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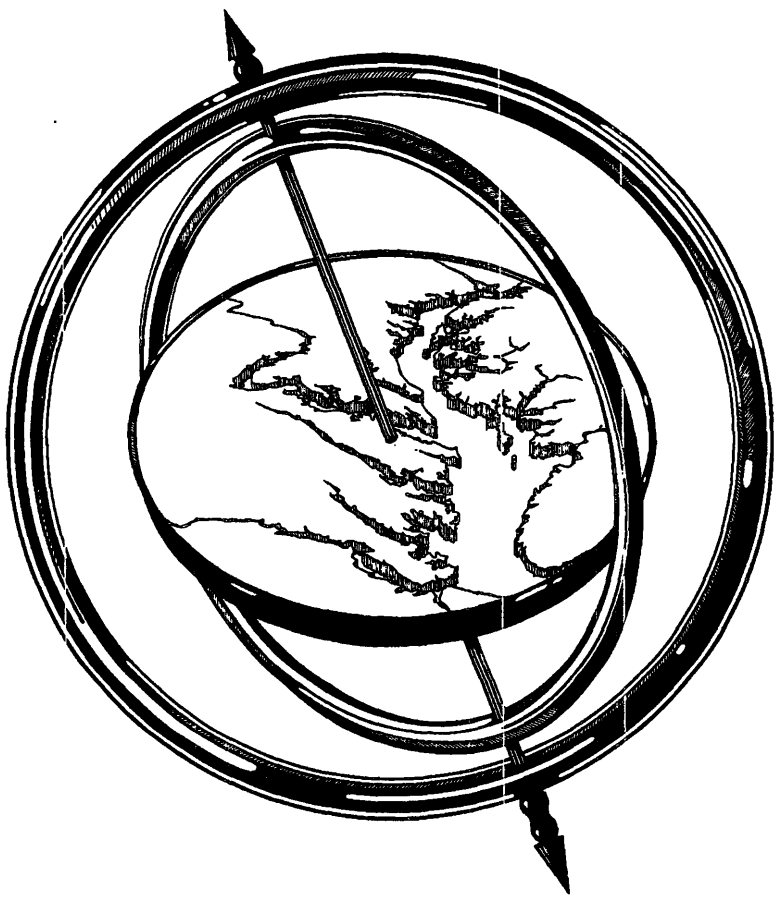

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Economic Aspects of the Chesapeake Bay Oyster Fishery: Problems and the Future or Should the Industry be Revitalized?

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Abstract: Between 1930 and 1939, average annual landings of *Crassostrea virginica* from Chesapeake Bay was 32 million pounds (meat weight). During the period 1980-88, average annual landings declined to 14.6 million pounds. In 1990, landings declined to less than 3 million pounds of meats. It has been this consistent downward trend in landings, particularly since 1983, that has concerned that National Marine Fisheries Service, various state agencies, and members of the oyster industry. In response to declining harvests, the National Oceanic Atmospheric Administration Sea Grant Program in cooperation with the National Marine Fisheries Service and various state agencies and sea grant programs developed *A Plan Addressing the Restoration of the American Oyster Industry*. The plan recommends that roughly $3 million annually allocated between 1991 and 1995 for research dedicated to restoring the oyster industry. A proposed $15 million budget raises two important issues that must be addressed: (1) should the industry be revitalized, and (2) if so, what needs to be done. In this paper, we offer that revitalization depends upon the marketability of oysters. A nationwide survey of wholesalers conducted in 1992 suggests that consumer demand for oysters has dramatically declined. Alternatively, oysters may be nearing the end of their product life cycle or going the way of the Edsel, IBM personal computer, or Yugo. Industry revitalization efforts, therefore, must be closely linked to, at least, a generic marketing campaign directed at restoring consumer confidence in oyster products. We conclude, however, that resource enhancement efforts based on bio-remediation goals (enhancing water quality and decreasing the population of jellyfish) may be warranted, and enhancement activities rather than industry revitalization efforts should be the focus of a national research program.

