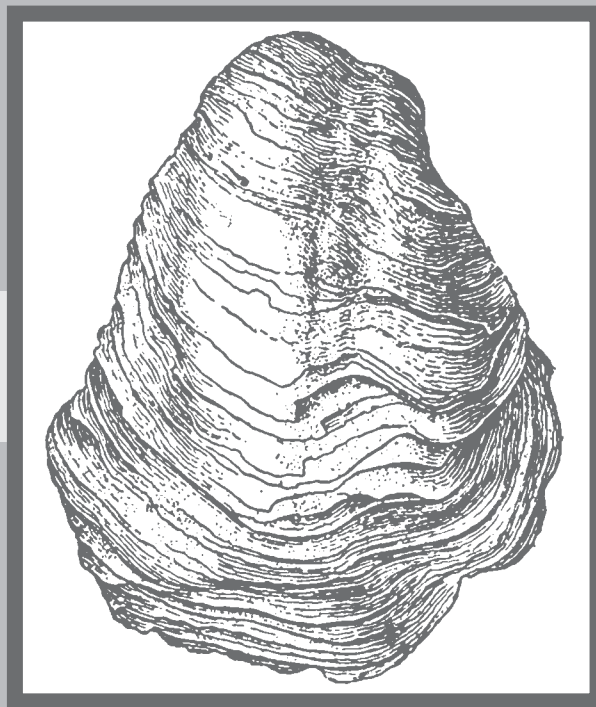


# Opinions

OF U.S. CONSUMERS TOWARD

# Oysters:



RESULTS OF A  
**2000-2001**  
SURVEY



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# Opinions of U.S. Consumers Toward Oysters: Results of a 2000-2001 Survey

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## ABSTRACT

Consumption of oysters in the U.S. declined during the 1990s. Understanding consumer attitudes and preferences toward oyster products can help the oyster industry turn this decline around. An understanding of why consumers increase or decrease their purchase and consumption of oysters is important. Although food safety is suspected of being a major factor in decisions to consume oysters, additional factors may be involved. Regional and national oyster consumption can be affected by many determinants that may vary across geographical region, ethnicity, income levels, and perceptions of nutrition. In 2000 and 2001, Mississippi State University, with support from the Mississippi-Alabama Sea Grant and the United States Department of Agriculture Higher Education Program, administered a survey to U.S. residents on the topic of seafood consumption. Information on consumer perceptions of oysters obtained from this survey is summarized in this bulletin.

This bulletin presents results from a 2000-2001 fish and seafood survey and should be of interest to the oyster industry, government agencies, and seafood retailers/marketers. Results from this study could be used by marketers as to guide to target consumers who are most likely to increase their oyster consumption. Another use of these results by processors would be the oyster purification methods preferred by consumers and the amount they would be willing to pay for purified oysters. Information gained about consumer awareness of food safety and inspection programs and the ones they feel are safest and most likely to trust are explored.

Survey results identify characteristics and opinions of oyster consumers and nonconsumers. Of a sample of 1,376 respondents to a nationwide survey on seafood consumption, 43% consumed oysters at least occasionally, with an average oyster consumer eating oysters 2.6 times per month. Consumers indicated enjoyment of flavor and addition of variety to their diet as the main reasons for consumption. Main reasons for not consuming oysters more often were price, product safety, and lack of availability of fresh product. The main reasons for not consuming oysters were taste, texture, smell, and product safety concerns. Changing nonconsumer perceptions of taste, smell, and texture is likely more difficult to achieve than perceptions of safety or price, suggesting that the industry should focus expansion activities on those who currently eat oysters.

# Opinions of U.S. Consumers Toward Oysters: Results of a 2000-2001 Survey

## INTRODUCTION

Americans enjoy many types of shellfish products, including clams, crabs, crawfish, lobsters, mussels, scallops, oysters, shrimp, and other animals. Overall per-capita fresh and frozen shellfish consumption in the United States has increased from 3.4 pounds in 1989 to 4.7 pounds in 2000 (USDC, 2001; Figure 1). During the same period, per-capita consumption of oysters decreased from an average of 0.29 pounds per year in 1989 to 0.21 pounds in 1999, with a recent increase to 0.24 pounds in 2000 (Figure 2).

U.S. oyster landings in 2000 amounted to 41.1 million pounds of meat valued at \$90.7 million. The Gulf of Mexico accounted for 27.5 million pounds of oyster meat, 67% of the national total. Among the Gulf States, oyster landings were greatest in Louisiana with 47% of the total in 2000, followed by Texas (25%), Mississippi (14%), Florida (10%), and Alabama (3%). The amount and value of oysters processed in Mississippi have varied over time (Figure 3). Nonetheless, oyster products still make an important contribution to the economy of coastal Mississippi and neighboring states on the Gulf of Mexico.

An understanding of why consumers increase or decrease their purchase and consumption of oyster products is important. Food safety is a factor often attributed to the decrease in consumption of oysters. A 1993 news release reported a multistate outbreak of viral gastroenteritis related to consumption of oysters in Louisiana, Maryland, Mississippi, and North Carolina (CDC, 1993). In 1998, bacteri-

ally tainted oysters from Texas were identified as the cause of sickness for 368 people, and during the preceding summer, 209 lab-confirmed cases of illnesses were linked to raw oysters harvested in the Pacific Northwest (ABC News, 1998). The Center for Science in the Public Interest has asked FDA “. . . to take immediate action to protect consumers from raw oysters contaminated with deadly bacteria. . .” (CSPI, 2000). They cited 36 deaths in the prior 2 years and 119 deaths since 1989 associated with raw oysters and other shellfish contaminated with *Vibrio vulnificus*. In 1995, 31% of the respondents to a University of Florida study considered raw oysters “not at all safe” compared with only a 9% rate for a similar study conducted 5 years earlier (Billups, 2001).

