Virginia's standing in the national fishery, but is predicted to reduce the average price per pound received by all clammers. Full-year operation would be the least restrictive use of the dredge. In any case, either of these three options is predicted to increase total industry revenues by over 240 percent above the levels otherwise projected (Table 7).

Conclusion

Since less information is available about the hard clam industry, any changes in the State's management of hard clam production should be approached carefully. Further research may be necessary to determine the impacts of any State action.

Current analysis indicates that increasing the harvesting effort on current growing areas could substantially decrease future production levels and slightly increase prices. Therefore, as a preventive measure, increasing the harvesting effort on current grounds

Table 7

ECONOMIC IMPACTS OF CULTIVATING NEW AREAS FOR HARD CLAM MARICULTURE

Effort	Full-Year Operation			Summer Operation			Winter Operation		
	Harvest (lbs.)	Ex-Vessel Price	Total Revenue	Harvest (lbs.)	Ex-Vessel Price	Total Revenue	Harvest (lbs.)	Ex-Vessel Price	Total Revenue
Maintaining Status Quo[1]	587,500	$3.19	$1,874,940	N/A	N/A	N/A	N/A	N/A	N/A
Harvesting of Cultivated Grounds:[2]									
-With 4 Dredges	791,510	$3.16	$2,498,640	791,510	$3.17	$2,508,920	791,510	$3.13	$2,478,680
-With 10 Dredges	1,097,510	$3.11	$3,407,790	1,097,510	$3.15	$3,452,950	1,097,510	$3.03	$3,320,120
-With 20 Dredges	1,607,510	$3.02	$4,852,600	1,607,510	$3.12	$5,007,780	1,607,510	$2.83	$4,551,390

[1]Assumes 110 patent tong licenses harvesting existing stock at past levels; seasonal share of patent tong harvest is 66% summer, 34% winter; average tonger catches 6,000 pounds per year; no hydraulic dredges operating.

[2]Assumes that current stocks will continue to be harvested at levels reflected in "future with no change"; additional growing areas will be developed where use of hydraulic escalator dredge will be permitted; average catch rate for dredge is 8.5 times greater than patent tong.

Source: JLARC hard clam model.

should not be encouraged unless future study indicates that this practice would be appropriate. Also, the effectiveness of cultivating new State management areas or leased grounds for hard clams and the actual effects on processors and on current watermen's income and landings of using the hydraulic escalator dredge should be assessed on a pilot basis.

If an option allowing the use of hydraulic dredges on cultivated stock is chosen, a statutory change would be necessary in order to permit dredging of hard clams in Virginia. Consideration should be given to placing the number of dredge operations and the season(s) during which dredges could operate within statutory limits.

Should the State decide to permit leasing of additional clam grounds with the express purpose of cultivating clams, several restrictions should be considered. These should include making only a few areas available at a significant rental price and long-term lease in order to restrict leasing to only those committed to long-range management of the leased ground. Leasing should only be permitted in areas where VIMS experts indicate current stock to be negligible, yet where ground is suitable for mariculture. If adopted, VMRC should work with VIMS and industry representatives to determine if other restrictions are needed on either leasing or use of dredges.

BLUE CRAB INDUSTRY

Blue crabs are an important part of Virginia's commercial seafood catch, representing 37 percent of the landings and eleven percent of the value of the edible harvest. In 1980, Virginia's harvest represented nearly one-fourth the national catch. The abundance of blue crabs in the Bay, combined with high consumer demand and new processing techniques, make the potential of this industry favorable.

However, some industry members are concerned that other factors may threaten the fishery's potential and the income of the industry. A recent court decision, which nullified the existing State residency requirements that prohibited out-of-state watermen from harvesting crabs in Virginia waters, has effected the status of the blue crab industry. In addition, several watermen and processors have expressed concern over access into the winter dredge fishery.

JLARC's approach to the blue crab industry focused on the identification of areas relating to the economic potential of the fishery. Assessment of these issues is based on a qualitative review which included discussions with industry and agency representatives. An econometric model was not employed during JLARC's review. However, on-going assessment of the industry could be facilitated by the use of such management techniques by the Virginia Marine Resources Commission.

Status of Virginia's Blue Crab Industry

A review of the current status indicates that Virginia's blue crab industry generally experiences high production levels with annual fluctuations in harvest and prices and an overall rise in the number of crab harvesting licenses issued.

Production. The abundance of blue crabs in the Chesapeake Bay has enabled Virginia to maintain high but fluctuating levels of production. While reported commercial landings for hard blue crabs have averaged 43.4 million pounds annually, fluctuations during the past 20 years have ranged from a low of 25 million pounds in 1976 to a high of 63 million pounds in 1966. During the 1981 season, watermen caught approximately 41.2 million pounds of hard crabs and over half a million pounds of soft-shell crabs. (The latter refers to crabs which have recently shed their shells in order to grow.)

Combined hard and soft-shell crab landings, which had a dockside value of $8.6 million in 1981, represent about 12 percent of the State's total commercial catch and over 20 percent of the total U.S. crab landings. Annual crab landings in Virginia are generally exceeded in quantity only by menhaden and in dockside value only by menhaden, sea scallops, surf clams, and oysters.

Harvesting Methods. Crabs are harvested with several different types of gear, depending primarily on the season and type of crab being sought. Summer harvesting of active hard crabs is primarily dependent upon crab pots. In 1982, 2,101 crab pot licenses were issued by the Virginia Marine Resources Commission. No catch limitations are in force for summer harvesting, although the size of most crabs taken is required by State law to measure at least five inches.

Because crabs are dormant during colder temperatures, winter harvesting occurs in only a very few states, including Virginia and those in the Gulf Coast region. Virginia's winter production occurs between December 1 and March 31, when clam dredges and scrapes harvest inactive crabs buried in the deeper waters of the Chesapeake Bay. The winter dredge fishery is much more regulated than summer harvesting. Regulations pertaining to the winter fishery include limitations on the season, geographic use, daily catch, and size. For example, each dredge boat is limited to harvesting 25 barrels a day. In 1982, there were 223 crab dredge licenses issued in Virginia. This represented the highest number of dredge licenses ever issued by VMRC.

Prices. According to industry sources, crab prices vary greatly from year to year as well as within years. Price variations tend to follow fluctuations in landings. In 1981, for example, prices received by commercial crabbers ranged from 13 cents to 33 cents per pound. Soft-shell crabs, which are considerably more valuable than those with hard shells, commanded prices ranging from $1 to $7 a dozen depending on their size.

Potential of the Blue Crab Industry

Recent changes in the State's residency requirements and concerns about the winter dredge fishery may somewhat hinder the industry from obtaining its full potential. However, the economic potential of Virginia's blue crab industry should remain strong due to high consumer demand, abundant supply, and improvements in processing techniques.

Changes in Residency Requirements. A recent court challenge by a Maryland watermen's group resulted in the overturning of a Virginia law restricting the licensing of crab harvesters to Virginians. The ruling was based on the migratory pattern of the crabs across State lines. As of October 1, 1982, residents and non-residents are eligible to obtain licenses to harvest crabs in Virginia and Maryland.

Industry members and State fisheries managers of both states have expressed concerns over the affect of this ruling. There is uncertainty about what the decision will do to harvesters' income, employment, and catch as well as State enforcement and management activities.

The Chesapeake Bay Commission is currently reviewing the impact of the federal court's decision on the management of the two states' blue crab fisheries. The Commission, composed of legislative representatives from both Maryland and Virginia, is expected to introduce legislation in the 1983 legislative sessions of both states to manage the situation. The proposals will likely include the establishment of non-resident licensure fees.

Access into the Winter Dredge Fishery. As mentioned, two main methods are used in Virginia for the harvesting of crabs: crab pots, used in the summer when crabs are mobile, and dredges, designed to harvest crabs during the winter when they are buried in the bottoms. A comparison of the two indicates that the winter crab fishery employs fewer persons and is more regulated. Some crab harvesters and processors would prefer increased regulation on the winter fishery in order to reduce the number of part-time dredgers into the fishery and to ensure themselves a steady harvest and income. Concerns have also been expressed over the potential influx of non-residents into the dredge fishery as a result of changes in residency laws (Maryland does not have a winter dredge fishery).

The dredge fishery, which operates between December 1 and March 31, accounted for a significant share of the State's total crab harvest. According to VMRC data, 25 percent (9.5 million pounds) of the total crab landings and 27 percent ($2 million) of the total value were harvested with dredges in 1980.

Typically, winter crabs are abundant early in the season but become scarcer as the dredge season progresses due to the intense harvesting of a limited supply. The large number of boats working in

December produces a substantial harvest resulting in a glut at the processing level. According to industry menbers, the processor is unable or unwilling to purchase additional crabs until his supply is processed. As crabs become harder to find later in the season, the number of working dredge boats also declines, reducing the supply of crabs and increasing the price crabbers receive. For example, industry sources indicate that 1981-82 winter prices paid to crabbers ranged from $12-$15 per barrel in December to $50 per barrel by March.

Industry members have expressed concern that the wide fluctuations in winter landings and prices place enormous pressure on processors and year-round crabbers. Some members have suggested that barriers be established to limit the number of harvesters in order to stabilize the supply for processors and the income of year-round crabbers. Suggestions have included:

- limiting the number of licenses issued for winter harvesting with preference given to full-time crabbers;
- lowering the daily catch limits for winter dredge boats; and
- combining summer and winter licensing fees into one year-round crab license in order to discourage part-timers from entering the limited winter fishery.

While these concerns may be valid, uncertainties exist as to the effect of the adoption of any of these actions on supply, prices, income, and employment.

The Virginia Marine Resources Commission should closely monitor the winter dredge fishery to see if changes are necessary to enhance the industry's economic potential. Use of an econometric model of the State's blue crab industry could facilitate this review. Researchers at VIMS and VPI&SU are already developing models, and could cooperate with VMRC in this endeavor.

Improvements in the Processing Sector. Unlike other fishery processing sectors, which continue to rely heavily on traditional methods, the blue crab industry has made advancements in processing techniques. Relatively new advancements in technologies such as crab pasteurization and the development of automated picking machines are available to help plants meet high consumer demand and to be less labor intensive.

A recent study by the National Marine Fisheries Service (NMFS) stated that pasteurization can strengthen consumer confidence in crabmeat products, increase the length of the processing season, increase total sales, and expand geographical markets for products. However, pasteurization has not reached its full potential in the crab industry.

Although pasturization of crabmeat has been used in Virginia for over twenty years, State Health Department officials indicate that

only about 30 percent of the Commonwealth's crabmeat processors utilize this method. The pasteurization process subjects the crabmeat to intense heat for a specified time to destroy bacteria and increase shelf-life expectancies from one week to over six months.

The NMFS study suggested that many processors may not use the technique because of high start-up costs, estimated to be $7,500, or because they do not feel existing production levels or potential cost savings justify its use. However, because of the perishability of the product, processors who do not use pasteurization must limit production levels to that of the weekly demands of local markets. Pasteurization can improve the economics of production by increasing shelf-life.

Wider use of pasteurization techniques could enhance the potential for Virginia's blue crab increase. The Marine Products Commission should take steps to inform and encourage industry members on the potential benefits and costs associated with pasteurization of crabmeat.

Until recently, all crabmeat was picked by hand, adding to its cost. Crab processors indicate that labor to pick crabs is difficult to get and often unreliable. The development and use of an automated crab-picking machine has eliminated some of these concerns for some industry members. Although the machine-picked crabmeat is not as high in quality as the premium hand-picked meat, the machine can be utilized during peak processing periods, and its product is suitable for institutional users who do not require the high quality of hand-picked lump meat. Another advantage to the processor is that the crab-picking machine may be rented, reducing both financial investment and risk. Currently, three of Virginia's 50-plus crab houses have installed the mechanical picker.

Other processing improvements continue to be researched by State agencies. Efforts by VIMS researchers to improve the handling of soft-shell crabs, for example, have the potential for significantly increasing this segment of the industry. High consumer demand will likely continue to stimulate developments in processing technology.

Conclusion

The industry's own viability suggests that few State management changes are currently necessary to ensure the economic growth of Virginia's blue crab industry. However, State agencies should monitor industry conditions, such as the change in residency laws and the winter dredge fishery, to determine if future changes are warranted. State assistance to the industry could also focus on encouraging the widespread use of improved processing techniques, thereby increasing the demand for additional harvests.

FINFISH INDUSTRY

The finfish industry is also an important part of the State's fishing and seafood economy. The industry includes several types of edible and nonedible finfish harvested for both human consumption and industrial purposes. Large quantities of finfish are found in Virginia's share of the Chesapeake Bay and offshore in the Atlantic. Although most of the current commercial landings are for industrial purposes, edible finfish have been cited by State experts as having the potential to be a growing part of Virginia's seafood industry.

Current and additional efforts could help to enhance the industry's potential and increase Virginia's competitive position in the industry. JLARC's review of the finfish industry focuses primarily upon industry trends and the development of new finfish products and marketing opportunities.

Status of Virginia's Finfish Industry

Several species are currently important to the State's commercial and recreational fisheries. These are fluke (flounder), sea trout, bluefish, and menhaden. Harvestable quantities predictably fluctuate from year to year due to natural and man-made causes. Fluke and sea trout catches for 1981, for example, declined by over 50 percent from 1980 levels. Menhaden and bluefish also declined by 25 and 16 percent, respectively, during the same period. Total finfish catches in 1981, excluding menhaden, declined by 30 percent from 1980 due to natural fluctuations in abundance and higher-than-average salinities in the Chesapeake Bay.

Menhaden Industry. Menhaden, which is a nonedible finfish used for making fish oil and fish meal, accounts for 96 percent of the total commercial finfish landings and is responsible for about 80 percent of the State's total commerical finfish and shellfish harvest. Because of its low price per pound, however, menhaden accounts for only about 27 percent of the State's total dockside value annually. The menhaden industry in Virginia consists of two processing plants in Reedville which employ several hundred persons. Virginia ranked second in the nation, behind Louisianna, in the production of processed menhaden products in 1980.

State and Regional Regulation of Finfish Industry. The finfish industry is regulated by both the State and federal governments. State regulation of the finfish industry is minimal, as regulations are concerned mostly with limitations on harvesting methods and catch size.

Because of the difficulty in managing migratory finfish which cross state boundaries, the federal government established fisheries councils in 1976 to help regulate and conserve several types of finfish on a regional basis. Virginia, which is a participant in the Atlantic

States Marine Fisheries Commission and the Mid-Atlantic Regional Fisheries Council, is currently preparing to adopt a regional plan designed to promote the long-term conservation of striped bass.

A lawsuit currently pending against the State's residency requirement for fishing licenses could have an important effect on the future management and potential of Virginia's finfish industry. Similar lawsuits involving the harvesting of menhaden and blue crab were decided against Virginia in recent years, granting non-residents eligibility to harvest these species in State waters. The introduction of a substantial number of nonresident harvesters into Virginia waters could have a significant impact on the future finfish stock and the need for increased State management of the industry.

Potential of the Industry

According to State seafood promotional experts, Virginia's finfish industries have the potential for developing into a significant portion of the State's fisheries. Their belief is based on several factors including:

- the nutritional value of finfish;
- the relatively low cost per pound in comparison to beef;
- the abundance of fish available to Virginia's harvesters and processors from State waters as well as nearby;
- the accessibility of major seafood ports within the State including Hampton Roads, which ranks 18th among all U. S. ports in terms of total dockside value; and
- the potential growth in the commercial export market for finfish.

Other factors, such as new product forms, new markets, and State promotional efforts, should serve to help the industry reach its potential. In addition, the development of cooperatives or seafood industrial parks may help small processors and harvesters take advantage of greater economies of scale.

New product forms. The continued development of new product forms should enable Virginia's finfish industry to continue to expand and grow. For example, recent efforts to develop ways to use menhaden in edible products have greatly increased the potential for that fishery.

Until recently, the outlook for the menhaden fishery has been uncertain, as soybeans and other products have become increasingly competitive for similar uses. However, 27 countries are currently

engaged in research to develop a variety of edible products from menhaden, and industry officials now predict future growth in this direction. Once the federal Food and Drug Administration completes its testing in 1984, industry representatives expect approval to use menhaden oil in margarine-type products as well.

The recent introduction of other new product forms for finfish should enable processors to market currently underutilized fish. "Flaked fish" is an example of a new product form being tried for the first time commercially by a Virginia processor. The product is developed by a processing technique which uses otherwise undesirable finfish to produce a fish product at a price competitive with lump crabmeat.

Further advances in product forms could greatly improve the marketability of Virginia's finfish species.

New Markets. Development of new markets for certain types of Virginia's commercial finfish is also responsible for increasing the industry's potential. Recent State promotional strategies under the leadership of the Marine Products Commission have emphasized increased marketing of Virginia's finfish products in retail grocery stores. Increased retailer knowledge on how to handle and market finfish, coupled with greater consumer awareness of how to prepare finfish, should enhance the industry's potential for growth.

As a member of the regional fisheries management councils, Virginia's finfish industry has also benefitted from efforts of regional fisheries management councils to create and expand export markets in Europe and Asia. While potential exists for increased sales in these areas, further development of overseas markets will require expertise in identifying opportunities in foreign markets and in marketing the product in a manner consistent with foreign customs and product forms. State agencies including the Marine Products Commission, VIMS, and the State's foreign trade bureaus can be expected to continue providing this expertise to processors in order to enable them to take advantage of new and expanding export markets.

Industry Cooperatives and Seafood Parks. Several industry members have also suggested that development of additional marketing arrangements may serve to further develop both the State's finfish and shellfish industries. Two such arrangements would involve the creation of fishery cooperatives and the development of seafood industrial parks.

Seafood industry cooperatives are currently found all along the eastern seaboard, principally in New England. Although different types exist, most have been started by fishermen who have joined together to improve their position in the industry. State officials indicate that few, if any, currently exist in Virginia.

The creation of seafood marketing cooperatives, similar to those used by farmers to sell dairy and agricultural products, could improve the earnings of the State's processors and harvesters through joint buying, handling, processing, and marketing opportunities. According to national experts, cooperatives are ideally suited for helping fragmented industries, such as Virginia's seafood industry, which are composed of primarily small organizational units. Specifically, the establishment of a seafood processors cooperative would enable small processors to join together and operate at a scale large enough to fill the demands of retail grocery establishments -- demands which are being generated by State promotional activities. A watermen's cooperative could enable harvesters to receive a minimum price for their products.

The concept of a seafood industrial park has also received considerable attention and study in Virginia in recent years. Proponents of the concept believed it would stimulate the growth of the State's seafood industry by creating efficiencies and economies of scale through the construction of a centralized facility. Opponents felt that adequate processing facilities already existed in the State and that the creation of a State seafood park would only result in shifts in business arrangements within Virginia rather than actual growth.

In 1977, VPI&SU researchers conducted a study of the feasibility of constructing a single State seafood industrial park. The study examined 17 possible locations and determined that the top three were in the Hampton area. Although several benefits -- including energy and waste management, reduction in processing costs and more efficient transportation -- would likely result from a centralized facility, the study questioned the park's potential to generate sufficient revenues at that time. Therefore, a State seafood industrial park was not established.

Since then, the City of Newport News has developed its own park on 48 acres of waterfront property owned by the city. The first phase of the Newport News seafood industrial park was completed in March 1982. Completion of additional construction is set for Spring 1984. City officials believe the park has been a success in terms of generating tax revenues and providing employment opportunities in marine-related activities. Although no new processors have been attracted to the park, existing facilities have begun to expand their current operations. Also, city officials indicate that the park has begun attracting fishing vessels from outside the Newport News area.

Conclusion

The State's finfish industry has the potential for considerable growth in the future due to several factors, including new product forms, new markets, and State promotional efforts. The State could facilitate this growth through improved management of the fishery and support of the marketing efforts of the industry.

More accurate statistics are necessary for scientific assessment of the status of various species. Moreover, some form of cooperative marketing could better enable the industry to take advantage of the opportunities presented by new markets.

CONCLUSION AND RECOMMENDATION

In accordance with HJR 59, this chapter provides a review of policy options aimed at fostering Virginia's competitive position within the national fishing and seafood industries. To initiate the next steps, JLARC recommends the following.

Recommendation (1): The General Assembly may wish to consider adopting a resolution which requests the Secretary of Commerce and Resources to report on the steps and considerations necessary to implement, in full or on a pilot basis, the economic and administrative policy options presented in this study and to clearly state the administration's point of view on both the adverse and beneficial consequences of each of the various policy options.

Recommendation (2): After considering the report of the Secretary of Commerce and Resources, the General Assembly may wish to implement one or more policy options contained in this study on a limited, pilot basis to permit evaluation of the actual impacts on biological, social, and economic conditions.

Recommendation (3): Prior to any increase of harvesting effort in current hard clam growing areas, VMRC and VIMS should conduct a joint study to determine whether the downward trend in clam production is actually due to stock reduction or the level of harvesting effort. On the basis of this study, the State may wish to consider methods of restraining entry or catch, or methods for developing a replenishment program.

Recommendation (4): Econometric modeling has been shown to be a useful tool for assessing management alternatives and monitoring results in the oyster and clam fisheries. Building on the techniques used in this study, VMRC should take the lead in refining these techniques, giving them broader application, and utilizing them to make fisheries management decisions. In expanding these techniques, VMRC should utilize the fisheries and economics expertise at VIMS and VPI&SU.

III. MANAGEMENT AND REGULATION BY THE VIRGINIA MARINE RESOURCES COMMISSION

The ability of State agencies to carry out their existing functions and to assume new responsibilities is critical to the success of any State effort to implement policy alternatives that will foster the long-term development, growth, and efficiency of the seafood industry. Fisheries conditions must be regularly monitored, and regulatory decisions and programs should ensure that species are maintained at sufficient quantities for repletion, are safe for consumption, and are marketable at reasonable prices. To these ends, HJR 59 directed JLARC to review the nature and scope of State management and regulation.

While several agencies support the industry through one or more specific programs, the Virginia Marine Resources Commission has been designated by the General Assembly as the lead fisheries agency in the Commonwealth. VMRC has major management and regulatory authority for protecting the State's marine resources, promoting the general welfare of the seafood industry, and enforcing all fisheries laws. The agency carries out numerous functions, including issuing licenses, regulating harvesting gear and seasons, managing oyster grounds, and patrolling the tidal waters of the State.

This chapter will focus on the structure and major program responsibilities of VMRC. The next chapter will address the promotion and advisory programs of the Marine Products Commission, the Virginia Institute of Marine Science, and several State universities. Also to be reviewed are the policies and procedures established for inspection of processing plants by the State departments of Health and Agriculture and Consumer Services.

VMRC has made several administrative improvements since selected aspects of agency management were reviewed in JLARC's 1977 report, Marine Resources in Virginia. Of current concern, however, is the agency's ability to assume expanded management responsibilities in order to foster the competitive position of the industry while adequately protecting fisheries resources from depletion. At present, VMRC does not have the organizational structure nor the information base necessary to support extensive fisheries management and regulation. In addition, the agency has not sufficiently used its existing authority. Moreover, despite changes, many of the administrative deficiencies noted by JLARC in 1977 continue to exist today in the areas of oyster ground management and marine law enforcement.

AGENCY STRUCTURE AND MANAGEMENT CAPACITY

Effective fisheries management requires a clearly defined focus of responsibility within the organization, a sound planning and information base, and adequate administrative support systems. However, authority and responsibility for agency fisheries management functions are fragmented or misplaced among several organizational units within VMRC. Information needed for management discussions is often inadequate or unavailable, and the current piecemeal approach to data collection and processing will most likely result in only limited improvement. These factors have resulted in the agency's inability to take advantage of recent regulatory flexibility granted by the General Assembly, although additional flexibility may be needed in the future.

Current VMRC Structure

Although created in 1898 to assist the oyster industry, the authority of VMRC has been considerably expanded over the years. Its jurisdiction now extends to the fall-line of all tidal rivers and streams and encompasses all marine fish, shellfish, and other organisms. The agency is responsible for adopting regulations to preserve resources and promote the seafood industry, administering environmental permits to protect wetlands, protecting the primary coastal sand dunes, and enforcing fish and shellfish laws. The agency is directed by a Commissioner who sits with a Commission. It is organized into several major units and has an appropriated budget for the 1982-84 biennium of $9,576,500.

Management Structure. The Virginia Marine Resources Commission consists of the Commissioner of Marine Resources and six Associate Commissioners who are appointed by the Governor and confirmed by the General Assembly. By law, the Associate Commissioners should be representative of the users of marine resources "insofar as practicable." One member should have earned a livelihood from the waters of Virginia for at least five years prior to appointment to the Commission. The Commissioner and two other members serve concurrently with the term of the Governor who appointed them; four members serve four year terms; and only the Commissioner can serve for more than two consecutive terms.

The full Commission meets monthly. Associate members receive expenses but are not salaried. The Commissioner of Marine Resources is a full-time State employee, who serves as chairperson of the Commission and chief administrator of the agency. Although most responsibilities are shared by the Commission and the Commissioner, the Commissioner alone is wholly responsible for enforcing State laws relating to fish and shellfish and employing and supervising a staff, with two exceptions. The Commission appoints the repletion officer, who is responsible for maintaining the productivity of public oyster grounds, and approves the Commissioner's appointment of a chief engineer, who is responsible for surveying public and private oyster grounds.

Organization. As of October 1982, the staff of 138 persons was organized into four divisions, an oyster repletion department, and a fisheries statistics section (Figure 10). In addition, a fisheries liaison officer reports to the Commissioner. Each of the major organizational units, exclusive of the statistics section and the repletion department, is headed by an Assistant Commissioner. About 60 percent of the staff is involved in enforcement activities in one of four geographic districts.

The responsibilities of the organizational units are described below:

- *Law Enforcement Division* -- enforces laws and regulations pertaining to fisheries, small boat safety and wetlands; sells commercial fishing licenses; and collects taxes levied on oysters.

- *Engineering-Surveying Division* -- supervises the leasing of State-owned bottomlands for shellfish; assists in locating boundaries for condemned shellfish; and maintains all records for oyster and clam planting grounds.

- *Finance and Administration Division* -- provides accounting, personnel administration, research grants, budgeting, purchasing, and financial analysis.

- *Environmental Division* -- reviews marine construction and dredging projects to determine their effects on the marine environment; supervises coastal zone planning; administers the Wetlands Act; coordinates the artificial reef program; and reviews all requests for encroachment on State-owned subaqueous lands.

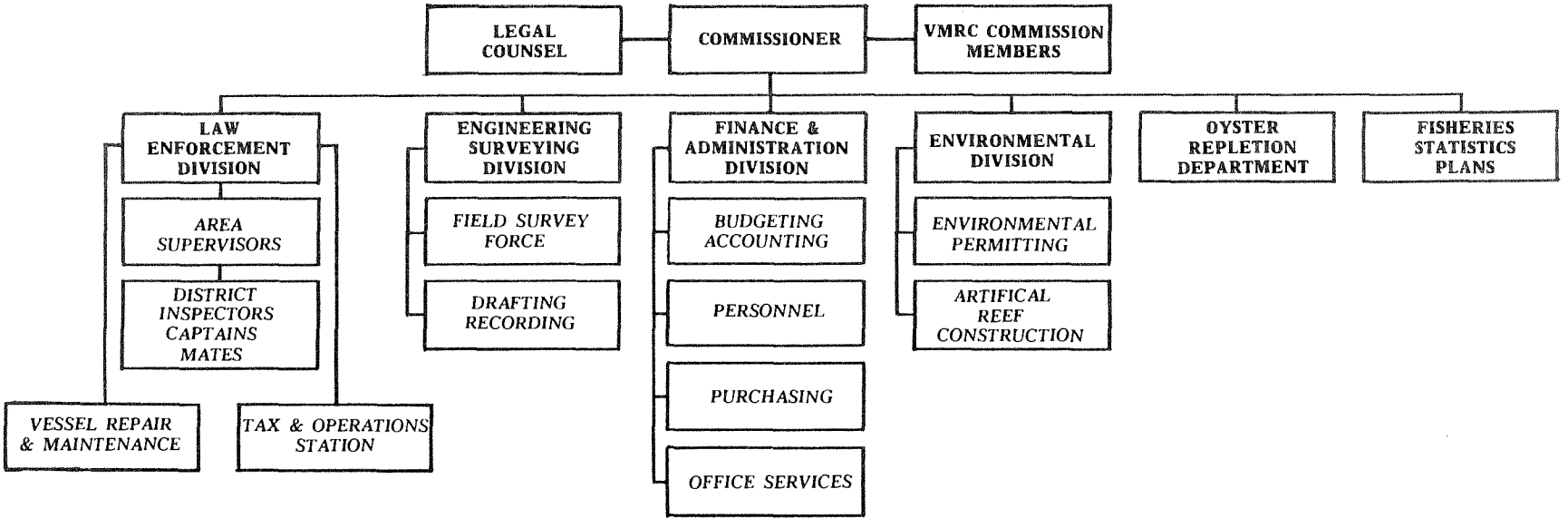
- *Oyster Repletion Department* -- carries out efforts to maintain and increase production in the oyster industry by replanting shell material or transplanting seed oysters.

- *Fisheries Statistics Department* - collects harvesting information on the fisheries within the State's territorial waters; manages the oyster tax collection system; documents licensing of commercial fishing gear; and produces a yearly vessel and employment report.

Prior to his resignation effective November 1, 1982, the former Commissioner appointed the fisheries liaison officer to a new position as head of a department of fisheries management to include the statistics section. However, this plan was not widely known within the organization and will likely remain in abeyance until a new Commissioner is appointed.

Figure 10

CURRENT MARINE RESOURCES COMMISSION ORGANIZATIONAL CHART



Source: VMRC 1981-82 Annual Report

Funding. The Commission is financed through a combination of State, federal, and special fund sources. Over the last few years, most of the agency's operating budget has been supported from general funds. Special funds are derived from license fees and from taxes collected by the Commission for oyster ground replenishment and improvements to commercial and sport fisheries. A greater share of funding from State sources is anticipated in light of declining federal support. Appropriations for the 1982-84 biennium are shown in Table 8.

Table 8

FUNDING SOURCES FOR VMRC
(1982-84)

	Amount	Percent of Total
General	$7,698,600	81%
Federal	384,200	4
Special	800,000	8
Highway Maintenance and Construction	693,700	7
TOTAL	$9,576,500	100%

Source: 1982-84 Appropriations Act.

Fragmented Responsibility for Fisheries Management

Although VMRC's responsibilities have been expanded from the oyster fishery to all marine fisheries, the agency's structure does not reflect this change. A division has been created to carry out new responsibilities for environmental protection, and two independent organizational units are responsible for aspects of oyster ground management. However, no unit has clearly-defined responsibility for overall fisheries management. In fact, the current organizational structure at VMRC fragments authority and responsibility for fisheries management functions that are highly interrelated in terms of their impact on the viability of the seafood industry and the State's marine resources.

It is necessary for the State's lead fisheries agency to have the information base and the management capacity to relate fishery-specific concerns to the broader impacts that management actions are likely to have on the resource and the industry. For example, changes in harvesting techniques or regulations that affect seasons or amounts of harvest may be beneficial to one species of fish or seafood and harmful to another or to the livelihood of competing sectors of the industry. As shown in Chapter II, management actions that affect State-managed oyster grounds also affect the privately-leased grounds.

The impacts of weather or pollution are common concerns, and the migratory patterns of fish require coordination with other states to develop consistent management strategies.

However, no organizational unit is responsible for managing all fisheries-related responsibilities or for systematic description, evaluation, and monitoring of fisheries conditions. Currently six units with fisheries responsibilities report directly to the Commissioner. Often, the Commissioner is responsible for synthesizing the technical information provided by these units. Technical synthesis of raw information is not, however, consistent with the role of the Commissioner. The Commissioner and the Commission must be able to use fisheries information to make decisions that are also based on broader economic, political, and policy considerations. Objective, technically correct, and synthesized information should be prepared in a form useful for decision making by a unit appropriately staffed to perform this function.

A fisheries management unit that included some functions now scattered throughout the agency existed briefly in 1979-1980. The unit, headed by a supervisor, had responsibility for planning, statistics, repletion, and interstate liaison. However, the potential of the unit was not realized. It was dismantled, apparently due to personality differences, fragmented authority over personnel, and the lack of a strong commitment among Commission leadership to the new centralized approach.

According to agency officials, key factors in the elimination of the fisheries unit were the Commission's discomfort with a nontraditional approach and the dissatisfaction of the repletion officer with a subordinate role within the unit. The repletion officer appealed to the Commission to remove his position from the unit. Partly because the Commission and not the Commissioner appoints the repletion officer, the Commission acted on his behalf.

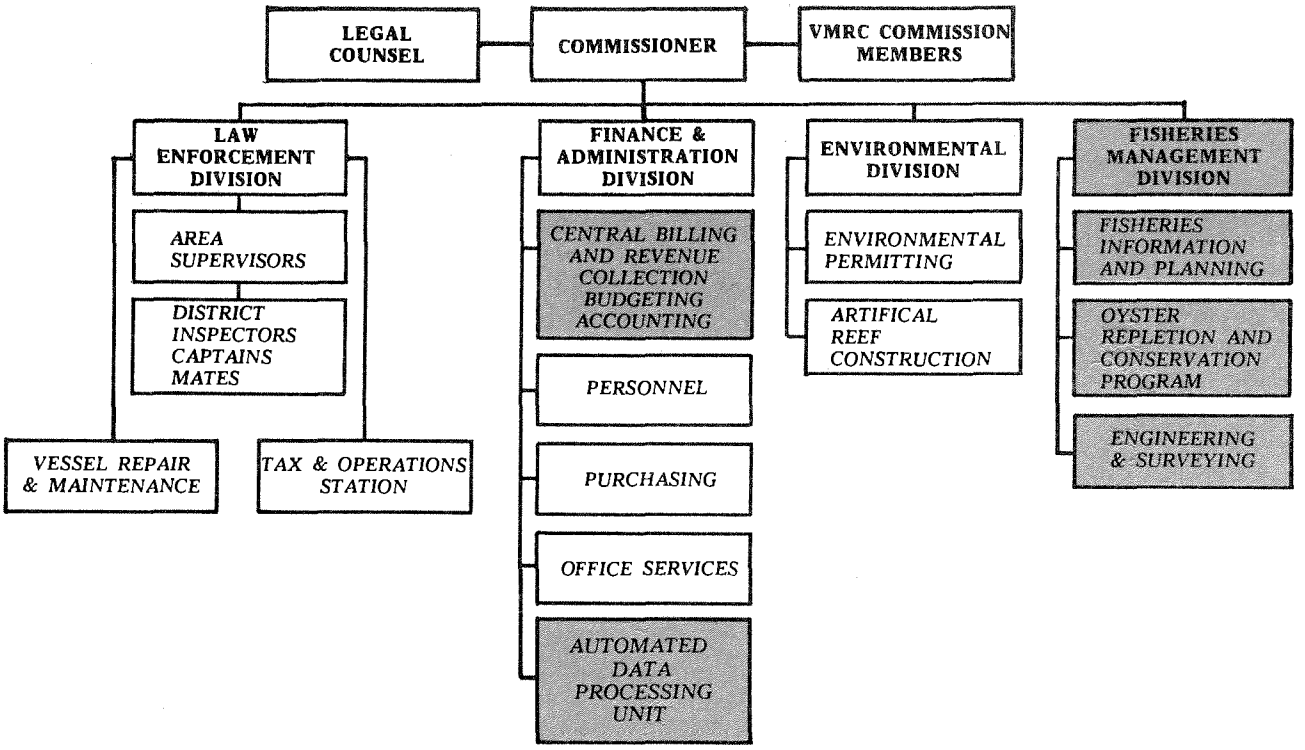
Nevertheless, clearly-focused responsibility for comprehensive fisheries management is needed in order for the State to maintain and enhance the resources of the Bay and the full economic potential inherent in the seafood industry. VMRC should create a fisheries management unit comprised of all aspects of fisheries management except enforcement. Included in the unit should be the statistics section, liaison officer, engineering and survey division, and repletion department.