INTRODUCTION AND DISCUSSION

Industry Problems and the Need for Public Assistance

Over the past 60 years, landings of the eastern oyster, *Crassostrea virginica*, from the Chesapeake Bay region have precipitously declined (figure 1). This decline has been particularly pronounced, however, since the second half of the1970s, when landings exceeded 20 million pounds of meats per year. Since 1990, landings have been less than 4 million pounds of meats per year. In response to the rapid and large decline in landings, the National Oceanic Atmospheric Administration (NOAA), Sea Grant Program, National Marine Fisheries Service(NMFS), National Coastal Resources Research and Development Institute, and various state agencies and sea grant programs developed a strategic plan for restoring the American oyster industry (Virginia Sea Grant 1990).

The plan outlines numerous major program areas and objectives for industry restoration. More important, however, is that the plan recommends annual expenditures of approximately $3, million per year between 1990 and 1995 or a total $15 million for industry restoration activities. Given that the entire exvessel value of landings from the region is less than $15 million per year, the decision to allocate

$3 million for oyster industry restoration activities needs to be carefully scrutinized. Alternatively, are there problems affecting the industry other than raw material supply that need to be resolved in order to successfully restore the industry?

In this paper, we address the question of whether or not $15 million should be allocated to industry restoration activities. A more detailed analysis of the oyster industry and associated restoration activities is provided in Lipton and Kirkley (1994). We focus on problems identified by fishermen, processors, wholesalers, and dealers, and consumer demand for oysters. Results of a nationwide survey of dealers and an analysis of consumer demand for oysters suggest that there has been a large change in the demand for oysters; since 1982, the per capita demand for oysters has declined by 54% and total demand has declined 52%. We conclude that oysters as a consumer product are going the way of the Edsel, Yugo, and IBM personal computer/oysters appear to be near the end of their product life cycle. We also, however, offer two positive notes:

1. The decline is not irreversible; a well-structured marketing effort could restore consumer confidence in the product.
2. Recovery of the resource for the purpose of bioremediation may offer substantial economic benefits to society.

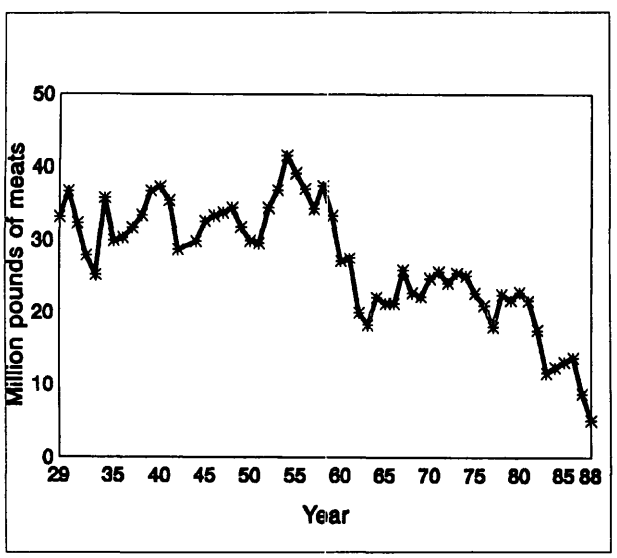

Figure 1. Annual landings of *Crassostera Viginica* from Chesapeake Bay region, 1929 - 1988.

Resource and Economic Conditions and Restoration Activities

What the Fisher Thinks

A survey of Maryland and Virginia fishers provided rather significant conclusions about resource conditions and possible restoration policies. Not surprising, a majority of fishers (60%) did not believe that overfishing was responsible for declining resource levels (table 1). A majority (65%) suggested that disease was primarily responsible for declines in the resource level of *Crassostrea virginica;* 39% of the respondents thought water pollution was the primary reason for reduced resource conditions. An overwhelming 79% of the respondents believed that consumer concern about product safety was seriously hurting the U.S. oyster industry.

What options for improving resource levels were supported by fishers? Nearly 80% of the respondents stated they supported increased seeding. Eighty-one percent stated they thought increased shelling would improve resource conditions. Use of disease-resistant native oysters was supported by 54% of the respondents, and 47% of the respondents thought that fast-growing cultured oysters should be used to restore resource levels.