Although food safety is suspected of being a major factor in decisions to consume raw oysters, other factors may be involved. Regional and national oyster con-

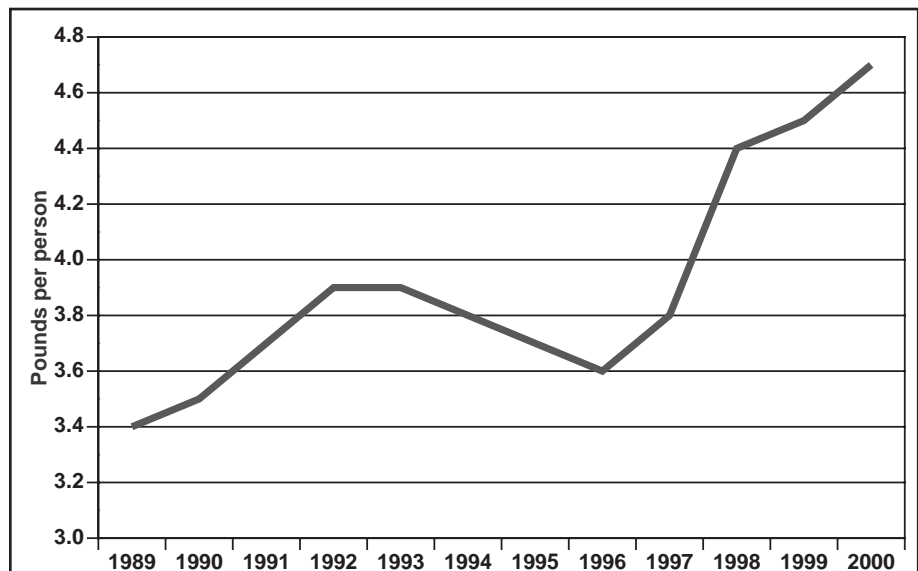
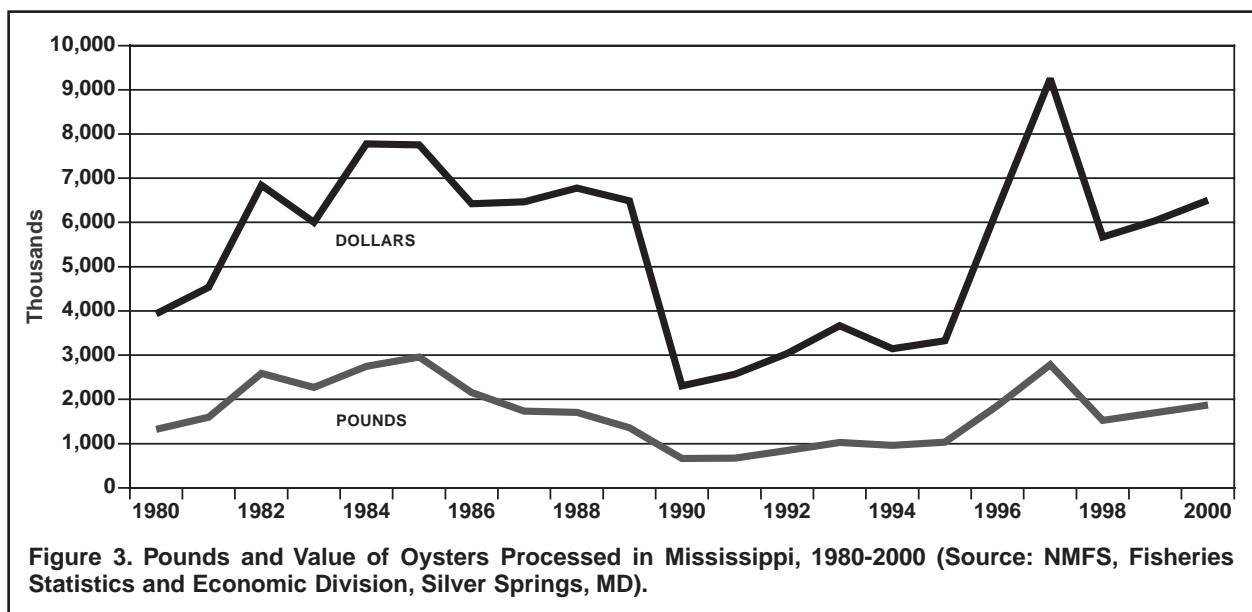
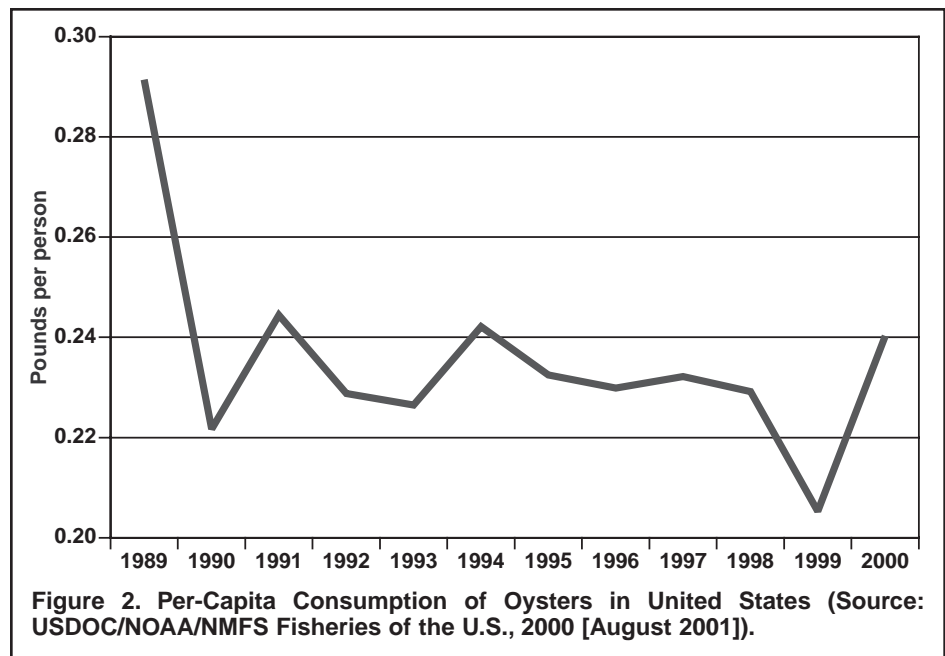


Figure 1. Per-Capita Fresh Shellfish Consumption in the United States (Source: USDA, ERS, 1999).

sumption can be affected by many determinants that may vary across geographical region, ethnicity, income levels, and perceptions of nutrition. In 2000 and 2001, Mississippi State University, with support from the Mississippi-Alabama Sea Grant and the USDA Higher Education Program, administered a survey to U.S. residents on the topic of seafood consumption. Information on consumer perceptions of oysters obtained from this survey is summarized in this bulletin.

