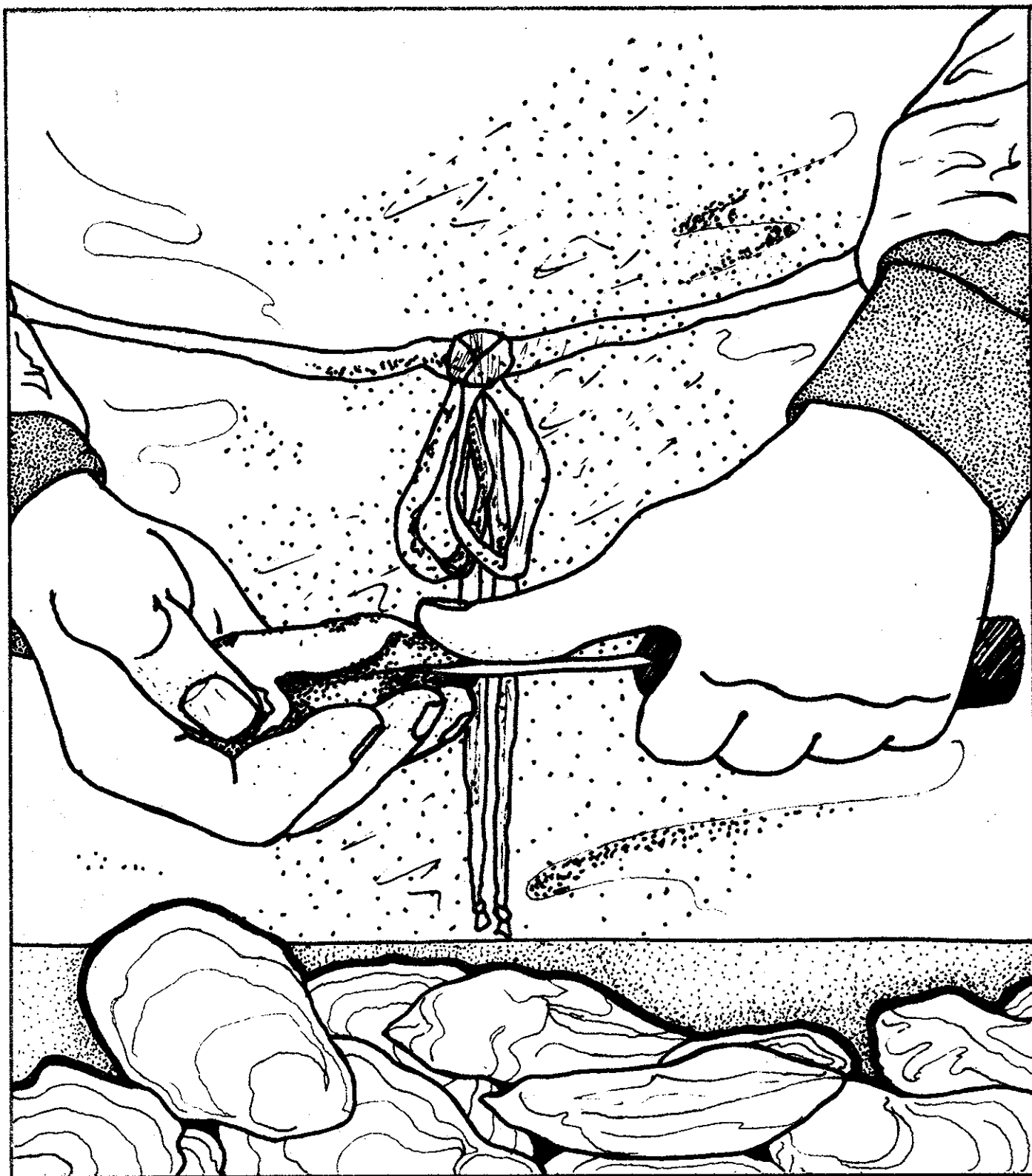


**A REPORT TO THE BI-STATE WORKING COMMITTEE
THE PROBLEMS OF THE OYSTER SHUCKING
INDUSTRY IN CHESAPEAKE BAY**



A Report to the Bi-State Working Committee

on

The Problems of the Oyster Shucking Industry

in Chesapeake Bay

Prepared by the

Ad-hoc Committee

to

Review Problems of the Shucking Industry

9 December 1981

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Issued separately, available in microfiche.	
Contains a bibliography and copies of articles	
and correspondence relating to oyster shucking.	