The unit should be headed by an individual with strong organizational skills and a background in fisheries management techniques. To ensure that reporting relationships and authority are clear, all personnel should be appointed by the Commissioner. The General Assembly may wish to amend the *Code* to repeal the provisions that require the Commission to appoint the repletion officer and approve the appointment of the head of the engineering division.

An organization chart showing the VMRC structure with the proposed fisheries management unit is shown in Figure 11. Also shown

Figure 11

SUGGESTED STRUCTURE FOR VMRC



Key:

Existing Sections

Sections Suggested in this Report for Creation or Reorganization

JLARC Staff Illustration

in the chart are two proposed sections to be added to the Finance and Administration Division. The billing and collections and data processing sections are options discussed in the next section for improving management information and support systems.

Inadequate Management Information and Support Systems

Accurate and timely management information is essential for top management to assess agency performance and as the basis for long-range planning and fisheries management. Large quantities of data are collected by various VMRC units for limited purposes. However, most of this data is manually maintained. It is not regularly integrated for management purposes; the volume of data is overwhelming; and the agency does not have sufficient automated data processing capacity and support systems for routine management or research needs. Problems exist, therefore, with the quality, sufficiency, and handling of management information which VMRC needs to address fisheries issues comprehensively.

Routine Information Needs. VMRC takes a piecemeal approach to data collection and processing. It is not unusual for data collected by one unit to serve more than one purpose within the agency and for collection and processing responsibility to be fragmented and delayed.

A significant example is the use of the oyster tax to provide revenue for replenishment of the public oyster grounds and statistics which reflect the amount and location of the harvest and, to some extent, effort of the watermen. The tax and a statistical data form required by law are personally collected by the enforcement division's district inspectors, who visit about 200 processors on a monthly basis. Since the oyster tax and catch statistics are sorted, cross checked, and tallied by hand, there is a considerable lag between the collection of statistics and their processing and dissemination.

This time lag prevents the conservation and repletion department from using this data to monitor the productivity of oyster growing areas. Instead, the repletion officer relies on informal contact with watermen and enforcement officers. Also impeded are cross checks that could indicate the extent of tax evasion, which agency officials believe to be extensive -- affecting both revenues and the statistical information.

Fisheries Management Information. Fisheries management information, which includes oyster statistics, suffers from poor quality, data gaps, and insufficient data processing capacity. Inaccuracy and under-reporting can be significant problems because they affect assessments of fisheries conditions and can result in loss of federal dollars for research purposes. Federal funds, which support the statistics section of VMRC, are provided under PL 88-309. These funds are allocated on the basis of a three-year average of the State's total reported value of raw fish landed and the manufactured fish products processed in the State.

The only mandatory reporting of statistics is for oysters. For all other fisheries reporting is voluntary, and data are collected by field agents of the statistics section, who visit over 200 licensed buyers of the harvest in the Tidewater region. Statistics are understated at the outset because field agents do not visit buyers on the Eastern Shore. Moreover, since reporting is voluntary, no standard reporting form has been developed. Field agents must review records that are differently and incompletely maintained by buyers.

VMRC plans to add another field agent to collect statistics part-time. This has the potential for increasing catch statistics. However, there may be more efficient and less time-consuming alternatives to the current system of data collection.

At a minimum, VMRC should provide buyers with a standard reporting form. In addition, consideration should be given to adopting a mail-in system such as that now used in Maryland. The feasibility of collecting data from a generalizable sample of buyers should also be considered in order to reduce costs, improve accuracy, and better ensure confidentiality of respondents. The General Assembly may also wish to make reporting of all fisheries statistics mandatory.

Another problem indicated by fisheries experts is that level of effort and recreational data essential to a full understanding of conditions in the fisheries are not currently being collected.

- Level-of-Effort -- data consists of information on the number of boats and watermen, the type of gear used, their harvesting location at a given time, and the quantity of fish or shellfish caught. This information is critical to determine, for example, whether a reduction in the amount of a species that is caught is reflective of stock depletion or reduced fishing effort on the part of watermen. Regulatory actions to deal with the situation would differ based on the cause of the problem.

- Recreational Catch Data -- is also important to the assessment of the condition of a particular species. Recreational fishing is believed to have significant but currently unmeasured impact on the stock available.

Some effort data is currently collected by the Potomac River Fisheries Commission and VIMS. The Commission requires Virginia and Maryland enforcement officers to report their observations of fishing activity during their regular patrols on the river. VIMS researchers note which boats are harvesting various species and the type of gear being used by observing fishing activity from planes flying over the Chesapeake Bay and its tributaries. VMRC should work cooperatively with VIMS to build on this research effort in order to provide the State with regular level-of-effort statistics.

The Commonwealth also has the opportunity to participate in a recreational fisheries survey conducted by the National Marine Fisheries Service on a regional basis. During the last two years, VMRC was apparently unable to make matching funds or personnel available for this effort. However, Maryland did participate and found that important information on the state's recreational harvest was gained with a minimal investment of staff. To the extent possible, VMRC should allocate funds or personnel for this purpose in the future. The use of interns or fisheries graduate students from VIMS, Old Dominion University, and VPI&SU could satisfy the State's contribution while providing these individuals with valuable experience.

Systems Capacity. VMRC's approach to developing automated data processing capacity and correcting deficiencies in routine agency systems has focused on individual issues rather than overall agency needs. The problem is illustrated by the agency's treatment of systems for handling oyster ground rents and the computer needs of the statistics section.

Yearly rents are charged by the engineering division to individuals and corporations leasing private grounds for the growing of oysters. Currently the engineering division sends leaseholder bills to district inspectors, who are part of the enforcement staff. The district inspectors forward the bills to the renters and collect the rents. (Leaseholders with leases in several districts submit separate payments to an inspector in each district). Revenues collected are deposited in the district inspector's account and remitted to VMRC's accounting department at the end of each month. Accompanying reports are distributed by the accounting department to the engineering division.

A new automated system is being developed to transfer the billing and collection functions to the engineering division by mid-1983. The rent collection responsibilities of district inspectors will be eliminated. Clerical personnel within the engineering section will need to be trained to handle this new function, which represents the first time that engineering staff have had to handle billing and money.

It appears that VMRC could more comprehensively address the assignment of responsibility for revenue collections. Although a small automated system is being created for oyster ground rents, other collection systems are still manual and involve the district inspectors. These include collection of taxes on oysters and fees for various licenses and permits. A system such as the one used in Maryland for billing and collection by mail should be considered. A central unit could be created within VMRC's finance and administration division to manage this process, supported by completely automated data processing systems. This approach would have the benefit of (1) reducing agency reliance on incompatible manual systems, (2) freeing more time for patrol by district inspectors, and (3) reducing the number of staff who handle funds.

The data processing needs of the statistics section are also being addressed by VMRC separately. Several options are being considered, including linking a terminal at VMRC with the VIMS computer. Voluminous data is now analyzed manually by a chief statistician and a clerk, and automated data processing capacity is obviously needed. However, the needs of this section should be assessed in conjunction with overall agency needs.

Acquisition of automated data processing equipment, however, has not been planned to accommodate the overall needs of the agency. Nor does there appear to be an attempt to integrate licensing, tax, and fisheries statistics into a useful management format. VMRC would secure greater benefits from a comprehensive rather than a piecemeal approach to the development of information systems. The agency should continue to work with the Department of Management Analysis and Systems Development to assess overall needs for hardware and software systems. It may be desirable to create an ADP unit within the administration and finance division and provide individual terminals to selected users, such as the statistics section.

Regulatory Authority and Constraints

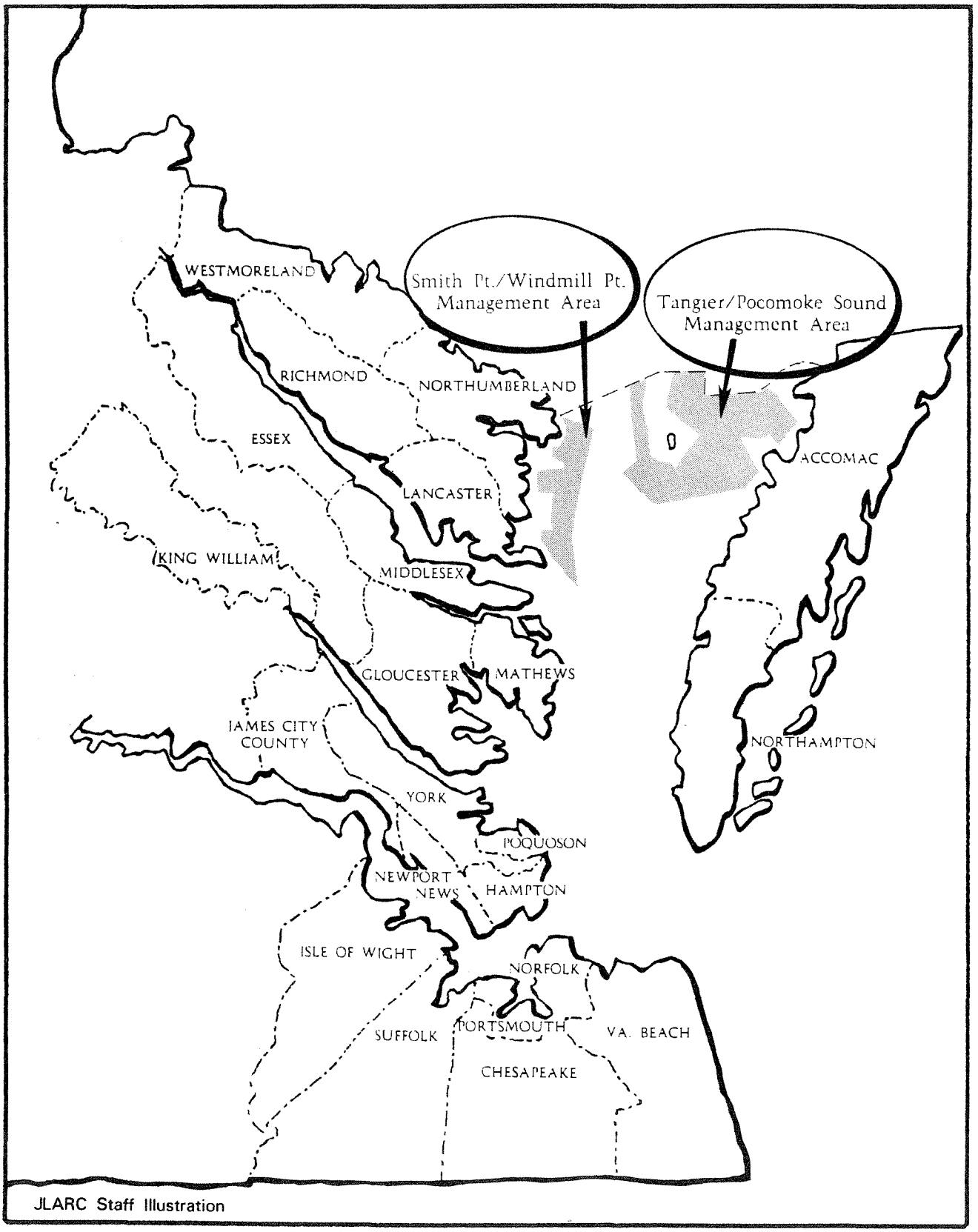
VMRC has been hampered in carrying out its overall responsibility for fisheries management, in part, because of fragmented management responsibility and inadequate information systems. Although the agency has extensive authority and flexibility, particularly in the recently designated management areas, it does not actively plan for the fisheries, or systematically monitor conditions, or evaluate the impact of regulatory actions. On the other hand, the agency is constrained in some areas by regulatory provisions and procedures specified in the *Code of Virginia*.

Management Areas. Since JLARC's 1977 report, the General Assembly has increased VMRC's management flexibility by creating two management areas that are exempt from existing statutory limits on factors such as year or season. The first management area was created in 1978 in Tangier/Pocomoke Sound (Figure 12). VMRC has the authority "to open and close such areas, or any part thereof or prescribe the manner, method, size and season of catch whenever it deems advisable to do so." The Commission's authority extends to both finfish and shellfish contained in the management area. The second management area was established by the 1982 General Assembly, and lies between Smith's Point and Windmill Point. Here VMRC has similar regulatory authority, but only over oysters and clams.

VMRC's management approach in these areas is, however, undistinguished from its management approach with respect to other areas. The agency's first management action was to promulgate an extensive administrative order stating that, unless otherwise notified, management areas are regulated by existing *Code* provisions. This may have been an appropriate first step to protect the resources. However, after four years, VMRC has not yet developed a management plan for the Tangier/Pocomoke Sound management area.

Figure 12

VMRC MANAGEMENT AREAS



JLARC Staff Illustration

In a major departure from tradition, however, dredging has been permitted on public oyster grounds encompassed by the management areas. This was done because the depth of the water and arrangement of the rocks precluded traditional tonging methods. However, no formal mechanism has been established to monitor the condition of the fishery. Rather, VMRC depends upon industry and marine enforcement personnel to advise the Commission on needed management actions such as opening or closing harvesting areas. This method is of limited effectiveness in spotting problems at an early stage or determining the reasons for noted variances in stock conditions. Management plans and systematic scientific assessment are needed for those purposes.

Need for Management Plans. The development of species-specific management plans is an important step in assessing the long-term viability of species in the Chesapeake Bay and other waters within the State's jurisdiction. In addition, cooperation with regional planning agencies is important to the protection of migratory species. VMRC is responsible for management of the fisheries within three miles of Virginia's coast. Fisheries beyond this limit are managed by regional councils. In addition to Virginia, the Mid-Atlantic Fisheries Management Council consists of Maryland, Delaware, Pennsylvania, New York, and New Jersey.

The federal Fishery Conservation and Management Act of 1976 states that fisheries management plans should contain a comprehensive description of the fishery including:

- present and probable future condition and location of the species;
- gear type and quantity;
- number of boats harvesting the species;
- extent of recreational interest;
- potential and actual revenues from the fishery;
- optimum yield;
- maximum sustainable yield;
- pertinent data to be collected; and
- measures for conserving and managing the fishery along with the estimated cost of applying these measures.

Without fishery-specific management plans, VMRC's ability to respond quickly to a resource problem is impaired by the need to make basic decisions about such factors as the present condition of the fishery, what types of gear are appropriate, and whether stocks are thriving or endangered.

Had a bluefish management plan been developed by VMRC, a recent controversy between sport and commercial fishing interests over the use of a new harvesting technique might not have reached crisis proportions:

In May 1982 four boats from Florida under contract to a Virginia processor began to harvest bluefish using a new, highly-efficient, encirclement gill netting technique. The technique allowed the boats to entrap entire schools of fish. In about ten weeks the four boats landed approximately 32 percent of the previous year's total commercial catch of bluefish.

Use of this technique caused concern because bluefish landings in the Chesapeake Bay had been declining over previous years; more efficient harvesting techniques had the potential to deplete stocks; and bluefish became especially scarce with the arrival of the Florida boats. Charter boat captains feared being forced out of business.

No regulatory provisions existed with regard to encirclement gill netting. VMRC initially decided that the matter needed study, then determined that an emergency regulation was not warranted. Finally, upon request of the Governor, the Commission promulgated an emergency regulation that will be in effect until April 1, 1983. Harvesters must set nets at least 100 feet apart and pull them in a straight line. A permanent regulation to prohibit encirclement gill netting has recently been adopted.

The regional Atlantic Marine Fisheries Commission has recently adopted voluntary interstate management plans for menhaden and striped bass. VMRC is in the process of adopting a modified version of the interstate striped bass management plan. The Mid-Atlantic Fisheries Management Council has also developed management plans for several species which transcend Virginia's territorial waters.

VMRC should begin to develop fishery-specific management plans for species within the State's jurisdiction. Establishment of a fisheries management division within VMRC could provide expertise, in conjunction with VIMS, to develop these plans for fisheries within the Bay and to assess the relevancy of interstate plans to Virginia's needs.

Problems with Statutes. Although VMRC has considerable flexibility in some areas, provisions in Title 28.1 of the *Code* and the Administrative Process Act limit VMRC's ability to respond quickly to changing conditions. These statutory provisions are based on average conditions observed in the fisheries. Nevertheless, in a primer on state fisheries management, To Stem the Tide, the Council of State Governments recommends that regulation rather than statutory provision be employed to specify all management parameters (e.g., season, gear, quantity, size), administrative procedures, fees, and types of information to be collected.

If such a revision were to take place in Virginia, the General Assembly's involvement in fisheries management could be focused on the overall policy matters. Currently in Virginia, modification of an existing provision, ranging from a change in surveying or license fees to restricting the use of a certain gear type, must be brought before the General Assembly. This can delay actions necessary to deal with unusual biological, socio-economic, or weather conditions affecting the fisheries.

An additional concern that should be addressed, according to agency officials, is the difficulty in enforcing certain fishery laws. Two examples cited relate to the legal possession of finfish and blue crabs:

> *Finfish that are not of legal size must be returned to the water unless they are "obviously injured or dead." (Section 28.1-49.1, Code of Virginia). This provision is difficult to enforce because it can be construed that once a fish is trapped by a fishing device it is injured. VIMS researchers suggest that size limits could be better enforced by regulating the mesh size of fishnets to prevent the catching of fish that are not of a certain size or shape.*
>
> * * *
>
> *To prevent the illegal taking of blue crabs less than five inches long, the law specifies that no more than ten percent by count of a barrel, box, or other shipping container may contain small crabs. Enforcement officers must, therefore, count all the crabs in each container in order to calculate a percentage. A less time-consuming alternative method is used by Maryland and the Potomac River Fisheries Commission. A number rather than a percentage limit is set, so inspectors only have to count until the number is reached rather than counting each whole container.*

In recent years the General Assembly has made several changes in Title 28.1 to provide VMRC with greater flexibility. Although compliance with the Administrative Process Act requires a minimum of six months before a regulation may be promulgated, VMRC has been permitted by amendments to 12 sections of Title 28.1 to promulgate regulations in certain circumstances within five days (Table 9). Most provisions relate to opening or closing seasons, which are dependent upon the life cycle, migratory patterns, and availability of various species. It appears that other *Code* provisions may require similar consideration.

In situations that require immediate response, VMRC must now use the emergency regulation procedures of the Administrative Process

Table 9

PROVISIONS EXEMPTED FROM APA REQUIREMENTS

28.1-69.1	Fishing with trawl net within three mile limit (restrict "manner, method, size and season of catch")
28.1-82	Season for taking oysters from public rocks
28.1-83	Prohibited area for patent tongs ("open or close such area, or any part, for patent tonging, and restrict or limit the manner, method, and amount of harvest")
28.1-85	Opening and closing of public rocks
28.1-96	Carrying oysters out of state, or buying for that purpose; permit required ("Commission shall have power to cease granting of such permits whenever it shall ascertain that the seed areas are becoming depleted")
28.1-124	Oysters to be culled as taken ("Commission shall have the authority to reduce the size or length of the oysters to be culled in any area except the James River where they have established seed beds")
28.1-128-1	Fishing in Pocomoke Sound and Tangier Sound ("open and close such area, or any part thereof, or prescribe the manner, method, size and season of catch")
28.1-128.2	Fishing in Chesapeake Bay immediately west of Tangier Island (same language as above)
28.1-128.3	Taking oysters or clams in Chesapeake Bay between Smith's Point and Windmill Point ("open and close such area, or any part thereof, for taking oysters or clams or prescribe the manner, method, size and season of oyster or clam catch")
28.1-166	Use of scrapes or dredges ("may open any season to the sixteenth day of November and it may likewise extend any season to the sixteenth day of April")
28.1-167	Limitations on sizes of crabs to be taken ("change such size restriction for a period not to exceed sixty days to respond to significant ecological changes")
28.1-179	Removal, transportation, etc. from polluted ground ("The Marine Resources Commission, whenever they deem an emergency exists, may make rules and regulations to protect the health of the public, which relate to shellfish from condemned areas without complying with the notification requirements of Sections 28.1-24 and 28.1-25")

Source: *Code of Virginia.*

Act. With the signature of the Governor, an emergency regulation may be put into immediate effect. It may be promulgated when "necessary for the immediate preservation of the public peace, health, safety, welfare, protection of the seafood industry, or natural resources of marine animals." VMRC has been reluctant to use this method because a routine need to change a season is rarely an emergency and because, as in the gill net controversy, supportive data is not readily available to determine if an emergency exists. In contrast to VMRC, the Commission of Game and Inland Fisheries has a blanket exemption from the Administrative Process Act and may publish regulations 30 days prior to enactment.

The General Assembly may wish to consider amending Title 28.1 of the *Code of Virginia* in order to provide broad policy guidelines for control by regulation of details related to seasons, enforcement methods, or licensure fees. Those provisions that are determined to be inappropriate for regulations should be retained in the law. Consideration might also be given to granting VMRC time frames and procedures for promulgating regulations that are consistent with those of the Commission of Game and Inland Fisheries.

OYSTER GROUND MANAGEMENT

The Commonwealth's oyster grounds are comprised of tidal bottoms that are constitutionally protected for use by the public, known as the "Baylor Survey Grounds," and grounds which may be leased from the State by individuals and corporations for the private propagation of oysters. The Marine Resources Commission is responsible for several activities relating to oyster grounds including: repletion of the public grounds, collection of oyster taxes, and leasing of unassigned grounds outside of the Baylor Survey.

Effective management of Virginia's oyster grounds is vital to the maintenance and growth of the State's oyster industry. Several problems, however, have been identified with VMRC's repletion and oyster ground leasing programs. Many of the problems were also identified in JLARC's 1977 study. Although some corrective action has been taken, the problems have not been fully addressed.

Public Repletion Program

The goal of the State's oyster repletion program is to maintain or increase the production of oysters from Virginia's public growing areas. Repletion of the grounds is carried out by VMRC and consists of planting shells on oyster bottoms to provide a clean surface where young oysters can attach themselves and grow. Small seed oysters, harvested most heavily in the James River, are also transplanted to areas that are poor for spawning oysters but good for growing them.

Industry representatives have expressed concerns about the current management and administration of the repletion program. Their concerns include the extent to which the Public Oyster Rocks Replenishment Fund may be used for other than specified purposes, the lack of a method to evaluate the program's effectiveness, and oyster tax evasion.

Sources of Funds. The repletion program receives operating funds from three sources: general funds, federal funds, and the Special Public Oyster Rocks Replenishment Fund. Funding from each source has fluctuated dramatically (Figure 13). The expenditures for transplanting seed and planting shells from each source for FY 1981-82, are shown in Table 10.

Table 10

EXPENDITURES FOR REPLETION
FY 1981-82

Funding Source	Expenditure	Percent of Total Expenditures
General Funds	$367,554	46%
Special Funds	381,910	48
Federal Funds	49,065	6
Total	$798,529	100%

Source: VMRC Annual Report 1981-82.

Special fund revenues from three different sources flow into the Special Public Oyster Rock Replenishment Fund. These revenue sources are:

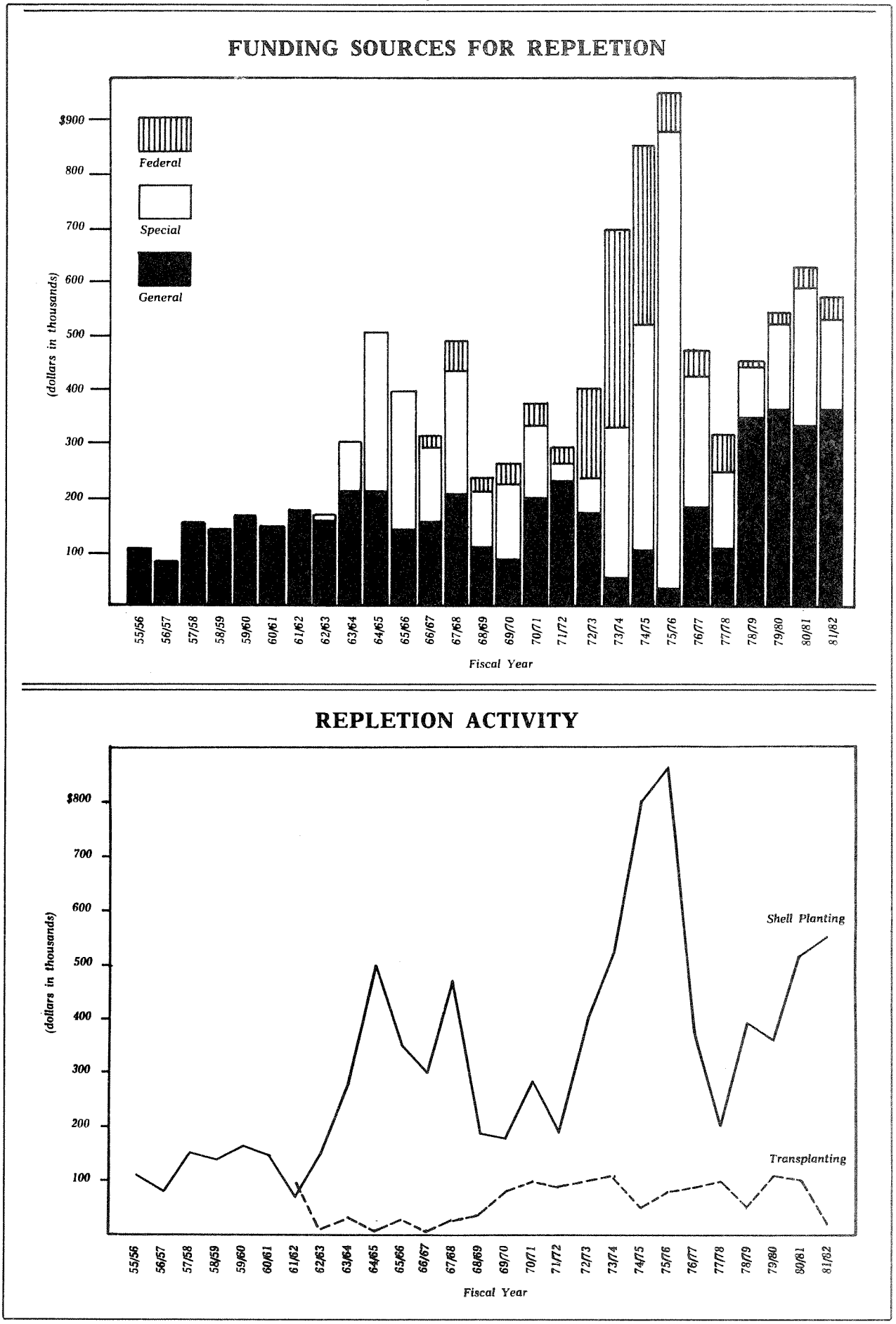
(1) fees from permits and easements for encroachment upon State-owned bottoms;

(2) a tax levied on all oysters harvested from the public ground; and

(3) an export tax on all oysters harvested from the public grounds and exported.

Special fund revenues are variable. Taxes are only collected during the public oyster season, which runs from October to March. Additional revenues collected from harvesting seed oysters in the James River continue to accrue through June. Revenues from easement and permit fees, while often substantial, are unpredictable. In FY 1982, for example, these fees contributed $605,188, or 68 percent, of the total $890,701 special fund revenues. In FY 1981, however, they contributed only $45,918, or 12 percent, to a smaller special fund total of $393,743. For FY 1982-83, the agency does not plan to use federal

Figure 13



Figures include only contractural services for seed and shell, not salaries or fringe benefits.

Source: JLARC illustration of VMRC data.

funds for repletion, and much of the five percent reduction required of all State agencies will be absorbed from the general funds appropriated for repletion. For the current fiscal year, then, VMRC will be largely dependent upon special fund income to operate the repletion programs.

Special Fund Balance. The decision to absorb much of the agency five percent reduction in repletion was possible because the Special Public Oyster Rock Replenishment Fund had a balance of $1,164,684 on June 30, 1982, although not all costs incurred for repletion during that fiscal year had been paid. The balance accrued, according to agency officials, because repletion is done in the spring and summer when general funds are available, which must be used or revert to the general fund.

A JLARC review of special fund revenues, expenditures, and fund balances from January 1979 to October 1982 revealed that a sizable balance existed in the Special Public Oyster Rock Replenishment Fund throughout this period. During these 46 months, the Special Fund had an average monthly balance of $602,460.

During the past ten fiscal years, total State expenditures for repletion far exceeded yearly special fund revenues except in 1975 and 1982. However, the large special fund balance indicates that, at least in recent years, general funds for repletion have been used to both supplement and substitute for special funds.

The apparent substitution of general for special funds and the accrual of a large balance in the Special Public Oyster Rock Replenishment Fund appear to run counter to legislative intent. Section 28.1-94, *Code of Virginia,* requires that the Special Public Oyster Rocks Replenishment Fund be used exclusively for funding repletion activities. Further, the Appropriations Act specifies that general funds be used to "supplement" special revenues collected for specific purposes.

It appears that greater use of the fund for repleting the public oyster grounds was possible during this time period. VMRC should improve its fiscal planning and allocation practices to allow full use of the special repletion funds for the purposes intended and to ensure that the State's oyster industry receives full benefit of the revenues collected and appropriated for repletion purposes.

Expenditures Related to Repletion. Repletion expenditures for FY 1981-82 (the most recent year for which total figures are available) were examined to determine the actual use of the funds. There appears to be a need for better accounting practices and a clear interpretation of what activities comprise "administration" of the program. According to language in Section 28.1-94 of the *Code of Virginia,* the Special Public Oyster Rock Replenishment Fund is to be used only for administration of the program, and for replenishment purposes.

Several special fund expenditures were made for purposes not clearly related to the repletion program (Table 11). VMRC officials were unaware that many of these expenditures were accounted for in this way until questions were raised by JLARC staff. They later explained that expenditure patterns were established many years ago, without the benefit of cost accounting methods, as "reimbursements for services rendered" to the repletion program by the enforcement and engineering divisions. However, current services rendered do not match the fees directly paid.

Table 11

SPECIAL FUND EXPENDITURES
NOT DIRECTLY TIED TO REPLETION
(FY 1981-82)

Expenditure	Amount Paid by Repletion Fund
Salaries and Benefits for Two Enforcement Personnel	$37,176
Salary and Benefits for One Clerical Position in the Engineering and Surveying Division	12,804
Expense Accounts for Eight Enforcement Officers	4,761
Phone Services and Electricity for Tax Collection Station at Deep Creek	674
Maintenance of Operations Station at Boat Harbor	3,558
Total	$58,973

Source: VMRC Repletion Ledger.

VMRC enforcement officers throughout the State assist the repletion program by marking and supervising planting on the public grounds. In addition, the officers enforce oyster laws and collect oyster taxes. These latter activities are part of their overall enforcement functions, which also include unreimbursed services for several other VMRC divisions. Two officers are paid from the special repletion fund. Although these particular officers may not actually do repletion work during the year, their salaries and benefits are viewed by VMRC officials as payment for all repletion-related work performed by the enforcement division. During 1981-82, the enforcement division reported a total of 2,619 hours for repletion-related work. The salary

range of all officers who worked in repletion in the past year was $12,731-$19,011. Assuming the standard 260 eight-hour working days in a year, special fund reimbursement to the enforcement division for repletion activities, if appropriate, should have been between $19,223 and $28,730. Thus, the enforcement division received a possible overpayment of between $8,446 and $17,953 for salaries (Table 12).

Table 12

REIMBURSEMENT SCHEDULE FOR ENFORCEMENT SALARIES
(FY 1981-82)

	Salary	+	20% Benefits	=	Total	Hourly Wage 260 days Eight Hours	Expected Reimbursement (Hourly Wage X 2619 Hours)	Potential Overpayment ($37,176 Less Expected Reimbursement)
High	$19,011		$3,802		$22,813	$10.97	$28,730	$ 8,446
Ave.	15,871		3,174		19,045	9.16	23,990	13,186
Low	12,731		2,546		15,277	7.34	19,223	17,953

Source: VMRC data and JLARC analysis.

Monthly expenses for eight enforcement officers are also reimbursed through the Special Public Oyster Rock Replenishment Fund. There is, however, no apparent connection between the amount of money charged by the agency to the repletion fund and the number of hours the officers spent on repletion-related work (Table 13). These accounts are also described by VMRC officials as "reimbursements" for enforcement services.

Table 13

ENFORCEMENT EXPENSE ACCOUNTS/HOURS WORKED
(FY 1982)

Officer	12 Month Reimbursement	Hours Worked in FY 82 Repletion
Officer 1	$ 609.30	0
Officer 2	354.24	233
Officer 3	431.20	3
Officer 4	374.50	2
Officer 5	874.45	61
Officer 6	893.65	45
Officer 7	588.74	6
Officer 8	634.67	14
Total	$4,760.75	364 hrs.

Source: VMRC Special Fund Ledger and Enforcement Activity Reports.

Other charges to the special fund for enforcement or agency purposes include all operating expenses for the Deep Creek Station, used during oyster season for tax collection and year-round for sale of licenses, and the Boat Harbor Operations Station, used for purchase and supply for the entire agency. A dispatcher system for all VMRC cars and boats also operates out of the station. Both stations are located in Newport News. The $3,558 used for Boat Harbor represents a sizable portion of the operating expenses of the station, which is little used for repletion purposes.

The salary and benefits paid for the engineering clerical position are also described as a reimbursement for the services provided to the repletion program by that section. However, VMRC engineering officials indicate that although at one time surveyors assisted the repletion program by making surveys of repleted oyster grounds, this service has not been used for many years. There is apparently no justification for the repletion program to have continued funding a position in the engineering department.

The General Assembly may wish to clarify whether the use of Special Oyster Repletion Fund monies to pay enforcement salaries and benefits, expense accounts, and maintenance of tax and operations stations is appropriate and in accordance with Section 28.1-94 of the *Code of Virginia*. In the interim, VMRC should establish a more precise cost accounting procedure to assure that no special fund monies are expended for unrelated purposes. The accounting procedure should provide clear documentation of the service performed and the rate of reimbursement per unit of service. Unrelated payments for engineering salaries should be stopped.

Evaluation of Program Effectiveness. The repletion program lacks a method to evaluate the effectiveness of the program's shell and seed planting activities. The success of the program is largely dependent upon the expertise of the current conservation and repletion officer, who has been involved in repletion work for many years. To assure a successful repletion program in the future, VMRC needs to establish a scientific evaluation approach that reduces the program's reliance upon any one person.

According to VMRC repletion officials, factors currently considered in deciding how to allocate repletion funds include the amount of funds available, the condition of the grounds, and the historical productivity of the grounds. Evaluation of the effectiveness of past and current funding decisions is based largely on the observation of marine enforcement personnel, the expertise of the repletion officer, and the participation of an advisory committee of industry representatives. Only limited use is made of statistical information, because it is not useful in its present form.

Current statistical information identifies the body of water from which oysters were harvested, but does not specify which of several productive oyster growing areas the harvest came from. Thus,

the information cannot be used to evalute the effectiveness of repletion efforts on the productivity of any single oyster growing area. Agency officials doubt that it would be possible to gain data on the productivity of specific harvesting areas through the current tax reporting system because of watermen's reluctance to divulge good harvesting areas.

Although the repletion officer, assisted by repletion assistants and VMRC enforcement personnel, samples the oyster beds throughout the year to determine their condition and productivity, this information is neither systematically collected nor recorded. Development of a consistent method of sampling and recording results would greatly improve VMRC's ability to evaluate the effectiveness of its repletion efforts over a period of several years. Further, this strategy would allow VMRC to collect information on oyster availability without having to depend upon the current tax reporting system. Fisheries officials from Maryland, North Carolina, and the Potomac River Fisheries Commission indicate they employ a system similar to the one recommended.

VMRC should improve its evaluation of the effectiveness of Virginia's public repletion program. Consideration should be given to developing a routine sampling method. Statistics should be collected in a more useful form, and computer capability should be developed to record and evaluate the effectiveness of past and current repletion activities.

Evasion of Oyster Tax Payments. Although estimates of its magnitude vary, the evasion of oyster tax payments has been recognized as a significant problem by VMRC repletion personnel, watermen, and seafood buyers. Oyster tax evasion may have reduced the amount of funds available to finance the oyster repletion program, because tax funds are used to fund repletion efforts. Effective October 1982, VMRC implemented a new procedure to combat the problem.