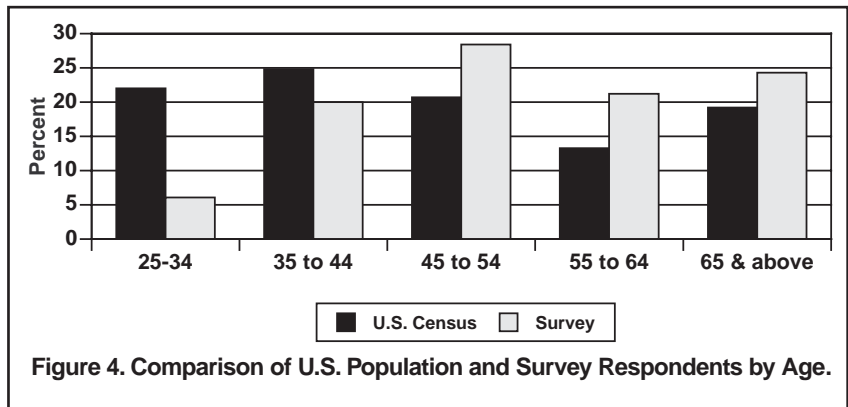
Results from the 2000-2001 survey should be interesting and useful to the oyster industry, government agencies, and seafood retailers/marketers for a variety of reasons. One important use of these results would be as a guide for marketers to use in targeting consumers who are most likely to increase their oyster consumption. A second area of interest is oyster purification methods that consumers are most willing to

accept, the amount they would be willing to pay for purified oysters, and the methods' effect on total oyster consumption. Another use of these results is the knowledge gained about food safety processes and programs that consumers feel are safest and most trustworthy when considering purchases from a grocery or restaurant outlet.



## DATA AND PROCEDURES

Data for this study were obtained through a mail survey (Appendix 1). Before the survey questionnaire was prepared, a number of focus groups were conducted in South Carolina, Mississippi, and Kansas to elicit fish and seafood consumption issues to be addressed. Results from these focus groups were used to develop categories for the questionnaire as well as test questions and phrasing of questions. The questionnaire was then mailed to a sample of 9,000 households in the United States, with 1,000 mailed to each of the nine major census regions. The stratified sample was chosen because region was expected to be a significant determinant of both the choice to consume and the choice of how often to consume oysters. The surveys were mailed in late 2000 and early 2001; households that did not respond received a second copy of the survey. A return total of 1,790 surveys or 20.1% (after accounting for returned surveys) was returned. Of these responses, 1,376 responded (15.5%) to the questions regarding consumption of oysters. The information obtained from these 1,376 responses is summarized in this bulletin. Overall, 43% of the 1,376 respondents indicated that they consumed oysters.



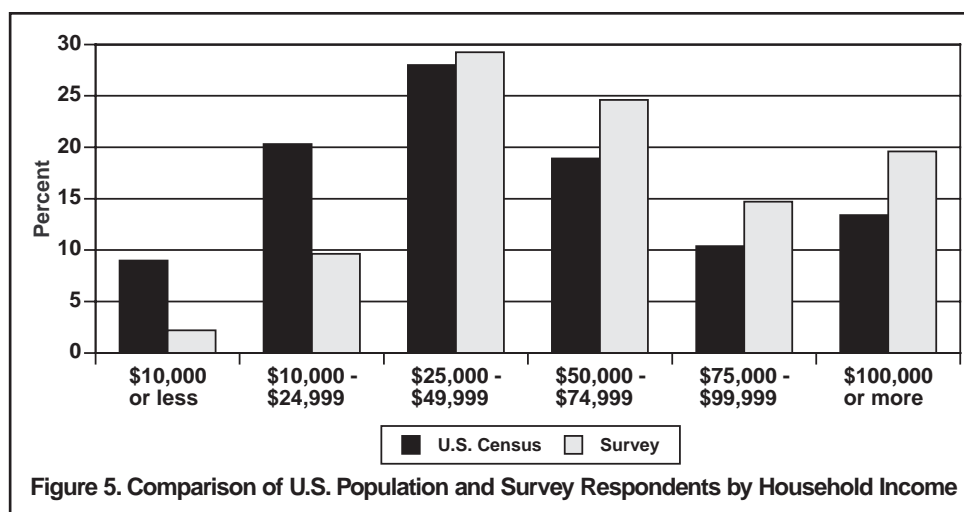
**Figure 4. Comparison of U.S. Population and Survey Respondents by Age.**

The demographic data collected indicated that the response rate per region was comparable (Table 1), ranging from 133 usable responses from the East South Central region to 176 responses from the West North Central region. Responses did appear to be biased toward Caucasians (84.1%). Of the remaining respondents, 3.1% were Black or African-American, 2% Asian, 1.8% Hispanic, and 5.3% other (3.7% of the respondents did not answer this question). The 2000 U.S. Census indicates that approximately 75% of the U.S. population is Caucasian, 12.5% Hispanic, 12.3% Black or African-American, and 3.6% Asian.

**Table 1. Region of Residence of Survey Respondents.**

Region	States in region	Number of respondents	Pct. respondents who live in each region
New England	Maine, Rhode Island, New Hampshire, Massachusetts, Vermont, Connecticut	164	11.9
Mid-Atlantic	Pennsylvania, New York, New Jersey	139	10.1
Southeast Atlantic	Florida, Georgia, North Carolina, South Carolina, West Virginia, Virginia, Maryland, Delaware, Washington D.C.	153	11.1
East North Central	Ohio, Indiana, Illinois, Michigan, Wisconsin	153	11.1
East South Central	Kentucky, Mississippi, Tennessee, Alabama	133	9.7
West North Central	Iowa, Minnesota, South Dakota, North Dakota, Missouri, Kansas, Nebraska	176	12.8
West South Central	Texas, Oklahoma, Arkansas, Louisiana	140	10.2
Mountain	Nevada, New Mexico, Arizona, Utah, Wyoming, Colorado, Montana, Idaho	175	12.7
Pacific	Alaska, Hawaii, California, Oregon, Washington	143	10.4
Total	All States	1,376	100.0

As shown in Figure 4, respondents to this survey also tended to be older than the population average. Considering only the U.S. population over the age of 25, 53% of the adult population is over 45, compared with 74% of the survey respondents. Figure 5 is a comparison of household income for survey respondents compared with that obtained by the U.S. census. Survey respondents tended to have slightly higher household incomes than those reported in census data. The mean income of survey respondents fell in the \$50,000-\$59,999 category compared with the U.S. mean income of \$42,148. Figure 5 uses U.S. census income categories. However, the actual survey question had more detailed income categories and therefore gave a better income distribution for analyses. Nevertheless, for comparison's sake, the survey data is presented in census categories. Additionally, survey respondents tended to have higher education; 47.7% had



some form of college degree compared with 26% of the general population. Religious composition of the survey respondents corresponded to that presented in the *World Almanac and Book of Facts* (1999), which states that approximately 85% of the U.S. population practices Christianity (including 23% Catholic), 2% Judaism, and 1% Islam. Our survey results indicated 83% of respondents were Christian (25% Catholic), and 3% practiced Judaism.