EXECUTIVE SUMMARY

The ad-hoc task force on oyster shucking has reviewed the problems associated with mechanizing and automating the shucking of oysters through a review of the literature on design and performance of various machines and through extensive discussions with industry and technical personnel.

We found that there are some improvements of the shucking process that have made the industry more efficient and that there are a number of devices in various stages of development short of commercial use.

There is a problem facing the oyster industry with a shortage of skilled suckers and unavailability of a labor pool willing or able to learn the shucking trade.

The following recommendations were developed.

A. It is recommended that the Bi-State Committee take active notice of the serious problems facing the oyster shucking industry and provide long term technological assistance through existing institutions and agencies.

B. It is recommended that industry be strongly encouraged to undertake major revisions to the shucking labor force to upgrade the status of this profession, through efforts such as providing a more appealing work place, and introducing appropriate technological advances. To support this, states should through the use of available resources enhance the perception of oyster shucking as a profession.

C. It is recommended that industry be encouraged to increase the use of steam assisted shucking in these areas where shucking capacity does not meet the industry demands. It is further recommended that state agencies and institutions in Maryland make introduction and use of this system a high priority.

D. We recommend that present state technical assistance programs maintain a continued interest in the topic of mechanical shucking and ensure that any improvements take place within a total systems approach to the problem. We recommend no state funding for specific systems at this time.

E. We recommend that Bi-State agencies and institutions take immediate steps to review existing regulations and restrictions which might be inhibiting technological improvements to more efficient oyster shucking, in cooperation with industry initiatives for modernization.

F. Finally, we recommend that the state agencies in Maryland and Virginia and the Bay oyster industry develop standards that will improve oyster products from the Bay and that the states take the lead in having these standards accepted nationally.

ACKNOWLEDGMENTS

The following individuals served as members of the ad-hoc task force:

- M. P. Lynch, VIMS
- W. P. Jensen, MD DNR
- D. Haven, VIMS
- M. Bundy, MD DNR
- W. Outten, MD DNR
- W. Mashbern, VPI&SU

Robert Learson of the National Marine Fisheries Laboratory provided substantial literature and his own expertise during the entire course of the study. William Shaw from the National Sea Grant Office contributed a great deal of information and comment prior to his retirement.

Several Sea Grant programs responded with substantial information. The inputs from Mr. Rick Jarman, University of Maryland Sea Grant and Bob Harris, University of Washington Sea Grant were particularly noteworthy.

The following persons attended the Fredericksburg workshop:

- M. Lynch, Task force
- W. Jensen, Task force
- D. Haven, Task force
- M. Bundy, Task force
- W. Outten, Task force
- W. Rickards, Virginia Sea Grant
- W. Prier, Maryland Seafood Marketing Authority
- W. Sieling, Maryland DNR Tidewater Administration
- C. Morgan, W. F. Morgan & Sons, Inc.
- W. DuPaul, VIMS Sea Grant Marine Advisory Service
- F. Wheaton, University of Maryland
- R. Jarman, University of Maryland Sea Grant

We appreciate the facilities provided by Mary Washington College to hold the workshop. The recommendations developed by the ad-hoc task force were developed by discussion aimed at achieving a consensus. The specific recommendations may not exactly reflect the opinions of individual task force members.

1. INTRODUCTION

The Bi-State Working Committee initiated a review of mechanical oyster shuckers because of industry requests to fund additional development of specific devices.

M. Lynch and W. Jensen were asked to assemble an ad-hoc task force to review this topic. Preliminary efforts included an extensive review of the literature on patents and design and performance of mechanical shucking systems and other methods used to open oysters.

Letters were sent to the Sea Grant programs in all states with an oyster industry asking for any information that might be available in their programs. In addition, the National Sea Grant Office and the National Marine Fisheries Service were contacted.

The results of these literature reviews and contacts were collected and disseminated to members of the ad-hoc task force. The information collected is presented in the appendix to this report.

After initial review of the material collected and discussions with state, federal and industry representatives, it was determined that the question of mechanical shucking could not be addressed without reference to other factors involved in the shucking process.