When asked about the introduction of the Japanese oyster, *Crassostrea gigas,* there was a clear difference of opinion between Maryland and Virginia fishers. Nearly 90% of the Maryland harvesters indicated they did not support introduction of the Japanese oyster. In comparison, 83% of the Virginia fishers supported introducing *gigas.* A large majority (71%) of the Maryland fishers also indicated that they thought the introduction of *gigas* was very risky, while only 34% of the Virginia fishers thought the introduction of the Japanese oyster was risky.

What the Processor/Dealer Thinks

An initial limited survey of dealers in the Northeast revealed that dealers and processors had been negatively affected by the decline in the industry. Approximately 51% of respondents indicated they had laid off employees because of declining resource conditions. Eighteen percent of the respondents, however, stated they had actually increased the number of employees.

When asked about obtaining supplies of oysters to fill orders, only 37% of the respondents indi-

cated they had a problem. Moreover, many processors stated that when they had supply problems, the purchased eastern oysters, *Crassostrea virginica*, from Gulf state dealers. Last, 73% of the Northeast respondents stated that in their view the future prospects for the oyster industry were bad.

Marketing Issues: Demand, Status, and Problems

To better understand the problems facing the industry, a detailed survey of 863 dealers in the United States was conducted in 1992. An overwhelming 85% of the respondents indicated that negative media publicity was the number one problem confronting the industry (table 2). However, only 60% and 69% of the respondents from Maryland and Massachusetts respectively indicated that negative media publicity was the major problem. Consumer concerns about product contamination and water quality were identified as the second major problem facing the industry. Only 47% of the Virginia dealers thought consumer concern about product contamination was a major problem.

A major survey question with significant ramifications for industry restoration activities was whether dealers thought supplies were inadequate. Only 19% of the respondents indicated they thought supplies were inadequate; 31% and 47% of the Maryland and Virginia dealers respectively, thought supplies were inadequate. In comparison, only 4% of the dealers from Washington State, which has a large aquaculture industry, stated that supplies were inadequate.

Another problem identified by analysis of the survey results was consumer resistance because of health/nutritional concerns. Thirty-seven percent of the respondents said that consumer resistance posed a major problem; these were primarily dealers in Alabama, Delaware, Florida, Hawaii, New Jersey, Oregon, Pennsylvania, Texas, and Washington State. Only 23%and 20% of the Maryland and Virginia dealers, respectively thought consumer resistance posed a major problem.

When asked about price levels, only 18 % and 20% of respondents thought wholesale and retail prices respectively, were too high. One hundred percent of the respondents from Washington, D.C., indicated that retail and wholesale prices were too high; 43% of the New York dealers thought retail prices were too high. Thirty-eight percent and 46% of Maryland dealers thought retail and wholesale prices were too high. Similarly, 40 % and 47% of the Virginia dealers thought retail and wholesale prices were too high.

Regarding competition from foreign imports, only 18% of the respondents thought that imports posed a problem for the oyster industry. Most of the respondents that indicated they thought imports were a problem were from Louisiana. For unknown reasons, 37% of the Maryland dealers and only 7% of the Virginia dealers thought that imports posed a problem.

Another important finding of the survey was dealer preferences for type and species of oyster. Whether or not dealers and consumers have preferences for a particular species or differentiated product has important ramifications for industry restoration activities. For example, if resource levels of the eastern oyster in the Chesapeake Bay region were restored but there was a clear preference for oysters from other areas or for different types of oysters, industry restoration efforts would fail without an appropriate marketing campaign. Overall, 68% of the respondents indicated they had a brand name preference, and 40% stated they preferred local to regional oysters; only 12% of the respondents indicated they had a species preference. Eighty-four percent of the respondents stated they preferred oysters from a specific state while 56% indicated they preferred that their oysters come from a particular body of water.