## RESULTS

### Oyster Consumption

Consumers were asked to identify how often they consumed oysters at home and away from home for each meal: breakfast, lunch, and dinner. Table 2 shows how frequently consumers ate oysters at each meal. Average consumption of the 593 oyster consumers was 2.55 times per month.

Demographics for oyster consumers versus nonconsumers are presented in Table 3. Oyster consumption did vary by region of residence, with consumers in the East and West South Central regions of the United States most likely to consume oysters (Figure 6). Overall, 56% of the respondents from the East South Central region consumed oysters, compared with the low of 28% in the East North Central region. Other

demographic variables that significantly differed between consumers and nonconsumers included gender (Figure 7), income level (Figure 8), and education level

Level of consumption	Breakfast		Lunch		Dinner	
	Home	Away	Home	Away	Home	Away
2-3 times per week <sup>2</sup>	0.0	0.1	0.0	0.0	0.0	0.1
1 time per week	0.4	0.1	0.7	0.9	0.9	1.2
More than once a month but less than weekly	1.5	0.2	3.5	4.2	4.9	8.1
Infrequently (< 1 time per month)	5.9	2.4	13.7	19.2	21.2	26.2
Never	92.2	97.2	82.1	75.7	73.0	64.4

<sup>1</sup>n=1,376 respondents; values indicate percent of respondents who indicated the level of consumption for the meal occasion.  
<sup>2</sup>There were no respondents who answered daily or four to six times per week consumption of oysters for any meal occasion.

(Figure 9). More of the male respondents reported consuming oysters (Figure 7). Higher oyster consumption was reported among the lowest (\$10,000 or less) and highest (\$100,000 or greater) income groups (Figure 8). Oyster consumption tended to be higher among respondents who had achieved higher levels of education

(Figure 9). (Chi-squared tests on significance are included with each of these figures. Chi-square probabilities below 0.05 indicate a significant difference in the variables. For example, in Figure 6 the chi-square probability of 0.001 indicates oyster consumption is significantly different in the different regions.)