This decision is reflected in the recommendations and statements supporting these recommendations in section 3.

A small workshop was held in Fredericksburg, Virginia, 11-12 November 1981, which was attended by most of the members of the ad-hoc task force, representatives of the Sea Grant programs in Virginia and Maryland, and representatives of the oyster industries in Maryland and Virginia.

During this workshop, industry representatives reviewed the problem of getting their oysters shucked with a declining labor force willing or able to shuck oysters. They felt that the only solution to this problem was increased mechanization and automation of the shucking process.

- Workshop participants also reviewed the industry and institutional knowledge of shucking machinery and perceived advantages and disadvantages of each system. A brief synopsis of the various methods or machines developed to facilitate shucking is presented in section 2 of this report.

The workshop brought several items into focus that are part of the overall problem.

a.) There is a declining labor force currently available that is able or willing to shuck oysters.

b.) Oyster packers believe that availability of shell stock is not the main impediment to growth of the oyster industry.

c.) Short term prospects for an increased oyster production over the next few years will severely strain the present shucking capacity of industry.

d.) This impact will probably affect Maryland harvest more than Virginia because of the greater dependence of Maryland on Virginia's shucking capacity.

After review of all of the information generated during the study the task force prepared recommendations on the following topics.

- A. Technical support for the industry.
- B. Work force improvement.
- C. Steam assisted shucking.
- D. Mechanical shucking.
- E. Other improvements.
- F. Product improvement.

2. CURRENT STATUS OF THE SHUCKING INDUSTRY

Introduction

There are about 31 shucking houses in Maryland; of this total only about 15 employ as many as from 20 to 25 shuckers. The remaining establishments typically employ from two to 20 shuckers.

Virginia shucks the bulk of the oysters grown in Chesapeake Bay, and in this state there are about 210 shucking houses. Of this total, about nine employ over about 50 shuckers. This latter group shucks about 50% of the oysters processed in Virginia.

In Maryland all oysters are shucked by hand, using a knife. This process of opening has remained virtually unchanged for the last 150 years. Shuckers simply stab the bill of the oyster, insert the knife, and then cut the adductor mussel. Sometimes the bill of the oyster is broken with a hammer to make insertion of the knife easier. Also, several simple mechanical aids have been developed which clip or notch the bill, as an alternate to using a hammer.

In Virginia, most but not all oysters are opened by hand shucking. The process of using steam to partially gape oysters prior to shucking, however, is gaining wide use.

Other Methods to Open Oysters

A. Steam Assisted Shucking. Gaping by steam makes insertion of the knife easy so that relatively unskilled operators may open as many

oysters and perhaps more than a skilled shucker using conventional methods. In fact, a 30% increase in efficiency is claimed by those who use the former process. Steam assisted shucking first used in Virginia in about 1976 consisted of slowly passing oysters (in the shell in a shallow layer) through a steam tunnel kept at about 155°F. The travel time through the tunnel varies depending on the size and shape of the oysters, but it ranges from about 10-20 seconds. This process in no way cooks the meats, which are sold as raw oysters. The steam shucking process has been approved by the Virginia Department of Shellfish Sanitation. To date there are four steam assisted shucking houses in Virginia; three more are in the planning stage.

B. Steam Cooking of Oysters. This process formerly saw wide use in Maryland and Virginia. Oysters are steam cooked in retorts, and the shells and meats are dumped into a tumble drum which separates shell from meat. In the early 1970's there were four large steam processing plants in Virginia; today only one remains. From a commercial aspect the steamed oyster is considered an inferior product to fresh shucked oysters. There are no steam processing plants in Maryland.

C. Hot Dip Process. The hot dip process developed by Dr. Pringle in Alabama in 1954 is a technique for opening oysters by immersing them in water at 145-150°F for about 3 1/2 minutes. This causes them to gape making them easy to open. The method is used to a limited extent in South Carolina but not in Maryland or Virginia since the meats are partially cooked and do not sell as well as fresh shucked stocks.

Mechanical Shucking Techniques Under Development

In recent years the concept of opening or shucking oysters by mechanical techniques or by using sophisticated technology has received much attention. Many patent processes exist; none have reached the stage where they can be used commercially. There follows a brief summary of some of the more promising techniques.