Responses to a question on seasonality provided unexpected results. While the respondents indicated a clear pattern in seasonal demand, 59% of the respondents said their sales did not follow seasonal patterns. In fact, they sold oysters year-round. States in which dealers indicated substantial nonseasonal sales included California, Florida, Massachusetts, New York, and Pennsylvania. Dealers from the other states indicated that sales were definitely seasonal.

What about the half-shell trade? The half-shell trade has traditionally been the product yielding the highest return. Overall, 43% of the dealers indicated they preferred the oyster, *Crassostrea virginica*, from the Eastern states; only 14% of the dealers indicated they preferred *virginica* from the Gulf states. Dealers from Hawaii and Washington State were the only ones indicating a preference for *gigas* for the half-shell trade.

Responses to a question about dealers' species preferences for the shucked-meat trade indicated that preferences were likely to be regional-specific. For example, 37% of the dealers indicated they preferred eastern *virginica* while 21% preferred Gulf coast *virginica*. Dealers preferring the eastern source were primarily from East Coast states while dealers preferring Gulf coast *virginica* were

Table 1. Attitudes of East Coast oyster fishers about the oyster industry.

Statements	Percent of oyster fishers with attitude				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Oyster stocks are low because of overfishing	16	0	24	18	42
Oyster stocks are low because of disease	65	23	3	5	5
Oyster stocks are low because of pollution	39	21	15	15	10
Consumer about safety of shellfish is hurting industry	56	23	13	3	5
Market demand for oysters is increasing	15	28	33	8	15
Increased seeding will improve the industry	72	8	15	0	5
Increased shelling will improve the industry	68	13	8	5	5
Disease resistant native oysters will improve the industry	31	23	26	5	15
Fast-growing cultured oyster will improve the industry	26	21	33	5	15
Support introduction of Japanese oyster	15	5	10	3	67
Maryland respondents	7	0	7	0	86
Virginia respondents	50	33	0	17	0
Introduction of Japanese oyster is risky to native populations	56	10	13	8	13
Maryland respondents	64	7	11	7	11
Virginia respondents	17	17	17	17	33
Japanese oysters will bring lower prices	32	24	32	5	8
Maryland respondents	37	22	30	4	7
Virginia respondents	17	17	33	17	17
Oyster industry will recover on its own if left alone	10	10	23	13	44
Maryland respondents	4	11	29	11	46
Virginia respondents	33	17	0	17	33
I will oyster even if I could make 50% more otherwise	29	13	21	16	21
Oyster program should be run by oyster fishers	49	26	18	3	5

Table 2. Ranking by firms of one of four major problems.

State	1	2	3	4	5	6	7	8	9	10	11	12
	Percent of Firms											
Alabama		100	100		100							
California	7	75	36	32	86	11	14	14	7	18	14	
Delaware		100	100		100	100						
Florida		89	67	44	89	22		11		11		
Georgia		67	33		100			33		33	67	
Hawaii	50	50	50	50	100		50					
Louisiana	19	88	38	13	94		6	13	13	44	13	
Maine		50		50	100	50						
Maryland	38	62	23	62	69	31	46	8	8	31	15	
Massachusetts	20	60	10	10	60	40	20	10			20	
Mississippi		100	40	40	100	40	20	20		20	40	
New Hampshire		100			100							
New Jersey	33	100	67		100	33					33	
New York	43	86	29	29	86	14	14			14		
North Carolina	9	64	27		91	27	18	18	27	18	9	
Oregon		50	100		100						50	
Pennsylvania		100	67		100	33	33	33	33			
Rhode Island		100	25		100	25	25		50			
South Carolina	29	71	29	14	100	14		29	29	14		
Texas	13	63	63	38	75	38	38		13		13	
Virginia	40	47	20	7	80	47	47	33	20	7	13	
Washington, DC	100	100			100		100					
Washington St.	18	80	40	44	82	4	11	9	11	27	13	
United States	20	75	37	26	85	19	18	13	11	18	13	

Problems 1-12: (1) high retail price, (2) consumer concerns about production contamination/water quality, (3) consumer resistance health/nutritional concerns, (4) familiarity with oysters, (5) negative media, (7) high wholesale prices, (8) price competition with other types of oysters, (9) inadequate state/federal regulations, (10) competition with imports, (11) other, (12) have no opinion.

located in Gulf states. Similarly, dealers indicating a preference for *gigas* or the Japanese oyster were located on the West Coast of the United States.