Tax evasion does not appear to be a problem in the seed oyster areas, since payments and reports are made in the presence of VMRC enforcement personnel. However, outside of the seed oyster areas, buyers of market oysters are responsible for completing a tax form for each transaction, indicating the quantity purchased and the amount of tax due. A similar form must be completed when buyers import oysters from out-of-state, or when one buyer sells unshucked oysters to another buyer. Buyers summarize all transactions monthly and indicate on a single form the amount of tax to be paid.

During the public tonging season (October 1 - March 31), district inspectors make monthly trips to approximately 200 buyers to collect the tax report, supporting documentation (forms 53s and 55s), and the tax payment. VMRC personnel feel that there are numerous opportunities to evade taxes through non-reporting or under-reporting of transactions.

To improve oyster tax collection, VMRC has recently begun issuing sequentially numbered transaction forms to buyers. This is to ensure that all recorded transactions are presented to inspectors when

payments are collected. In addition, a new tracking system has been implemented. VMRC enforcement officers stationed on land randomly stop and check individuals transporting their own catch over land to seafood buyers. In a cooperative effort between the enforcement and statistics units, information gathered by enforcement personnel on the seller, the buyer, and the amount of purchase will be cross-checked with monthly buyers' reports to verify both the sale and tax payment. The new tracking system is currently being implemented by VMRC district inspectors and two repletion officers.

In order to further increase the tax revenues available for financing the State's oyster repletion program, VMRC should also consider several other methods. These methods include: having buyers mail reporting forms and payments to VMRC for systematic cross-checking by central office staff; random auditing of the oyster buyers' books to verify accuracy of tax payments; and adopting a system used on the Potomac River, where marine enforcement personnel record oyster harvesting activities while on patrols to identify instances where oysters are harvested but no taxes are paid.

Oyster Ground Leasing

VMRC's Engineering and Surveying Division is responsible for leasing lands outside the Baylor Survey to private individuals and firms for the purpose of oyster propagation. Some grounds are also leased for clam production. Currently, 7,390 people hold these leases. In 1977, JLARC found several problems, including a large backlog of lease applications, inadequate surveying methods, inefficient processing of applications, and inappropriate use of leased lands. Although VMRC has recently taken steps to implement one of JLARC's 1977 recommendations regarding automating the billing and collecting of lease rentals, other problems continue to exist.

Backlog of Lease Applications. The backlog of oyster lease applications grew from 474 in 1977 to 678 as of March 1982, and subsequently was somewhat reduced (Table 14). Over 75 of the outstanding applications were received ten or more years ago. VMRC engineering officials indicate that the backlog represents a total of 23,552 potentially productive acres.

In 1977, VMRC explained that the backlog was primarily a result of unreliable base maps, which are used to locate existing leases, and the lack of personnel to update these maps. Agency surveyors recently completed a federally-funded project to improve the mapping system. According to VMRC officials, this effort involved much of the surveyors' time and, therefore, they could not keep up with lease applications.

Although the accuracy of VMRC's base maps has been improved as a result of this project, significant problems continue to exist. Many of the early surveys were based on a reference point such as a house or tree that no longer exists. Without the exact reference

Table 14

APPLICATIONS FOR SHELLFISH PLANTING GROUNDS
(as of March 1982)

Calendar Year	Application Received	Pending	
		Regular	Riparian**
1967	143	6	1
1968	154	5	1
1969	168	9	2
1970	120	14	5
1971	124	11	5
1972	184	12	4
1973	146	16	10
1974	171	22	12
1975	134	27	13
1976	139	36	11
1977	155	40	23
1978	626*	78	28
1979	217	54	17
1980	187	71	16
1981	113	75	6
1982	64	41	7
TOTALS		517	161

*Backlog of grounds of deceased persons cleared from the books in 1978.

**Riparian leases are granted to individuals whose land borders an oyster producing body of water. The individual may lease no more than one-half acre.

Source: VMRC 1982 Report to Secretary of Commerce and Resources.

point, the survey cannot be precisely located. Surveying in areas where several old leases have yet to be relocated is a time-consuming process. In a March 1982 report to the Secretary of Commerce and Resources, VMRC officials indicated that 80 percent of the then pending applications fell in areas where existing leases must be relocated before new leases can be assigned.

VMRC officials feel that the agency does not have sufficient personnel to conduct survey and boundary work. The Engineering Division has four registered surveyors stationed throughout the Tidewater area. Each surveyor has an assistant. However, other remedies to relieve the backlog, such as increased use of private surveyors, should be explored before additional personnel are considered.

Private vs. MRC Surveyors. JLARC recommended in 1977 that VMRC should consider requiring applicants to provide their own surveys, as occurs in North Carolina. VMRC currently accepts private surveys in order to facilitate application processing. However, the agency believes that deficiencies in the base maps, and difficulties in sharing base information, make private surveys of less reliable quality than those conducted by VMRC surveyors.

In March 1982, VMRC developed a report entitled, "Surveying of Oyster Planting Grounds" in response to a request by the Secretary of Commerce and Resources. A VMRC opinion poll of 24 private surveyors located near the coastal region found:

- 79 percent of the respondents were equipped to do oyster ground surveys;
- 88 percent had experience in this type of work; and
- 83 percent would like to survey oyster grounds.

Nevertheless, in this report VMRC expressed the opinion that private surveyors who are now interested in oyster ground surveying would not be interested in this work under improved economic conditions.

This does not appear to be relevant, since use of private surveyors for a relatively short period could make substantial progress toward the completion of the existing backlog. Once the backlog is removed, existing VMRC personnel would likely be sufficient to handle the influx of new applications.

VMRC should consider requiring new applicants to provide their own survey. The Commission could establish a list of private surveyors willing to conduct these activities or put the work out for bid. VMRC's own surveyors could then concentrate on reducing the backlog.

Non-Compliance With the Code. VMRC's current procedures for processing lease applications appear not to comply with statutory requirements in two areas. Section 28.1-109(3) of the *Code* states that "applications shall be given priority in the order in which they are received." According to agency officials, however, surveying priorities are determined on the basis of "need," which is frequently defined as an applicant's persistence in contacting agency staff about the application. When VMRC staff survey an area, all backlogged applications in the area are surveyed at the same time. Therefore, a survey for an application filed in 1982 could be conducted at the same time as one received in 1967. Although this system may be an efficient use of engineering staff, it appears to ignore the procedure mandated in the *Code* and may have resulted in unequal treatment under the law.

Section 28.1-109(8) of the *Code* states that if the ground assignment has not been made within six months after the notice of

application has been posted, the application becomes void unless extended by the Commission. An extension has never been recorded by the Commission, but due to the backlog, the engineering division does not try to comply with this requirement. Instead, the agency surveyor contacts the applicant whose survey is ready to be performed before conducting the survey in order to verify that interest still exists in obtaining the lease.

VMRC should take steps to comply with all *Code* requirements related to the processing of lease applications. Consideration should be given to notifying all applicants of the agency's intent to void all lease applications. Only renewed applications should be considered for survey, in the order received.

Appropriate Use of Leased Grounds. Despite recent legislative changes, concerns still exist about the number of leased grounds that are not being used for shellfish production.

Oyster researchers at the Virginia Institute of Marine Science estimate that between 80 and 90 percent of all leases are not in use today. In a recent study, VIMS researchers outlined four reasons for holding oyster leases without making them productive:

1) Leases may be held to eliminate competition by preventing others from planting and harvesting in the area.

2) Grounds are inherited and leases are maintained for sentimental reasons.

3) Companies or individuals seek economic gain as a result of loss of leasee rights when projects such as bridge or pier construction or channel dredging are undertaken in the area.

4) Industrial companies may hold title to large tracts of land to protect themselves from law suits resulting from damages to adjacent lease holders.

In its 1977 report JLARC recommended that the renewal period for leased grounds be shortened and that the leaseholder be required to give proof of using the grounds for oyster production. In 1980, the legislature amended Section 28.1-109(12) to shorten the duration of new or initial leases from 20 to ten years. The legislature also added the following statutory language relating to proof-of-use:

> ...the [Marine Resources] Commission shall not renew or extend an assignment where there has been neither significant production of shellfish nor reasonable plantings of shellfish or cultch during any portion of the ten-year period immediately prior to the application for renewal, unless the Commission finds that there was good cause for the failure to produce or plant shellfish or cultch or

finds that such assignment is directly related to and beneficial to the production of oyster planting grounds immediately adjacent to such assignment.

Although evidence of oyster ground use will not apply until the first set of leases expires in about eight years, VMRC has yet to begin developing a system for verifying that leased oyster grounds are being made productive. This is true even though Commission officials have expressed concern that even one oyster harvested from the leased ground could satisfy the current proof-of-use requirements.

VMRC should develop and implement a strategy for identifying inappropriately used leased oyster grounds. In addition, the General Assembly may wish to consider raising the rent on oyster leases to discourage improper holding of grounds and requiring more frequent evidence of appropriate use.

MARINE LAW ENFORCEMENT

VMRC's law enforcement division is responsible for enforcing laws and regulations governing fishing activity within the marine waters of the State. The division has also been delegated responsibility for enforcing small boat safety in conjunction with the Commission of Game and Inland Fisheries, posting and patrolling condemned shellfish growing areas, carrying out portions of the National Shellfish Sanitation Program, and patrolling the Potomac River in cooperation with Maryland enforcement staff. In addition, law enforcement personnel assist other VMRC divisions with oyster ground repletion, tax collections, licensing, and oyster ground leasing.

Marine law enforcement is the agency's largest activity. During the 1980-82 biennium, 51 percent of VMRC's total budget and 63 percent of its manpower, or 87 of 138 agency positions, were allocated to the law enforcement function. Field officers are divided into four enforcement supervisory areas (Figure 14).

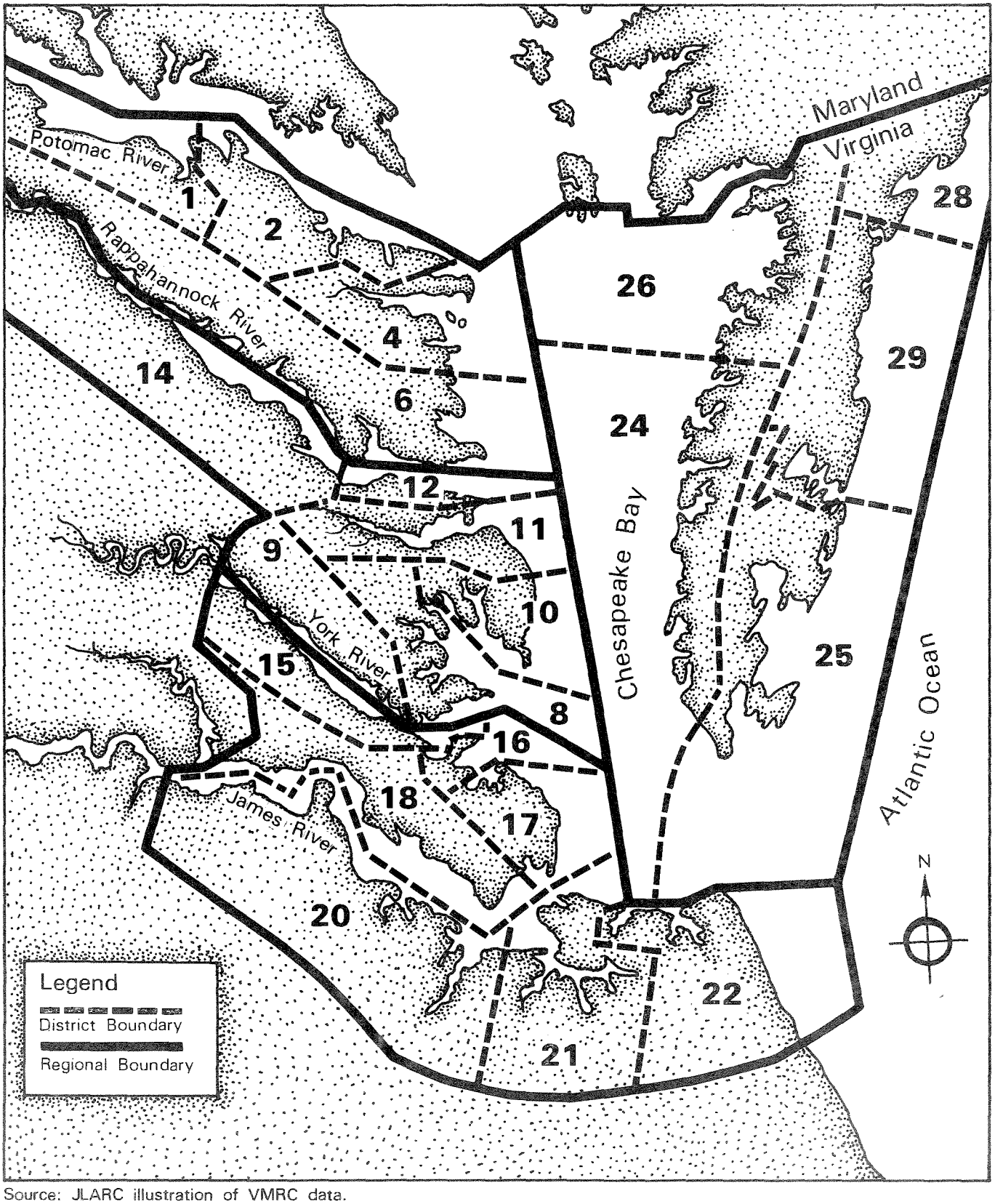
Several deficiences within the VMRC's law enforcement division were cited in JLARC's 1977 report on marine resources. Many deficiencies continue to exist in the role of district inspectors, personnel classification, and patrolling activity.

Authority of VMRC Enforcement Staff

VMRC's enforcement has developed from that of "oyster inspectors" to more broadly defined responsibility for all species of fish and seafood within the State's geographic jurisdiction. The agency is responsible, however, only for enforcement of the laws specifically delegated to the Commission, and the enforcement staff are generally referred to as "marine patrol" rather than "marine police," which reflects their limited authority. The agency does not have full police

Figure 14

VMRC REGIONAL AND DISTRICT BOUNDARIES



Source: JLARC illustration of VMRC data.

power to deal with all violations of law that occur on the water, such as homicide, assault, or smuggling. These powers and duties are handled by local law enforcement agents or the Coast Guard. Moreover, the VMRC marine patrol is unarmed. Although some agency staff feel that the limits on their role and methods of carrying out their current duties are not generally recognized, a 1979 Legislative Commission supported continuance of that role. The General Assembly subsequently provided state subsidies for local patrols to carry out activities not assigned to VMRC.

Differences in Authority. Comparisons of the amounts of authority granted to enforcement units reveal that VMRC's powers are more narrowly defined than its counterparts. In contrast to VMRC's limited authority, both the game wardens of the Commission of Game and Inland Fisheries and Maryland's natural resources police have been granted full or "general" police powers, which authorize them to enforce all civil and criminal laws in addition to their specific charges.

Although general and limited police powers are the same with regard to enforcing misdemeanors, they differ significantly in the officer's ability to act on a felony. Under both general and limited police powers, a misdemeanor offense must be committed in the presence of a law enforcement officer before the violation can be acted upon.

In the case of a felony, general powers allow the enforcement officer to make a physical arrest or have a warrant issued by a magistrate in response to a felony charge as long as "reasonable grounds" or "probable cause" exists. In contrast, under limited authority a VMRC officer may only make a physical arrest or have a warrant issued for a felonious act that is committed in the officer's presence. Otherwise, VMRC agents are instructed to refer an alleged felony charge to the nearest local police authority or Coast Guard unit for investigation and possible issuance of a warrant.

VMRC currently enforces only a few laws which would be designated as felonies if violated. These include larceny of value over $200 and larceny involving oysters.

The limitations on VMRC's enforcement authority are not fully appreciated by the seafood industry members or other agencies. Several industry members expressed concerns to JLARC about the inability or perceived unwillingness of the VMRC officers to handle certain situations, such as the stealing of crab pots. Other agencies expressed concerns about the reluctance of VMRC enforcement staff to enforce laws. These complaints appear to be partly based on misperceptions of VMRC's limited grant of authority.

Differences in Enforcement Capabilities. VMRC is also limited in its ability to carry out its existing enforcement authority. Unlike the Virginia Commission of Game and Inland Fisheries and the Maryland natural resources police, VMRC officers do not currently carry firearms for enforcement purposes. As a result, VMRC's enforcement

chief advises his officers not to attempt to apprehend violators of fisheries laws suspected of bearing firearms and not to take undue risks.

Issuance of a summons, for example, can jeopardize Commission officers if the offender is uncooperative or in possession of a gun. If the offender refuses to sign the summons, enforcement agents are required by law to make a physical arrest. However, VMRC officers have been instructed not to attempt the arrest because they do not have guns to enforce their authority. Instead, the VMRC will contact the local police to issue a warrant. A problem occurs though, when the offender's identity is unknown to the enforcement officer. In such a case, the offender may go without penalty, and the reputation of VMRC officers' ability to enforce the law is damaged. This problem has the potential to increase due to the changing residency law requirements.

VMRC officers were disarmed in 1976, after several years in which agency officials were dissatisfied with the inappropriate use of arms by enforcement staff. Key concerns involved the lack of adequate training and the qualifications of personnel employed at the time.

Should the General Assembly grant VMRC additional enforcement authority in the future, the agency would have to considerably upgrade the enforcement unit through hiring and recruitment procedures and a rigorous training program. Personnel would require training in such areas as investigative techniques, provisions of other laws, the use of firearms, and protection of constitutional rights.

Role of the District Inspector

The duties of the position of district inspector are varied and important for the proper functioning of many VMRC activities. In addition to their primary duty to enforce fishery laws and regulations, most of VMRC's 24 district inspectors have responsibility for issuing and collecting oyster ground rents, issuing licenses and permits, and collecting oyster taxes. These additional administrative tasks, however, tend to involve large amounts of paperwork, thereby reducing and in some cases eliminating time for actual law enforcement. Moreover, present job classifications do not recognize the differences in responsibility and risk in the performance of administrative versus patrol activities.

Inappropriate Administrative Responsibility. Several studies conducted by legislative and executive committees, including JLARC's 1977 study on marine resources, have cited administrative tasks undertaken by district inspectors as inappropriate and unnecessarily time consuming. Many of these study recommendations have resulted in actions taken by the General Assembly. For example, the *Code* was amended to relieve district inspectors from several responsibilities, including the collection of oyster ground rents, and oyster taxes. As mentioned previously, VMRC has recently made preparations to remove district

inspectors from the collection of oyster ground rents by automating this function, but inspectors will continue to be involved in collecting oyster taxes and license fees.

Prior to 1977, VMRC took several steps to relieve district inspectors of licensing duty. These steps included the consolidation of several districts for the purposes of issuing licenses and permits and limited use of agents. Very little progress has been made since that time, however, and VMRC continues to use district inspectors as the major source for licenses and permits.

There are several alternatives that would free more time for district inspectors to pursue enforcement activities:

- Automate licenses and permits to provide for direct billing and payment through the central office. This function could be modeled after the system currently used by the Division of Motor Vehicles in issuing annual vehicle licenses. An automated system would eliminate the need for district inspectors to perform this function and allow the central office to maintain a permanent file of licenses and permits, adding and deleting entries only as new applicants appear or previous license and permit holders fail to reapply. This function could be handled by the central billing and collections unit, the creation of which JLARC recommended.

- Field offices within each supervisory area could be opened on alternate days of the week to issue licenses and permits. More days could be added during peak licensing times. This option would significantly reduce the time spent by district inspectors performing administrative tasks and increase the time available for law enforcement activities with only minor inconvenience to water users.

- Licensing agents (such as grocery, hardware and sporting stores) also could be used to reduce marine enforcement staff involvement in administrative tasks. This option is currently employed by the Commission of Game and Inland Fisheries and the State of North Carolina. To avoid conflicts, licensing of fixed fishing devices such as staked pound nets should, however, be coordinated through the central office.

In light of recent budget constraints and the inadequacy of VMRC patrol activities, administrative tasks and paperwork conducted by the law enforcement division should be eliminated or significantly reduced to allow district inspectors more time for patrol and other enforcement activities. The elimination of these tasks should substantially increase the amount of time available for enforcement duties, allowing wider coverage of marine waters and improved night and weekend patrols.

Personnel Classification. Although some changes have occurred, VMRC's classification system remains limited in providing performance incentives and recognition of the variations in responsibility and risk.

Although all district inspectors are eligible for the same pay scale ($12,731-$19,011), four distinct areas of work responsibilities for district inspectors have been in existence for a number of years:

1) agents for the sale of licenses and permits;

2) agents for the sale of licenses and permits who also conduct law enforcement patrol;

3) shore patrol; and

4) administrative functions including manning tax stations and handling communications and supplies.

Review of the agency's current monthly activity reports for enforcement staff revealed wide variation between supervisory areas in the utilization of district inspectors. In the North area, district inspectors are almost exclusively used for administrative tasks, spending much of their time staffing field offices and dealing with paperwork related to licensing and the collection of oyster taxes and leased ground rents (Table 15).

By contrast, Eastern Shore district inspectors conduct significantly less paperwork and spend over twice the time patrolling, partially because many licenses are issued in the field while on

Table 15

USE OF DISTRICT INSPECTORS ACROSS REGIONS
(FY 1981-82)

	Supervisory Areas			
Work Activity	North	Middle	South	Eastern Shore
Administrative Paperwork	62%	25%	18%	8%
Patrol	30	59	69	74
Other	8	16	13	18
Total	100%	100%	100%	100%

Source: JLARC review of VMRC monthly enforcement reports.

patrol. One Eastern Shore district inspector is also classified as a boat captain. In addition to differences across areas, the use of district inspectors varies within areas. One area supervisor, for example, indicated to JLARC that three of the area's eight district supervisors are spending up to 100 percent of their time on administrative tasks.

While the analysis may, in part, point to differences in regional management, it also indicates that VMRC's present personnel classification system fails to recognize these varying levels of activity and responsibility and the extent of time not spent in patrol activities. In addition to reducing administrative workload, VMRC should update and reclassify enforcement positions in order to provide work incentives for personnel and to recognize different levels of responsibility and experience.

Patrol Activity

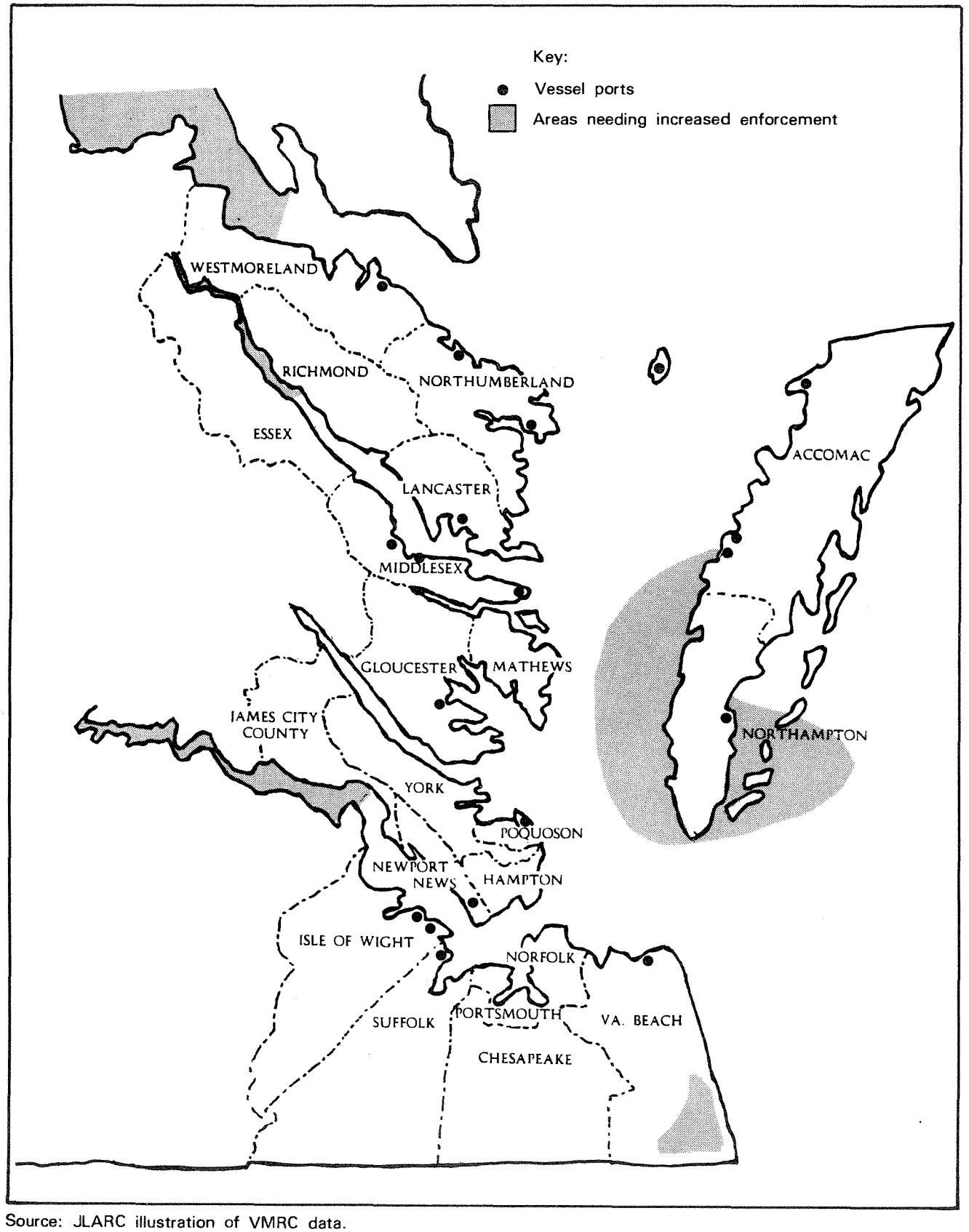
Shore and water patrol activities of VMRC's law enforcement division have remained relatively unchanged since 1977. At that time, JLARC noted a lack of systematic procedures for deployment of personnel and equipment and for assessment of overall law enforcement needs. JLARC recommended that VMRC begin to systematically assess its law enforcement responsibilities and needs, and establish criteria for determining placement of personnel and equipment needed to support field operations. However, VMRC continues to rely on the traditional patrol patterns and deployment of personnel and equipment as established over 20 years ago. As a result, geographic districts and patrol patterns may no longer be appropriate or efficient.

The traditional deployment and location of personnel and equipment, combined with changing enforcement needs, has resulted in inadequate patrol coverage of several actively fished bodies of water. For example, the creation of the management area in the Pocomoke and Tangier Sounds in 1978 and the lifting of residency requirements for the crab fishery in October 1982 diverted much fishing activity to the upper Chesapeake Bay. VMRC responded by reassigning a major vessel from the Hampton area to Tangier Island. VMRC was able to deploy equipment and personnel to the upper Bay area only at the expense of patrolling activities in the Back Bay and Eastern Shore areas. Figure 15 shows other areas which VMRC enforcement officials indicate currently receive little or no patrol.

Further, night and weekend patrols apparently need to be increased. Law enforcement officials indicate that presently night patrol is conducted sporadically when illegal activity, such as widespread fishing of crab pots during night-time hours, is suspected. Weekend patrol is also virtually nonexistent, except during holiday weekends when large numbers of pleasure boaters take to the waters.

Figure 15

AREAS IN NEED OF INCREASED ENFORCEMENT ACTIVITY



Source: JLARC illustration of VMRC data.

Area supervisors claim that current personnel and equipment levels are at an absolute minimum, and that existing patterns of patrol are the most appropriate given limited agency resources. Yet, in the absence of a process for systematic evaluation of law enforcement needs, VMRC lacks the ability to assess and deploy personnel and equipment to most effectively respond to changes in the fisheries.

VMRC should reassess current practices for the deployment of personnel and equipment to assure that the best use of resources is made. Development of a deployment plan would enable the agency to conduct a systematic review on a regular basis. Current needs for additional personnel should be met to the greatest extent possible by reducing the administrative activities of existing enforcement staff and using them for more patrolling duties.

CONCLUSIONS AND RECOMMENDATIONS

As the State's chief fisheries agency, VMRC's management and enforcement activities have a significant impact on the Commonwealth's seafood industry. The agency's current management framework is, however, inadequate to carry out many important agency functions. VMRC should develop a focus on fisheries management, centralize fragmented responsibilities, and implement support systems that would enhance the agency's capability to fulfill its fisheries management role. In addition, overdue improvements in oyster ground management and enforcement should be made.

Recommendations

Recommendation (5). VMRC should take steps to reorganize its organizational structure in order to place proper emphasis of agency resources on fisheries management issues by creating a new fisheries management unit, to include the statistics section, liaison officer, repletion department, and engineering and survey division. The unit should be headed by an individual with strong organizational skills and a background in fisheries management.

Recommendation (6). The General Assembly may wish to consider repealing Sections 28.1-19 and 28.1-20 of the *Code* relating to the appointment of the repletion officer and chief engineer so that the Commissioner of MRC would have exclusive authority to appoint Commission employees.

Recommendation (7). VMRC should centralize all revenue collection activities by establishing a collection and billing unit within the agency's finance and administration division. Creation of a central revenue collection unit would greatly reduce the use of enforcement personnel for administrative and clerical tasks and decrease the number of VMRC staff handling collected money.

Recommendation (8). VMRC should take a comprehensive rather than piecemeal approach to the development of computer support systems for the agency. VMRC could continue to work with the Department of Management Analysis and Systems Development in conducting an overall assessment of the agency's ADP needs and in implementing appropriate structural changes and information systems.

Recommendation (9). VMRC should develop fishery-specific management plans for fisheries within the Bay and to assess the relevancy of interstate plans to Virginia's needs.

Recommendation (10). VMRC should take steps to improve the quality and completeness of its statistical information by methods such as increasing data collection by agency staff; allowing for mail-in of information by seafood buyers; utilizing sampling techniques for data gathering; and providing seafood buyers with standardized reporting forms. VMRC should work cooperatively with VIMS in an effort to provide the State with regular level-of-effort statistics. To the extent possible, VMRC should allocate funds or provide personnel to match federal research monies to upgrade fisheries information. In addition, the General Assembly may wish to make reporting of statistics mandatory.

Recommendation (11). The General Assembly may wish to consider amending Title 28.1, *Code of Virginia*, in order to provide broad policy guidelines for control by regulation of details related to restrictions in gear, season, enforcement methods, or licensure fees. Those provisions that are determined to be inappropriate for regulation should be retained in law. Consideration might also be given to granting VMRC time frames and procedures for promulgating regulations that are similar to those granted the Commission of Game and Inland Fisheries.

Recommendation (12). VMRC should improve its fiscal planning, allocation, and accounting processes to ensure that special repletion funds are used for the purposes intended. In addition, the General Assembly may wish to clarify how the fund may be used for "administration" of the program and for repletion purposes.

Recommendation (13). VMRC should improve evaluation of the effectiveness of the oyster repletion program through such means as a regular sampling program and computerization of data.

Recommendation (14). VMRC should consider instituting several improvements that would reduce the involvement of enforcement personnel and bolster the effectiveness of tax collection efforts. Suggested improvements include having buyers mail reporting forms and payments to VMRC for systematic cross-checking by the central office; random auditing of the buyers' books to verify accuracy of tax payments; and adopting a system used on the Potomac River, where marine enforcement personnel record oyster harvesting activities while on patrols to identify instances where oysters are harvested but no taxes are paid. Implementation of these changes, in addition to VMRC's new system, should increase the tax revenues available for financing the state's oyster repletion program.

Recommendation (15). VMRC should consider requiring new applicants for leased ground to provide their own surveys. The Commission could establish a list of private surveyors willing to conduct these surveys or put the work out for bid. VMRC's own surveyors could then concentrate on reducing the backlog of applications.

Recommendation (16). VMRC should immediately take steps to ensure that procedures for handling the processing of lease applications are in compliance with *Code* requirements.

Recommendation (17). The General Assembly may wish to consider raising the rent on oyster leases and requiring more frequent evidence of appropriate use to discourage non-productive holding of private leases.

Recommendation (18). VMRC should take steps to update and reclassify enforcement positions in order to provide work incentives for personnel and to recognize different levels of responsibility.

Recommendation (19). VMRC should reassess current practices for the deployment of personnel and equipment to ensure that the best use of resources is made. Development of a deployment plan would enable the agency to conduct a systematic review on a regular basis. Current needs for additional personnel should be met, to the greatest extent possible, by reducing the administrative activities of existing enforcement staff and using them more for patrolling duties.

IV. PROMOTION, ADVISORY SERVICES, AND INSPECTIONS

The previous chapter focused on management and regulation by Virginia's lead fisheries agency, the Virginia Marine Resources Commission. Besides VMRC, several other agencies also support the State's seafood industry through promotion, research and advisory services, and inspection of processing plants. This chapter will focus on the carrying out of these functions and services by the agencies that provide them.

Promotion is the primary goal of the Marine Products Commission, and research and advisory services are the mission of the Virginia Institute of Marine Science. Other agencies conduct fisheries-related activities as part of their broader missions. For example, Virginia Polytechnic Institute and State University, as well as other State universities, provide advisory and research services. The State Department of Health and the Department of Agriculture and Consumer Affairs inspect shellfish and finfish processing plants and retail outlets.

Generally, these agencies operate independently and with little formal coordination, which can hamper the setting of priorities and lead to duplication of efforts. To a limited extent, these weaknesses are offset by the variety of resources brought to bear on fisheries problems. This chapter will focus primarily on the processes established by each agency to carry out its unique functions, and on opportunities to enhance these activities through better coordination and cooperation among the agencies and the seafood industry.

PROMOTION OF VIRGINIA'S SEAFOOD INDUSTRY

Advertising and public relations techniques can be used to improve Virginia's image as a seafood producing state, increase public awareness of finfish and shellfish as desirable foods, and expand markets through consumer and commercial sales. In 1979, the General Assembly created the Marine Products Commission to serve as the major promotional agency for the seafood industry and to overcome negative publicity resulting from a major water pollution problem in the James River. Other promotional activities are carried out by VPI&SU, VIMS, and the Department of Agriculture and Consumer Services. The effectiveness of these activities, however, has been limited, in part, due to shortcomings in the programs and to the inability or reluctance of Virginia's processors to make use of State promotional efforts.

Effectiveness of the Marine Products Commission

The Marine Products Commission has engaged in many promotional activities and is considered by several regional marketing experts to be among the best seafood promotional agencies in the nation. Despite its reputation however, only a small percentage of the State's seafood processors have used the Commission's activities to increase their business. Moreover, the indirect results of promotional strategies are difficult to measure, and the Commission is a relatively new agency.

Organization and Background. The Commission consists of 11 members who represent the seafood industry in Virginia. One member is required to represent the menhaden industry, and the remaining members must be predominantly dependent on the seafood industry for their livelihood. All members are appointed by the Governor for three-year terms. Current membership includes representatives of the oyster packers, finfish industries, and oyster growers. The Marine Products Commission presently employs two staff persons: an executive secretary and an assistant.

Prior to 1979, The Virginia Seafood Council, an association of seafood processors, conducted promotional activities funded through a grant of approximately $30,000 annually from the Marine Resources Commission and $10,000 in State general funds. In 1979, seafood promotion was expanded by special revenues received from a settlement with a private corporation for damages to State waters. The Virginia Marine Resources Commission was allocated $781,993 of these funds; approximately $500,000 was earmarked for promotion of Virginia seafood.

Over a three-year period, the funds were used by VMRC, and later by the Marine Products Commission, for a study by a private advertising agency and for the publishing of a seafood brochure on Virginia seafood products. The study revealed that Virginia lacked the image of a seafood producing state, even though the Chesapeake Bay was widely recognized by consumers as a seafood area.

The Marine Products Commission is regularly funded through a special dedicated fund known as the "Virginia Marine Products Fund." The fund is supported by recent increases in twelve categories of existing license and permit fees levied on the seafood industry (Table 16). Most of these fees were either doubled or tripled to support the fund.