A. Harris Machine. This apparatus consists of four processing stations arranged in a vertical work carrier which consists of two tables rotating about a vertical axis. These stations position individual oysters, cut off the hinge with a saw and next, separate the valves using a hydraulically powered wedge. Next, mechanical knives cut the adductor mussel from the shell and the meats drop into a container.

B. Evans Machine. This device consists of an electrically heated tunnel and a conveyor tract to which is attached individual bivalves holder arms, with shielding elements for protecting the hinge and bill portion from being burned. As the oysters pass through the oven, heat breaks the bond between the oyster shell and the adductor mussle. A vibrating and turning motion of the tract and water jets assist in removing meats from the shell.

C. Wheaton Shucker. This device developed by Dr. F. W. Wheaton at the University of Maryland utilizes a combination, a saw which cuts off the hinge end, infrared heat and mechanical force. Heat is applied to one valve at a time and the bond between shell and adductor mussle is broken.

D. Other Devices. Almost 100 other techniques have been investigated which includes shock wave energy, ultrasonic energy, lasar beam energy, mechanical shock, chemicals, vacuums, and freezing. None of these processes to date have proven practical.

3. RECOMMENDATIONS

A. Continued Technical Support

It is recommended that the Bi-State Commission take active notice of the serious problems affecting the oyster shucking industry in the Bay and provide long-term and technological assistance.

The seafood industries, particularly the oyster industry, are important to the states sociologically and economically. Chesapeake Bay continues to lead the world in the production of oysters. Maryland and Virginia seafood values are frequently cited as a fundamental value and justification for environmental protection and fishery research and development.

Both states currently have government and institutional programs which can assist the oyster shucking industry (Virginia Polytechnic Institute and State University; the Virginia Institute of Marine Science; Virginia Sea Grant; Maryland Sea Grant; University of Maryland; Department of Natural Resources, University of Maryland Joint Shellfish Program; Virginia Marine Products Commission; Maryland Office of Seafood Marketing; Virginia Shellfish Sanitation; Maryland Department of Natural Resources; and Virginia Marine Resources Commission). Each of these agencies receives state appropriated funds and several are eligible for federal funding. Additional assistance is available through federal agencies.

The Bay oyster shucking industry is currently exhibiting the symptoms of an industry caught up in an evolution of changing consumer attitudes, increasing unit production costs, decreasing specialized work forces, traditional practices and a need for modernization. Competition for the consumer seafood market is increasing from other oyster producing states and other countries.

A continuing commitment of state programs is considered necessary to assist this industry. If the shucking and processing portion of the industry is unable to purchase or process the oysters available from the harvesters, the effect is felt throughout the seafood community. Vigorous state efforts to produce more oysters are for naught if markets and processing capabilities are not maintained. In the interest of efficiency and the best use of the two state's government and institutional arrangements, the Bi-State Commission should take active notice of the needs of the industry and direct state agencies and institutions to participate with the industry to address specific problems.

A Bi-State commitment is particularly important at a time when federal funding may be reduced. A number of general areas need to be addressed on a continuous basis over the next 10 years; flexibility in processing without dependence on a small work force of skilled shuckers; reduction of unit costs; improved product quality; and new products.

B. Work Force Enhancements

Traditionally, shucking has been regarded as a menial job relegated to a second class status. It is often thought of as unskilled and dirty and the conditions are often cold and damp. This has created a negative social stigma which has provided little incentive for new workers to enter into the labor force. As a consequence, the present labor force consists of a small, declining market of aged workers. Many processors have expressed concern that without replacements for these workers, there may soon be no shucking capacity. Ironically, the negative social stigma which discourages new entries has been, in part, perpetuated by some of the processors themselves. Existing work conditions and management-labor relations have the unintentional consequence of reinforcing the perceived negative value of shucking. Many processors do provide amenities to their shuckers; but, this is often done in an attempt to keep those presently on board, not to attract new entries. Characteristic of the remoteness of many fishing communities is a socio-cultural relationship that has evolved between the fishing industry and the surrounding community. Even with the prevailing stigmas many workers have continued to shuck oysters because of its compatibility with their social system.