Last, 5% of the dealers indicated they were not going to sell oysters of any type in 1993. Five percent stated they may not sell oysters in 1993, and 4% indicated they were uncertain about selling oysters in 1993 or any other year. The majority of the respondents indicated that they either would not sell or may not sell oysters in 1993 were from Louisiana and Texas.

What the Consumer Thinks

Given a limited budget, we were unable to actually survey the consumer. Data on at-home and away-from-home consumption, however, were available from the USDA National Food Consumption Survey and the NMFS National Seafood Consumption Survey. These data were used to assess the at-home and away-from-home demand for oysters.

At-Home Demand for Oysters

The demand for at-home consumption was examined for three product forms: (1) fresh/frozen oysters, (2) canned oysters, and (3) oyster stew. Details of the analytical methodology are available in Berry (1992), Buss (1990), Buss and

Strand (1991), and Lipton and Kirkley (1994). Analyses indicated that different factors influence consumer demand for each product.

As one might expect, household income positively affected the likelihood of fresh and canned oyster purchases (table 3). Income, however, had a negative influence on the demand for oyster stew. In comparison, household size had a negative influence on purchasing fresh and canned oysters but positively influenced purchases of oyster stew. The analysis also revealed that families with children were less likely to purchase any product form of oysters. The age of the homemaker was also found to be an important determinant of oyster sales; a homemaker more than 44 years of age was found to be twice as likely to purchase oysters as a younger homemaker. Households with a male head of household were more likely to purchase all types of oysters than were households with a female head of household. Nonwhite households were also found to be more likely to purchase fresh and canned oysters but less likely to purchase oyster stew.

The tradition of purchasing oysters in "R" months was also found to be supported by the analysis. The positive influence of "R" months, however, was restricted to purchases of fresh oysters. The influence of "R" months was not found to characterize purchases of either canned oysters or oyster stew. This result coincides with dealer and processor responses that oyster sales are not really seasonal. There was, however, evidence that households are more likely to purchase canned oysters and oyster stews during the fourth quarter.

Away from Home Demand for Oysters

Data necessary for a detailed analysis of the away-from-home demand were not available. Rather than ignore this important source of consumption, the number of times a household head purchased oysters away from home in a month was analyzed (for additional information on the methodology, see Berry 1992, Buss 1990, Buss and Strand 1991, Lipton and Kirkley 1994). The number of times a household purchased oysters was examined relative to certain household and market characteristics.

Factors found to have a positive influence on the number of times a household purchased oysters in a month were household income, rural residence, suburban residence, and sex (table 4). The following factors were determined to have a negative influence on the number of times a household purchased oysters in a month: education (more educated less likely to purchased oysters away from home), New England resident (individuals from New England less likely to purchase oysters away from home), New York Metropolitan area resident, mid-Atlantic resident, and retail price. Retail price, however, only had a negative influence during the off-season or non "R" months.

$15 million and Should the Industry Be Revitalized

Whether or not $15 million should be allocated to restoring the industry is a question that has already been answered. NOAA/NMFS has regularly funded oyster research since 1990. Moreover, the political process has determined that industry restoration is a priority of the research dollars. Given that oyster industry restoration is a research priority of the federal and state government agencies, what needs to be done other than increasing the available resource?

Research presented in this paper demonstrates that successful restoration of the industry will require a major marketing campaign. The demand for oysters has substantially declined over the past 10 years; the market demand is simply very weak. Consumers are concerned about product quality, safety, and water quality.

A successful marketing campaign will have to address consumer confidence and concerns about product safety and water quality. Individuals younger than 40-45 years of age will have to be targeted; older individuals are familiar with oysters. New products will have to be introduced to the consumer. Consumption of raw oysters, once the major product of the industry relative to income opportunities, will continue to be highly discouraged.