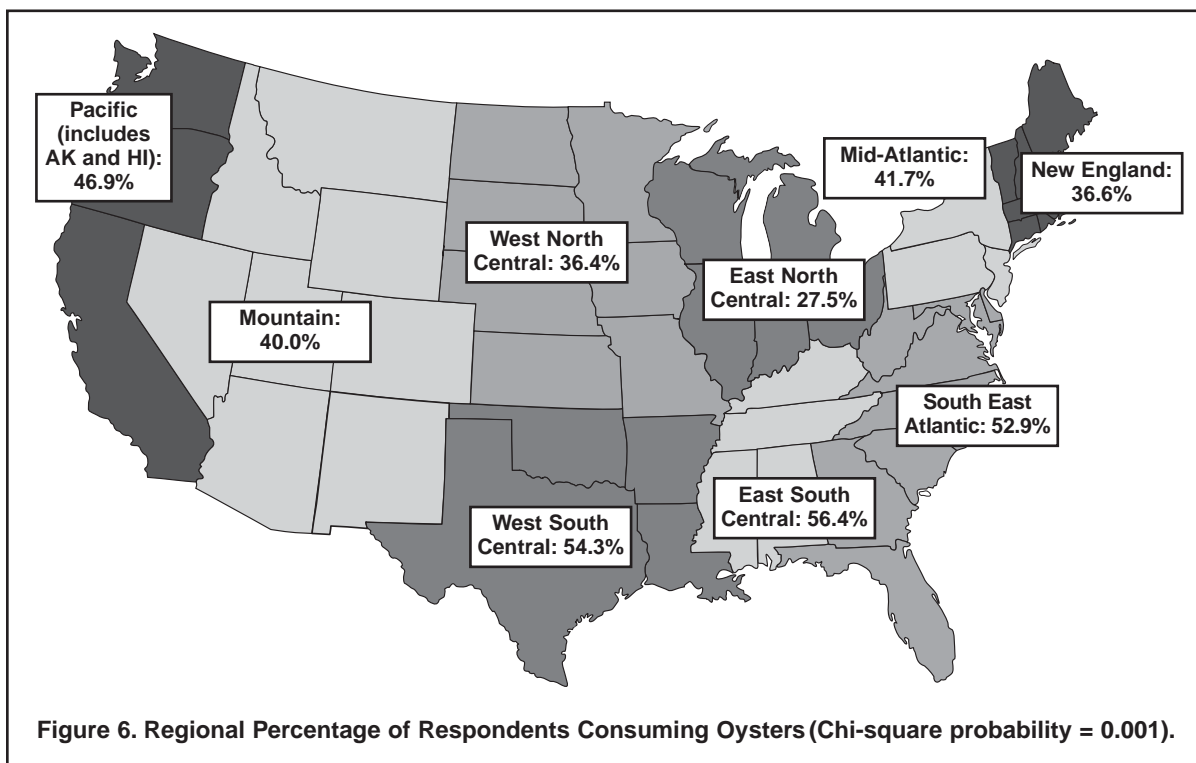
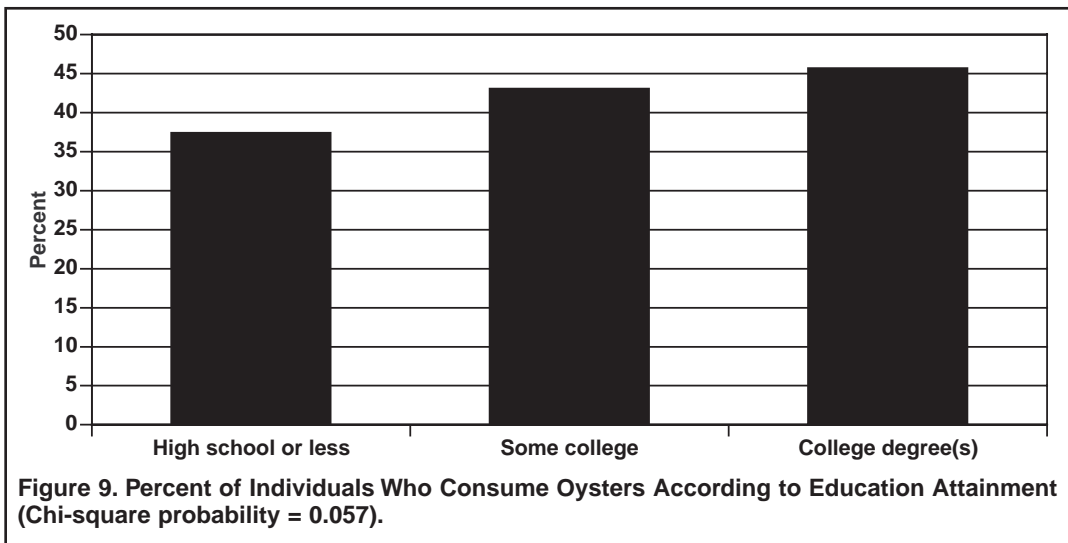
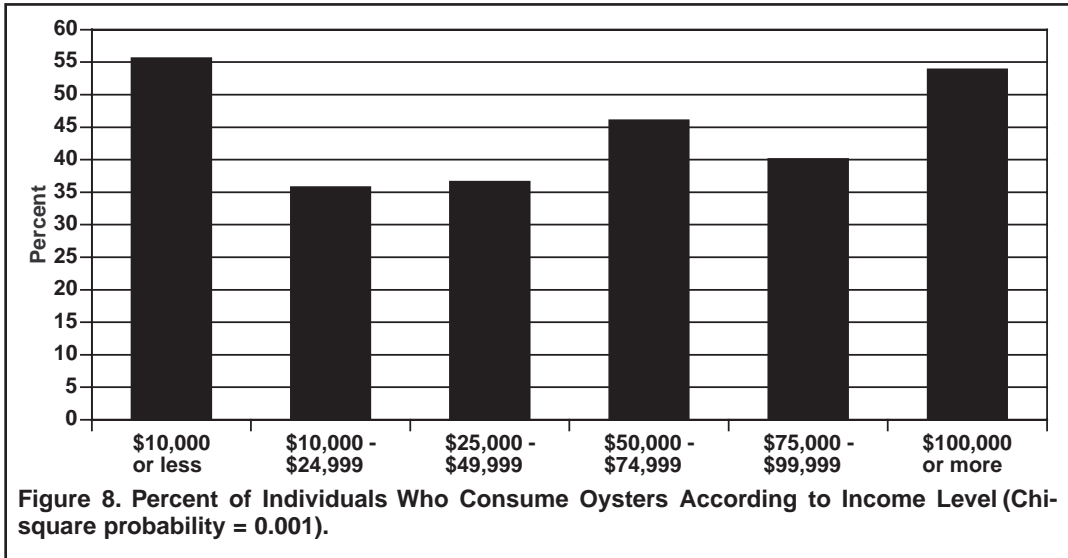
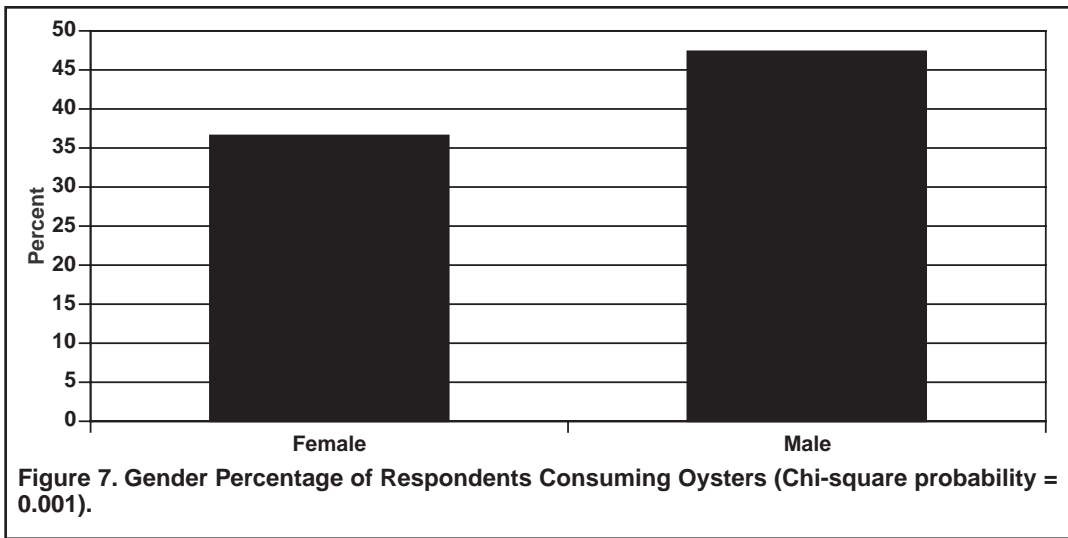


Table 3. Summary of demographics Comparing Oyster Consumers with Nonconsumers.

Demographic	Nonconsumers	Consumers	Demographic	Nonconsumers	Consumers
	%	%		%	%
<b>Age of Respondent</b>			<b>Ethnicity</b>		
Older than 65	24.0	26.6	Caucasian	88.3	86.1
Between 50 and 65	33.8	36.3	Non-Caucasian	11.7	13.9
Between 35 and 50	34.7	30.9	<b>Region of Residence</b>		
Under 35	7.4	6.2	New England	13.3	10.1
<b>Gender</b>			Mid-Atlantic	10.3	9.8
Percent male	54.4	65.0	Southeast Atlantic	9.2	13.7
<b>Household Income</b>			East North Central	14.2	7.1
Less than \$29,999	25.3	22.9	East South Central	7.4	12.6
Between \$30,000 and \$59,999	34.7	30.7	West North Central	14.3	10.8
Between \$60,000 and \$99,999	25.7	24.3	West South Central	8.2	12.8
\$100,000 or more	14.3	22.1	Mountain	13.4	11.8
<b>Education</b>			Pacific	9.7	11.3
High school or less	23.8	18.7	Lives within 50 miles of coast	33.3	31.9
Some college	30.7	30.7	<b>Religion</b>		
College degree(s)	45.6	50.6	Catholic	25.5	25.1
			Christian	57.8	58.2
			Other	16.7	16.7