Efforts have been made to attract new entrants into this labor force. Nearly all have failed presumably because of the prevailing negative connotations associated with shucking. Television, military service and education have changed the social acceptability of some

traditional employment opportunities. As programs are initiated to attract new workers to jobs with traditional social stigmas, resistance is encountered. As a result, processors are forced to continually search within the existing narrow labor market for workers.

It is therefore the recommendation of this committee to strongly encourage the industry to undertake major revisions in their approach to the shucking labor force. Since the basis for this negative stigma is centered in the preception of both the work conditions and social value of the job, efforts should be initiated to create a new image. Providing a cleaner, drier work area and upgrading the classification of the job are essential. Workers are attracted to jobs they can take pride in doing. Oyster shucking is a skilled profession, a fact which should be used to the advantage of the industry.

As a skilled trade, accouterments associated with it would help to create a sense of worth. Aprons, sanitary coats, and head gear are examples of symbols which denote a skilled or technical vocation. Introducing new technological advances into the industry (processing assisted by steam, mechanical or other methods) provides the opportunity to introduce new job titles and new worker classification. An "oyster processing technician" denotes a socially acceptable skilled or technical vocation. Experience has shown that working in a skilled or technical trade in a modernized setting encourages pride and helps to attract new workers.

It is also recommended that with the development of new working conditions and recognition of oyster processing as a skilled or technical vocation, the states and the industry should jointly seek to identify an alternate labor market from which a new labor force would be obtained. Initially, this requires a carefully designed comprehensive initiative to re-educate the existing and future labor market concerning the social worth of participating in oyster processing. To this end the states should commit available resources (i.e., education, social services, employment services, and industry extension and liaison) to enhance the perception of oyster processing work. It is anticipated that with the appropriate direction, effort and time, a new labor force will emerge to meet industry demand for skilled and technician level workers.

It must be emphasized that the enhancement of the work force for oyster processing cannot be done in a void. It is incumbent on the industry to remove those conditions which perpetuate a negative social value; concurrently, the states must commit the necessary agencies to assist the industry in identifying alternate labor markets and attracting the necessary labor force. Finally, the ability of the industry to create a new image for oyster processing will be partially dependent upon the development of and incorporation of technological advances in oyster processing.

C. Steam Assisted Shucking

It is recommended that the shucking industry adopt the best known available steam-assisted technology until other shucking systems are perfected.

A steam assisted method of opening oysters until they "gape" was developed in Virginia and has been in use since 1976. At the present time there are four plants using this technology in Virginia with three additional plants due to install this equipment in the near future.

In Virginia, the steam tunnel method, as it is commonly referred to, has been intensively studied by the VPI&SU Sea Grant program with the cooperation of the oyster industry in Virginia. These studies have shown that there is an approximate 30% increase in productivity when the steam tunnel is used to gape the oysters before they are hand opened.

There are several variations of steam tunnels in use in Virginia and each has varying degrees of efficiency. The basic system is very simple and can be immediately applied in most oyster houses in Maryland and Virginia. The primary requirements are a source of steam and a conveyor system to carry the oysters through the steam tunnel.

The Virginia Polytechnic Institute and State University Sea Grant program has developed a full set of plans and guidelines that can be adapted to fit most existing oyster houses. Since the equipment

necessary to utilize this system can be installed for approximately 10-12 thousand dollars (excluding the steam boiler) it can be cost effective for even small oyster houses having limited investment capital.

The committee feels that the steam tunnel method of opening oysters has the potential of keeping Maryland and Virginia oyster houses in business until other methods of processing oysters are developed or until it is demonstrated that the steam tunnel is the best practical method for opening oysters.

No Maryland oyster houses are using the steam tunnel system in spite of the fact that Maryland has a more critical need for additional shucking capacity than Virginia.

Some additional benefits attached to the steam tunnel system by the Virginia studies are an increased shelf life for the product due to partial sterilization of the oyster in the steam tunnel and a uniform color of oyster meats due to the slight rise in the temperature of the oyster meat during the steam treatment process.

The steam tunnel system should be put in use immediately to increase oyster shucking production in those areas of Maryland and Virginia when shucking capacity does not meet the industry demands.