As reported by the Commission, major activities during its three years of operation include:

- developing an award-winning poster kit for retailers that included a seafood operations manual for meat departments, "Virginia Seafood" theme posters, and other materials;

Table 16

TAXES AND FEES DEDICATED TO THE "VIRGINIA MARINE PRODUCTS FUND"

	License Fees and Permits	Subjects of Tax
1)	license tax on fishing in tidal waters (§28.1-48)	every resident catching or taking fish from tidal waters
2)	license fee for commercial fishing piers (§28.1-52.2)	every commercial fishing pier located over or upon subaqueous beds
3)	license tax on catching menhaden with purse nets (§28.1-59)	any person, firm, or corporation using purse net methods
4)	license fee on use of trawl nets (§28.1-70)	residents and non-residents using trawl nets within three-mile limit
5)	license tax on handling bivalves (§28.1-119)	any person, firm, or corporation in business of shucking and packing oysters
6)	business and vehicle tax on seafood purchasers (§28.1-119.1)	any person, firm, or corporation purchasing seafood from a catcher
7)	license fee for use of hands or tongs for harvesting clams or oysters (§28.1-120)	any resident in the State using such methods
8)	license tax to dredge or scrape (§28.1-133)	any applicant
9)	license tax to dredge or scrape on private grounds (§28.1-134)	lessees of such grounds
10)	license tax to harvest scallops (§28.1-163)	any applicant
11)	license tax to harvest crabs for market or profit (§28.1-165)	any resident of the State
12)	permit fee for removing shellfish from condemned areas and relaying them to non-condemned areas (§28.1-179)	any person, firm, or corporation desiring to do so

Source: *Code of Virginia.*

- increasing the number of grocery stores nationwide handling Virginia seafood products, for example, in Chicago, North Carolina, Ohio, and New York, as well as in Virginia;

- placing advertising inserts into national trade magazines;

- making personal sales presentations to interested buyers;

- sponsoring retailer training seminars in conjunction with VPI&SU seafood specialists;

- participating in trade shows nationwide;

- developing a joint promotional campaign for Virginia seafood and other products for Sheraton Inns;

- promoting seafood consumption through media opportunities;

  printing a "Trades Opportunity Bulletin" that periodically lists persons or firms interested in buying seafood; and

- establishing September 1982 as the first annual "Virginia Seafood Month."

Communication With the Industry. Sales opportunity information and other items of interest appear in two newsletters published by the Commission: "Trades Opportunity Bulletin" and "Fisheye." Not all members of Virginia's processing sector receive this material, however.

Currently, over 600 individuals and firms are on the Marine Products Commission's mailing list. The original list was based on a directory of processors developed by VPI&SU researchers, which contained entries from the State Health Department's list of businesses certified to sell shellfish across State lines. Commission officials indicate that this mailing list is updated periodically from the list of seafood buyer licenses issued by the Virginia Marine Resources Commission and as other processors become known.

JLARC's review of the State Health Department's current list of certified shellfish shippers and the Department of Agriculture and Consumer Services' list of finfish plants operating in Virginia indicates that 130, or 35% of those firms listed, were not receiving the newsletter. Those firms that are directly engaged in wholesale distribution or processing should receive the newsletter. Others on the list who are retailers or shippers may benefit from other Commission activities or publications. The agency should ensure all firms are aware that the Commission's services are available to them.

Utilization by the Industry. JLARC staff conducted a telephone survey of a randomly selected sample of 90 individuals or firms currently on the Marine Products Commission's mailing list to determine the level of utilization of the Commission's promotional efforts. The mailing list was found to include representatives of all industry

segments and some persons not currently engaged in the business. JLARC's further analysis focused on the 37 respondents who are currently engaged in wholesaling or distributing seafood products, because these firms are in the best position to use Commission activities to expand their business.

Twenty-eight percent of the processors and handlers responding to the survey indicated that they had followed up on a lead listed in the Commission's "Trade Opportunity Bulletin." Because results are based on a small number of respondants, sample results are not sufficiently precise to be projected to the entire processing sector.

In comparison to firms which specialized in shellfish or crabs, a much higher percentage of processors specializing in edible finfish products attempted to increase business by contacting a lead. This difference seems to reflect the Commission's initial emphasis on promoting the State's finfish products.

Five out of the eight processors who followed up on leads made at least one sale. Some processors were more successful than others. One oyster processor, for example, told JLARC staff that he had contacted over 40 leads listed in the "Trades Opportunity Bulletin," resulting in approximately 35 new sales. In contrast, another processor who contacted 15 different leads made only one sale. Industry members unable to make a sale indicated to JLARC that problems such as transportation costs and the quantity of product desired by a lead prohibited them from doing so.

For various reasons, many industry members do not make use of State promotional activities to expand their business. Industry members who are not engaged in promoting their own business are less inclined to take advantage of promotional activities and leads generated by the Marine Products Commission. Survey results show that over half of the processors contacted by JLARC had neither promoted their own product nor attended a trade show or industry seminar sponsored by the Marine Products Commission. In addition, 48 percent of the processors contacted had neither promoted their own product nor followed up on a lead listed in the Trades Opportunity Bulletin.

Many owners of seafood processing or handling businesses indicated to JLARC staff that they were reluctant to contact State-identified sales opportunities because they had long-established buyers for their product, were operating at full capacity, preferred to wait for orders to come to them, faced financial constraints, or felt the quantity of product desired would be unprofitable or impossible for them to handle. Industry members gave such responses as:

> "We get our orders when we deliver to our customers. They tell us what they want next week."

> "We are a small company . . . and don't have the capital to risk losing."

"We're just about at capacity now and are careful where we place our merchandise."

Commission officials indicate that at least four processors and some major retail grocery chains have taken greater advantage of promotional assistance than the rest of the industry. These firms were aggressively attempting to develop new business. Representatives of these firms often attended trade shows and followed up on a number of Commission-generated leads. Recent Commission policies have set limits on participation of individual processors in trade activities in order to encourage the involvement of more industry members.

The Marine Products Commission is a relatively new agency that is servicing an industry with long-established patterns of business. Therefore, the aggressive pursuit of new markets and marketing strategies needs to be balanced by promotions that benefit smaller firms with primarily local markets and which highlight the shellfish products traditionally associated with Virginia. However, to the extent possible, the industry should continue to be encouraged and supported in developing its capacity to use expanded markets. The Commission staff strongly emphasize that there is significant potential for the State to expand its processing and distribution capacity and take advantage of its unique position on an outstanding harbor with good access to rail and highway systems. New programs should be developed and evaluated regularly in cooperation with the industry.

The Marine Products Commission should institute a systematic method for evaluating the effectiveness of its promotional activities. This may require the Commission to periodically survey the State's seafood processors and distributors in order to determine the level of use of promotional activities by the industry and to assess the capabilities of the industry to respond to new promotional ideas. Adjustments to the Commission's activities should be made accordingly.

Coordination of Promotional Activities

The Marine Products Commission is the only agency specifically established by the General Assembly to conduct seafood promotional efforts. The Commission has, however, attempted to use the expertise and staff of the other agencies that conduct promotion-related activities to extend the efforts of its two-person staff. The Commission has also funded several of the activities carried out by the other agencies as they have met the Commission's needs (Table 17).

Domestic and export product promotion involves a variety of funding sources and four State agencies - Virginia Institute of Marine Science (VIMS), The Department of Agriculture and Consumer Services (DACS), Virginia Polytechnic Institute and State University (VPI&SU), and the Marine Products Commission. VIMS Advisory Service staff have participated in export trade missions to Egypt, Nigeria, and Venezuela sponsored and funded by regional and national sources. According to VIMS personnel, the missions have resulted in approximately 900,000

Table 17

PROMOTIONAL ACTIVITIES FUNDED BY THE MARINE PRODUCTS COMMISSION

Project	FY	Recipient Agency	Amount
Brochure, "How to Enjoy Seafood in the Old Dominion Tradition"	80/81	DACS	$ 725
Marketing Seminars for Seafood Industry (3)	80/81	VPI&SU	900
Train D.C. Extension Agents	81/82	VPI&SU	348
National Food Distributors Trade Show	81/82	VPI&SU	366
Fresh Seafood Retail Seminar, Norfolk	81/82	VPI&SU	1,543
Ohio Retail Food Dealers Trade Show	81/82	VPI&SU	450
Virginia State Fair	81/82	VMRC	91
Fresh Seafood Retail Seminars, (3) Wisconsin	81/82	VPI&SU	1,213
Photo Exhibit	81/82	Virginia Waterman's Museum, Yorktown	130
Financing the Seafood Industry Seminar	81/82	VIMS and Virginia Banker's Assoc.	373
PA Food Merchant's Trade Show	81/82	VPI&SU	386
Brochure-Flavorful Tour	81/82	DACS	200
Fisherman's Forum, Seminar	81/82	VIMS	694
Recipe Brochures	81/82	VIMS	2,500
NARGUS - Trade Show	81/82	DACS	1,646
Pasteurization of Oysters	82/83	VPI&SU and Steeltyn Corp.	16,000
Criteria for Quality Control	82/83	VPI&SU	4,500
TOTALS			$32,055

Source: Marine Products Commission.

pounds of Virginia finfish being exported, mostly through a regional buyer, to those countries in 1981. In addition, VIMS conducts export and financing seminars for industry members.

The Department of Agriculture and Consumer Services is involved in seafood promotion as it relates to its broader export trade responsibilities. DACS foreign trade offices in Japan and Europe distribute Virginia seafood materials abroad and act as the State's representatives in these efforts.

VPI&SU's Sea Grant and Marine Extension programs have been using State, federal, and private funding to carry out several seafood promotional activities. Since 1979, VPI&SU staff have been conducting seminars for retail grocery store personnel across the country on how to operate in-store seafood counters. This effort has been very well received by retail representatives and has been utilized in conjunction with the Marine Products Commission the past few years to encourage retailers to sell Virginia seafood. Other VPI&SU activities include consumer services, such as seafood recipe development, in-store demonstrations, and media appearances, as well as assisting high-school home education classes with seafood cooking instruction and conducting research to benefit the processing sector.

The activities of each agency appear to be useful for supporting the seafood industry. No formal planning or coordinating exists, however, between the Marine Products Commission and the other agencies. In addition, no attempt has been made to involve other agency representatives with the development process for the Commission's annual plans.

While flexibility is needed for agencies to pursue avenues of interest and expertise, more coordination is necessary in order to ensure that staff and funding resources are available to meet the State's promotional goals. The Marine Products Commission has lead responsibility for obtaining these goals and, therefore, should work with representatives of VPI&SU, VIMS, and DACS to establish more formal coordination and planning of the State's seafood promotional activities.

MARINE RESEARCH AND ADVISORY SERVICES

Marine research and advisory services are carried out by several State agencies and educational institutions. VIMS is the State's primary marine research agency. Other institutions which provide valuable research and assistance to Virginia marine resource users include VPI&SU, Old Dominion University, and the University of Virginia. Staff from VIMS and the State's universities provide information on a variety of subjects in the fields of marine biology, resource economics, commercial gear development, and seafood utilization and processing.

JLARC's 1977 report on marine resource management found that no formal research priority-setting process involving VIMS, VMRC, and other maritime interests existed. In addition, marine advisory services offered by VIMS and VPI&SU were found not to be coordinated, resulting in unnecessary competition for federal funds. To improve these areas, JLARC recommended:

- the development of an agency-wide research plan for VIMS;
- establishment of an advisory group for setting VIMS research priorities; and
- closer coordination of advisory services through the development of a Sea Grant Consortium.

Follow-up on these recommendations reveals that VIMS is in the process of establishing an agency-wide research plan and that a Sea Grant Consortium was established by the General Assembly in 1979. Development of a formal mechanism for involving industry members and marine agencies in the VIMS research planning process, however, has not occurred. The need continues for this advisory group, as possible cuts in federal funding will require the targeting of research efforts on the areas most important to State marine agencies, legislators, and seafood industry members.

Coordination of Advisory Services

The provision of marine advisory services is an important aspect of meeting industry needs. Two advisory programs exist in Virginia, at VIMS and VPI&SU. Coordination of these programs has been strengthened since 1979 through the development of a Sea Grant Consortium.

The advisory service program at VIMS provides information to fisheries managers and to industry members. Specific projects have included a series of seminars and workshops on industry-related problems, newsletters containing articles on VIMS' research findings, daily contact with industry members, and research efforts by field staff.

VPI&SU currently provides marine advisory services through three seafood extension agents, an experimental seafood processing laboratory in the Tidewater region, and staff at the Blacksburg Campus. Staff address specific individual and Statewide seafood processing needs through projects to increase product shelf-life and improve processing plant design.

JLARC's 1977 study found that the activities of the two programs were not coordinated and potentially competing against one another for federal funds. At that time, JLARC recommended the development of a Sea Grant Consortium to coordinate State marine educational and advisory programs.

In 1979 the Virginia Graduate Marine Science Consortium was authorized to be formed to coordinate activities of VIMS and VPI&SU, as well as the programs at Old Dominion University and the University of Virginia. The consortium, located at the University of Virginia, employed its first director in June, 1981.

The Consortium has provided coordination in several areas. During the summer of 1982, for example, the Consortium took steps to develop closer cooperation between the marine extension agents of VPI&SU and the marine fisheries specialists at VIMS by designating a VIMS official as coordinator over this activity.

VIMS Research Planning Process

VIMS' research activities should address the most urgent needs of fisheries resource managers, principally the Virginia Marine Resources Commission and various segments of the industry. A follow-up on JLARC's 1977 study found that VIMS has recently re-emphasized its commitment to concentrate research on the problems of the Virginia seafood industry. An institute-wide, ten-year research plan is currently being developed to identify and prioritize related research projects. Upon completion, the Institute intends to expose the plan for scrutiny by other marine resource related agencies, interested industry representatives, and the General Assembly.

VIMS does not have, however, an on-going mechanism to secure industry appraisal of its efforts or to identify top priority industry needs for research or advisory services. Neither have the Institute and VMRC developed a systematic approach to meet VMRC's need for research.

Coincident with the merger of VIMS and the College of William and Mary in 1979, a VIMS advisory committee composed of representatives from the seafood industry and other maritime segments was created to advise on matters related to the Institute. The advisory committee was authorized but not required by Section 28-197.1, *Code of Virginia*. VIMS officials indicate that the Governor has not reappointed the committee.

VIMS is, however, establishing a "Marine Science Development Council," which will include members of the seafood industry as well as representatives of the business community, such as the shipbuilding, railroad, and chemical industries. The Council will provide limited input into the planning process for research and advisory services and will coordinate fund raising. While the Council can be used as a forum for obtaining the full spectrum of industry and business opinion on VIMS research activities, it appears that the unique needs of the seafood industry may require special attention.

VIMS should establish a formal mechanism for soliciting the advice of industry and marine agencies as part of its research planning process. This could be achieved through the reestablishment of the

VIMS advisory committee for this specific purpose or by broadening the mission of the "Marine Science Development Council" to include wider seafood industry and marine agency representation.

However, the problem could also be addressed in a way that would increase coordination of all marine research activities and provide consistent assessment of the industry's research needs. Currently both VPI&SU and the Sea Grant Consortium have advisory committees to assist in identifying industry problems. However, creation of separate advisory bodies for the same purpose fragments industry input and can result in inconsistent direction and fragmented efforts among the various research agencies. As discussed in Chapter V, the General Assembly may wish to create one advisory committee representative of all major segments of the industry to advise and comment on the research activities of Sea Grant, VPI&SU, and VIMS.

SEAFOOD PLANT INSPECTIONS

The State inspects shellfish and finfish processing facilities for compliance with sanitary and processing standards. These inspections are important to protect the public health and the economic vitality of the industry. An outbreak of disease related to contaminated products, even if traceable to a limited source, can, according to State and federal regulators, lead to a decrease in seafood consumption nationwide and to major economic losses.

Responsibility for inspecting facility conditions and analyzing seafood products for contamination is divided between two agencies. The Bureau of Shellfish Sanitation within the State Department of Health (SDH) is responsible for monitoring shellfish and crabmeat plants, while the Department of Agriculture and Consumer Services (DACS) carries out similiar functions for finfish plants and further processed shellfish (e.g., deviled crabs) operations. Sound inspection procedures and adequate follow-up and enforcement mechanisms are necessary to ensure compliance with standards. SDH and DACS appear to visit plants regularly to monitor correction of cited violations. Nevertheless, there are administrative deficiencies in both programs and some overlap and duplication between the two agencies. Since different contaminants are being introduced into the State's waters and new seafood processing procedures are being developed periodically, it is important that Virginia continue to ensure the adequacy of its seafood regulatory function.

Shellfish and Crabmeat Plant Inspections

The State Health Department's Bureau of Shellfish Sanitation operates a program for monitoring shellfish and crabmeat processing plants. The program, for the most part, is adequate to effectively monitor the sanitary and operating conditions in the facilities.

Several aspects of the program, such as requiring all shellfish facilities to be certified whether or not they are shipping out-of-state, certifying crabmeat plants, and inspecting facilities monthly, exceed requirements of the National Shellfish Sanitation Program. The agency also has written standards which address specific sanitary needs for each type of operation, and plant evaluation forms designed to ensure that sanitarians observe all standards during inspections.

These efforts are commendable. JLARC found, however, that improvement of some administrative and management practices could strengthen the program. Current certification procedures allow facilities to receive certificates of operation prior to the correction of physical plant and equipment deficiencies. In some cases these procedures result in the continued violation of SDH standards throughout the operating year. In addition, the State's shellfish sanitation program has few formalized policies and procedures to ensure uniform administration and enforcement by field personnel. Despite recent actions begun by SDH in September 1982 to address these problems, additional improvements are needed.

Bureau of Operations. The Bureau employed 36 staff in FY 1982, with operations financed through a general fund appropriation of $717,700. During fiscal year 1981-82, the Bureau issued 324 shellfish and 61 crabmeat certificates of operation. A total of 2,768 and 928 monthly inspections were conducted, respectively.

Surveillance of sanitary and operating conditions of these plants consumes approximately one-third of the Bureau's manpower and resources. Other activities conducted by Bureau staff include:

- sanitary shoreline surveys to determine potential and actual pollution sources of shellfish growing waters;
- bacteriological and hydrographic sampling of shellfish growing waters;
- evaluation and condemnation of polluted shellfish growing areas; and
- assistance to VMRC, VIMS, and the State Water Control Board on items of joint responsibility with respect to shellfish growing waters.

SDH employs 28 field personnel to conduct these activities. Six of thirteen sanitarians have major responsibility for conducting shellfish plant inspections. Approximately 35 to 40 plants are assigned to each of the six sanitarians, and workloads are rotated every two to three years. The remaining sanitarians assist in inspections but have primary responsibilities in either shoreline surveying or water sampling.

Area offices outside Richmond are located in White Stone, Accomack, and Norfolk. These offices provide work space for 75 percent of the Bureau's staff and serve as laboratory facilities for analyzing water quality and shellfish product samples.

The sanitary and operating standards for Virginia's shellfish plants are those developed by the National Shellfish Sanitation Program. These standards were developed through a cooperative effort between national, State, and industry officials throughout the shellfish producing areas in the U.S. In keeping with the provisions of the program, Virginia has adopted these standards for its own shellfish sanitation program. Crabmeat plant sanitation does not fall under the requirements of NSSP. Therefore, sanitary requirements specifically designed for crabmeat plants were adopted by SDH in 1965. Sample requirements representative of these standards are provided in Exhibit B.

While conducting monthly inspections, SDH sanitarians are provided with a rated checklist to evaluate facility conditions. The evaluation checklist is a summary of all required sanitary and operating standards. Values are assigned to each standard and are subtracted from a base of 100 when found in violation. Facilities are required to meet a minimum value of 80. This evaluation method ensures that SDH standards are fully reviewed and provides a minimum requirement to evaluate overall facility conditions. Furthermore, the standards on which these evaluations are based are designed to address the specific sanitary needs of shellfish and crabmeat operations. In addition, the National Shellfish Sanitation Program considers a plant to have met basic standards when the same sanitation item is not violated repeatedly.

Deficiencies in Certification Procedures. Under SDH's certification program for shellfish and crabmeat plants, all facilities are required to be certified annually prior to beginning seasonal operation. Prior to certification, SDH sanitarians review the condition of processing equipment and the physical plant. If the plant is in compliance, SDH then issues a certificate of operation to the facility. In some cases, however, SDH has allowed facilities to be certified and operate with sanitary or construction deficiencies over extended periods of time.

To assist facilities in complying with certification standards, SDH sanitarians conduct pre-certification inspections several weeks prior to issuance or renewal of certification. According to SDH officials, if minor deficiencies are found during the formal certification inspection, the sanitarian will typically indicate on the certification evaluation form that an agreement was reached with the facility operator to correct the deficiencies. Central office officials review these certification reports and generally grant certification to a facility having deficiencies as long as an agreement has been made with the facility operator to correct deficiencies within a reasonable time frame.

Exhibit B

EXAMPLES OF SDH STANDARDS
FOR THE SHUCKING AND PACKING OF SHELLFISH

Cooling and Refigeration

- shucked shellfish cooled to an internal temperature of 45° within two hours
- stored at 40° or less
- frozen at 0° or less
- ice not contaminated by handling or storage

Health and Cleanliness of Employees

- infected persons excluded from plant
- clean aprons or coats worn by employees and stored properly
- finger cots, gloves, or shields sanitized at least twice daily
- no evidence of spitting, tobacco, or food and drink in shucking or packing areas
- proper handwashing by employees

Construction of Shucking Benches and Equipment

- constructed of smooth, corrosion-resistent material, free from cracks and self draining
- shucking blocks of one piece construction, easily cleanable, and non-toxic
- stands and stools easily cleanable and painted
- tanks, tubs, and storage containers top rim at least two feet above the floor

Shucking Shellfish

- separate rooms for shucking and packing
- approved refrigeration
- shellstock free of mud
- only shuck live shellfish from approved sources
- containers rinsed after each use
- shells removed promptly from shucking room

EXAMPLES OF SDH STANDARDS
FOR CRABMEAT PROCESSING

Plant Arrangements

- separate rooms or arrangements for picking, packing, cooking, cooling, and backing or bobbing of crabs
- adequate protection from flies, insects, rodents, and dust
- protected storage rooms for packing containers
- partitioned area for costumers away from packing room

Equipment Construction

- equipment constructed of approved material with smooth surfaces and joints, and easily cleanable
- lap boards, knives, claw breakers, and crab and ice shovels constructed of one piece corrosion--resistant metal, easily cleanable, and maintained in good repair

Cleanliness

- premises clean, free from litter and rubbish, and only used for crabmeat processing
- no animals, fowl, or unauthorized persons on the premises
- plant and equipment properly cleaned within two hours after each day's operation
- utensils and equipment sanitized after cleaning within three hours after each day's operation
- approved bactericidal treatment and storage of utensils and equipment

Packing Crabmeat

- picked crabmeat packed and cooled to 40° within four hours
- food contact surfaces adequately sanitized prior to day's operation and every two hours thereafter
- no repacking of picked or processed crabmeat from another plant

JLARC found that the agreements between the sanitarian and the facility operator do not always ensure timely correction of facility deficiencies. The following examples from a review of 51 randomly-selected plant inspection records illustrate how some facilities have continued in violation of standards found during certification inspections.

Facility A

A certification inspection of an oyster shucking plant in Westmoreland County during August 1981 found that the facility was in violation of a standard requiring shucking equipment to be constructed of smooth and impervious material in order to guard against contamination. SDH's precertification inspection the previous month had cited the same violation. Despite the continued existence of the violation, the facility was certified for a period extending to May 1982.

During the certification period, the facility was cited twice for the same violation and received a warning letter from the White Stone area office. The monthly inspection form for the February 1982 inspection indicated that the sanitarian threatened to close the plant down unless the violation was corrected.

Although the problem persisted, seasonal certification was again awarded to the facility in May 1982. At that time, the same violation for inadequate shucking equipment was cited. All monthly inspections since then have noted the same violation. During the August 1982 certification inspection, this condition, which was first cited during the certification inspection twelve months previously, was finally corrected.

* * *

Facility B

At the time an oyster shucking plant in Middlesex County was certified in August 1980, it was found to have inadequate vermin controls in the packing container storage area. Indications in the plant's inspection file show that the facility owner agreed to correct the deficiencies in a timely manner.

Six consecutive months following certification, however, the facility continued to be found

in violation of the same standard. A letter of warning was issued by SDH in February 1981 after citing the facility for rodent droppings in the storage area.

The facility was certified twice following the August 1980 certification, during JLARC's review period. Each certification inspection found the same violation. In six of the twelve months during these certification periods the facility was cited for inadequate rodent controls.

It appears that the agreements with owners are not sufficient to ensure timely correction of violations. SDH should take steps to formalize agreements with owners if certification is awarded when substandard conditions exist. A required time frame should be established for correcting the deficiencies. If requirements are not met within the stated period, SDH should take action to either temporarily decertify the plant or issue a cease and desist order to stop operations until deficiencies are corrected. The department should also standardize procedures for issuing a provisional or temporary certificate to facilities in violation of standards at the time of certification.

Inconsistency in Program Administration. Although SDH inspection procedures appear to be reasonable and thorough, several practices have created the potential for inconsistent implementation of program requirements within and between regions. The lack of an inspection manual for field personnel and few formalized written policies have given area offices wide discretion in implementing SDH administrative requirements. In addition, central office officials do not regularly monitor field activities.

Central office officials, in some cases, have appeared reluctant to formalize new policies, claiming that field personnel should have discretion to handle individual cases as they deem appropriate. Although some flexibility is needed, the lack of formalized practices can result in inconsistent application of standards and enforcement practices.

Although other Bureau functions, such as the shoreline survey program, have manuals specifying program procedures and enforcement requirements, an approved manual for the plant inspection program does not exist. SDH officials indicate a draft of an inspection manual for the shellfish and crabmeat plant inspection program was developed several years ago, outlining departmental policies and procedures. However, the document never underwent organizational review and therefore has not been implemented. New policies and procedures are currently communicated informally through such methods as meetings with area supervisors and interoffice memos.

Without policy manuals, area supervisors and sanitarians must work without prescribed practices. In addition, the Bureau is without

a written method for ensuring that program procedures and enforcement requirements are consistently administered. For example, several years ago the Bureau's central office developed suggested guidelines that "letters of warning" be issued to facilities found repeating the same sanitary or operating standard for two consecutive months or for any three months during the processing season (September through August). A reporting form was also designed to assist in the tracking of facility deficiencies cited throughout the season.

Because the central office did not formalize these procedures, field staff continued to exercise their own discretion in determining when repeat deficiencies were sufficient to warrant a written warning. The following examples taken from JLARC's review of a sample of 51 shellfish and crabmeat plant inspection records show instances where repeat violations of SDH standards were not dealt with consistently.

> *A SDH standard, considered by State and national health officials to be one of the most important, requires that shellfish products be cooled to a temperature of 45 degrees farenheit within two hours after shucking. During the 1981-82 processing season, two oyster plants which were repeatedly cited for violating the time-temperature standard by the White Stone office were handled differently.*
>
> *In the case of a Westmoreland County facility, a warning letter was sent by the area office requesting correction after the violation was found for the third time during the year. The deficiencies were apparently corrected, since no indication of violation was cited for the remainder of the season.*
>
> * * *
>
> *In a similar situation concerning a facility in Lancaster County, there is no evidence of a letter of warning being sent, even though the same violation occurred four out of the first seven months of the season. Apparently the deficiency was corrected, however, since no violations of this nature were cited for the remainder of the season. In this case, field sanitarians apparently chose to informally counsel the facility owner rather than issue a warning letter.*

SDH officials indicate that a recent review by the central office of area office practices revealed that suggested procedures were not being uniformly implemented. As a result, a written policy direc-

tive was issued in September 1982 requiring all area offices to utilize the "tracking" form to monitor repeat deficiencies. The use of the warning letters, however, remains an informal guideline.

The Bureau of Shellfish Sanitation should take steps to ensure that departmental policies are uniformly applied across area offices. Formalizing policies such as those dealing with repeat violations and developing a written manual for plant inspection procedures would result in more uniform program administration by the agency and in the building of a case for administrative or legal action against a repeat violator, should it be necessary.

Finfish Plant Inspections

The Department of Agriculture and Consumer Services (DACS) monitors the sanitary conditions of food processing facilities to assure that products manufactured for human consumption are wholesome, free of adulteration, and properly labeled. Finfish processing facilities are one type of facility inspected.

In contrast to the State Health Department's program for shellfish sanitation, the DACS program for finfish facilities has several programmatic deficiencies. The agency does not require notification of plant operations; no specific standards exist for finfish plants; an inadequate facility evaluation form is used; and intermediate sanctions such as suspension of certification or an administrative order are not available.

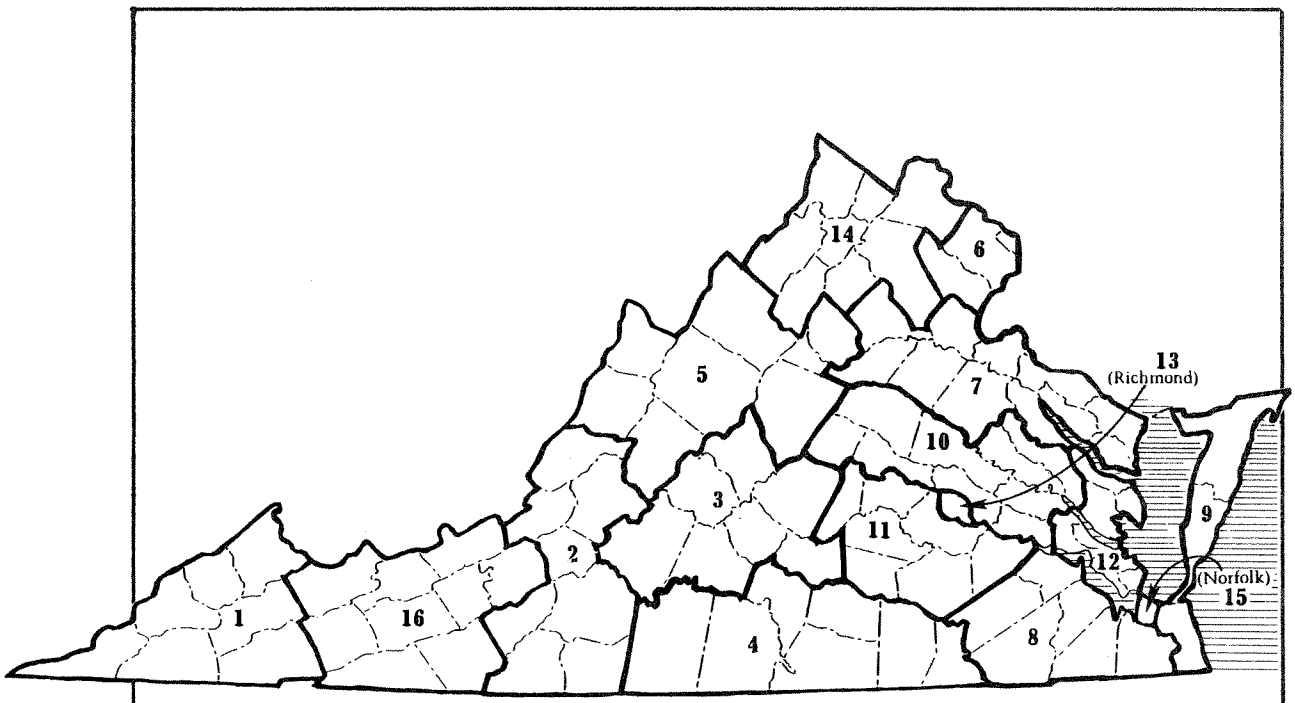
DACS Operations. During fiscal year 1981-82, DACS was responsible for monitoring the sanitary conditions of 156 facilities which handle finfish and reprocessed shellfish. These facilities represent approximately three percent of the total 5,509 establishments DACS is required to inspect annually. Other types of establishments inspected by DACS include retail and wholesale grocery and meat markets, flavor/spice and condiment processors, nut and vegetable processors, commercial and community canneries, wheat and cornmills, ice plants, and various other food processors.

DACS employs 16 field inspectors in its Food Inspection Section, who work out of their homes and are responsible for all food processing facilities within their geographic districts (Figure 16). At least one finfish processing facility is located in each district, with the highest concentration located in districts bordering the tidal waters of the Chesapeake Bay, its tributaries, and the Atlantic Ocean.

Notification Requirements. Virginia Food Laws as administered by DACS do not require registration or certification of finfish processing operations, although the cold storage warehouse portion of a facility is licensed annually. Most processors have small facilities and product turnover is rapid, so they do not have cold storage warehouses. As a result, many new facilities are not required to inform

Figure 16

DACS INSPECTION DISTRICTS



Source: Department of Agriculture and Consumer Services.

DACS when they begin operations, and unidentified facilities can operate without being inspected to ensure sanitary conditions.

Mandatory notification requirements could be achieved through either a registration or certification program administered by DACS on an annual basis. Annual registration of new and continuing finfish processing operations would require processors to inform DACS of the intent to conduct business. A registration program, however, would not require facilities to be in compliance with Virginia Food Laws prior to beginning operation. New facilities would simply register when beginning operations. This would reduce the time such facilities could operate without DACS knowledge and assist in maintaining up-to-date listings of processors throughout the State. Registration information on the seasonal operation of processors would also assist DACS in adjusting workloads of inspectors. Currently, DACS maintains no such information, resulting in some unnecessary inspection visits to non-operating facilities.

A certification program for finfish processing facilities would serve two additional functions. First, it would require that new facilities be inspected by DACS before starting operation. This would ensure that new establishments are in compliance with Virginia Food Laws prior to receiving a license to conduct business. Second, certification would provide DACS with some alternatives to current enforcement sanctions, such as decertification, to deal with facilities found operating in unsanitary conditions.

To ensure protection of the public health, the General Assembly may wish to amend current statutes to require notification of pending annual operation of finfish processing facilities. Notification could be accomplished through either a registration or certification program.

Inspection Standards and Procedures. Although general sanitation requirements exist for food processing facilities, no specific sanitary standards exist for finfish processing facilities, and inspections are not conducted with uniform frequency. Once in a facility, DACS inspectors use an open-ended evaluation form which does not provide guidelines for a systematic and comprehensive review of the plant's operating and sanitary conditions.

DACS relies primarily on on-the-job training to provide new inspectors with the knowledge and guidelines to perform sanitary inspections of finfish processing facilities. A manual is also provided which outlines the mechanics of conducting inspections such as sampling procedures, workload planning, and preparing for court.

However, no specific written sanitary standards exist on which inspectors can evaluate finfish facility conditions. Rather, the broad requirements of Virginia Food Laws serve as an official guide (Exhibit C). In addition, the State Board of Agriculture and Consumer Services has adopted certain parts of the federal regulations pertaining to all plants where food for human consumption is processed or handled. Although similar to the approach in many other states, federal experts indicate that some states have adopted specific written sanitary standards for finfish plants as appropriate.

DACS should consider developing, as appropriate, written sanitary standards for finfish processing facilities to serve as a guide for inspectors in evaluating facility conditions and to ensure that the Virginia Food Laws and general facility requirements are interpreted in a uniform and consistent manner. If developed, these standards should include provisions on plant facilities, equipment, personnel, supervision, and required processing controls. SDH standards for shellfish and crabmeat processing establishments could be used as a guide.

In the interim, the need exists to better ensure that agency inspectors comprehensively review each facility's conditions. Presently, DACS uses an open-ended essay approach to document facility conditions and list violations (referred to as objectionable conditions) of Virginia Food Laws.