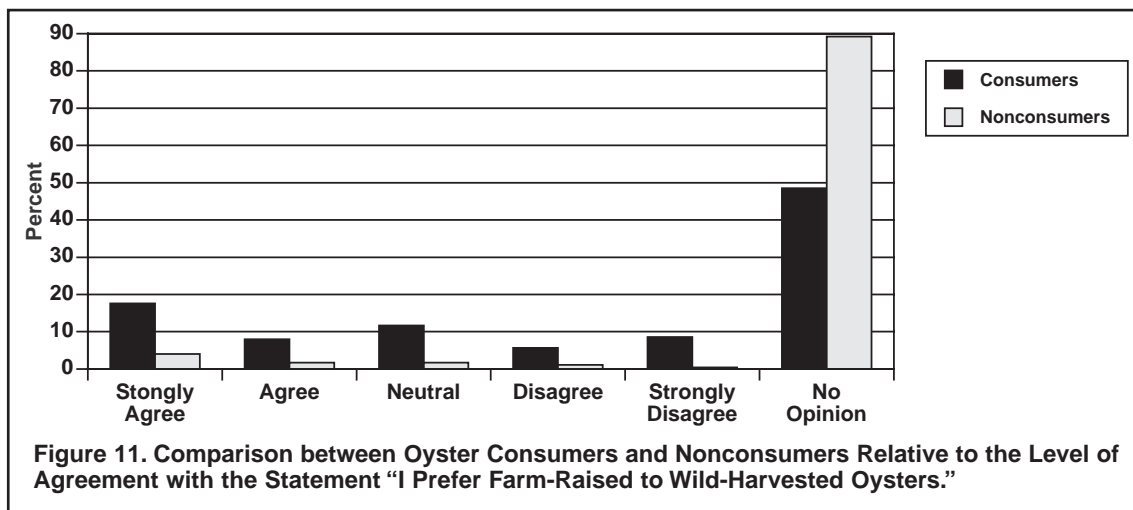
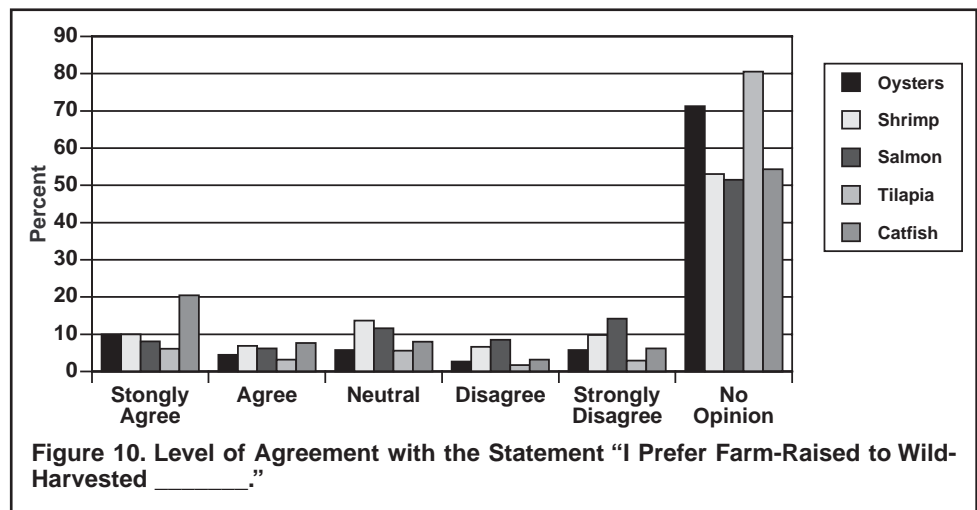
## Farm-Raised Seafood

Eastern oysters are primarily grown from the Gulf of St. Lawrence in Canada to the Gulf of Mexico, and Pacific oysters are grown along the western coast of the United States. Most cultivated, or farm-raised, oysters are grown in the West Coast states of Washington, Oregon, California, and Alaska. The second and third most important regions of oyster cultivation are the northeastern U.S. states of Massachusetts and Maine, and the southern states, primarily Chesapeake Bay. In the U.S., 45% of all oysters consumed are cultured (USDC, 2001; Wallace, 2001; USDA/NASS, 2000).

Respondents were asked if they had ever consumed farm-raised oysters, as well as their opinions about these oysters. Only 27.4% of oyster consumers were aware they had eaten farm-raised oysters, but of those people, more than 95% indicated they would eat farm-raised oysters again. Of the oyster consumers who had not eaten, or were not aware they had eaten, farm-raised oysters, more than 76% indicated they would be willing to consume farm-raised oysters.

A noteworthy fact is that 18.4% of the people who indicated they did not consume oysters also indicated they would consume farm-raised oysters.

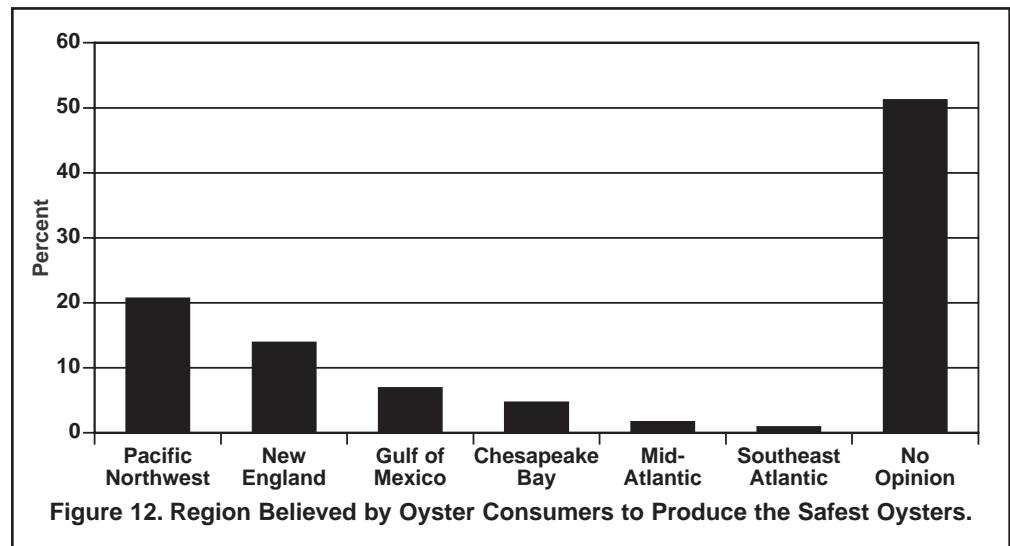
Respondents were also asked to rate whether they preferred farm-raised to wild-harvested seafood for five different species (oysters, shrimp, salmon, tilapia, and catfish). Responses are shown in Figure 10. Regardless of species, the majority of people had no opinion, particularly in regards to oysters and tilapia. The opinions of oyster consumers and nonconsumers were significantly different, as oyster consumers were more likely to express an opinion on oysters (Figure 11).