The committee recommends steps to encourage the Maryland oyster processing industry to install this technology as a way to increase processing capacity almost immediately. It is recommended that the

state agencies and institutions cooperate to make the introduction of this system in Maryland a high priority project.

D. Mechanical Shucking

It is our opinion that none of the mechanical shuckers built to date are sufficiently superior to the others or are at a stage in development that would bring them to commercial status in the near future (within the next three years).

We recommend no state funding of specific systems at this time.

We do recommend that the present state technical assistance programs maintain a continued interest in this topic and ensure that in so far as possible any mechanical shucking improvements take place within a total systems approach.

A major impediment to private industry developing a mechanical oyster shucker without public subsidy lies in the perceived small market for the final machine. We received indications that marketing potential studies done by some machinery manufacturing corporations indicate that the developmental costs could not be recouped by sales. Much of this development of present oyster shucking machinery has been supported with public funds. One estimate of public subsidy was \$500,000 for one system that is still not fully operational.

With major machine manufacturers believing they cannot recover developmental costs, new advances in mechanical shucking will probably be developed by individual entrepreneurs or small businesses.

Activity in this sector could be encouraged by the establishment of a prize for the first machine that meets a certain standard of shucking. If such a prize were established with either public or private funds or some combination of public and private funds, it would be necessary to have a clear definition of what standard of performance would be satisfactory.

Any immediate activity of state agencies to encourage development of mechanical shucking should be limited to encouraging private sector activity, particularly in view of increased tax incentives for corporate R&D.

E. Recommendations for Other Improvements

It is recommended that Bi-State agencies and institutions take an immediate initiative to review existing regulations and restrictions which might be inhibiting needed changes and to assist in work place improvement and technological initiatives.

The Task Force recognizes that any investment to improve the shucking capabilities of processing plants is only one step in a series of technological improvements necessary to upgrade the entire shellstock handling system. A recent study by Drs. Tamchoco and Coale, VPI&SU, discussed in detail some system improvements for the oyster processing industry. Their study, "An Economic Design for an Oyster Shucking Production Line: A Comparative Study of Four Systems," is included in the appendix section of this report. The Task Force is not suggesting that this study answers all the questions of shellstock

handling, but pointing out that many improvements must be made in the processing sectors, and the study certainly represents an excellent starting point.

The use of available technology in processing plants will reduce the dirty, often unpleasant work conditions, and should lead to better working performance and, ultimately, a better product. For example, the installing of a shellstock washer as part of the delivery system to the shucking station will result in a much cleaner work area. A cleaner work area is an excellent selling point in the recruitment of any labor force.

The various health departments of the oyster producing states have regulations that deal with the washing of shellstock and the handling of the runoff. It is recommended that these regulations be critically reviewed to determine their impact upon any wash system and, if necessary, initiate efforts to amend any that are unnecessarily prohibitive. Obviously, no changes should be suggested that may comprise safeguards to public health.

It is felt that the shellfish industry has the primary responsibility for overall system improvements. The role of the state governments is to provide the expertise necessary to aid in system design and development. Certainly the universities have the engineering capability to provide this support, and must make this expertise available to the industry. The role of the resource

management and regulatory agencies must be to develop meaningful policies consistent with available technology.

F. Product Improvements

In order for the state governments of Virginia and Maryland to justify major efforts in support of the oyster industries in their states, the industry must strive to make improvements to their products. These improvements are necessary for the upgrading of the current industry. A projected increase in raw product availability and increased productivity from new and improved processing methods and increased competition from other food products emphasizes this need.

Standards should be developed jointly by industry and state regulatory agencies of both states working together. The two states should take the lead in having those standards and controls which are adopted incorporated into the proposed Interstate Shellfish Sanitation Conference.

These standards should at a minimum address the following:

- a) Oyster liquor ratio in any container offered for sale either at wholesale or retail.
- b) Size designation such as number of oysters per gallon for standards, selects, extra selects, and counts.

c) Overall quality as to bacterial level, and other factors dealing with the assurance of fresh, wholesome oysters reaching the consumer.

d) Labeling and consumer information.

The industry has primary responsibility with state agency support to develop new product form along with improved packaging that will present the oyster to the retail consumer in a new concept.

Product shelf life of several months is technologically possible and should be a priority area for industry. This would enable better planning for investment in technological improvements.