Exhibit C

SUMMARY OF VIRGINIA FOOD LAWS

Physical Plant

- Every building, room, basement, or cellar shall be properly lighted, drained, plumbed, and ventilated
- Floors, sidewalls, ceilings, furniture, receptacles, implements and machinery shall at all times be kept in a clean, healthful, and sanitary condition
- Every building, room, basement, or cellar shall have an impermeable floor which can be flushed and washed clean with water
- Sleeping places for employees shall be separate from rooms where food is manufactured or stored
- A convenient washroom and toilet of sanitary construction shall be provided and separate from rooms where food is manufactured or stored

Sanitary Requirements

- Food must be securely protected from flies, dust, dirt and all other foreign or injurious contamination
- Refuse, dirt, and waste products subject to decomposition and fermentation must be removed from the premises daily
- All trucks, equipment and utensils must be thoroughly cleaned daily
- Personnel clothing must be clean
- No domestic animals, except cats, are permitted in rooms where food is manufactured or stored
- No employer shall permit any person to work with any contagious of infectious disease, or skin disease
- Cuspidors shall be provided and no person shall expectorate on the floors or sidewalls
- Smoking in workrooms is prohibited

Prohibited Acts

- Manufacture, sale, or delivery of food that is adulterated or misbranded
- Adulteration or misbranding food
- Receive food that is adulterated or misbranded
- False advertisement
- Refuse entry or inspection by authorized agents of the
- Commissioner of DACS
- Food guarantee without signiture, name, address of the seller
- Forging, counterfeiting, simulating, or falsely representing food identification

Source: Section 3.1-361 et seq, *Code of Virginia*

The form provides space for the date of inspection, owner's name, and facility identification. The remainder of the sheet is blank so the inspector can enter written comments on conditions found in the facility. This type of form allows for documenting objectionable conditions but does not ensure that the facility is systematically and comprehensively reviewed.

The 1976 plant sanitation report conducted by the Louisiana State University Cooperative Extensive Service for the National Oceanic and Atmospheric Administration concludes that a checklist type observation sheet "is useful as a basis for a good sanitation program and is effective because it requires the analysis of certain situations or conditions." Currently, the State Health Department uses the checklist format for their inspection sheet. In addition, DACS has chosen to employ a checklist when agency personnel inspect facilities as part of a contract with the Federal Food and Drug Administration.

The benefit to DACS of a checklist format would be threefold. First, if properly developed, it would help to ensure that finfish facilities are comprehensively and systematically reviewed and that products are safe to market. Second, it would allow DACS to develop statistics and information to evaluate conditions of facilities and provide other indicators of performance based on a standardized format. Third, it could be used as an orientation tool for new agency staff by indicating areas to emphasize during sanitary inspections.

DACS should develop a comprehensive checklist of conditions for conducting finfish plant inspections. The checklist should be based on standards to be developed for these facilities. If desired, extra space could still be included for further explanation of observed conditions.

Infrequent Inspections. Over the past two years, DACS has significantly increased its effort and frequency of inspections. During FY 1980, 82 inspections were conducted on 145 finfish processing facilities. By FY 1982, the number of inspections had increased by almost 300 percent, while the number of facilities had increased by eight percent. JLARC's analysis of DACS' plant inspection records reveals, however, that the agency's administrative goal of conducting sanitary inspections every six months is inconsistently applied.

A randomly-selected sample of 47 finfish plant inspection records were reviewed by JLARC staff for the period January 1979 through July 1982. Analysis of the two most recent inspections for each facility found that almost 75 percent of the sampled facilities were not inspected within DACS' six month goal (Table 18).

On the average, over eight months elapsed between inspections for each facility. Nine facilities received inspections greater than 12 months apart, and seven of these ranged from 13 to 18 months between inspections. The other two facilities had received only one inspection during the JLARC review period and, as of July 1982, had not been reinspected for 14 and 21 months, respectively.

Table 18

TIME ELAPSED BETWEEN THE LAST TWO
SANITARY INSPECTIONS CONDUCTED ON SAMPLED FACILITIES

Months	Number of of Facilities*	Percent of Facilities
0-3	2	5.7%
4-6	7	20.0
7-9	13	37.1
10-12	4	11.4
12+	9	25.8
Total	35	100.0%

*excludes new facilities

Source: JLARC review of DACS inspection records.

DACS should continue to improve the frequency of inspection of each seafood processing facility under its jurisdiction in order to ensure that the public health is protected by frequent observations of plant operations and conditions. At a minimum, the agency's six-month goal should be adhered to.

Ineffective Enforcement Sanctions. DACS has few intermediate enforcement sanctions with which to handle flagrant and repeat violators of Virginia Food Laws. Because existing sanctions either require a court proceeding or are severe in nature, DACS inspectors indicate that they are rarely used. Rather, the inspectors frequently attempt to obtain compliance by counseling the facility owner. In addition, no agency guidelines exist as to when supervisors should initiate enforcement actions designed to bring facilities into compliance with the law.

To stop finfish processors who flagrantly or repeatedly violate Virginia Food Laws, for example, DACS must obtain a conviction in a court of law, which may require the compilation of extensive and detailed biological evidence. DACS officials indicate that the burden of proof through biological testing is difficult and time-consuming and that test results may not correlate with the unsanitary conditions observed in the facility. At times unsanitary equipment may not contaminate products to the extent that would violate testing standards; however, if allowed to continue, conditions could worsen, resulting in contaminated food products.

Rather than taking court action, DACS has developed administrative procedures to bring facilities into voluntary compliance with Virginia Food Laws. These procedures are in accordance with Section 3.1-406, *Code of Virginia*, which states that if filthy or unsanitary

conditions are found to exist, a facility "shall be first notified and warned by the Commissioner" about the conditions and given a "reasonable length of time" to correct deficiencies.

The procedures are listed below:

1) If a facility is found to be unsanitary, all violations are discussed with the owner and a *follow-up inspection* is scheduled for 30, 60, or 90 days depending on the severity of violations.

2) Continuing violations after the follow-up inspection result in a *letter* to the owner of the facility listing violations cited and stating that the facility is operating illegally. A *follow-up* inspection is again scheduled for either 30, 60, or 90 days.

3) Further continuation of violations after the follow-up inspection results in an informal *field hearing* with DACS officials to discuss violations with the owner and develop guidelines for correction of the deficiencies.

4) If violations persist, an *administrative hearing* is called to determine whether evidence in the case is sufficient to take it to court if the owner will not agree to correct violations.

Under these procedures, a facility in violation could continue to operate over 180 days pending the final outcome, although DACS officials indicate that the sequence of procedures may be changed if conditions are severe enough to warrant it.

DACS has used field hearings (Step 3) and administrative hearings (Step 4) only a few times for finfish processors. Over the past ten years, one case has ended with a field hearing while three others have resulted in an administrative hearing. Most of these actions were related to products contaminated by industrial pollutants.

At any time during the administrative process or otherwise, DACS has two powerful enforcement sanctions which can effectively stop adulterated finfish from entering the marketplace. DACS has the statutory authority to seek a permanent or temporary injunction requiring that the facility cease operations, and the authority to seize adulterated food products. Seizure powers have been used on several occasions and are essential to prevent suspected adulterated products from entering the marketplace. Injunctions are used rarely and only after a conviction has been rendered by the courts.

Even though the power of seizure has been used to effectively stop adulterated food from reaching consumers, DACS has no interim sanctions to ensure timely correction of unsanitary plant conditions. It appears that DACS administrative procedures are not fully effective

in ensuring that unsanitary conditions are corrected and that facilities remain free of violations over extended periods of time. The following examples illustrate how facilities can operate in violation of Virginia Food Laws despite attempts by the agency to bring the facility into compliance on a voluntary basis.

Facility A

Sanitary inspection of a retail seafood market in Hanover County on July 3, 1979, revealed ten objectionable sanitary conditions, including evidence of rodent activity and unsanitary equipment. Upon review of facility conditions, DACS determined the market was in violation of Virginia Food Laws and was scheduled for reinspection in 90 days. The follow-up inspection noted much improved conditions. Only two objectionable conditions -- inadequate protection against insect entry and improper disposal of garbage -- were found.

The next regularly scheduled inspection on February 1, 1980, found the facility to be in violation again due to unsanitary conditions similar to those found the previous summer. The follow-up inspection again cited much improved conditions.

This pattern of the violations continued for over 18 months until the facility went out of business in January 1981.

* * *

Facility B

Repeated objectionable conditions were cited in a wholesale/retail seafood outlet in Hampton for over two years without any action taken. During this period, the facility was cited for no less than five objectionable conditions during any inspection -- ranging from the observation of 250 mouse droppings to an employee smoking while cutting fish.

Despite continued dialogue with the owner, as provided in DACS administrative procedures, the owner continually failed to repair a 1½ foot hole in the ceiling in the processing room and to shield fluorescent lights above processing tables. As of August 1982, these conditions continued to exist.

Without effective interim sanctions to deal with flagrant and repeated violations of Virginia Food Laws, DACS must rely on voluntary

compliance by processors to ensure that sanitary conditions are maintained. Voluntary compliance has, however, permitted some processors to continue operating under unsanitary conditions.

A DACS inspector told JLARC staff that it is extremely frustrating not to be able to get repeated violations corrected. In a plant visited by JLARC, numerous violations were observed, which the inspector said he had discussed with the plant manager on numerous occasions. During an employee lunch break, fish ready for processing were left at room temperature for over an hour. In addition, there was evidence of decomposition. There were no screens in the windows, soda cans were on the floor, and an uncovered drain and large crack in the floor allowed debris to run out of the facility into the open water. In addition, conveyor belts were rusted and there were wood chips in the ice used to pack fish. In contrast, some facilities visited by JLARC were clean and well maintained. Fish were appropriately handled, and products for sale were attractively displayed.

DACS should develop and propose to the General Assembly intermediate enforcement sanctions to ensure continued compliance with Virginia Food Laws and to reduce the potential harm to the public. Introduction of a facility certification program, for example, could provide the agency with intermediate administrative sanctions for dealing with repeat violations through certificate revocation, suspension, or probation. Another possible sanction is an administrative cease and desist order similar to that of SDH.

Lack of Guidelines for Taking Official Action. No guidelines exist at DACS to determine under what conditions "official action" (sanctions provided for in DACS administrative procedures or in law) is to be taken. Rather, it is left to the discretion of the regional supervisor to determine what conditions are significant enough to warrant such actions. This situation has resulted in facilities operating with a wide range of conditions.

Several examples selected from JLARC's record review show that the number of violations or the type of conditions found in a facility do not appear to be a factor in the supervisor's decision to classify facilities for official action. Facilities with widely differing conditions are often treated in similiar fashion.

In the following examples, neither facility had a history of repeat or flagrant violations. Though similar conditions were found, the two facilities were classified differently.

Official Action Indicated

A seafood market in Arlington was cited for the following objectionable conditions on May 29, 1981:

1. *25 live roaches found in the cracks and crevices under and above a processing table and on the walls adjacent to it.*

2. *An accumulation of old fish body scales on the floor under the processing table.*

* * *

No Action Indicated

An inspection of seafood market in Petersburg on July 30, 1980, revealed the following objectionable conditions:

1. *20 live flies in the air and on fish being processed.*

2. *An accumulation of old fish body scales in fish display case and on equipment.*

When questioned, DACS central office officials indicated that evidence or actual observation of roaches and flies, especially near processing areas, are key indicators of unsanitary conditions, and that official action should also have been taken in the Petersburg facility.

It appears that the absence of guidelines for facility classification has resulted in the the inconsistent use of official actions and unequal treatment of facilities. DACS should develop guidelines for use by regional supervisors in classifying facilities for official action in order to ensure that Virginia Food Laws are equally and fairly enforced statewide.

JLARC's review of the DACS food inspection function only addressed the activities as they relate to finfish processors. However, some findings may be applicable to procedures used for other food processing facilities, since all establishments under DACS jurisdiction are subject to the requirements outlined in the Virginia Food Laws (Sections 3.1-361 et. seq.).

Coordination of Processing Plant Inspections

The sharing of inspection responsibilities between the State Health Department and the Department of Agriculture and Consumer Services has led to duplication and overlap. This duplication is a result of both agencies inspecting some of the same processing facilities and a lack of clarity in the *Code*.

Areas of Duplication. Inspectors from both SDH and DACS are responsible for conducting inspections of 31 wholesale processing plants and approximately 100 seafood retail markets which handle both

shellfish and finfish. Wholesale processing plants may have both types of operations in the same building or in separate structures. One facility in Hampton, for example, processes clams, oysters, and several varieties of finfish. Clam and oyster processing are conducted in a room separate from the area where finfish are processed, but both operations are located in the same plant. When SDH sanitarians conduct their inspection, they observe and evaluate only the conditions present in the room where clams and oysters are processed. Similiarly, DACS inspects only that portion of the facility which is involved in processing finfish. Officials of each department indicate that their inspectors would notify the other agency of problems observed while working in the facility.

In seafood retail markets, SDH and DACS monitor the same products for separate purposes. DACS is currenty responsible for conducting sanitary inspections of these markets and sampling products, regardless of whether they are shellfish or finfish, for analysis of potential contamination. As part of its monitoring of illegal operations, SDH personnel periodically check shellfish in seafood retail markets to ensure that the products were purchased from a dealer certified by the agency rather than from either contaminated waters or a bootleg operation. Under current arrangements, a single stock of shellfish could be inspected once by DACS to check for contamination, and a second time by SDH to ensure the product is from a certified source. In addition, seafood retail markets in some localities, including Norfolk and Virginia Beach, are also periodically inspected by local health officials in compliance with local ordinances.

Code Authority. Statutory language regarding agency responsibility for inspecting seafood processing facilities is unclear. Processing plant inspections for both shellfish and finfish currently appear to be under the jurisdiction of the State Health Department. Section 28.1-175, *Code of Virginia*, states:

> For the purpose of protecting the *fish* and *shellfish* industries of the State, as well as the public health of the country, and preventing the sale of fish and shellfish which are deemed unfit for market, the State Health Commissioner is hereby directed in his discretion or at the request of the Governor or the Commission or Commissioner of Fisheries (VMRC) to make an examination or analysis of *fish* and *shellfish*, whether on planting grounds, in packing houses or any other place or places in this State from which *fish* and *shellfish* are to be taken or sold for food purposes. *In making such an examination the Health Commissioner shall examine the packinghouses and plants wherein fish and shellfish are handled and the sanitary conditions surrounding the packinghouse and plant.* [Emphasis added.]

Section 3.1-399, *Code of Virginia*, however, gives the Commissioner of Agriculture the authority to inspect "any factory, warehouse, or establishment in which foods (articles used for food or drink for man or animals) are manufactured, processed, packed, or held for introduction into commerce."

These sections appear to indicate that both agencies have authority to conduct inspections of seafood facilities. SDH is given the clear and specific responsibility for both fish and shellfish plant inspections while DACS has broad authority. For the past several decades, however, DACS has been conducting sanitary inspections of finfish processing facilities.

No formal agreements are known to exist outlining the present division of responsibility between the two agencies. Furthermore, the laws remain unclear as to which agency has statutory responsibility for conducting sanitary inspections of seafood processing plants.

The General Assembly may wish to clarify the statutory authority for conducting seafood plant inspections. Centralization of this function into one of the agencies is an option the Assembly may wish to consider. Alternative organizations include:

1. *Centralizing seafood plant regulation in SDH* -- Benefits to this approach are that SDH sanitarians currently assigned to shellfish plant sanitation have expertise in plant inspections, have a smaller number of facilities assigned to them than DACS inspectors, are responsible for several plants which close during the summer months; and have laboratory testing facilities in the area offices. SHD also currently conducts other shellfish related functions.

   A problem with this arrangement is how to inspect the approximately 30 finfish facilities located outside the area where SDH shellfish sanitarians are assigned. One possibility would be to require inspections of these facilities by local health departments or by shellfish sanitarians located in Richmond.

2. *Centralizing seafood plant regulation in DACS* -- This approach would serve to consolidate another aspect of food regulation in DACS. Since the agency already has a statewide network of food inspectors, the location of shellfish and crabmeat plants would not be a problem. However, DACS inspectors currently have a large number of facilities for which they are responsible, and the added burden of monthly shellfish plant inspections could be significant enough to require additional staff. The DACS inspection program would also have to meet national standards for shellfish plants.

CONCLUSION AND RECOMMENDATIONS

Several improvements are needed in the State's activities relating to seafood promotion, research and advisory services, and plant inspections. Specific improvements include the need for improved effectiveness in seafood promotion, increased industry input into the research planning process, and better administration of inspection programs. In addition, agency coordination is needed to eliminate existing and potential overlap in the areas of promotion and inspections.

Recommendations

Recommendation (20). The Marine Products Commission should update its mailing lists by periodically cross-checking them against health department and FDA lists to ensure that all seafood processing firms are afforded the opportunity to take advantage of Commission services.

Recommendation (21). The Marine Products Commission should aggressively pursue new markets and marketing strategies. At the same time, the Commission should develop promotions which benefit smaller firms with primarily local markets and which highlight the shellfish products traditionally associated with Virginia. In addition, new programs should be developed and evaluated regularly in cooperation with the industry.

Recommendation (22). The Marine Products Commission should work with representatives of VPI&SU, VIMS, and DACS to establish more formal coordination and planning of the State's seafood promotional activities.

Recommendation (23). VIMS should establish a formal mechanism for soliciting industry and marine agencies advice as part of its research planning process. This could be achieved through the reestablishment of the VIMS advisory committee for this specific purpose or by broadening the mission of the "Marine Science Development Council".

Recommendation (24). The General Assembly may wish to create one advisory committee representative of all major segments of the industry to advise and comment on the research activities of Sea Grant, VPI&SU, and VIMS.

Recommendation (25). The Bureau of Shellfish Sanitation should take steps to formalize agreements with owners in cases where certification is awarded when substandard conditions exist. A required time frame should be established for correcting the deficiencies. If requirements are not met within the stated period, SDH should take action to either temporarily decertify the plant or issue a cease and desist order to stop operations until deficiencies are corrected. In addition, the department should standardize procedures for issuing a provisional or temporary certificate to facilities in violation of standards at the time of certification.

Recommendation (26). The Bureau of Shellfish Sanitation should take steps to ensure that departmental policies are uniformly applied across area offices. Formalizing policies such as those dealing with repeat violations and the development of a written manual for plant inspection procedures would result in more uniform program administration.

Recommendation (27). To ensure protection of the public health, the General Assembly may wish to amend current statutes to require notification of the pending annual operation of finfish processing facilities. This could be accomplished through either a registration or certification program.

Recommendation (28). DACS should develop, where applicable, more specific written sanitary standards and a checklist for inspecting finfish processing facilities to serve as a guide for inspectors in evaluating facility conditions and to ensure that the Virginia Food Laws are interpreted in a uniform and consistent manner.

Recommendation (29). DACS should develop guidelines for use by regional supervisors in classifying facilities for official action in order to ensure that Virginia Food Laws are equally and fairly enforced statewide, and should inspect facilities in accordance with the agency's six-month goal.

Recommendation (30). The General Assembly may wish to clarify the statutory authority for conducting seafood plant inspections. Centralization of this function into one of the agencies is an option the Assembly may wish to consider.

V. POLICY AND MANAGEMENT FRAMEWORK

House Joint Resolution 59 required JLARC to review and recommend policy options regarding the economic potential and management of Virginia's fishing and seafood industries. Chapter II of this report suggests options to enhance the economic potential of several important Virginia fisheries. Some of these options will require significant improvement and expansion in State management responsibilities. Improvements in current State agency activities relating to fisheries management, enforcement, promotion, advisory services, and inspections are recommended in Chapters III and IV.

Broader actions are also available for improving the context and framework within which the State's fisheries-related activities are carried out. Potential actions by the State include development of a comprehensive State policy for the fisheries and changes to the State's existing organizational framework for fisheries-related agencies.

Developing a Comprehensive State Fisheries Policy

The Commonwealth does not have an explicit policy towards the comprehensive management of its marine resources. Rather, State policy towards the fisheries is scattered throughout the *Code* and is stated in terms such as "promote the general welfare of the seafood industry and conserve and promote the seafood and marine resources of the State." As a result, fisheries management efforts appear to be based upon an implicit policy of balancing a variety of often divergent goals. These goals include: conserving the resource, enhancing the industry's efficiency, and maintaining traditional lifestyles.

Conflicts frequently arise during discussions on management issues which place one goal at odds with others. The balancing of these goals often occurs during "crisis situations" and requires the subjugation of some goals to others. Resolution of issues frequently favors competing goals at different times and results in little consistency in the State's management approach or in the consideration of long-term goals. An explicit policy towards the use of Virginia's marine and seafood resources would greatly strengthen the State's management efforts in this area by providing fisheries managers with the long-term goals upon which to base present and future fisheries decisions.

National goals for fishery conservation and management as defined in the federal Fishery Conservation and Management Act of 1976 include:

- measures to prevent overfishing while achieving on a continuing basis the optimum yield from each fishery;
- management based upon the best scientific information available;
- management of an entire species as a unit;
- promotion of efficiency in the utilization of fishery resources;
- allowances for variations and contingencies in fisheries; and
- avoidance of unnecessary duplication and cost.

Also, in its fisheries management primer, To Stem The Tide, the Council of State Governments suggests the following language for articulating state management objectives (emphasis added):

1. The conservation of the fisheries resources and their habitat to ensure their *continued existence*.
2. The maintenance and enhancement of fisheries resources to *support a recreational use* where a species is the object of recreational fishing.
3. The maintenance and enhancement of fisheries resources, to *support commercial use* consistent with aesthetic, educational, scientific, and recreational uses of such fisheries resources and the utilization of unused resources.
4. The management, on a basis of scientific information, of the fisheries resources under the State's jurisdiction, and the participation in the management of other fisheries in which [State] fishermen are engaged, with the objective of *optimum utilization*.

Virginia could adopt language similar to the national standards or that used by the Council of State Governments to form a specific fisheries policy for the Commonwealth. A specific fisheries policy, stated in the *Code*, would provide a guide to resource managers in their decision-making and facilitate a management approach consistent with long-term State objectives.

Changes in the Management Framework

The multiplicity of agencies which carry out fisheries-related activities function within the broad governmental framework

which includes the Secretary of Commerce and Resources and other natural resources agencies. Several options appear to be available to the State for improving the performance of these functions, including:

- improving deficiencies within the current organizational structure;
- strengthening existing mechanisms for coordination between agencies; and
- creating a new agency to house all natural resource functions.

These options are not mutually exclusive and others may exist. However, they do address problems which have been identified during the course of this review.

Option 1: Improve Management Deficiencies Within The Current Organizational Framework.

As previously mentioned, several State agencies have responsibilities for fisheries-related programs. Recommendations to improve many of these programs are contained in Chapter III and IV of this report. These include: developing a fisheries management orientation at the Virginia Marine Resources Commission; improving fisheries statistics upon which to base management decisions; strengthening State seafood promotional activities by encouraging the participation of more industry members; increasing industry input into the setting of the research priorities of VIMS; and providing more uniformity in the inspections of seafood processing facilities. Implementation of these recommendations would substantially improve current fisheries programs.

Option 2: Strengthen Coordinative Mechanisms Within the Current Organizational Framework.

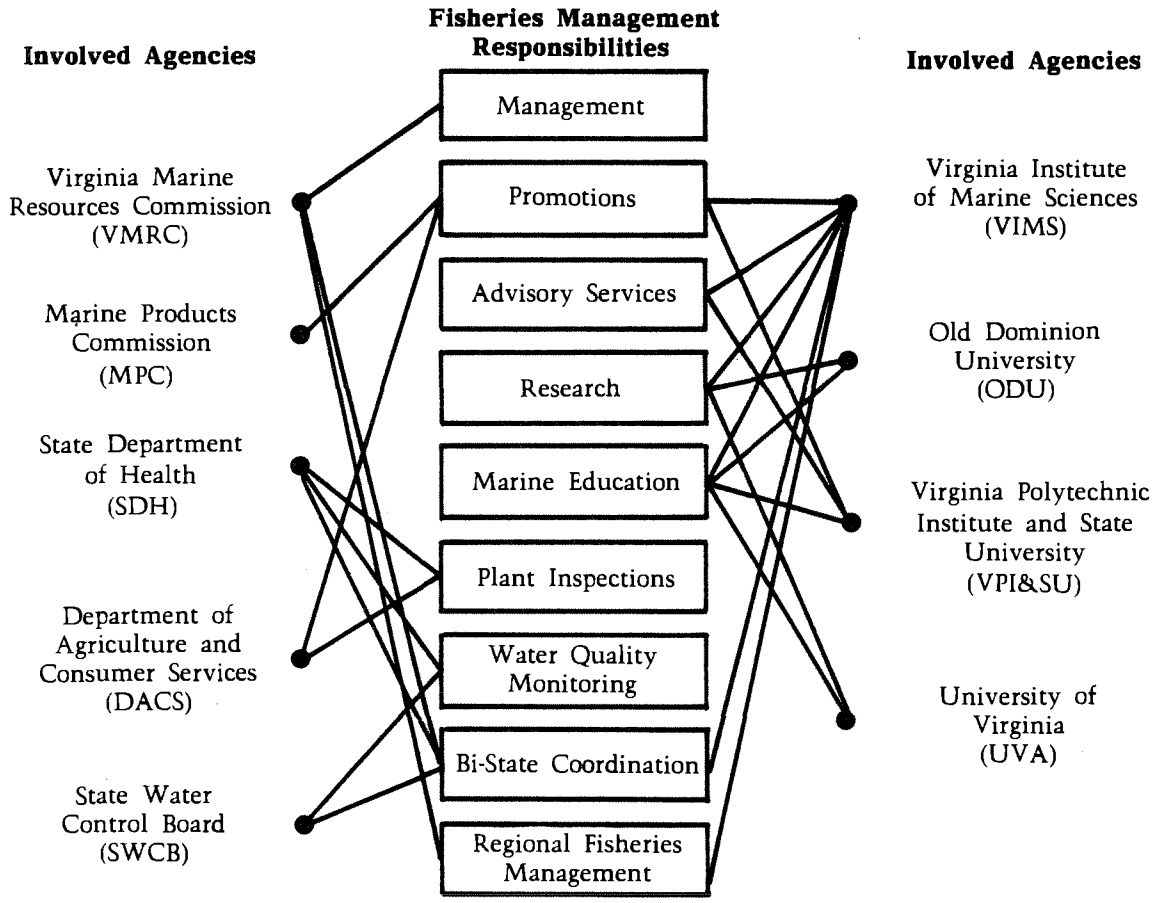
Because so many agencies carry out activities relating to the State's seafood industries, coordinative mechanisms are necessary to ensure that agency activities do not duplicate or conflict with one another. Mechanisms currently exist to carry out this role. However, as identified in this report, the need for greater coordination is evident in at least two areas, seafood promotion and inspections.

At least two actions are available for strengthening existing coordinative mechanisms: development of a fisheries management coordinating committee, and designating an assistant secretary for natural resources within the office of the Secretary of Commerce and Resources.

Fisheries Management Coordinating Committee. A wide variety of State agencies are involved in some aspect of fisheries management in Virginia (Figure 17). Most of these agencies have their own policy-

Figure 17

EXISTING STATE FISHERIES MANAGEMENT RESPONSIBILITIES



JLARC staff illustration.

setting commission or advisory board. During the course of this study, several agency and industry members indicated that there is a need for more coordination and consistency between the agencies.

In order to ensure consistency in approach among the agencies, eliminate areas of overlap, and assure that broad fisheries management needs are addressed, a coordinating committee for fisheries management could be created. The committee could bring together representatives of fisheries agencies and selected industries. Although the agencies could maintain their respective commissions or boards, agencies would be expected to comply with and implement priorities agreed upon by the fisheries management committee in order to assure the effectiveness of this approach.

This group could be used to assist the Secretary of Commerce and Resources in coordinating agency activities relative to fisheries management. The committee members would also be expected to communicate to their agencies an understanding of their roles in carrying out broader State fisheries goals. Since fisheries matters are part of a larger context of natural resources, the committee could be expanded to include all agencies with responsibilities for managing Virginia's natural resources.

Establishing an Assistant Secretary for Natural Resources. The establishment of an Assistant Secretary for Natural Resources under the Secretary of Commerce and Resources could also provide greater coordination of fisheries matters within the broader context of natural resources. An assistant secretary could provide a natural resources focus within the span of responsibility assigned to the Secretary of Commerce and Resources.

Currently, the Secretary of Commerce and Resources is responsible for overseeing and coordinating a greater number of agencies and boards than any other secretariat. Several past legislative studies have proposed that this arrangement be remedied by splitting the responsibility into two secretarial areas: Commerce and Natural Resources.

While this could be done, a similar outcome could be achieved within the current organizational structure by establishing an assistant secretary for natural resources. The precedent for such an action occurred in 1978 with the designation of an Assistant Secretary of Financial Policy under the Secretary of Administration and Finance.

The assistant secretary could be charged with overseeing all agency activities with natural resources to ensure consistency in goals and efficiencies in approach. The assistant secretary might also be involved in the development of the proposed Fisheries Management Coordinating Committee.

Option 3: Create a Single Department of Natural Resources

Since fisheries matters are directly linked to broader concerns within the area of natural resources, the State could choose to strengthen coordination of this area by combining all resource-related agencies into a single Department of Natural Resources. The creation of a single agency in this area has been suggested in previous legislative studies and would be similar to the organizational structure used in North Carolina and Maryland.

Study by the VALC Committee on Environmental Management. The 1972 General Assembly directed the Virginia Advisory Legislative Council (VALC) to continue a comprehensive study of the State's environmental problems begun in 1971. The committee's charge included a study of all aspects of governmental management of environmental problems, identification and review of unregulated environmental problems, and proposals for management changes, including agency reorganization.

The Committee's report identified several major problems confronting Virginia's environmental agencies. These included:

- duplication of environmental functions;
- fragmentation of properly unified environmental functions among several different agencies;
- increased involvement of boards and commissions in the day-to-day management of agencies, largely due to the insufficient delineation of responsibilities;
- neglect of certain critical regulatory functions because of an absence of coordinating supervision; and
- increased steps and delays in permit application processing.

As a result, the committee recommended that Virginia's environmental agency management structure should be "substantially reorganized." The committee felt that reorganization should fulfill several objectives, including: ensuring accessibility, increasing coordination, unifying policy-making and management, resolving conflicts and balancing competing environmental uses, improving permit processing, and ensuring that environmental values are pursued and protected by all State agencies.

Specifically, the Council proposed that all environmental agencies be under the jurisdiction of the Secretary of Commerce and Resources and centrally located within the Department of Conservation and Economic Development. The agency would be renamed the Department of Conservation, Development and Natural Resources and reorganized into four distinctive divisions:

1. Division of Environmental Quality (presently the State Water Control Board, the Air Pollution Board, and the Bureau of Solid Wastes and Vector Control);

2. Division of Natural Resources (presently the Department of Conservation and Economic Development);

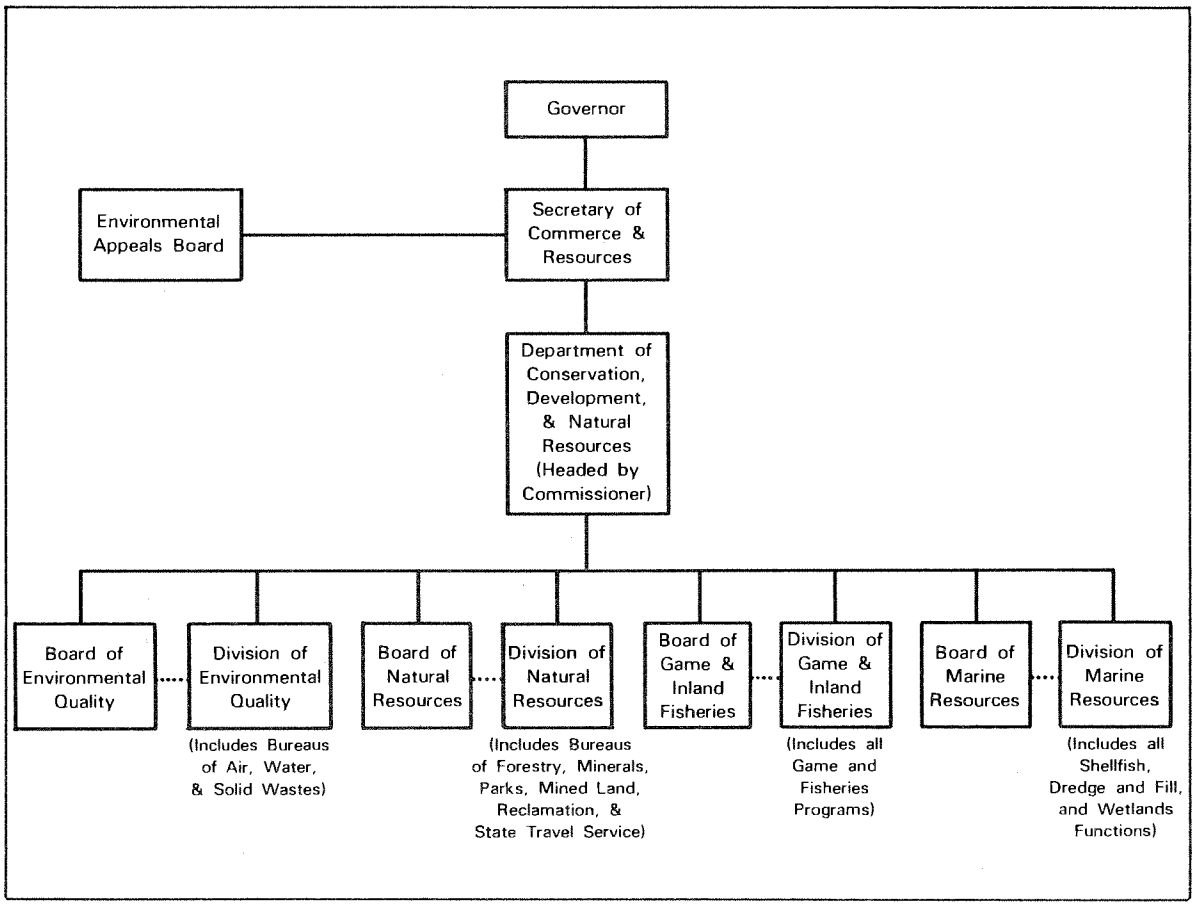
3. Division of Game and Inland Fisheries (presently the Commission on Game and Inland Fisheries);

4. Division of Marine Resources (presently the Marine Resources Commission).

Figure 18 shows the proposed reorganization chart.

Figure 18

1973 PROPOSED REORGANIZATION FOR STATE RESOURCE AND ENVIRONMENTAL AGENCIES



Source: Virginia Advisory Legislative Council.

The committee concluded that consolidation was necessary in order to "create an institution in Virginia which can evaluate proposed projects and programs in terms of their full-scale impact on the environment."

Under the committee's proposal, marine resource management would be divided between a policy-making citizen board and a department division responsible for marine resources. A Marine Resources Board would be responsible for making regulations and formulating policy for the proposed Division.

The Division of Marine Resources would continue to carry out administrative and enforcement activities. The Division would be headed by a director and would be administratively linked with the other three divisions in order to facilitate planning, communication, and collaboration in areas of mutual involvement.

The VALC hoped that the proposed delineation between marine resource administrative and policy making functions would lead to a more efficient use of governmental resources. In addition, the Council hoped that the reorganization would permit "more intensive focus upon the problems relating to the development and conservation of Virginia's seafood industry."

In reaction to the VALC's report the 1973 General Assembly passed the Environmental Coordination Act. The Act effectively encompassed all the recommendations of the Council with only minor alterations. Five divisions were to be created under the newly formed Department of Conservation, Development and Natural Resources instead of four divisions as proposed by the Council. A fifth division was the result of dividing VALC's proposed Division of Environmental Quality into two separate divisions: 1) The Division of Solid Wastes and Air Pollution and 2) The Division of Water Resources. Marine resource management was designed by the Act as proposed in the VALC report.

The Act was to go into effect July 1, 1974. However, the 1974 General Assembly repealed the legislation prior to enactment.

North Carolina and Maryland's Organization. North Carolina and Maryland, Virginia's coastal neighbors, manage their marine and seafood resources within a wider natural resources context. In both of these states, marine resource management is one of several components within a Department of Natural Resources. Although the framework for resource management is similar in these states, important differences between the two agencies exist.

North Carolina's Division of Marine Fisheries, within the Department of Natural Resources and Community Development, has a Marine Fisheries Commission responsible for regulating the resource to "maintain a viable commercial fishing industry," and to "manage for optimum utilization for all citizens." Totalling fifteen members, the Commission is comprised of a representative from both the commercial and

recreational industries, a Ph.D. marine biologist, and representatives from both the processing sector and coastal land development interests. The North Carolina Marine Fisheries Commission has broad regulatory authority with few management provisions specified in the *Code*. The Department of Natural Resources and Community Development sets general policy for each of its subunits including the Division of Marine Fisheries.