## Source of Oyster Supply

Respondents were asked to identify a region where they believed the safest oyster products came from. They were offered seven choices: Pacific Northwest; Gulf of Mexico; Chesapeake Bay; New England; Southeast Atlantic; Mid-Atlantic; and No Opinion. The majority of respondents (65%) indicated they had no opinion. However, 51% of oyster consumers had no opinion compared with 76% of nonconsumers. Of those oyster consumers with an opinion about the safest region of supply, the majority selected the Pacific Northwest followed by New England (Figure 12), and this response was influenced by region of residence. For example, 42% of oyster consumers from the Pacific region believed the Pacific Northwest was the safest source of supply (51% no

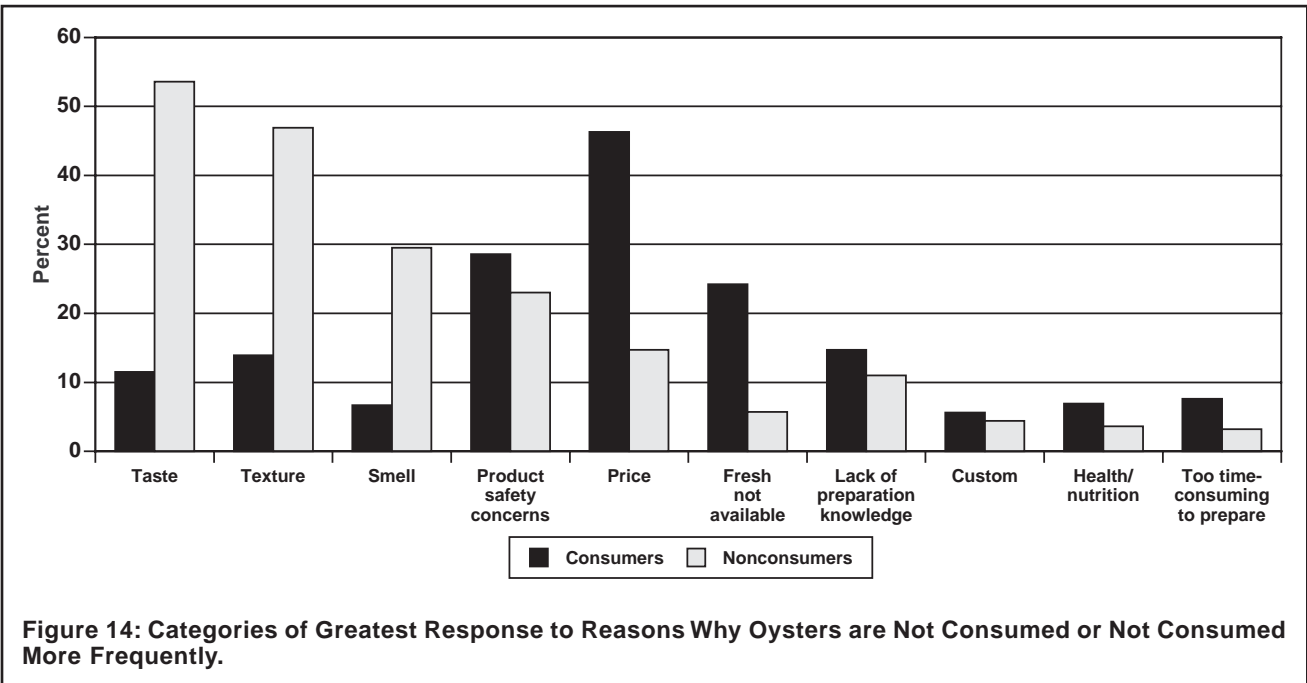
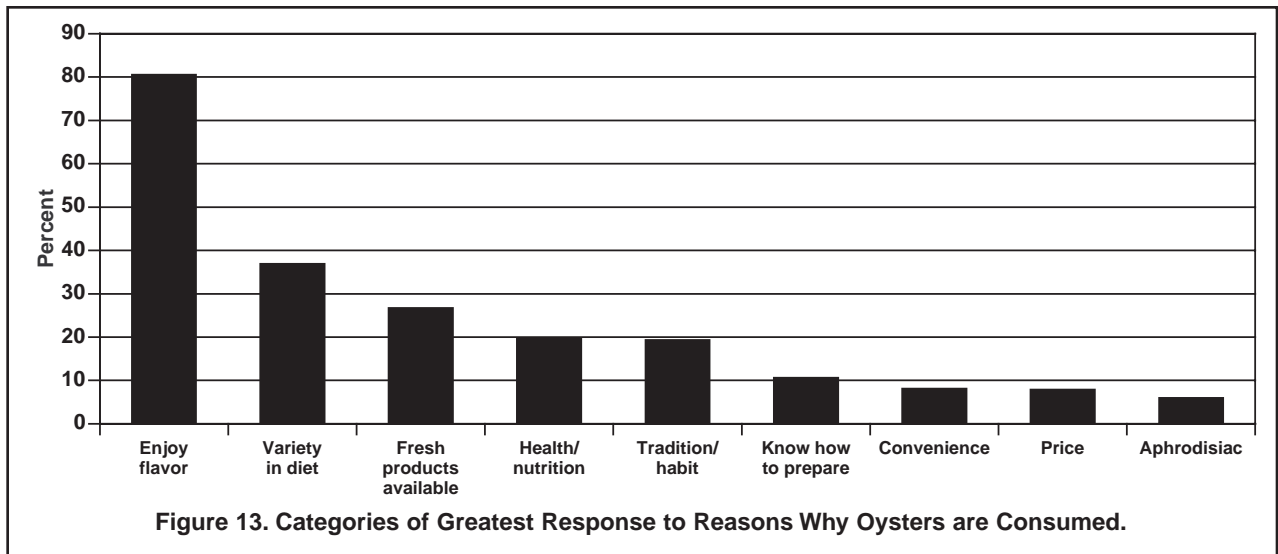
opinion), whereas 22% of oyster consumers from New England believed New England was the safest source (57% no opinion). More than 70% of consumers from the East and West North Central regions had no opinion on the safest source of supply.



## Reasons for Consumption and Nonconsumption

In addition to the frequency of consumption and the demographic variables, respondents were asked to identify reasons for their consumption of oysters. Results from the 483 oyster consumers who responded to this question are presented in Figure 13. As indicated by more than 80% of consumers, the principal reason among the top three reasons for consuming oysters was enjoyment of flavor (Figure 13). Next was variety to their diet, followed by availability of fresh products.