If a marketing campaign is to be supported by public funds, it will be necessary to develop a national, regional, and local marketing strategy. A comprehensive strategy is necessary to ensure equity among the nation's oyster harvesters and processors. If a program was implemented today and was successful in increasing the demand for oysters in a year, Gulf Coast and West Coast dealers would benefit; fishers and dealers in the Chesapeake Bay area would not have sufficient natural resource levels to supply

Table 3. Factors influencing the at home demand for oysters.

Household Characteristics	Fresh/Frozen Oysters		Canned Oysters	
	1977/78 and 1981	1987/88	1977/78 and 1981	1987/88
Household Income	++[a]	NS	++	NS
Household Size	NS[b]	NS	NS	++
Male Household Head	++	++	++	NS
Non-white Household	++	++	++	NS
Age	++	++	++	NS
Months without an R	--[c]	--		
Rural Residence	++	NS	++	++
Quarter 1			--	NS
Quarter 2			--	NS
Quarter 3			--	NS

[a]++ indicates sigificant and positive influence on oyster demand at 10% or less level of statistical significance.
[b]NS indicates variable does not significantly influence oyster demand.
[c]–indicates significant and negative influence on oyster demand at 10% or less level of statistical significance.

Table 4. Factors influencing away from home demand for oysters.

Factor	Positive Effect	Negative Effect
Household Income	✓	
Rural Residence	✓	
Suburban Residence	✓	
Male	✓	
Education Level		✓
New England[a]		✓
New York Metro Region[a]		✓
Mid-Atlantic[a]		✓
Retail Price[b]		✓

[a]Compared with residence in south.
[b]Only significant during months for which spelling does not contain the letter "R".

the market. Alternatively, importers may reap the benefits of a successful marketing campaign.

Even if industry restoration activities are not supported by economic analysis, there may be substantial reasons for restoring the resource. Bioremediation has often been suggested by researchers as a product of resource restoration. That is, it is hypothesized that more abundant resource stocks would improve water quality and reduce the population of jellyfish in the Chesapeake Bay. If true, the economic benefits would be substantial. There would be increased demand for boating, swimming, and fishing, and property values would likely increase. It is possible that the recreational benefits from improved water quality and reduced

jelly- fish populations would far exceed the benefits possible from industry restoration.

CONCLUSION

Fifteen million dollars or $3 million per year for five years is a lot of money to devote to restoring the oyster industry. Analyses of market conditions clearly indicate that the oyster industry is in a state of decline. The decline, while possibly or partially related to resource conditions, is very definitely related to declining consumer demand. Supplies and prices have both dramatically declined, particularly since 1990; the simultaneous decline in prices and supplies is a clear indication of declining consumer demand. Shifts in consumer demand for oysters appear to have been caused by negative media publicity, consumer concerns about health and nutrition, product safety, and water quality.

Because policy makers have decided to focus on restoring the industry, it is necessary to develop policies that will enhance market demand and resource levels. Increasing resource abundance of *Crassostrea virginica* in the Chesapeake Bay region is only one major priority. It will also be necessary to develop a major marketing campaign a campaign that must be cognizant of geographical differences. The successful campaign will have to mitigate the influence of negative media publicity, promote new products, target individuals that are not familiar with oysters, and eliminate the negative influences of a "health-conscious" America.

Moreover, if the industry of the northeastern United States is to be restored, it will be necessary for dealers in these states to reestablish markets lost to other producing regions and species. The Chesapeake Bay area producers will also have to focus on convincing potential consumers that water quality and pollution are not problems. Producers will also have to develop cost-saving processing and harvesting techniques in order to be competitive with Gulf Coast and West Coast producers. New products or value-added product lines will have to be developed.

Last, even if economic conditions do not warrant industry restoration activities, there may be reasons for restoring resource abundance. The most important possible reason may be bioremediation or cleaning up the Chesapeake Bay and its tributaries. If increased populations of oysters actually improve water quality and decrease the population of jellyfish, the economic benefits of bioremediation may be quite substantial. In fact, the economic benefits of bioremediation may far exceed the benefits of restoring the oyster industry.

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