Although the Commission and Division of Marine Fisheries are not physically located along with other divisions within the Department of Natural Resources and Community Development, coordination of fisheries management within the broader natural resources context is achieved through an Assistant Secretary for Natural Resources, who meets weekly with all division heads. In addition, the Secretary is advised by a Commercial and Marine Sport Fisheries Advisory Committee, which also works closely with the Marine Fisheries Division.

Maryland's Tidewater Administration, within the Department of Natural Resources, is responsible for managing Maryland's marine and seafood resources. In contrast with both Virginia and North Carolina, Maryland's Division of Tidewater Administration has advisory, not policy-making commissions. The most active of these advisory commissions are the Sport Fish Advisory Commission and the Tidewater Advisory Commission. In addition, the Secretary of the Department of Natural Resources has an advisory board to assist in developing policy for the entire department. These advisory commissions and boards are comprised of citizens nominated by Maryland's Secretary of Natural Resources and appointed by the Governor.

The authority to manage and regulate the marine and seafood resources is vested by the Secretary in the head of the Division of Tidewater Administration. The extent to which this authority is constrained by management provisions specified in *Code*, such as season, size, and limit, varies widely from fishery to fishery. Virginia and Maryland appear to be similar in this respect.

Both the North Carolina and Maryland departments have mechanisms for coordinating with other agencies that have related functions, such as plant inspections and promotions.

The framework employed by both North Carolina and Maryland for managing marine resources within the broader context of natural resource management has the advantage of providing structural mechanisms for resolving user conflicts and for coordinating the policies and activities of each division. Such a framework addresses resource needs in a comprehensive manner and reduces the likelihood of one natural resource segment developing objectives and strategies in conflict with the goals of other natural resource segments.

The development of such a department, which would comprehensively address natural resource management needs, is an option always available to the Commonwealth. This option would provide structural corrections and meet coordination needs in both fisheries management and natural resources management.

CONCLUSION AND RECOMMENDATIONS

Several options are available to improve the framework within which State fisheries management decisions are made. These options include developing a specific State policy for the fisheries and instituting changes to the present management framework. Changes along these lines would better prepare the State for the future challenges it must meet as it strives to enhance the full potential of the industry.

Recommendation (31). The Secretary of Commerce and Resources should be requested to draft for consideration by the 1984 General Assembly a statement of a specific fisheries policy, as outlined in Chapter V of this report, which can serve as a guide to resource managers in their decision-making and facilitate a management approach consistent with long-term State goals and objectives.

Recommendation (32). The Governor and the General Assembly may wish to consider structural changes to enhance coordination among marine resource agencies and to place marine resources within a broader natural resource context.

APPENDIXES

APPENDIX A

HOUSE JOINT RESOLUTION NO. 59

Requesting the Joint Legislative Audit and Review Commission to study and review the seafood industry and the economic potential of the seafood industry.

WHEREAS, the Atlantic Coast of Virginia and the Chesapeake Bay and its tributaries are among the greatest natural fisheries in the world; and

WHEREAS, the people of the Commonwealth of Virginia derive great benefit from the use of the waters of the Atlantic Ocean and the Chesapeake Bay and its tributaries for commercial and sport fishing and recreational and other uses; and

WHEREAS, Virginians also derive substantial economic benefits due to the existence of a large fishing and seafood industry in the Commonwealth; and

WHEREAS, in recent years the fishing and seafood industries in Virginia have suffered from a variety of problems resulting in certain of Virginia's seafood catches becoming a smaller portion of total national catches; and

WHEREAS, the Commonwealth needs to further articulate a policy for the management and conservation of these great natural resources which has the goals of fostering the long-term development, growth, and efficiency of the fishing and seafood industries compatible with the socio-economic well-being of those whose livelihood depends on these industries; the conservation and full repletion of fish and shellfish stocks; and maximizing the social and economic benefits of a prosperous seafood industry to all citizens of the Commonwealth; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Joint Legislative Audit and Review Commission study the nature and scope of the regulation of the fishing and seafood industries, and the economic potential of these industries. The Commission shall make its recommendations on the advisability of formulation and implementation of state policy alternatives to manage and regulate the fishing and seafood industries, and to foster Virginia's competitive position within the national fishing and seafood industries, to the 1983 Session of the General Assembly.

APPENDIX B

TECHNICAL APPENDIX

For purposes of review, technical discussions of the econometric models used by JLARC for the oyster and hard clam industries are included here. Interpretation of the results generated from the models is included in Chapter II of this report.

A meeting with representatives from the Virginia Marine Resources Commission, the Virginia Institute of Marine Science, and VPI&SU was held to review the technical aspects of these models. To the extent possible, technical comments raised at that time were incorporated into the draft of Chapter II.

AN ECONOMETRIC MODEL FOR VIRGINIA'S OYSTER INDUSTRY

Development of an econometric model for addressing policy alternatives in the oyster industry requires sensitivity to the State's role in the industry. The role that the State takes determines the type of policy options that can be assessed with the model. The State does not participate in the commercial harvesting or processing of oysters; this is a private sector activity. The State manages and regulates the industry through a number of activities. Specifically, the State regulates gear used to harvest market and seed oysters, restricts property rights in the naturally productive oyster grounds (Baylor), limits the oyster harvesting, and repletes the public oyster beds. Other ancillary activities are undertaken by the State, but the regulations and restrictions mentioned here produce major impacts on the industry.

The State undertakes these activities to balance many concerns raised about the oyster industry:

- protection of the natural resource
- preservation of longstanding cultural patterns
- protection of the livelihood of watermen
- enhancement of the industry's production

When changes to the current State activities are suggested, policy-makers consider impacts on watermen, the resource, and the industry. The policy-makers often rely on information from the parties involved and the knowledge they have gained through their involvement with the industry. Often the information for one source conflicts with the information presented by others. Uncertainty abounds about the effects of various policy alternatives on the State's interests.

Clearly, it is in the interest of the State to reduce the uncertainty about the impacts of policy options. If the uncertainty is reduced, the beneficial and detrimental impacts of any policy can be better understood and policy-makers can make the value judgements that direct the industry's management. Econometric models can help reduce the uncertainty.

Developing the Oyster Industry Model

For any model to aid policy making, it must focus on issues that are of interest to policy-makers. In addition, the model must attempt to shed light on areas where the greatest uncertainties exist. By dealing with issues salient to policy-makers and controversial areas, the model's results may be a focal point for debate.

In Virginia, the oyster industry has shown significant decline in production over the past 20 years. Reversing this trend is important to the State, as the oyster industry plays a major role in the economy of the region. In addition to the overall production levels, the distribution of revenue between the two harvesting groups is salient. Adverse effects on the watermen who work on the public grounds or planters who cultivate leased grounds affect the livelihood of the individuals involved and the economic base of the region. These are specific areas where the model can reduce some uncertainty.

Other impacts must be considered when policy-makers contemplate changing management practices. The State has a long-standing commitment to protect the resource. Much research has already been conducted that demonstrates the impact to the oyster grounds from various harvesting practices. Thus, many questions about the biological impacts of policy options may be answered from previous research.

The lore surrounding the Virginia oyster industry, especially the watermen, surely has a special value to the Commonwealth. The independent watermen exercise their right to pursue a livelihood from the State's waterways, using techniques similar to those of the 19th century. Their persistence and lifestyle offer insights about the traditions of Virginia and the unique culture of the area. The impact of any change to the oyster industry on the area's cultural pattern is difficult to ascertain, even through a sophisticated model. But consideration of these values can be included in an intuitive fashion.

The econometric model of the oyster industry focused on:

- oyster production on the private grounds
- oyster production on the public grounds
- oyster prices received by the watermen

Concerns for other values must be added from other research or judgments about the impacts.

Oyster Production on Private Grounds

Private grounds are the naturally unproductive areas of Virginia's Chesapeake Bay system which are leased for oyster cultivation by private industry. Approximately 110,000 acres of private grounds are leased from the State; however, much of the land is not actively cultivated.

During the 50's the private grounds produced between 12 and 20 million pounds of oysters annually. However, after 1961 the production fell from 10 million pounds to recent totals of approximately 3 million pounds. Furthermore, the private grounds production fell proportionately more than the public grounds production. Thus, the decline in Virginia's production has been for the most part a decline in private grounds production, and under the current structure the private grounds are the most probable focus of production expansion.

Three factors seem to indicate that production on the private grounds will not rejuvenate by itself. The first is MSX, the disease which destroyed much of the young oyster crop for the first time in the sixties. Two effects seem to have lasted from that era. One is the lethal impact on the oysters in certain areas. Another is the perceived risk by the planters, which affects seed planting.

The second factor which slows the growth potential of the private grounds is the lack of unleased ground suitable for cultivating oysters. The third factor is the market return on oysters. Cultivation of barren grounds depends largely on the return available from planting seed oysters. The return is currently too small, according to planters, to encourage more planting.

Private ground production depends on two processes, seed planting and market harvesting.

Seed planting. Seed is planted based upon biological factors and economic factors. The amount of seed planted on the private grounds is the amount of seed harvested in Virginia less the amount planted by the Marine Resources Commission. The amount of seed planted depends on the availability of seed and the economic return from the seed planting in that year.

The seed planting was modeled by VPI&SU faculty members in their study of the oyster industry funded through Sea Grant. The quantity of seed planted was taken to be a function of the biological productivity of the seed and the real difference between the price for seed oysters and market oysters.

The VPI&SU researchers have developed an innovative means of calculating the biological effect of MSX on the growing grounds. Before 1960 the biological productivity was measured as the average productivity in 1957-58 and 1958-1959 seasons. To measure the productivity impact of MSX, the productivity of the 1959-1960 and 1960-1961

seasons were averaged. This shows the impact which was due to biological conditions alone, because the three-year lag between seed plantings and the harvesting of marketable oysters controls for changes in seed planting decisions due to MSX.

The economic factor selected for the VPI&SU model is a measure of the profitability of planting seed oysters. The profit of planting oysters is the difference in the price of market oysters and the price of seed oysters, controlling for the cost of capital.

The seed planting model was estimated by VPI&SU researchers using data from 1949-1950 through 1975-1976 (26 data points). An ordinary least squares technique was used to estimate the equation and the results are as follows:

QSP =	-1556636 +	925718.4EF +	195.2BF
STD.ERROR	304646	259943.4	19.3
SIGN.	.0001	.0016	.0001

R^2 = .8231

F Ratio = 55.82 F test SIGN. = .0001

Durbin-Watson D = 2.16

Where:

QSP = quantity of seed planted, measured in Virginia bushels.

EF = economic factor, measured by (price of lb. oyster meat - price of 1 bushel seed) interest rate index.

BF = biological factor, measured by the average productivity of 1957-1958 and 1958-1959 seasons before 1959 and average productivity of 1959-1960 and 1960-1961 seasons after 1960.

The equation for predicting the quantity of seed planted shows strong relationships. Both coefficients are significant at the .05; therefore they can be assumed to be greater than zero. The signs are positive as expected. The decreased biological productivity of seed reduces seed planting by 1.2 million bushels [(19037-12688.5) x 195.2]. In addition, each dollar increase in the price of market oysters when seed prices are held constant increases planting by nearly one million bushels. The same effect is present for reducing the price of seed while maintaining the price of market oysters. The statistical tests show that the equation is strong. Only the R^2, which shows that nearly 18% of the variance in seed planting is unexplained, indicates a slight weakness. However, in the case of seed planting the behavior of the industry would be expected to have a random element. Therefore, the R^2 term is not considered a serious problem.

Oyster Harvesting. Because the privately leased grounds are not naturally productive, the harvest of oysters depends on the amount

of seed planted. But seed has an average maturation period of three years to reach marketable size. Thus, some lag structure between planting and harvesting must be used. Theoretically, the oysters harvested in one year could have been planted during the previous 5-10 years. However, the market forces would push the private planter to harvest as quickly as possible. Thus, the three-year delay would be most likely.

In addition, the least squares technique loses a data point and a degree of freedom for each year the lag is increased. For example, if the lag is assumed to be seven years, the seed plantings for 1950-1957 would have to be known before the first estimate of seed available for harvest could be calculated. In this case, seven data points and seven degrees of freedom are lost. To minimize these problems and incorporate the knowledge of an average three-year maturation period, the following lag structure was developed by VPI&SU researchers:

$$WQSP_t = .25QSP_{t-2} + .50QSP_{t-3} + .25QSP_{t-4}$$

Where:

QSAH = the marketable seed available for harvest in year t

QSP_{t-2} = total seed plantings two years before year t

QSP_{t-3} = total seed plantings three years before year t

QSP_{t-4} = total seed plantings four years before year t

The lag structure used here implies that in any year, one quarter of the harvestable oysters on the private grounds comes from seed planted two years before; another quarter comes from seed planted four years before; and one half comes from the seed planted three years before. The quantity of seed available for harvesting ($QSAH_t$) is one independent variable used to explain private grounds oyster production.

A second factor must also be taken into account. If MSX reduced the productivity of seed, then fewer pounds of oyster meat would be harvested in the post-MSX period for each bushel of seed oysters. This possibility made it necessary that the effect of MSX be tested. A dichotomous variable with a value of 0 before MSX and 1 after MSX multiplied by the quantity of seed was used to measure the MSX effect. The coefficient could be interpreted as a slope shifter for the coefficient on seed quantity after MSX struck.

The equation explaining private grounds production was tested in the following form:

QOPR =	1010906 +	$8.532QSAH_t$ -	1.969PS
STD.ERROR	621713	.416	.443
SIGN.	.1170	.0002	.0002

R^2 = .9484

F Ratio = 220.34 F test SIGN. = .0001

Durbin-Watson D = 1.3449

Where:

QOPR = quantity of oyster produced from private grounds, measured in lbs. of oyster meat.

$QSAH_t$ = quantity of seed available for harvest in year t (described above).

PS = productivity of seed, measured as a slopeshifter, a dichotomous variable (0 for 1949 - 1950 season through 1959-1960 and 1 for 1960-1961 season through 1976) multiplied by $QSAH_t$.

The results of the equation show that prior to 1960, one bushel of seed oysters produces 8.5 lbs. of oyster meat. However, since 1960 the productivity has been reduced by 1.969 lbs. per bushel. All of the signs are in the expected direction and the other tests, substantive and statistical, show strong results. One possible exception is Durbin Watson D, which is in the indeterminate range and may inflate the significance of the coefficients. Given this as a caution, we can conclude that the private sector oyster production can be explained with a high degree of confidence.

Oyster Production on Public Grounds

Public grounds are generally the best areas for oyster production in the Commonwealth. Approximately 243,000 acres are designated as public grounds, most of which were assigned as a result of the Baylor Survey of 1892. While these grounds represent the premier oyster growing areas and all areas which receive natural set, there is a substantial variation in their productive capacity. A recent VIMS study divides the Baylors into five categories based upon their productivity capacity. Much of the Baylor ground is labeled non-productive.

The State manages the public grounds to avoid depleting the resource while maximizing the yield, maintaining the livelihood of watermen, and preserving the region's culture and economy. To accom-

of seed planted. But seed has an average maturation period of three years to reach marketable size. Thus, some lag structure between planting and harvesting must be used. Theoretically, the oysters harvested in one year could have been planted during the previous 5-10 years. However, the market forces would push the private planter to harvest as quickly as possible. Thus, the three-year delay would be most likely.

In addition, the least squares technique loses a data point and a degree of freedom for each year the lag is increased. For example, if the lag is assumed to be seven years, the seed plantings for 1950-1957 would have to be known before the first estimate of seed available for harvest could be calculated. In this case, seven data points and seven degrees of freedom are lost. To minimize these problems and incorporate the knowledge of an average three-year maturation period, the following lag structure was developed by VPI&SU researchers:

$$WQSP_t = .25QSP_{t-2} + .50QSP_{t-3} + .25QSP_{t-4}$$

Where:

QSAH = the marketable seed available for harvest in year t

QSP_{t-2} = total seed plantings two years before year t

QSP_{t-3} = total seed plantings three years before year t

QSP_{t-4} = total seed plantings four years before year t

The lag structure used here implies that in any year, one quarter of the harvestable oysters on the private grounds comes from seed planted two years before; another quarter comes from seed planted four years before; and one half comes from the seed planted three years before. The quantity of seed available for harvesting ($QSAH_t$) is one independent variable used to explain private grounds oyster production.

A second factor must also be taken into account. If MSX reduced the productivity of seed, then fewer pounds of oyster meat would be harvested in the post-MSX period for each bushel of seed oysters. This possibility made it necessary that the effect of MSX be tested. A dichotomous variable with a value of 0 before MSX and 1 after MSX multiplied by the quantity of seed was used to measure the MSX effect. The coefficient could be interpreted as a slope shifter for the coefficient on seed quantity after MSX struck.

The equation explaining private grounds production was tested in the following form:

QOPR =	1010906 +	8.532QSAH$_t$ -	1.969PS
STD.ERROR	621713	.416	.443
SIGN.	.1170	.0002	.0002

R^2 = .9484

F Ratio = 220.34 F test SIGN. = .0001

Durbin-Watson D = 1.3449

Where:

QOPR = quantity of oyster produced from private grounds, measured in lbs. of oyster meat.

$QSAH_t$ = quantity of seed available for harvest in year t (described above).

PS = productivity of seed, measured as a slopeshifter, a dichotomous variable (0 for 1949 - 1950 season through 1959-1960 and 1 for 1960-1961 season through 1976) multiplied by $QSAH_t$.

The results of the equation show that prior to 1960, one bushel of seed oysters produces 8.5 lbs. of oyster meat. However, since 1960 the productivity has been reduced by 1.969 lbs. per bushel. All of the signs are in the expected direction and the other tests, substantive and statistical, show strong results. One possible exception is Durbin Watson D, which is in the indeterminate range and may inflate the significance of the coefficients. Given this as a caution, we can conclude that the private sector oyster production can be explained with a high degree of confidence.

Oyster Production on Public Grounds

Public grounds are generally the best areas for oyster production in the Commonwealth. Approximately 243,000 acres are designated as public grounds, most of which were assigned as a result of the Baylor Survey of 1892. While these grounds represent the premier oyster growing areas and all areas which receive natural set, there is a substantial variation in their productive capacity. A recent VIMS study divides the Baylors into five categories based upon their productivity capacity. Much of the Baylor ground is labeled non-productive.

The State manages the public grounds to avoid depleting the resource while maximizing the yield, maintaining the livelihood of watermen, and preserving the region's culture and economy. To accom-

plish these conflicting tasks, the State restricts the gear used in harvesting (hand tongs), limits the season, places minimum size requirements on marketable oysters, and repletes the grounds (shell and seed). The State invests in the public grounds through a repletion program that is similar to the activities of the lease holders on private grounds.

Researchers at VPI&SU proposed three factors which were expected to influence the quantity of mature oysters harvested from the public grounds. The first factor is the relative productivity of the grounds. This variable is an index of grab samples taken by VIMS scientists which were then standardized statistically by VPI&SU economists.

The second factor measures the State's effort to increase productivity through repletion. Repletion is financed through a tax paid by watermen for harvesting oysters. In addition, the maturation cycle for oysters implies that no return will be garnered for the watermen from investment for at least two years. Thus, a structure had to be devised which would test for a depressing effect on the oyster harvest immediately after repletion and an enhancing effect on productivity after the oysters mature for harvest. To do this a second order polynomial lag was estimated with the following results:

$$RE_t = -.49511\ R_t + .05501R_{t-1} + .51688R_{t-2} + .89049R_{t-3} + 1.175844R_{t-4}$$

Where:

RE_t = the weighted repletion effect for year t

$R_t \ldots R_{t-4}$ = the repletion effort, measured in real dollars for one year from the present to 4 years in the past.

The results show that the repletion expenditure is a drag on harvesting in the year it is actually spent. The second year it is nearly zero. And in each subsequent year the repletion effort improves the harvest.

In addition, the economics of harvesting is a factor in the quantity of oysters produced from the public grounds. For this model, the price of oysters received by watermen has been used as the determinant of the level of effort. Changes in the price of oysters, however, take a number of years to have an effect on the industry. The public sector laborers are mostly self-employed watermen, and their entry or exit from the occupation is not immediately affected by price changes. A lagged structure similar to the repletion effect calculation was used to estimate the impact of price changes on harvest:

$$PE = 247060P_t - 1695328P_{t-1} - 1051680P_{t-2} + 1683854P_{t-3} + 6511284P_{t-4}$$

Where:

PE = effect of price on harvest.

$P_t - P_{t-4}$ = the price of market oyster for each year between the present and 4 years in the past.

The results indicate that the increase in prices takes three years to show a positive effect on harvest. Overall, a dollar increase in price is estimated to increase production by 5.2 million lbs.

When these factors are incorporated into a least squares equation, the results are:

QOPUB = 4373397 + 1.0RE + 1.0PE + 5434464PI

STD. ERROR 1341974 .498 .215 1103040

SIGN. .0036 .0569 .0001 .0001

$R^2 = .6227$

F Ratio = 12.10 F test SIGN = .0001

Durbin Watson D = 1.4394

Where:

QOPUB = quantity of oysters produced on public grounds, measured in pounds of marketable oysters.

RE = repletion effect (coefficient constrained to 1).

PE = price effect (coefficient constrained to 1).

PI = productivity index, developed from measures of productivity of location on public grounds.

The coefficients of the repletion effect, price effect, and productivity index all indicate a positive relationship with public ground harvest. The repletion effect is statistically the weakest, and cannot be considered different than 0 with 95% confidence. The R^2 is also somewhat low with only 62% of the variance explained. The low R^2 can be interpreted as a function of the inclusion and exclusion of certain harvesting methods by the State, the effect of the shifts in the work force, and the limitation of range of values through the study period.

Oyster Prices

The price paid to watermen and planters for oysters has fluctuated since 1950. In recent years the price in nominal terms has increased, but the increase was not as high as the inflation rate.

Many factors seem to affect the price received for oysters. Prices in the fall season, when demand is peaking, are higher than prices in the spring. Private grounds oysters bring a higher price than public grounds oysters. This is partially a function of the private grounds harvest peaking when the public grounds are closed by MRC. Prices are highest in Northern Neck and South Rappahannock, less from the Northern York to North Carolina, and lowest on the Eastern Shore.

In addition, several standard economic relationships are expected to affect the price of oysters. In general, an increase in the quantity of oysters supplied will be expected to decrease the price. For this model, it is important to disaggregate the Chesapeake Bay's total oyster production into a Virginia component and a Maryland component. Although the Bay constitutes the supply area for the Virginia oyster processors, the model was designed to be sensitive to changes in Virginia oyster harvests resulting from changes in management practices in Virginia.

Another economic relationship which is expected is a relationship between retail price and price paid to watermen. As the retail price increases, the price to watermen should increase. However, it is not expected that the entire increase would be passed on to the watermen -- only a share.

These relationships were tested by agricultural economists at VPI&SU. The data used for these estimates differed from the data used in the previous equations. The price model was estimated using pooled, cross-sectional data from each county in Virginia by type of grounds (public/private) and season (fall/spring). The county data were aggregated into the regions shown in Exhibit D, maintaining the grounds and season distinctions. The data was collected from 1972 to 1979 by the MRC. A total of 96 data points were used to estimate the equation in Exhibit D.

The results of the estimation point out several problems with the equation. One of the substantively most important variables, quantity of oysters produced in Virginia, shows a relationship with price that cannot be distinguished from zero. This appears to be the result of high multicollinearity between the quantity produced in Virginia and the quantity produced in Maryland. The quantities are both negatively correlated to the price (in -.016QMD and -.012QVA) as is the total Bay quantity (-.015). However, none of the relationships are statistically significant. The researcher must decide on the relative value of two approaches. On the one hand, substantive interests in testing impacts of Virginia supply on the price makes it desirable to include the quantity for Virginia and Maryland. On the other

Exhibit D

$$P = .010 + .448RP + 3.522 \times 10^{-8}QMD - 1.587 \times 10^{-8}QVA + .0224SEASON + 116GNDS - .161\ REG1 - .106\ REG2$$

STD.ERROR	.038	.017	2.687×10^{-8}	5.342×10^{-8}	.016	.015	.014	.017
SIGN.	.7868	.0001	.1906	.7665	.1508	.0001	.0001	.0001

$R^2 = .6386$

F Ratio = 118.899 F test SIGN = .0001

Durbin Watson D = 1.431

Where:

P = price paid to watermen, measured in dollars per pound units

RP = retail price of oysters, measured in dollar per pound units

QMD = oyster harvest in Maryland, measured in pounds

QVA = oyster harvest in Virginia measured in pounds

SEASON = summer season effect, measured as a dichotomous variable
(0 = Fall; 1 = Spring)

GNDS = grounds effect, measured as a dichotomous variable
(0 = Public; 1 = Private)

REG1 = regional effect for Eastern Shore

REG1 = regional effect for lower Bay

hand, the statistical relationships show that those variables are giving the same information and the coefficients (especially the positive sign on QMD) are biased because of their joint inclusion. The researchers decided to allow the substantive concerns to prevail, after looking at other possible specifications.

The season dummy variable is not statistically significant, but was included because of its theoretical importance. Furthermore, some concern with omitted variables is evidenced by the somewhat low R^2 value. Only 64% of the variance in prices is explained by the equation, indicating that other influences are operating on price setting in the oyster industry. The R^2 is fairly strong when the pooled, cross-sectional nature of the data is considered.

AN ECONOMETRIC MODEL OF VIRGINIA'S HARD CLAM INDUSTRY

Virginia's hard clam industry has shown considerable decline since the mid-seventies. Total catch, consistently above a million pounds per year prior to 1975, has only edged over that mark twice in subsequent years. The drop in landings stands in contradiction to the increase in prices evidenced since 1975. Two explanations are plausible: the fishing effort has declined despite the increase in prices, or the hard clam stocks are being reduced. While definite conclusions cannot be reached, recent research results from VIMS indicate that they suspect the decline in effort is principally responsible for declining catch. However, the fall-off in fishing effort may be due to a decline in hard clam availability.

Given the circumstances of an industry in decline, it is logical to examine the potential for reviving the fishery and to assess alternatives for the State to encourage the revival. Currently, the State has little involvement in the hard clam fishery. The most significant intervention is the licensing of clammers and restrictions on type of gear used to harvest clams. Certain grounds that are protected by the Baylor Survey Grounds statutes are good growing areas for clams and are harvested by clammers. The State also monitors relaying activities, which are carried out to remove harmful chemicals from clams harvested in polluted waters.

Through the years many proposals to remove the restrictions on gear or to alter management activities have been suggested to enhance the economic potential. To evaluate some of the proposed changes, it is useful to look at the economic impact of the changes. In order to estimate the impacts of policy alternatives, an econometric model summarizing the relationships that have existed in the fishery had to be developed. The model was designed to focus on several key aspects of the industry:

- the price of clams;
- clam landings;
- total dockside revenues;
- catch per unit fishing effort.

In addition, some assessments of the stock availability and effects on the livelihood of patent tong operators can be inferred, although no definitive statements can be made. Other areas of legislative interest, such as total employment, the traditional ways of life in the shore areas, and the net revenues to various gear type operators, could not be estimated.

THE HARD CLAM INDUSTRY

The hard clam industry in Virginia can be divided into two separate parts. The first part is a representation of the future harvest of hard clams. The objective of this part of the model is to determine the amount of landings to be expected from a specified level of fishing effort. The second part is a summary of the way in which prices are formulated. Essentially, the price formation model tests the various factors which are expected to influence the price for hard clams.

Hard Clams Supply

Hard clam supply in Virginia has dropped since 1975. While the Atlantic seaboard harvest has dropped slightly from 1970 to 1980, Virginia's share of the Atlantic seaboard production has dropped more rapidly, from approximately 10% to 5% of the total. During the seventies, the trend of declining patent tong licenses has been reversed, with the last four years posting nearly a 70% increase.

The drop in landings while licenses are increasing indicates a possible decline in catch per license. As mentioned previously, this trend indicates that either the licensed patent tongers are not spending as much time harvesting clams or their efforts produce fewer clams.

The first hypothesis is reasonable given that demand for hard clams peaks in the summer while the public oyster grounds are closed and some part-time laborers may be attracted to the fishery during the summer. Also, increased prices have made clamming attractive in comparison to finfishing and trapping blue crabs. This hypothesis has some support in the findings of a recent VIMS research effort.

However, the decline in catch due to reduction in stock hypothesis is also supported by the clam experts at VIMS. During interviews with JLARC staff, the hard clam experts reported that the

decline in effort was related to the decline in hard clam stock. A third conjecture that the data are not reliable does not seem persuasive.

The cause of the decline in supply cannot be precisely determined. In order to give adequate credence to the stock decline hypothesis, an equation was estimated to test the relationship between catch per license and effort. The catch per license is expected to decline by the effort exerted during the same time period. Also, the catch in previous years is expected to reduce the catch per license, because of the overall reduction in stock. Specifically, the effort four years prior to the year in which the catch-per-license is being examined was thought to be relevant, because of the maturation cycle of clams.

Finally, since 1972 a number of factors which cannot be measured precisely are expected to reduce the catch-per-unit effort. The increase in licenses points up the increase in part-time tongers. Secondly, mechanical dredging of the grounds was also occurring. Thirdly, hurricane Agnes struck, disrupting some of the clam beds. Lastly, the pollution in the Bay may have reduced the stock.

Although these factors cannot be measured directly, their impacts have been tested by the use of a dichotomous (dummy) variable. The dummy variable's coefficient must be interpreted with extreme caution, because of the hodge-podge of effects it represents. The sign on the coefficient is expected to be negative, as it is for the other two coefficients.

The equation testing this specification was estimated with ordinary least squares regression. The results were as follows:

CPL =	55.66	- .23 EFFORT	- .11 EFFORTLAG4	- 12.47DV
STD. ERROR	4.50	.04	.03	2.94
t STATISTIC	12.37	-5.16	-3.35	-4.24

F Ratio = 27.13 F test SIGN = .0001

R^2 = .83

Durbin Watson D = 2.07

Where:

CPL = catch in pounds per license

EFFORT = number of license

EFFORTLAG4 = number of licenses 4 years prior

DV = dummy variable - 0 = 1955 - 1971
1 = 1972 - 1978

The data utilized was annual data from 1955 through 1978.

The statistical properties of the equation are good. The R^2 shows that a large amount of the variance in catch per license is explained. The coefficients are all significant, and the signs are all negative, as expected. No serial correlation is diagnosed and no severe multicollinearity problems were detected.

The main problem with the equation is the interpretation of the coefficient on the dummy variable. Clearly something caused a decline in effort as of 1972, but no interpretation is precise. Another problem is the effort measure -- the number of patent tong licenses. However, it is the only data available on effort, and an estimated 95% of the catch is by patent tongers. Other formulations were attempted, using catch and other variables, but the results of this equation were the most sound.

The catch-per-license equations can be used for two purposes. First, their use promotes an understanding of the industry. The model shows that the catch-per-effort unit is declining as effort increases. This indicates that the value of current clam harvest is less than it would be because of the level of harvesting taking place.

In addition, the equation may be used to calculate the probable catch for various levels of effort exerted in the hard clam industry. By multiplying through by effort the equation becomes:

$$CPL = A(EFFORT) + B_1(EFFORT)^2 + B_2(EFFORTLAG4)$$

$$(EFFORT) + B_3(EFFORT)(DV)$$

Thus, for a specified level of effort, catch can be estimated. However, due to the effort being measured in terms of licenses and the impact of possible decline in effort by licenses, the result of this calculation should be taken as a lower bound on the catch. The effect of decreased catch-per-unit effort would be assumed to result entirely from a decline in stock. While the assumption is not empirically testable, it is useful to examine the most drastic possible result of an increase in clamming effort.

Hard Clam Prices

Prices for hard clams have been extremely volatile both in Virginia and along the Atlantic seaboard in recent years. The price trend shows annual increases in both cases since 1975. However, the monthly prices per pound show 50% increases within one year. Because of the concern for the effects of any change in the supply of hard clams on the price, it is important to ascertain the factors which contribute to the fluctuation in the price paid to the watermen.

To begin to analyze price formation, it is necessary to determine the relevant market area for the hard clam price. Of course, the price paid to Virginia watermen is relevant, but the relationship of that price to other market area prices is important. If other

market area prices are related to Virginia prices, then the entire market supply will affect the price, and the impact of Virginia's supply of hard clams will be reduced because of the relatively small proportion of Virginia's production in the total hard clam supply.

An analysis of variance was conducted to determine the relationship of hard clam prices in various eastern seaboard states to Virginia's price. The strongest relationship was between New York prices and Virginia prices. New York is the largest producer of hard clams. In fact, prices in several other states on the eastern seaboard were related to Virginia prices, indicating a large market area probably dominated by New York and to a lesser extent by Rhode Island. This finding creates an expectation that Virginia prices will be nearly inflexible with respect to the Virginia hard clam harvest size.

When the model of hard clam price formation was developed both the quantity of hard clams produced in Virginia and the total hard clams produced on the eastern seaboard were tested for their relationship to Virginia prices. Both were expected to be negatively related to prices, but neither was expected to have a strong impact.

Three other variables were expected to influence price. First, consumer demand is expected to be positively related to the price paid to watermen. In this case, consumer demand is measured by the wholesale price of hard clams, specifically little neck prices. An adjustment period is necessary between the increase in wholesale prices and the expected increase in exvessel prices. Because of the fairly long shelf life of hard clams, a period of one to two months was hypothesized to be an appropriate lag.

Prices were also expected to be influenced by an effect of the seasonal supply changes. Rival hypotheses were suggested for the direction of this relationship. One was developed from received economic theory: in the summer when supply is great the price of hard clams will decrease, even after controlling for the normal price response to supply. The second was based on knowledge of the competition in the fishing industry and general economic theory: the price paid to tongers will increase in the summer months to recruit labor into the fishery when consumer demand is peaking. The hypotheses were tested by estimating the relationship between a season-supply interaction term and the price of hard clams, while controlling for supply and consumer demand.

The final factor tested in the model was the supply of a substitute, surf clams. Normally, the quantity of a substitute commodity is expected to be negatively related to the price. In the case of hard clams and surf clams, the relationship is somewhat more complex. Surf clams are direct substitutes for chowder grade hard clams only. Chowders are the least expensive hard clams and are used only for soups. Thus, if surf clams displace chowders in the soup market, the overall price for hard clams may increase due to the culling of chowders before the sale is made. However, if the chowders are not culled, an increase in surf clam supply could reduce the price paid for ungraded hard clams.

The relationships were estimated using ordinary least square techniques. The data series was monthly observations from January 1973 through June 1982. The results are shown in Exhibit E.

The equation exhibited reasonably solid statistical properties with three possible exceptions. The R^2 was high and the signs were all interpretable. Three of the coefficients were not significantly different from 0 with 90% assurity. However, their substantive importance overrode their lack of statistical significance. The decision to retain these variables is reinforced by the presence of moderate degrees of multicollinerity. The multicollinearity represents the second problem, but explains to some extent the lack of significance of some of the coefficients due to variance inflation. A third problem exists with the indication of some positive serial correlation. Overall, the equation performs reasonably well.

The most striking result of this analysis is the relative lack of impact of quantity of hard clams on price. In winter months the production of an additional 10,000 lbs. of hard clams would be expected to drive prices down by less than 5 cents. An increase of 10,000 lbs. is equivalent to an increase of between 20 percent and 50 percent in monthly production during the winter.

Even less effect of Virginia production is evident in the summer. Prices from April to August show almost no response (perfectly inflexible) with respect to changes in Virginia quantity. An increase in Virginia hard clam production in the summer has no appreciable effect on the prices paid to Virginia watermen, since the production of other states is at a maximum at that time. The only effect is transmitted through the overall increase in hard clam production on the eastern seaboard.

By far the most significant relationship was with the consumer demand variable, the retail price of littlenecks in the previous month. This indicates the strength of consumer demand in price setting. The strength is further indicated by the positive sign on the season-quantity interaction. Even though the quantity is highest in the summer, the strength of the consumer demand shows an increase in price during that period. The sign on the surf clam coefficient seems to indicate that increases in surf clam supply depress the price of the chowder hard clams, and thus the entire hard clam price.

Exhibit E

PRICE = $-.16 - 6.00(\times 10^{-8})$ SURFQ $-1.48(\times 10^{-7})$ TOTALCL $-4.79(\times 10^{-6})$ VACL $.06$NECKPR1 $+.0026$ NECKPR2 $+ 4.45(\times 10^{-6})$ SEAINT

STD. ERROR	.28	3.43×10^{-8}	1.36×10^{-7}	2.21×10^{-6}	.0039	.0025	1.60×10^{-6}
t STATISTIC	-.59	-1.75	-1.09	-2.16	15.24	1.04	2.78

F Ratio = 27.13 F test SIGN = .0001

$R^2 = 89$

Durbin-Watson D = 1.18

Where:

PRICE = price paid to Virginia clammers

SURFQ = pounds of surf clams sold in Virginia

TOTALCL = pounds of hard clams sold on the eastern seaboard

VACL = pounds of hard clams sold in Virginia

NECKPR1 = retail price of littleneck grade hard clams in previous month

NECKPR2 = retail price of littleneck grade hard clams two months prior

SEAINT = season-quantity interaction term for med using 0 for Jan.-March and Sept.-Dec.; 1 for April-August and multiplying by the quantity of hard clams supplied (VACL)

APPENDIX C

AGENCY RESPONSES

As part of an extensive data validation process, each State agency involved in JLARC's review and evaluation effort is given the opportunity to comment on an exposure draft of the report.

Appropriate technical corrections resulting from the written comments have been made in the final report. Page references in the agency response relate to the exposure draft and may not correspond to page numbers in the final report.

Included in this appendix are responses from the following:

- Office of the Governor
- Virginia Seafood Council
- Virginia Marine Resources Commission
- Virginia Institute of Marine Science
- Marine Products Commission
- Department of Health
- Department of Agriculture and Consumer Services

COMMONWEALTH of VIRGINIA

Office of the Governor

Richmond 23219

Betty J. Diener
Secretary of Commerce and Resources

December 27, 1982

Mr. Philip A. Leone
Deputy Director
Joint Legislative Audit and
Review Commission
910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Leone:

Thank you for the exposure draft of your report on the Economic Potential and Management of Virginia's Seafood Industry.

The Marine Resources Commission will be reviewing the draft for accuracy. In the meantime, I would like to indicate my appreciation for the completeness of the study and my general support for its contents.

I would also like to request that copies of the draft be made available to the members of the Search Committee for the new Virginia Marine Resources Commission Commissioner. Even in draft form, it would be extremely helpful to them during the remainder of their search period. I've asked the search consultant, Maya Hasegawa, to work with you on the distribution details.

Cordially,

Betty J. Diener

BJD/sew

cc: Bob Craft
Maya Hasegawa
Peck Humphreys

VIRGINIA SEAFOOD COUNCIL · 2600 Washington Ave., Suite 901 · Newport News, Va. 23607 · (804) 247-6681

January 3, 1983

JAN 5 1983

Mr. Ray D. Pethtel, Director
Joint Legislative Audit and
Review Commission
Suite 1100
910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Pethtel:

The Virginia Seafood Council sincerely appreciates the opportunity to review the December 16, 1982 JLARC Exposure Draft entitled "The Economic Potential and Management of Virginia's Seafood Industry". I know that those members of the JLARC staff which worked on this study put forth a great deal of time and effort, and we feel that the results are highly commendable. Hopefully, the study will serve as a working tool for State and industry efforts over the coming years to improve the viability of the industry. In our judgment, this would be a proper use of the study, and the study itself provides a solid basis for much-needed change.

With regard to the recommendations made in the study, we have some specific comments. Recommendation (1) concerns implementation of a pilot program to permit evaluation of the effects of implementation of one or more of the policy options for management of the oyster and hard clam industries. We endorse this approach to implementation of policy options; however, in our view, the implications for the oyster industry of Option No. (1), maintenance of the status quo, would have dire consequences for all segments of the industry. The study clearly shows that this option should not be adopted. Likewise, the discussion of maintenance of the status quo in the hard clam industry dictates selection of another option, in order that this industry not be allowed to decline. Since implementation of option (2) for the hard clam industry would result in maintenance of present production levels only through the imposition of substantial limitations

upon the number of harvestors, and consequent hardship to those who do not receive licenses, we cannot support adoption of that option. We believe that the additional policy options set forth for both the oyster and hard clam industries show great promise, and urge that a carefully planned combination of these options be implemented.

We endorse Recommendation Nos. (2), (3), (4), (5), (6), (8), (11), (12), (13), (14), (15), (16), (19), (20), (21), (22), and (23). With regard to recommendation (3), we feel that a study of the downward trend in clam production will show that the trend is due to a decrease in clam harvesting efforts. We suggest Chincoteague Bay as one possible site for such a study.

Recommendation No. (7) is that VMRC establish a centralized collection and billing unit. We agree that implementation of such a step might result in economies of operation, but only if such a step can be taken without an increase in personnel. Because of the significance of special funds in the operating budget of VMRC, we urge that this step be closely examined to make certain that no cost increases would result.

Recommendation No. (9) would require VMRC to develop fishery-specific management plans for species within the Bay. Because some species migrate in and out of the Bay on a frequent basis, a management plan for every species found within the Bay may be unnecessary, and costly to administer. Specific consideration should be given, however, to adoption of a management plan for those species which spawn in the Bay and its tributaries. Therefore, we urge that careful consideration be given to the subject, and that management plans be developed only for those species for which plans are necessary or would be effective.

Recommentation No. (10) concerns data collection by VMRC. Standardized reporting forms are recommended, as is General Assembly consideration of mandatory reporting for commercial buyers. We believe that complete, accurate, and timely data would greatly add to the management capabilities of VMRC; however, we believe that the industry should be given a strong voice in the manner in which any mandatory reporting requirement is implemented.

We believe that the question of encouragement of productive holding of leased bottom (Recommendation 17) is extremely complex. Raising the rent for oyster leases will certainly discourage non-productive holding of these leases; however, it will also increase costs of producing oysters from productive beds. There are many reasons for holding leases in a non-productive state, some of them valid, and we feel that any efforts to remedy this problem should be carefully tailored to take into account valid reasons for holding leased bottoms in an unproductive state.

We strongly support the upgrading of the VMRC enforcement unit. (Recommendation 18). We see the need for additional comprehensive training of personnel in fisheries laws. We do not support, however, a grant of general police power to VMRC enforcement personnel.

We feel that Recommendation (25), which would create an advisory committee of all major segments of the seafood industry to advise and comment on the research activities of Sea Grant, VPI, and VIMS would be a desirable step. Creation of such a committee would make implementation of Recommendation (24) unnecessary. That Recommendation would establish a formal mechanism for soliciting industry and agency advice for VIMS. We heartily endorse the concept of industry input into the research and research planning processes followed by each of the research agencies.

Recommendations (26) through (31) deal with inspection and enforcement procedures of the Bureau of Shellfish Sanitation and the Department of Agriculture and Consumer Services. The Virginia Seafood Council strongly supports inspection and enforcement procedures designed to assure the public of the quality of their seafood purchases on a consistent basis. Moreover, we support the concepts of uniformity in implementation of policies, procedures, and enforcement techniques. Finally, we feel that responsibility for inspection of seafood processing plants should be centralized under the responsibility of one agency; however, in this area, we feel that the General Assembly should be fully aware of the importance of comprehensive and reliable inspections to the marketing of the product, and to interstate commerce, since each state and the federal government presently maintain standards for seafood products. Prior to implementation of any

of the seafood inspection recommendations, we feel that Virginia should give specific consideration to participation in the Interstate Shellfish Sanitation Conference, and adoption of the standards and policies promulgated by the Conference.

Recommendation No. (32) provides that the General Assembly may wish to adopt statutory policy goals. We strongly endorse this concept; however, Virginia shares many of its coastal and marine resources with Maryland. Consideration should be given to the adoption of bi-state goals consistent with those statutory goals which may be adopted by the General Assembly.

Recommendation No. (33) provides that the Governor and the General Assembly may wish to consider structural changes in the overall regulatory framework of the seafood industry, in order to enhance coordination of these efforts. We agree, and particularly endorse the Assistant Secretary for Natural Resources concept, as expressed in Part V of the Exposure Draft.

As reflected above, the Virginia Seafood Council is in substantial agreement with the vast majority of the recommendations. We feel that these recommendations, if adopted and implemented, will greatly enhance the position of Virginia's seafood industry. Thank you for the opportunity of commenting upon your recommendations. If we may be of assistance in the future, please do not hesitate to call upon us.

Sincerely,

Keith Porter

Keith Porter
Executive Director
Virginia Seafood Council

DEC 30 1982

COMMONWEALTH of VIRGINIA

Marine Resources Commission
P. O. Box 756
2401 West Avenue
Newport News, Virginia 23607-0756
Telephone: ~~xxxxxxx~~ (804) 247-2200

December 29, 1982

Mr. Philip A. Leone
Deputy Director
Joint Legislative Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Leone:

I am providing comments on portions of the Joint Legislative Audit and Review Commission report "The Economic Potential and Management of Virginia's Seafood Industry", which relate to the Virginia Marine Resources Commission.

You will find my comments grouped in the following categories:

I. Comments relating to fisheries management.
II. Comments relating to legislative policy.
III. Comments relating to VMRC Law Enforcement, patrol, inspection, and licensing.
IV. Comments relating to public oyster ground management.
V. Comments relating to oyster ground leasing.
VI. Comments relating to automated data processing at VMRC.

Please note that I am commenting in the capacity of Acting Commissioner. Mr. James E. Douglas, Jr., who served as Commissioner for eleven years, resigned November 1, 1982. Appointment of a permanent Commissioner has not been made.

Thank you for sharing the draft report with me.

Sincerely,

Robert D. Craft
Acting Commissioner

RDC:pal

Enclosure

I

JLARC Recommendations Pertaining to VMRC Fisheries Management

5. (p. XVIII) Create a Fisheries Management unit; consolidate units for fisheries statistics, public oyster repletion, surveying and leasing.

6. (p. XVIII) Amend Code of Virginia to delete provisions for appointment of "Repletion Officer" and "Chief Engineer" by the Commission.

9. (p. XVIII) VMRC should develop fishery management plans for species within the Bay.

10. (p. XVIII) Improve the quality and completeness of statistics.

Comments Of Acting Commissioner, VMRC

The above recommendations are among the most important that JLARC has made relating to the Marine Resources Commission.

- I concur that there is need for greater emphasis on fisheries management, and that the development and use of fisheries management plans for species in Virginia waters is an excellent approach.

- I concur, and have proposed in VMRC Program Budget Proposals, that fisheries statistics (harvest and landing data, employment data, etc.) is an important tool for fishery management and needs to be strengthened. The State does not provide general fund support for fisheries statistics. VMRC has a small capability in this area which is supported by Federal funds obtained under Federal grants from the Commercial Fishery Research and Development Act. This source of Federal funds has been reduced, and has been questionable for continuance in the past two Federal fiscal years.

- I concur, and have proposed in Program Budget Requests, that a position be established to oversee fisheries management within the agency. The fishery management function has been performed as a personal duty by the Commissioner.

- I concur that Sections 28.1-19, and 28.1-20 be amended so that appointment and control of the Agency's Repletion Officer and Chief Engineer are clearly vested with the Commissioner. These sections are in conflict with Section 28.1-12, which empowers the Commissioner to appoint and control employees of the agency. This is a constructive recommendation.

VMRC Biennium Budget Proposals for 1980-82, and for 1982-84 contained recommendations and requests for improved fishery management - a staff to form a fisheries management unit - and improvements in fisheries statistics. None of these proposals have been funded (copies of the agency's requests are attached).

JLARC mentioned that VMRC has 138 positions. The authorized manpower levels for VMRC are:

138 FTE in the 1980-82 Biennium

136 FTE in the 1982-84 Biennium

128 FTE under executive branch employment ceilings

122 FTE 5% projected employment reduction, executive branch objective for July, 1984.

The agency will have reduced its employment level by approximately 12% from the 1980-82 Biennium by the end of the 1982-84 Biennium. These reductions reflect Statewide conditions and restrict the agency's ability to increase its services.

JLARC recommendations on increased fishery management capability, increased fisheries statistics, and establishment of a fishery management unit are repeats of proposals that VMRC has been making in budget proposals for the past four years. Financial support is needed to accomplish these advances in fishery management.

At the present level of staffing, the Commissioner personally must perform much of the fisheries management work.

The above recommendations are key to the agency having capability to pursue many of the other JLARC recommendations including:

1. Pilot projects to test and monitor the results of dredging for seed.

2. Pilot projects to test new methods of oyster ground leasing (such as bidding).

3. Pilot projects to test different methods of harvesting.

4. Use of econometric modeling as a fisheries management tool.

5. Scientific assessment of the resources.

6. Evaluations of the effectiveness of oyster repletion efforts.

COPY OF VMRC 1980-82 BIENNIUM BUDGET PROPOSAL FOR ESTABLISHMENT OF A FISHERY MANAGEMENT DIVISION.

THE REQUEST WAS NOT FUNDED.

One additional patrol vessel and its crew ((1) Marine Resources Inspector and Captain A. (1) Marine Resources Inspector and Mate A) were requested. This vessel was to be stationed in the Cape Charles area and serve a dual purpose. It would provide fishery patrol and enforcement in the Southern Chesapeake Bay area, Bayside lower Eastern Shore, and Seaside lower Eastern Shore. In addition, it would have been used for general recreational boating patrol in these open water areas during the summer recreational boating season. However, this vessel and crew cannot be established within the assigned target.

Three new positions were requested with which to establish a Fishery Management Division. They were to function as Division Head, Assistant Division Head, and Clerk-Stenographer. Existing positions in the oyster repletion department, sport fishing reef unit, statistics unit, and a grant funded Marine Scientist B position were to be combined into this new Division.

The Commissioner, VMRC, functions as the chief professional employee in developing fishery management plans, developing fishery management regulations, and maintaining liaison with the Virginia commercial fishery. VMRC program responsibilities and staff have been added during the last four bienniums in environmental management, in wetlands management and bottomlands management. With the addition of environmental program responsibilities, and the continuation of fishery management and regulation responsibilities, professional staff is needed to provide organizational capability for fishery management. However, these positions cannot be established within the assigned targets.

Private oyster planting and harvesting is an important component of the seafood industry in Virginia. The State has designated certain bottom grounds for use by the public for oyster harvesting (Baylor Survey). The Engineering/Surveying Division is responsible for surveying all oyster grounds, and for leasing bottomlands not in the Baylor areas for private oyster propagation and harvesting. Thus, Virginia provides for use of its oyster resources by the public, as well as by private planters. Fees and taxes are paid to the State for leased bottomland, and for harvested oysters. The original Baylor Survey dates from 1894. Since then, continuous records have been kept on surveys. A major problem in surveying oyster ground is the reestablishment and maintenance of shore base stations. Changing

OF VMRC 1982-84 BIENNIUM BUDGET PROPOSALS
R INCREASED FISHERY MANAGEMENT AND INCREASED
FISHERY STATISTICS.

(2) Fiscal and Accounting (3) Fishery Industry Licensing (4) Property Inventory and (5) Environmental Permit Tracking. A Joint Legislative Audit and Review Commission Report, dated March 14, 1977, recommended ADP capabilities at VMRC as the means for improved financial management (P.46 of that report). A detailed plan for automation at VMRC has been prepared, and funds are *were* requested for implementation in the 1982-84 Biennium *Program Proposal.*

There is a need for analytical based fishery management capability. Fishery management decisions (as published in Commission regulations and orders) are developed on Commission initiatives and also in response to citizen and industry proposals. There is need to evaluate alternative resource management plans, and conflicting interests that arise between segments of the industry. The decision making process takes place at open public hearings, where there is need to demonstrate the rationale of decisions with data, analysis, and findings. ~~It is planned that the use of Federal Funds will be increased in the first Biennium under this subprogram, for fishery industry statistics; reporting and analysis. Three grant funded positions will be transferred into this subprogram from the Marine Life Management Program to work in statistics.~~ *The continued status of Federal assistance to States for Commercial Fisheries Statistics has not been decided at the Federal level. Federal Funds have been included in the financial exhibit to continue grant supported statistical services on the assumption that support will continue. Included are 3.75 Federally funded positions.*

Two new positions are *were* requested for the Fishery Management Division, as Assistant Division Head and Secretary. These positions, as Marine Scientist C, and Clerk-Stenographer D are *were* needed for development of resource management regulations and policies and presenting them for adoption by the Commission at Public Hearings. ~~The Commissioner, VMRC, has personally performed this function over the years dating from a time when the agency had a single~~

~~activity; i.e., fishery regulation. The agency now has multiple activities which the Commissioner manages, and it is inappropriate to remain dependent upon his personal skill and time to write and staff fishery regulations for public hearing and adoption. There is an increasing trend for adversely affected parties to challenge and test public regulations and decision making. The lack of sufficient rationale to demonstrate the soundness of decisions will result in increased litigation, court adjudicated decision, increased cost to government, and less effective management of the public resources.~~ *These additional positions have been included as changed services in the Marine Life Management Program, in accordance with guidance instructions from the Secretary of Commerce and Resources.*

A Marine Patrol Act became effective during the 1980-82 Biennium. It authorizes grants to Tidewater localities for partial financing of marine patrol services in their police departments. It also provides for a marine police dispatch center to be operated by VMRC. House Document Number 30, (Report of the Marine Patrols Study Commission, 1979), cited the radio dispatch service as a means to increase emergency coordination in the deployment of State and local patrol vessels. Four Dispatcher positions were established in the Special Marine Patrol Fund for the 1980-82 Biennium. However, five positions are needed to provide continuous seven-day per week twenty-four hour per day coverage without interruption. ~~The additional position is requested to be funded in the Marine Patrol Special Fund.~~ *The additional position has been deleted to remain within target funding. The Marine Police Communications and Dispatch Center will not be operated twenty-four hours per day.*

~~The outlook in this subprogram for two subsequent Bienniums is for level resources to maintain services, provided that these additional resources proposed in the 1982-84 Biennium are funded. Most of these additional needs were requested for funding in the~~

II

JLARC Recommendations Relating To Legislative Policy

4. (p. XVII) General Assembly to adopt statement of a specific fisheries management policy for Virginia.

II. (p. XIX) General assemby to revise Title 28.1 Code of Virginia (Marine Resource Laws) to achieve fisheries management by Regulation, and to reduce required time frames for VMRC regulatory action.

Comments Of Acting Commissioner, VMRC

- I concur with JLARC observations that there is no explicit legislative policy toward comprehensive management of marine resources. Such a policy, stated in Code, is needed. Many of the day-to-day management dilemmas faced by fisheries managers are public conflicts between competing user groups:

    - sport fishermen vs. commercial fishermen; highly efficient mechanical harvesting techniques that would reduce employment for traditional watermen vs. hand harvesting methods that support employment of watermen, etc. Should the fisheries manager choose high efficiency harvesting techniques to produce maximum food - or choose to preserve hand harvesting techniques for maximum employment of watermen? These are life style and cultural questions. A legislative policy that gives a framework for making these choices is needed.

- I concur with JLARC observations that the Code of Virginia contains numerous detailed fisheries regulations. The level to which details are codified has placed the General Assembly in a position of detailed fishery management, rather than policy making.

  JLARC has also correctly observed that VMRC regulatory making powers are encumbered because of the long time periods that must be followed to adopt regulations under the Virginia Administrative Processes Act. (Approximately six months). It is not possible to respond to rapidly changing resource conditions under the lengthy time periods that are required.

III

JLARC Recommendations Pertaining to VMRC Law Enforcement, Patrol, Inspection, and Licensing Activities

14. (P. XIX) VMRC should consider instituting several improvements that would reduce the efforts of field enforcement personnel in tax collection - centralized tax collections, centralized license sales, etc.

18. (P. XX) JLARC asks if the General Assembly should expand the VMRC law enforcement mission beyond its present limited role of fisheries inspection and conservation - to that of a full police force on the water - with jurisdiction over all civil and criminal statutes.

19. (p. XX) JLARC recommends that classifications for enforcement positions be updated.

20. (p. XXI) JLARC recommends that VMRC reassess current deployment of personnel and equipment in law enforcement.

Comments of Acting Commissioner, VMRC

- JLARC has made several comments throughout the report that VMRC should reduce or eliminate administrative and paperwork tasks of district law enforcement inspectors.

  The key to reduction of manual paperwork and administrative workloads for both field personnel and office personnel is the introduction of automated data processing. VMRC and the Department of Management Analysis (MASD) have worked together on developing plans for the automation of VMRC major administrative systems.

  Funding is available in the current Biennium for the automation of one system only. Oyster ground leasing and billing is to be automated. One result will be elimination of work for law enforcement district inspectors in collecting rents and penalties. Such work will be performed centrally.

- JLARC has suggested that licenses and permits be sold centrally from the main office, in similar fashion to that of the Division of Motor Vehicles. Centralized sale of all licenses and permits is not desirable. A sizable number of licenses require field screening by inspectors and the assignment of geographic locations based upon site inspection. "Permits" are required to

be purchased directly from district inspectors in order that they may oversee and certify activities such as the loading, transport, and relaying of polluted shellfish under controlled conditions. License laws will become more complicated with the entry of non-residents into the Virginia fishery. It is desirable for licenses to be issued by inspectors who are knowledgeable of and able to explain complicated harvesting and conservation laws which often vary in different areas and rivers of the State. Automated data processing can help reduce the paperwork involved in license sales for district inspectors. However, centralized sale of licenses is not desirable. Shifts of manual paperwork from the field to the central office will necessitate shifting personnel resources from the field to the central office, except where automated data processing can be used to reduce the net amount of manual work. Again, it is pointed out that VMRC has funding that is only enough to automate one system - oyster ground leasing and billing - in the current Biennium. Automation for other systems, including statistics and licensing, must await the availability of funds. VMRC has almost doubled its use of license agents (independent stores and shops) to sell those licenses that do not require screening by district inspectors. The increased use of license agents is desirable and will continue to be pursued.

- State government does not have a full powered waterborne police force. General police powers are exercised by the State police, local police and sheriff's departments, although they have limited capabilities on the water. JLARC thus raises the question of expanding VMRC into a full police power agency on the water.

  This question was before the General Assembly in 1978 when it formed a Marine Patrol Study Commission. That legislative study commission examined law enforcement roles on the waters - including functions of VMRC, local police, U. S. Coast Guard, State Police, and the Commission of Game and Inland Fisheries. The Marine Patrol Study Commission completed its work in 1979 and did not recommend an expanded law enforcement function for VMRC, after deliberate examination of the question. The legislature chose to subsidize local police departments that operate marine patrols. VMRC administers grants to them under a Marine Patrol Act. Should the General Assembly ever wish

to assign broad police powers to VMRC, the result would be a major expansion of the agency's mission well beyond that of its present fisheries conservation and management function. It would need to be accompanied by major additional resources for training, equipment, communications, and twenty-four hour, seven day-per-week capability.

- JLARC criticized the personnel classifications used for VMRC Law Enforcement positions for not having been updated since its 1977 Study. The entire VMRC classification series for Marine Law Enforcement has been reviewed, revised, and updated through the State Department of Personnel and Training since a 1977 JLARC Report in which a similar comment was made. Class specifications have been updated for all classifications, additional classifications have been added to the series after approval by the State Department of Personnel and Training. There have also been several specialized salary regrades for these classes, approved by the State Department of Personnel and Training at the agency's request.

- I concur with the recommendation that there needs to be a reassessment of where VMRC enforcement personnel and vessels are deployed. There are increasing demands for law enforcement coverage brought about by the creation of fishery management areas, entry of non-residents into the fisheries, the adoption of new regulations, closure of areas to seafood harvesting due to pollution, etc.; while the number of enforcement personnel is decreasing due to State reductions in funds and employment. Such conditions place considerable importance on matching resources with the areas of highest fishery activity.

IV

JLARC Recommendations Pertaining to the Public Oyster Ground Replenishment Program

12. (p. XIX) JLARC recommends that VMRC improve its fiscal planning for the Repletion Program.

13. (p. XIX) JLARC recommends that VMRC should improve the effectiveness of the oyster repletion program through such means as sampling and computerization of data.

Comments of Acting Commissioner, VMRC

- It is important to point out the undependable nature of the fund sources that are available for public oyster repletion, and the declining trends of these sources.

  Federal Funds have previously contributed to oyster repletion from the Commercial Fisheries Research and Development Act. However, the amount of funds has been reduced under the Act, and the Federal appropriation has been delayed in each of the last two fiscal years while Congress considered the Reagan Administration's suggestions to eliminate it all together. The reduced federal funding under this Act is being used to support VMRC's small fisheries statistics service in the current Biennium, (statistics has been given major emphasis by JLARC). None is allocated for repletion.

  General Funds have been appropriated for repletion in the current Biennium at amounts that are less than enough to maintain the level of the previous Biennium. A portion of the general fund reversions that are required of all State agencies to balance projected revenue shortfalls in the current fiscal year has been taken in this program. There is an Administration policy, in the current times of limited general fund revenues, of "replacing general fund financing with non-general fund revenues when available".*

  * Governor Charles S. Robb remarks to Agency Heads, June, 1982, copy attached.

  Special Funds are collected for oyster repletion from environmental permit and royalty fees, and from oyster repletion taxes. The environmental fees are highly variable and unpredictable. Last fiscal year $511,620 was generated from just 5 permits, out of a total of 331 permits. Oyster repletion taxes decline at times when they are most needed - to recover from declining oyster production.

VMRC has documented and confirmed the economic value of public oyster repletion expenditures in a "Benefit-Cost Analysis of the Virginia Oyster Subsidies". This was a scientific economic appraisal of oyster repletion by economists from the College of William and Mary. The Study concluded that public expenditures for oyster repletion produce an economic return to the State's economy that is greater than program costs. VMRC has requested larger general fund support for this program based upon its economic value in Program Budget proposals.

JLARC has made comparisons to the volume of oysters produced on public oyster grounds in Maryland. Maryland has a much larger commitment with 17 personnel and $1.29 million per year for its program.

There are several existing revenue sources that the General Assembly should consider routing into the Special Public Oyster Rocks Fund.

1. Income from oyster ground leasing is approximately $160,000 per year, and is paid to the State General Fund. This would be a dependable source of income to the fund, derived from industry fees.

2. Income from seafood industry licenses, that is paid into the General Fund, is approximately $150,000 per year. This source of income is derived from a portion of the fee from each license sold in the commercial fishery and would be a dependable source of income to the fund.

3. Income from seafood industry oyster inspection taxes, that is paid into the General Fund, is approximately $75,000 per year. This is an industry fee derived directly from a tax on oyster harvests.

JLARC has criticized the cash balances that are on hand at times in the Special Public Oyster Rock Fund. It must be pointed out that the Repletion Program operates on a cash basis; income must be earned and collected in advance of expenditure. Because the Special Fund sources have great variability, short term windfall collections, such as occur from environmental permits, are properly allocated over more than one oyster repletion season in order to have stable programs.

JLARC has criticized the use of Special Funds that defray expenses in General Fund departments of the agency that make contributions to the repletion effort (specifically some salary and operating expenses in Marine Law Enforcement and Surveying). The value of these contributions from General Funded departments exceeded $83,000 in the last fiscal year. The reimbursements from the Special Fund were much less, $46,101.56. Contrary to the JLARC suggestions that the repletion program is overcharged for general fund services, the repletion program is receiving support that far exceeds the full cost. Most of the reimbursement is for salaries of three positions. The cross-funding arrangements and authorizations were established in 1964, upon formal action of the Commissioner at that time, with written approval as required from the State Budget Office (approved G. O. Form P-5).

It is not likely that approval could be obtained to shift these costs to the General Fund (approved G. O. Form P-5 would be needed with Department of Planning and Budget concurrence), unless there is a legislative commitment to more fully support oyster repletion with General Fund Appropriations.

- JLARC recommendations to increase the monitoring and evaluation of oyster repletion efforts are welcomed, provided the agency's fishery management capabilities can be increased. This has already been commented on in Section I of the Acting Commissioner's response.

  Again, there is good documentation supporting the economic value of oyster repletion to the State, and a strong basis to support it with larger funding commitments.

JLARC STAFF NOTE:

Follow-up with VMRC regarding the agency's estimate of $83,000 in contributions from General Funded departments essentially substantiates the point that agency accounting procedures relating to the Special Repletion Fund should be reviewed and revised. The figure is based upon assumptions and omissions which include:

- imprecise estimates of enforcement personnel workload for the past year;

- costs related to activities, such as tax collection and reporting, which are generally considered by agency enforcement officials as part of the overall enforcement duties, and similiar activities which are not reimbursed by other agency divisions; and

- salaries or expenses for several inspectors who are not directly or indirectly engaged in duties relating to the State's repletion program and omission of approximately $12,900 in the salary and benefits attributed to a clerical position in the engineering and surveying division, which has questionable relationship to the repletion program.

MEANS. RATHER, I EXPECT CONCISE [illegible]
BUREAUCRATIC JARGON AND PRESENT A TANGIBLE RESULT, PRODUCT OR BENEFIT THAT CAN BE MEASURED.

LASTLY, PREPARING FOR THE FUTURE (1984-86): IN THE COMING MONTHS, WE WILL DISCUSS OUR GUIDANCE PACKAGE FOR THE 1984-86 BIENNIAL BUDGET. THE BROAD POLICIES, WHICH I'M NOW CONSIDERING FOR THAT BUDGET, FALL INTO FOUR AREAS: SERVICES, REVENUES, EXPENSES, AND OPERATIONS.

FIRST, SERVICES: AS I'VE ALREADY SAID, I'M COMMITTED TO HOLDING DOWN THE SIZE OF STATE GOVERNMENT. AMONG THE OPTIONS AVAILABLE TO ACCOMPLISH THIS ARE --

1. IDENTIFYING AND ELIMINATING OBSOLETE, INEFFECTIVE, UNNECESSARY OR LOW-PRIORITY SERVICES;
2. [illegible]EW SERVICES OR CHANGED SERVICES ON A TEST [illegible]T WHEN ANY NEW SERVICE IS INITIATED, AN EXISTING [illegible] IS GOING TO HAVE TO BE TERMINATED;
3. [illegible]ING OUT OR ELIMINATING OF STATE SERVICES WHICH ARE [illegible]ORE APPROPRIATELY DELIVERED BY THE PRIVATE SECTOR;
4. ENCOURAGING THE PRIVATE SECTOR TO PARTICIPATE IN OR ASSUME CERTAIN SERVICES CURRENTLY PROVIDED BY THE STATE; AND
5. TRANSFERRING OF RESPONSIBILITIES FOR SERVICES TO OTHER LEVELS OF GOVERNMENT, WHERE THAT OPTION EXISTS, AND THE BENEFITS TO THE TAXPAYERS ARE PROVEN.

SECOND, REVENUES: I'M COMMITTED TO BETTER USE OF OUR EXISTING RESOURCES. AMONG THE OPTIONS THAT ARE AVAILABLE TO ACCOMPLISH THIS ARE --

1. INCREASING OR ENACTING USER CHARGES WHICH SUPPORT AN APPROPRIATE PORTION OF THE COST OF SUCH SERVICES;
2. RESTRICTING THE USE OF GENERAL FUND REVENUES TO OFFSET FEDERAL FUND REDUCTIONS:
3. PERMITTING AGENCIES TO RETAIN THE NONGENERAL FUND REVENUES DERIVED FROM FEES AND CHARGES THEY IMPOSE:
4. REDUCING FEES AND CHARGES FOR SELF-SUPPORTING SERVICES WHICH GENERATE REVENUES IN EXCESS OF EXPENSES; AND
5. REPLACING GENERAL FUND FINANCING WITH NONGENERAL FUND REVENUES WHEN AVAILABLE.

THIRD, EXPENSES: I'M COMMITTED TO REDUCING THE GROWTH OF

V

JLARC Recommendations Pertaining to Oyster Ground Surveying and Leasing

15. (p. XX) VMRC should consider requiring new applicants for leased ground to provide their own survey in order to reduce the backlog of applications and expedite processing of new applications. The Commission could establish a list of private surveyors willing to conduct these surveys or put the work out for bid.

16. (p. XX) VMRC should immediately begin complying with Code requirements relating to the processing of lease applications.

17. (p. XX) The General Assembly may wish to consider raising the rent on oyster leases and requiring more frequent evidence of appropriate use to discourage non-productive holding of private leases.

Comments of Acting Commissioner, VMRC

- JLARC recommended the use of private surveyors to reduce the present backlog of lease applications. Surveys must be completed before assignments can be made. VMRC presently accepts private survey work on oyster ground lease applications. Approximately 16 private surveys were accepted during 1982. However, only four surveyors in the Tidewater area are fully equipped for and willing to perform submerged ground surveys as needed. The difficulties for private surveyors are locating base stations when old ones are found destroyed, performing base station calculations, and taking a group of private applications together (separate applicants in the same area must be willing to use the same private surveyor for the work to be economical).

  VMRC is willing to encourage private surveyors to qualify and accept this type of work; however, only limited interest from private surveyors has been shown.

- JLARC is not accurate in comments that leasing and surveying procedures of the agency's chief engineer do not comply with the Code in two specific instances:

  1. Section 28.1-109 (3), Code of Virginia states, in part:

     > "Applications shall be given priority in the same order in which they are received."

     Applications are taken in order on an area-by-area basis. There are four survey parties, each assigned a region of the State. Applications with the earliest date are surveyed first in the given area to be worked.

2. Section 28.1-109 (8), Code of Virginia, states in part:

> "If an assignment be not made within six months - - - such application shall - - - become null and void, unless an extension is allowed by the Commission."

In May 1975, a full report was made to the Commission stating the lack of surveyors, the large number of regular and riparian applications pending, and the wording in Section 28.1-109 (8). After a mature discussion, a motion was made and approved to give priority to 28.1-109 (regular) applications and to leave to the discretion of the Chief, Surveying Division, procedures for the most economical and efficient means to survey the 28.1-108 (riparian) applications. The Commission understood the situation and its action has been interpreted to have granted extensions for all applications. It would be unreasonable to require an applicant to submit a new application and pay the $25.00 application fee every six months because there is a backlog.

JLARC STAFF NOTE:

We recognize that VMRC has developed procedures for processing lease applications in view of the backlog and surveying problems. However, the agency's compliance with statutory requirements remains open to interpretation. In addition, the fact that 75 of the pending applications were received ten or more years ago is surprising, given the agency's response that "applications are taken in order on an area-by-area basis."

- Rental fees charged by the State for oyster ground leases are specified in the Code. Because leases are held to be contracts for set terms, increased rents do not become effective until terms are completed at the end of twenty, or ten-year periods.

  At present, the highest rate is $1.50 per acre. Oyster ground that is used productively is worth much more. Higher charges could be justified.

  Oyster ground leaseholders will first be affected by Section 28.1-109 (12) in 1990. This will be the first time that leaseholders are required to demonstrate efforts at planting or harvesting as condition of lease renewal. All leaseholders are being given ten years advance notice of this requirement by VMRC.

- Following are technical corrections for errors in the report relating to oyster ground surveying and leasing:

  1. p. III-36

     "Since 1977 the backlog of lease applications has grown from 474 to 678".

Correction:

The table below indicates that the backlog of lease applications reached a peak in 1979, and has been reduced in each of four consecutive years:

	Number of Applications Received Annually	Surveys Pending as of December 31st
December 31, 1976	139	476
December 31, 1977	155	517
December 31, 1978	296	716
December 31, 1979	217	741
December 31, 1980	187	731
December 31, 1981	113	629
December 31, 1982	79	581

2. (p. 111-36)

"The Chief Engineer estimates that as many as 50% of existing surveys still cannot be exactly located."

Correction:

<u>This should read 5% - 10%.</u>

3. (p. 111-37)

"The Engineering Division has four registered surveyors - - - two have assistants."

Correction:

<u>Each surveyor has one assistant. Three of the four surveyors are Certified Land Surveyors.</u>

The matter of surveying Section 28.1-109 leases before Section 28.1-108 leases was brought before the Commission.

The Commissioner asked the Commission to give consideration to directing the Surveying Division to put as top priority Section 28.1-109 applications.

Joan C. Skeppstrom, seconded by Russell C. Scott, moved to table the matter until it could be given further study. The Commission denied the motion.

S. Sewell Headley, seconded by Royal C. Insley, moved that top priority be given to Section 28.1-109 applications until caught up on all applications, provided that it shall be left to the discretion of the Chief, Surveying Division, if it is economical and efficient to survey a riparian application in conjunction with Section 28.1-109 applications. The Commission approved the motion with Joan C. Skeppstrom and Russell C. Scott dissenting.

* * * * * * * * * * *

EXTRACT FROM MINUTES OF MARINE RESOURCES COMMISSION MEETING, MAY 1975.

VI

JLARC Recommendations Pertaining to VMRC Automation and Centralized Handling of Transactions

4. (p. 111 54) VMRC should request assistance from the Department of Management Analysis and Systems Development (MASD) in conducting an overall assessment of the agency's ADP needs.

7. (P. xix) VMRC should centralize revenue collection activities.

Comments of Acting Commissioner, VMRC

- JLARC comments give the impression that VMRC is proceeding to install Automated Data Processing without first having developed a plan. Contrary to this suggestion, VMRC requested and received the assistance of MASD (Management Analysis and Systems Development) in obtaining an agency-wide operational and requirements analysis. This was completed in 1980 and outlined all major systems of the agency that would benefit from automated data processing. It detailed processes and ranked systems in priority for placement on ADP. Funding in the current Biennium is only enough to automate one system, which is oyster ground leasing and billing.

JLARC STAFF NOTE:

Although VMRC has identified potential uses for data processing and initiated an automated billing program in one area, additional planning is necessary to assess overall software and hardware needs and to develop an integrated system for agency-wide data management. This need has been documented in the executive agreement between the Secretary of Commerce and Resources and VMRC dated September 1982 which requests "MASD to conduct a study of all systems needs with the goal of developing a five- or six-year plan for conversion to automated processes."

- JLARC suggested that all revenue collection should be centralized in a main office accounting and billing unit. As has already been stated in comments about licensing, the centralized sale of all licenses and permits is not desirable. Fees flow to the central accounting unit for audit, classification, coding, and entry into the state accounting system. However, sale of licenses by the central accounting unit is not desirable. The management of oyster ground leasing, and the control of automation for the entire leasing system, will be vested in the Engineering Division. Billing charges for leases are built into, and will be generated by, the same system. Again, the revenue will flow to the central accounting unit for audit, classification, coding, and entry into the state accounting system.

CHARTERED 1693
COLLEGE OF WILLIAM AND MARY
VIRGINIA INSTITUTE OF MARINE SCIENCE
SCHOOL OF MARINE SCIENCE

Gloucester Point, Virginia 23062

Phone (804) 642-2111

January 4, 1983

Mr. Philip A. Leone
Deputy Director
Joint Legislative Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Leone:

Thank you for your letter of December 16, 1982 and the opportunity to comment on the exposure draft entitled "The Economic Potential and Management of Virginia's Seafood Industry." Upon your suggestion I contacted Mr. Joseph Maroon on January 3, 1983 and gave him my comments over the telephone. This letter is written in confirmation of that conversation.

I found the report to be an excellent one and, with two exceptions, accurate with respect to the areas of concentration which I am qualified to judge. Concerning the references to the Virginia Institute of Marine Science Research Planning Process on pages IV-15 and 16 (and elsewhere), I wish to call your attention to the fact that the Marine Science Development Council is in the process of being formed and will consist of more than nine members. It will represent a broad spectrum of business and industrial interests and the seafood industry will have broader representation.

At present we have the following representation:

Name	Area of Interest
Mr. George W. Roper, II Chairman of the Council Senior Vice President Norfolk Shipbuilding and Dry-dock Corporation P. O. Box 2100 Norfolk, Virginia 23501	Shipbuilding Industry

Name	Area of Interest
Mr. Louis N. Dibrell, Jr. Executive Vice President Dibrell Brothers, Incorporated 512 Bridge Street Danville, Virginia 24541	Tobacco Industry
Mr. William C. Monroe, A.I.A. Caro, Monroe, Liang - Architects 10 San Jose Drive P. O. Box 6632 Newport News, Virginia 23606	Architecture
Captain J. Maury Werth President Werth Realty Company 1675 Lauran Road Hagerstown, Maryland 21740	Real Estate
Mr. J. Carter Fox President The Chesapeake Corporation of Virginia West Point, Virginia 23181	Pulpwood and Paper Industry
Mr. H. R. Humphreys, Jr. President Standard Products Company Kilmarnock, Virginia 22482	Fish Meal and Oil Industry
Mr. Joseph R. Neikirk Vice President Corporate Development Norfolk Southern Corporation 8 N. Jefferson Street Roanoke, Virginia 24042	Railroad Industry
Mr. Fred M. Biddlecomb President Virginia Waterman's Assoc. P. O. Box 62 Reedville, Virginia 22539	Seafood Industry - harvesting in Chesapeake Bay

We intend to add representation from the following businesses, industries, and interests:

Seafood Industry - processing in Chesapeake Bay

Seafood Industry - harvesting on Continental Shelf

Seafood Industry - processing of species from Continental Shelf

Petrochemical Industry

General Chemical Industry

Coal Industry

Pharmaceutical Industry

As you can see, we shall have strong and diverse representation from Virginia's businesses, industries, and special interest groups with further representation to be added as need is identified. I was most pleased to read on page IV-16, second paragraph, that those preparing the report recognized that expansion of the Council membership is a viable alternative to reestablishment of the VIMS advisory committee. In preparing this response I wished to alert you to the fact that we have been and are engaged in a continuing effort to expand on the Council membership.

I do not believe that expansion or alteration of the mission of the Council is necessary. We had an organizational meeting of the Council on November 12, 1982 at which time the role of the Council was determined to be one in which advice to the Virginia Institute of Marine Science would be offered concerning planning for research and advisory service activities. A secondary fole is to provide guidance for our fund-raising efforts directed toward the private sector. Therefore, the Council will be used "as forum for obtaining the full" (as nearly as possible) "spectrum of industry opinion on VIMS research activities" not the inverse as was stated on page IV-16, first paragraph.

On another matter (see page IV-15, paragraph 3, ll. 5-8), I believe it would be more accurate to state that: "The advisory committee was authorized but not required by Section 28.1-197.1, Code of Virginia."

In addition, I believe that it is presumptuous and unwarranted for "VIMS officials" to "indicate" why the Governor has not reappointed members of the committee. Furthermore, I have seen no correspondence to indicate that he will not reappoint an advisory committee. Any comments beyond that are only conjecture. It would be best to state: "VIMS officials indicate that the Governor has not yet reappointed members to the committee."

I hope you will find my comments to be useful. Once again, please accept my congratulations on a fine report. I found the reading of it to be most informative.

Sincerely,

Frank O. Perkins

Frank O. Perkins
Dean/Director

FOP:jmr
cc: President Graves

JAN 4 1983

COMMONWEALTH of VIRGINIA

Marine Products Commission

P. O. BOX 1248
97 MAIN STREET
NEWPORT NEWS, VIRGINIA 23601
TELEPHONE: (804) 599-7261

M E M O R A N D U M

December 27, 1982

TO: Mr. Joseph H. Maroon, Senior Legislative Analyst

FROM: Jim Wallace, Executive Director Jim Wallace

SUBJECT: Comments on Exposure Draft, "The Economic Potential and Management of Virginia's Seafood Industry"

On behalf of the Commission, I have reviewed the draft document as it pertains to the Marine Products Commission and offer the following comments:

Recommendation 1:

The agency is now receiving the lists of certified shellfish and finfish processors and shippers and these are being compared to our mailing list.

However, on page IV-6, the statement is made: "Since all firms contribute to the Marine Products Fund through licenses and fees...". As the only way to contribute to the fund is through purchase of a buyer or processor's license from the VMRC, and we check such licenses at VMRC on a monthly basis, then we have two possible explanations:

a. The activities of the firm are such that they are not required to be licensed by VMRC, and therefore do not contribute to the fund, or:

b. They are operating without a license, as required by statute.

Recommendation 2:

"The Commission should develop promotions which benefit smaller firms with primarily local markets and which highlight the shellfish products traditionally associated with Virginia."

by:

a. Providing travel expenses and product for cooking demonstrations to home economists from VPI&SU and VDACS to appear on television and radio programs in the Tidewater, Richmond and Lynchburg/Roanoke market areas to promote Virginia seafood.

b. Issuing on a regular basis recipe articles and features on seafood to daily and weekly newspapers within Virginia.

c. Sending "consumer tips" on seafood to radio stations within Virginia.

d. Having developed a series of promotions for use in retail markets.

e. Having printed consumer recipe brochures.

f. Currently planning in conjunction with the Virginia Restaurant Association and individual restaurateurs a food service marketing and promotion strategy.

We are not, however, in a position to design and implement a strategy which can meet the needs or desires of each individual firm within the industry, but only one which, in our opinion, can benefit them collectively.

In regards to the recommendation to review periodically the effectiveness of agency programs, VMPC has, in its Agency Service Agreement, committed to conduct such reviews.

Recommendation 3:

This recommendation is being implemented in the planning of the 1983/84 marketing strategy.

Also, although not noted on the graph on page V-5, the agency is authorized to, and is currently conducting research. Those projects are:

1. Pasteurization of Oysters: A two year $16,000 joint venture project with Steeltyn Corporation of Baltimore, Maryland. Work is contracted to VPI&SU. This project aims at increasing the shelf life of fresh oysters with benefits to the industry being: (a) ability to expand the market area, (b) decreased losses due to spoilage, and (c) leveling out curves in the supply/demand cycle.

2. Criteria for Quality Control: A one year project for $4,500 contracted to VPI&SU. This project is the first step in an

attempt to achieve a marketing advantage by grading Virginia seafood under a voluntary certification program. Contractor is examining quality control criteria inside processing houses and onboard the boats. This work has a direct bearing on the current certification inspection programs conducted by the Bureau of Shellfish Sanitation and VDACS, and upon completion will be circulated to those agencies for comments and input.

COMMONWEALTH of VIRGINIA

JAMES B. KENLEY, M.D.
COMMISSIONER

Department of Health
Richmond, Va. 23219

December 30, 1982

Mr. Philip A. Leone, Deputy Director
Joint Legislative Audit and Review Commission
910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Leone:

The attached comments are in response to your December 16, 1982 letter requesting State Health Department review of a JLARC Exposure Draft entitled "The Economic Potential and Management of Virginia's Seafood Industry".

Various members of my staff have reviewed the draft and present the enclosed concerns and comments for your consideration and possible incorporation into the final report.

One cannot read the report without coming to the conclusion that it is very thorough and comprehensive in scope. The cooperative attitude and spirit evidenced by the investigators during the entire course of the study, investigation and research were commendable in every respect.

Thank you for the opportunity to review the draft report prior to its presentation to the Joint Legislative Audit and Review Commission.

If I may be of further assistance, please advise.

Sincerely yours,

James B. Kenley, M.D.
State Health Commissioner

COMMENTS ON JOINT LEGISLATIVE AUDIT AND REVIEW

COMMISSION EXPOSURE DRAFT ENTITLED:

THE ECONOMIC POTENTIAL AND MANAGEMENT OF

VIRGINIA'S SEAFOOD INDUSTRY

By

Virginia State Department of Health

HEALTH DEPARTMENT CONCERNS

1. In the event a Department of Natural Resources or Fisheries Management Agency is formed, the protective umbrella provided by the State Health Department will be diminished for the Seafood Industry. In order for the industry to survive, it is essential the public be assured the product is safe and wholesome. The close sanitary supervision of the shellfish industry now in effect results from a shellfish oriented typhoid fever outbreak in 1925. Proper classification of shellfish waters and sanitary supervision of processing plants is necessary to assure consumer acceptance of the product. Should these responsibilities not be adequately handled, serious damage may be done to the shellfish and crab meat industries. It is recommended the Secretary of Human Resources be included in the early deliberation of any consolidation effort.
2. The activities of the Bureau of Wastewater Engineering and Water Supply Engineering, which are vital to the overall management scheme that supports the seafood industry, were not discussed in the report.
3. Health Department review and action on permit applications from the Marine Resources Commission, State Water Control Board and U. S. Corps of Engineers were not discussed in the report.

4. The classification of shellfish growing areas relative to their suitability for harvesting for direct marketing is a vital function of the Virginia State Health Department and should be given additional emphasis.

5. Relaying (oysters and clams) occurs from many condemned areas in Tidewater Virginia, not solely from the James River, this activity is jointly controlled by the State Health Department and Marine Resources Commission.

6. Shellfish have not been impacted by Kepone Contamination of the James River to the extent crabs and finfish have been. The river was reopened to the harvesting of shellfish in early 1976 following the general kepone closure.

7. Depuration or the controlled cleansing of contaminated shellfish was not discussed in the report.

8. The Virginia State Health Department makes every effort to assure that outstanding construction and equipment deficiencies in shellfish and crab meat processing establishments are corrected prior to operation of the facility. "Certificates of Inspection" may be issued if only minor deficiencies exist with the understanding, along with a signed statement from the operator that such deficiencies will be corrected prior to commencing operation or subsequent follow up. Normally, this is done in order for the plant name to appear on the Interstate Shellfish Shippers List, which expedites and facilitates interstate shipments and sales. In the event of more serious deficiencies, 30 or 60 day certificates may be issued, provided ample public health protection is afforded. Operational and maintenance deficiencies are corrected as observed while the facility is certified. Supervisors also make frequent inspections with

sanitarians to develop uniformity of inspections.

9. Formalized policies and procedures for issuing Certificates of Inspection to shellfish and crab meat processing establishments are generally believed to be adequate to ensure uniform administration and enforcement by field personnel. In addition to established Rules and Regulations governing the processing of shellfish and crab meat, Part II of the National Shellfish Sanitation Program Manual is strictly enforced. Interpretations and policies for implementing the above regulations are available to the staff through Intra-Bureau memoranda and staff conferences. However, efforts are underway to formalize all such guidelines and requirements into a single procedures manual as recommended.

10. It is not believed any significant duplication of seafood establishment inspectional activities exist between the State Health Department and the Department of Agriculture and Consumer Services. The State Health Department does not inspect finfish processing establishments. Also, retail seafood markets are only visited by the SHD on an infrequent, random basis to assure that shellfish and crab meat offered for sale are from certified sources for the health protection of the consumer. Virginia Department of Agriculture and Consumer Services staff assist in this effort when carrying out their inspectional responsibilities.

While both VDAC and SHD may inspect different phases of a processors operation, the overlapping is minimal and could be eliminated entirely by the State Health Department inspecting all seafood operations associated with a facility that also processes shellfish or crab meat.

11. The State Health Department and Marine Resources Commission work closely

together in regard to the execution of shellfish and crab meat responsibilities. A Memorandum of Understanding was developed between the two agencies approximately 15 years ago defining procedures for administering the controls necessary to assure industry and consumer protection. The State Health Department makes observations of activities in shellfish growing areas and takes required action wherever possible. Monthly reports of shellfish growing area inspections are forwarded by SHD to VMRC for inclusion in that agencies patrol reports.

A similar M.O.U. exists between the State Health Department and the State Water Control Board regarding coordination and excution of assigned responsibilities relative to the Virginia seafood industry (copies attached).

JLARC STAFF NOTE: The referenced document may be viewed upon request at the JLARC staff offices: 910 Capitol Street, Suite 1100, Richmond, Virginia 23219.

GENERAL COMMENTS

1. Page VII: "The ability of state agencies to carry out their existing functions and to assume new responsibilities is critical to the success of any state effort..."

   Comment:

   The above implies new regulations which are inconsistent with current directives to reduce regulation.

2. Page XIV: "The Bureau of Shellfish Sanitation, within the State Department of Health (SHD), is responsible for monitoring shellfish and crab meat plants while the Department of Agriculture and Consumer Services (DACS) carries out similar functions for finfish plants and reprocessed shellfish (e.g. deviled crabs) operations."

Comment:

The word "reprocessed" implies a failure in the original process. Actually, it should read "further processed shellfish, e.g., breaded oysters and deviled crab operations." The State Health Department is responsible for the sanitary processing of shellfish and crab meat in the fresh and frozen state. Shellfish and crab meat are considered a processed food when condiments, seasoning, breading, batter etc. are added. Activities involving further processing is presently a VDAC responsibility.

3. Page XXII, Recommendation 25: "The General Assembly may wish to create an advisory committee representative of all major segments of the industry to advise..."

Comment:

To be all inclusive the words " and agencies" should be added after the word industry.

4. Page XXII, Recommendation 26: "The Bureau of Shellfish...formalize agreements if certification is awarded when substandard conditions exist. A required time frame should be established for correcting the deficiencies..."

Comment:

Normally, the sanitarians establish a time frame for correction. Action will be taken as recommended to formalize agreement with follow up.

5. Page I-8: "Few plants are modernized and, therefore, seasonally employ a large number of semi-skilled labor."

Comment:

It is believed mechanized would be a better word than modernized. Many of the plants are modern, having been built in the last 15-20 years.

6. Page I-8: "Based on various lists of the seafood processors, there are approximately 250 processors of shellfish... and approximately 50 process crabs."

Comment:

The 50 crab processors are in addition to the 250 shellfish processors.

7. Page I-10: " - contamination of the James River which has resulted in the loss of some soup contracts..."

Comment:

Statement is misleading. Soup contracts were lost to those with leases in the James River. The firms processing soup oysters simply expanded their raw product market in other areas.

8. Page I-11: " - protect the public health by regulating the quality of seafood for marketing; and ..."

Comment:

The State Health Department is the lead agency in this regard. It is essential that the health umbrella be maintained for the overall industry benefit.

9. Page II-6: "Since oysters play a major role in the fisheries economy, the General Assembly may wish to consider actions to reverse this trend."

Comment:

It is imperative that some control also be exercised over the water content in processed oysters. Many complaints have been received regarding water content (i.e. containers with 2/3 oysters and 1/3 water). The State Health Department has no regulation for controlling this problem. Federal legislation is needed to guard against unfair competition. The usual response is that any dealer will meet the competition.

10. Page II-12: "In 1959, an outbreak of the disease Minchinia Nelsoni..."

Comment:

Rules of taxonomy nomenclature require the species name to be lower case. Accordingly, "Nelsoni" should be nelsoni.

11. Page II-16: "An increase in the quantity of oysters supplied, for example, will be expected to decrease the price."

Comment:

This statement is questionable in view of the fact the 60-80% of the oysters shucked in Virginia originate in New Jersey, Maryland, Louisiana, Mississippi, Texas and possibly other states. The savings in high freight costs alone should negate this trend unless there is a surplus in all states.

12. Page II-22: "On the positive side, the marketing program would not challenge established practices or relationships in the oyster industry."

Comment:

The marketing program should challenge the industry regarding the

"watering" of oysters as currently practiced.

13. Page II-26 Opt. 4: "...for at least some of the 35 tongers who currently harvest and transplant seed."

Comment:

Surely there are more than 35 tongers harvesting "seed" oysters in Virginia.

14. Page II-41: "Hard clams can be harvested throughout the year except in the polluted James River. During the summer months, contaminated clams may be fished from the James River and relayed to clean water for a minimum of 15 days where the clam cleanses its tissue and becomes suitable for human consumption."

Comment:

Hard clams, as well as oysters can not be harvested from any condemned areas, not just the James River, except for relaying during the time period authorized in the Code of Virginia which is May 1 to August 15. Accordingly, the last sentence on page II-41 should be corrected - May 1 to August 15 - the relaying period.

15. Page II-65: "For example, each dredge boat is limited to harvesting 25 bands a day."

Comment:

Bands should read barrels a day.

16. Page II-69: "...to destroy bacteria and increase shell life..."

Comment:

Shell should read "shelf-life". Repeated in second paragraph.

17. Page II-69: "Wider use of pasteurization techniques could enhance this potential for Virginia's blue crab increase. The Marine Products Commission should take steps to inform and encourage industry members on the potential benefits and costs associated with pasteurization of crab meat."

Comment:

However, pasturization is a very complex process which requires competent and trained personnel. If not handled properly, it could lead to serious trouble with salability or possibly food poisoning outbreaks - i.e. botulism.

18. Page III-41: "Marine Law Enforcement - The division has also been delegated responsibility for enforcing small boat safety in conjunction with the Commission of Game and Inland Fisheries, carrying out portions of the National Shellfish Sanitation Program and patrolling the Potomac River..."

Comment:

The posting and patroling of condemned shellfish growing areas is of great importance to the proper management of the shellfish industry and should be so stated here.

19. Page III-52: "Further, night and weekend patrols apparently need to be increased..."

Comment:

Without question, there should be random night, weekend and holiday patrols to discourage clandestine harvesting and sale of polluted shellfish.

20. Page IV-41: "... and a second time by SHD to ensure the product is from a certified source rather than from contaminated water or a bootleg operation."

Comment:

The rest of sentence after certified source is unclear. If not from a certified source, it may be either from contaminated water or a bootleg operation.

21. IV-44 Recommendation (7): "The Bureau of Shellfish Sanitation should take steps to ensure that departmental policies are uniformly applied across area offices.

Comment:

The Bureau has issued a formal policy in reference to repeat violations - Copy is attached.

22. Page V-3: " - Creating a new agency to house all natural resource functions."

Page V-7 Option 3: "Creating a single Department of Natural Resources".

Comment:

Certain portions of the Natural Resources could be put under a single agency. However, the health department should remain a separate entity to supervise sanitary control. Most states have had great success with the health umbrella concept. Even in those states cited, North Carolina and Maryland, as having DNR, also have health department oriented oversight.

TO: Messrs. Marsh, Smith, Rudolph Date: 7-30-82

FROM: J. A. Hope

SUBJECT: Shellfish Packing Plant Inspection Deficiencies

In order to adequately track routine deficiencies for repeat violations, it is necessary to formalize and standardize a reporting form.

A form has been prepared which has been reviewed by each respective office. Th This form is set up on an operating year of September-August.

The following criteria are to be used in the completion and utilization of this form:

1. Form shall be completed for all shellfish plants.
2. Form shall be completed in a timely manner and kept current.
3. When two consecutive repeat deficiencies or when three deficiencies have occurred, a letter shall be written to the dealer indicating status and need for corrections.
4. If deficiency isn't corrected by the next inspection, area supervisor shall convene an informal hearing in the local office to plot corrective action.
5. If deficiency isn't corrected as agreed in the local office hearing, an administrative hearing will be convened in the central office as soon as convenient to all parties concerned.

DISTRIBUTION:

White Stone 800

Norfolk 350

Accomac 350

Central Office 200

vhm

SHELLFISH PACKING PLANT INSPECTION DEFICIENCIES

PLANT: _____ SANITARIAN: _____

CERTIFICATION: _____ SEASON: _____

COUNTY: _____

SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE JULY AUG.

SECTION B (Shucking Packing)

1. WET STORAGE:
- Protected, State approved

2. PLANT ARRANGEMENT:
- Not subject to flooding
- Separate shucking and packing rooms
- Proper delivery window
- Adequate packing & clothing room

3. DRY STORAGE OF SHELLSTOCK:
- Trucks identified
- Conveyances easily cleanable, clean
- Not used as passageway
- Floor drain protected against backflow

4. FLOORS:
- Impervious, smooth, graded to drain

5. WALLS AND CEILINGS:
- Smooth, washable, light-colored, well-constructed
- Glass in windows satisfactory

6. FLY CONTROL MEASURES:
- Adequate screens or fans, self-closing, outward-opening screen doors
- Approved internal fly control measures
- Free from flies

7. LIGHTING:
- Ample, properly distributed
- Approved light covers - bulbs

8. HEATING AND VENTILATION:
- Comfortable temperature, well ventilated

9. WATER SUPPLY:
- Safe, adequate quantity
- Outlet in each room
- Ample, regulated, hot water supply
- Hot & cold water at each sink vat

10. PLUMBING AND RELATED FACILITIES:
- Approved, no cross-connections
- Backflow preventers available at blowers and water taps
- Adequate number and locations of lavatories, mixing valves, soap, single-service towels,
- Handwashing signs posted
- Adequate number and location of toilets, clean, good repair, ventilated, lighted, supply of toilet tissue
- Toilet room privy doors, tight, and seats self-closing
- No overhead drains, drains unobstructed

11. SEWAGE DISPOSAL: Satisfactory

12. RODENT CONTROL:
- Rodent free, proper construction, barriers in place
- Safe use and storage of rodenticides

13. CONSTRUCTION OF BENCHES:
- Smooth, impervious, self-draining
- Blocks easily cleanable, non-toxic
- Stalls & stools cleanable, painted
- No attached padding on stools

14. EQUIPMENT CONSTRUCTION:
- Material, smooth surfaces & joints, good repair, easily cleanable, equipment installed complies sub-item i
- Container rim 2" above floor
- Blower not connected directly to sewer
- Blower air intake protected

15. GENERAL CLEANLINESS:
- No miscellaneous equipment or material
- Plant used only for shellfish
- No animals, fowl, unauthorized persons
- Premises clean, no rubbish
- Shuckers do not go into packing room

16. CLEANING:
- Building cleaned within 2 hrs.
- Equipment disassembled - cleaned - 2 hrs.
- Benches and blocks disinfected weekly
- Sinks, bactericides, detergents, and brushes
- Blowers and tanks rinsed between use
- Refrigerators clean

17. BACTERICIDAL TREATMENT OF EQUIPMENT: Approved

18. STORAGE OF EQUIPMENT:
- Treated equipment properly stored

19. SOURCE OF SHELLFISH:
- Approved, identified

20. SHELLSTOCK COOLING:
- Refrigerated or protected as necessary

21. SHUCKING SHELLFISH:
- Wash water from approved source (See item 3)
- Shellstock free of mud
- Shell not returned
- Dip buckets not used
- Shucking containers rinsed after each use

22. SHELL DISPOSAL: Prompt

23. SINGLE-SERVICE CONTAINERS:
- Storerooms clean, no rodents, trash, insects
- Kept clean and dry until used
- Contaminated containers sanitized or discarded

24. PACKING SHUCKED SHELLFISH:
- Shuckers do not go into packing room
- Shellfish not contaminated during packing
- Containers closed as soon as feasible
- Clean, properly designed containers
- Containers: identified, Code-dated

25. COOLING SHUCKED SHELLFISH:
- Cooled to 45° in 2 hrs.
- Stored at 40° or less
- Frozen and stored at 0° or less

26. ICE:
- From approved source, protected from contamination, washed

27. RECORDS: Complete, accurate

28. PERSONNEL HEALTH:
- Infected persons and carriers excluded

29. SUPERVISION: Effective

30. CLEANLINESS OF EMPLOYEES:
- Clean aprons or coats, properly stored
- Hair restraints worn
- Finger cots sanitized, no tobacco used, no eating drinking in process area
- Packing-room workers wash and disinfect hands, wear arm guards or roll sleeves to elbows
- Handwashing by employee

SECTION C (SHELLSTOCK):

1. WASHING SHELLSTOCK:
- Shellstock clean at time of shipment
- Wash water from approved source (See item 3)

2. SHIPPING SHELLSTOCK:
- Shipping containers clean, identified

SECTION D (REPACKING)

1. SHELLFISH FOR REPACKING:
- In approved containers at 40° or less

2. REFRIGERATION DURING REPACKING:
- Temperature does not exceed 45°
- Frozen shellfish not thawed

3. CLEANING OF RETURNABLE CONTAINERS:
- Cleaned soon after emptying

JAN 3 1983

S. MASON CARBAUGH
COMMISSIONER

COMMONWEALTH of VIRGINIA

BILLY W. SOUTHALL
DIRECTOR

DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
Division of Product and Industry Regulation
P. O. Box 1163, Richmond, Virginia 23209

January 3, 1983

Mr. Philip A. Leone
Deputy Director
Joint Legislative Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, VA 23219

Dear Mr. Leone:

Commissioner Carbaugh requested that I respond to your letters of December 16, 1982 to him and Mr. O'Connell of our Food Section transmitting an exposure draft of The Economic Potential and Management of Virginia's Seafood Industry.

In response to your request for our factual review of this document, we submit the following comments with the hope that their inclusion in the final document will contribute to its utility and completeness.

Page IV-28 and Recommendation (8) on page IV-45 deal with the registration, certification or permitting of finfish processing operations. The concept of establishment registration may have some merit, however, there doesn't seem to us to be any justification for requiring this of finfish operation to the exclusion of other food processing establishments. As your report indicates, finfish operations number only 156 in our total universe of 5,509 food establishments. The administrative cost of a total registration, certification or permitting process for all food establishments would be significant and could not be done without significant increases in personnel. Funding and staff requirements should be studied and discussed more fully in this document if the recommendation is to remain in the report.

Page IV-29 and Recommendation (9) on page IV-45 deal with the need for specific written sanitary standards. Such written standards were adopted by the Board of Agriculture and Consumer Services in 1977 as part of "General Rules and Regulations Pertaining to Food for Human Consumption". These rules and regulations adopt by reference certain parts of Title 21, Code of Federal Regulation. Title 21 CFR Part 110 "Current Good Manufacturing Practice in Manufacturing, Processing, Packing or Holding Human Food" is adequate for the purpose of regulating finfish facilities. They contain specific provisions for personnel, plants and grounds, sanitary facilities and controls, sanitary operations, equipment and procedures and processes and controls. One of the reasons the Board adopted these regulations was to promote uniformity between the U. S. Food & Drug Administration and VDACS. The GMP regulations address both the JLARC concerns and the need for uniformity of regulation.

On Page IV-30, the report states "Over time, each inspector may develop personalized interpretations of the Virginia Food Laws, resulting in a lack of uniform enforcement statewide." If an individual is prone to "personalize" an interpretation of law, he or she may just as easily "personalize" interpretations of specific written sanitary standards or checksheets. Any written material is subject to some subjective interpretation. Only through training can interpretations be made as uniform as possible. We believe our training program and the monthly visits to field inspectors that our supervisors make achieve realistic uniformity of interpretation.

Pages IV-31 and IV-32 and Recommendation (10) on page IV-45 discuss the advantages of using a checklist report form instead of an open-ended essay format. Page IV-31 also carries a statement that FDA uses a checklist format. The U. S. Food & Drug Administration does not use a checklist format. FDA's form FD483 is a narrative reporting form similar to VDACS "observation sheet". The advantage of a narrative report is its broad applicability and its potential to provide more detailed information than is possible with a checklist. Food inspectors are trained to follow the manufacturing process step by step from raw ingredients to finished product. They do not need a checklist to guide them through an inspection. Checklists for each and every different type of food establishment would not be feasible or practical.

Page IV-32 states that it is VDACS' policy to conduct sanitary inspections every six months and that said policy is inconsistently applied. There is no such agency policy. The Food Section established a goal of conducting sanitary inspections of processing plants every six months, if the resources were available. Over the past two years, the Food Section of VDACS has seen its field force go from 21 inspectors to 16 inspectors (a 23.8% reduction). This loss in manpower has been partially offset by an increase in productivity. On the basis of the JLARC staff analysis of 47 finfish processing plant records, approximately eight months elapsed between establishment inspections. There is no significant difference in consumer protection between 6 or 8 month inspection intervals.

On page IV-34, mention is made of the extensive and detailed biological evidence necessary to obtain a conviction for microbiological adulteration. Proving microbiological adulteration is only one approach in dealing with Food Law violators. It is also possible to proceed against violative firms using the sanitary provisions of the Virginia Food Laws. The Department's "voluntary compliance" approach has lessened the need for instituting criminal proceedings against finfish processing establishments. If the intent of Recommendation (12) on page IV-46 is to increase enforcement activity and improve compliance in the seafood industry, this can be accomplished by modifying the voluntary compliance program. No additional laws or regulations are needed.

We would welcome the opportunity to further discuss the above comments with you.

Very truly yours,

Billy W. Southall
Director

cc: S. Mason Carbaugh,
Commissioner
Mr. Don O'Connell

JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

Research Staff

John M. Bennett
L. Douglas Bush, Jr.
Suzette Denslow
Lynn L. Grebenstein
Stephen W. Harms
Gary T. Henry
Clarence L. Jackson
Kirk Jonas
R. Jay Landis
Sarah J. Larson
Philip A. Leone
John W. Long
Joseph H. Maroon
Barbara A. Newlin
Ray D. Pethtel
Cynthia Robinson
Robert B. Rotz
Mary H. Schneider
Walter L. Smiley
E. Kim Snead
Ronald L. Tillett
Glen S. Tittermary
Susan L. Urofsky
Mark D. Willis
William E. Wilson
R. Shepherd Zeldin

Administrative Staff

Deborah A. Armstrong
Vivian L. Dorrough
Sharon L. Harrison
Joan M. Irby
Betsy M. Jackson
Patricia L. Jordan
David W. Porter

Interns

Florence R. Haines
Carolyn C. Tedholm
Geraldine A. Turner

RECENT REPORTS ISSUED BY THE JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

The Virginia Community College System, March 1975
Virginia Drug Abuse Control Program, October 1975
Working Capital Funds in Virginia, February 1976
Certain Financial and General Management Concerns, Virginia Institute of Marine Science, July 1976
Water Resource Management in Virginia, September 1976
Vocational Rehabilitation in Virginia, November 1976
Management of State-Owned Land in Virginia, April 1977
Marine Resource Management Programs in Virginia, June 1977
Sunset, Zero-Base Budgeting, Evaluation, September 1977
Use of State-Owned Aircraft, October 1977
The Sunset Phenomenon, December 1977
Zero-Base Budgeting? December 1977
Long Term Care in Virginia, March 1978
Medical Assistance Programs in Virginia: An Overview, June 1978
Virginia Supplemental Retirement System, October 1978
The Capital Outlay Process in Virginia, October 1978
Camp Pendleton, November 1978
Inpatient Care in Virginia, January 1979
Outpatient Care in Virginia, March 1979
Management and Use of State-Owned Vehicles, July 1979
Certificate-of-Need in Virginia, August 1979
Report to the General Assembly, August 1979
Virginia Polytechnic Institute and State University Extension Division, September 1979
Deinstitutionalization and Community Services, September 1979
Special Study: Federal Funds, December 1979
Homes for Adults in Virginia, December 1979
Management and Use of Consultants by State Agencies, May 1980
The General Relief Program in Virginia, September 1980
Federal Funds in Virginia, October 1980
Federal Funds: A Summary, January 1981
Methodology for a Vehicle Cost Responsibility Study: An Interim Report, January 1981
Organization and Administration of the Department of Highways and Transportation: An Interim Report, January 1981
Title XX in Virginia, January 1981
Organization and Administration of Social Services in Virginia, April 1981
1981 Report to the General Assembly
Highway and Transportation Programs in Virginia: A Summary Report, November 1981
Organization and Administration of the Department of Highways and Transportation, November 1981
Highway Construction, Maintenance, and Transit Needs in Virginia, November 1981
Vehicle Cost Responsibility in Virginia, November 1981
Highway Financing in Virginia, November 1981
Publications and Public Relations of State Agencies in Virginia, January 1982
Occupational and Professional Regulatory Boards in Virginia, January 1982
The CETA Program Administered by Virginia's Balance-of-State Prime Sponsor, May 1982
Working Capital Funds in Virginia, June 1982
The Occupational and Professional Regulatory System in Virginia, December 1982
Interim Report: Equity of Current Provisions for Allocating Highway Construction Funds in Virginia, December 1982
Consolidation of Office Space in the Roanoke Area, December 1982
Staffing and Manpower Planning in the Department of Highways and Transportation, January 1983
Consolidation of Office Space in Northern Virginia, January 1983
Interim Report: Local Mandates and Financial Resources, January 1983
Interim Report: Organization of the Executive Branch, January 1983
The Economic Potential and Management of Virginia's Seafood Industry, January 1983
Follow-Up Report on the Virginia Department of Highways and Transportation, January 1983

910 CAPITOL STREET — SUITE 1100 — RICHMOND, VIRGINIA 23219 — (804) 786-1258