Both consumers and nonconsumers were asked to identify the top reasons for either their lack of consumption or frequent consumption of oysters (Figure 14). For nonconsumers, taste, texture, and smell were the top three reasons. Consumers gave significantly different responses; price, product safety concerns, and unavailability of fresh products were the top three reasons.



## Product Safety Concerns

Product safety concerns were cited as the reason why 23% of nonconsumers avoided eating oysters and 29% of consumers ate oysters less frequently (Figure 14). Respondents were also asked to identify which fish or shellfish product they considered to be the safest and least safe of all fish and shellfish products. The responses further emphasized consumer concerns about oyster safety. Of the 1,210 consumers who responded to the question, 36% had no opinion, more than 22% considered tuna safest, and only one consumer (less than 0.01% of all respondents) considered oysters the safest. Of the 1,283 consumers who answered the question about the least safe product, 43% had no opinion. Oysters were considered to be the least safe of all seafood products by more than 37% of respondents, followed by clams at 10%. Concern about oyster safety was significantly different between consumers and nonconsumers (Figure 15), with approximately 44% of consumers rating oysters as the least safe product compared with only 33% of nonconsumers. Apparently, consumers know and accept the risk oysters pose to their health.

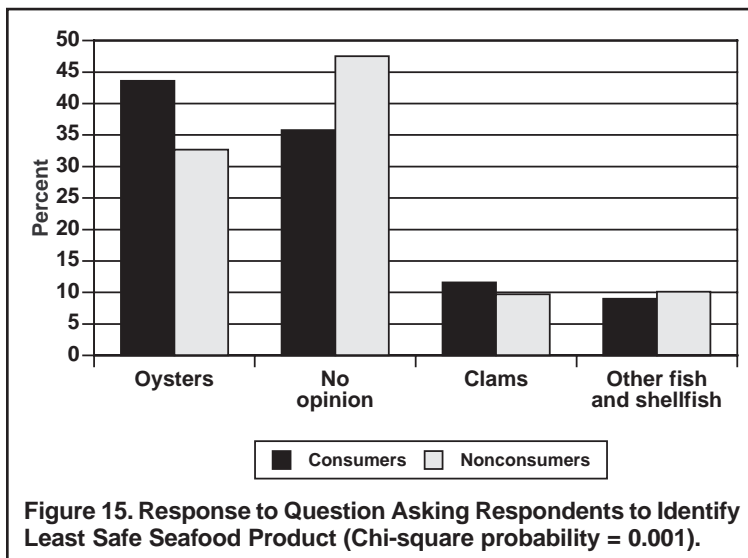
In an attempt to learn more about respondents' perceptions of safety, consumers were asked to rate four potential oyster postharvest treatment methods to increase their confidence in the safety of oysters. These safety treatments were described in lay terms to avoid potential confusion or bias derived from the name of the process (i.e., consumers may form an opinion about the process of irradiation based on the name containing

the word radiation). The four treatments were as follows: Plan A — depuration; Plan B — ozonation; Plan C — irradiation; and Plan D — pressurization (Appendix 1, question 11). The following is the question from the survey:

“Each of the following treatments can be used to kill bacteria and viruses that may be present in raw oysters. Each treatment works equally well and provides a safer oyster without causing any difference in taste or texture. Please indicate whether treatments A, B, C, or D would increase, have no effect on, or decrease the amount of oysters you eat.”

Plan	Program description	Increase	No effect	Decrease
A	A process of flushing bacteria and viruses from the oyster with purified water.			
B	A process of exposing oysters to an indirect energy source.			
C	A process of exposing oysters to a direct light energy.			
D	A process of placing oysters in an extremely high pressure.			

The responses of consumers versus nonconsumers to this question were significantly different. Results are presented in Figure 16. Additionally, the responses to this question were significantly different for consumers who had indicated that product safety was one of the top three reasons they did not eat oysters, or did not eat oysters more frequently (Figure 17). Overall, oyster consumers were most supportive of the depuration process, with 43.6% of all oyster consumers and 53.5% of oyster consumers who indicated safety was a concern responding that depuration would increase their consumption of oysters. More nonconsumers of oysters indicated they would decrease consumption as a result of ozonation and irradiation treatments than those who said these treatments might increase their probability of consumption. More than 10% of oyster consumers said ozonation, irradiation, and pressurization would decrease their consumption. When asked to select one of the four plans, 61% of the 962 respondents chose



deputation, 16% selected pressurization, 12% selected ozonation, and 9% selected irradiation.

Respondents were also asked to identify the amount they would be willing to pay for a guaranteed safe oyster produced through the safety plan they preferred. Those who indicated a preference for one of the four plans indicated a willingness to pay a mean of \$0.30 per oyster, range of \$0 to \$9.99 per oyster, above the initial raw oyster price. Of those who indicated a preference for one of the four plans, approximately 36% indicated they were not willing to pay any additional amount above the initial raw oyster price for this plan (a value of \$0). Additionally, 13% indicated they would pay \$0.25 more per oyster, 10% would pay \$0.10 more, and 10% would pay \$1.00 more. Table 4 shows the amount consumers were willing to pay based on the guaranteed oyster treatment program they selected.

To further learn about consumer perceptions of seafood safety, respondents were asked if they were currently aware of any governmental inspection programs for seafood and HACCP (Hazard Analysis of Critical Control Points). Overall, 30% indicated that they were aware of current government safety inspections for fish, while only 6% indicated awareness of HACCP. Of those

aware of HACCP, 61% indicated it had no effect on their seafood consumption, 17% indicated it increased consumption, and 22% indicated it decreased consumption. Oyster consumers were significantly (chi-square probability = 0.004) more likely to believe there was a government safety inspection program (34% of oyster consumers and 27% of nonconsumers believed there was inspection).

Respondents were also asked to indicate if any of three possible seafood inspection and safety programs would increase, have no effect on, or decrease consumption of seafood. These three programs were described in lay terms and were designed to represent HACCP (Plan A), the old USDA visual meat (beef and pork) inspection system (Plan B), and third-party certification (Plan C). Results are presented in Table 5. Plan B, government visual inspection, was most likely to increase seafood consumption. Fifty-five percent of the respondents indicated this type of seafood inspection program would increase their consumption, compared with 41% for third-party certification and 15% for HACCP. HACCP was most likely to decrease seafood consumption, with 26% indicating

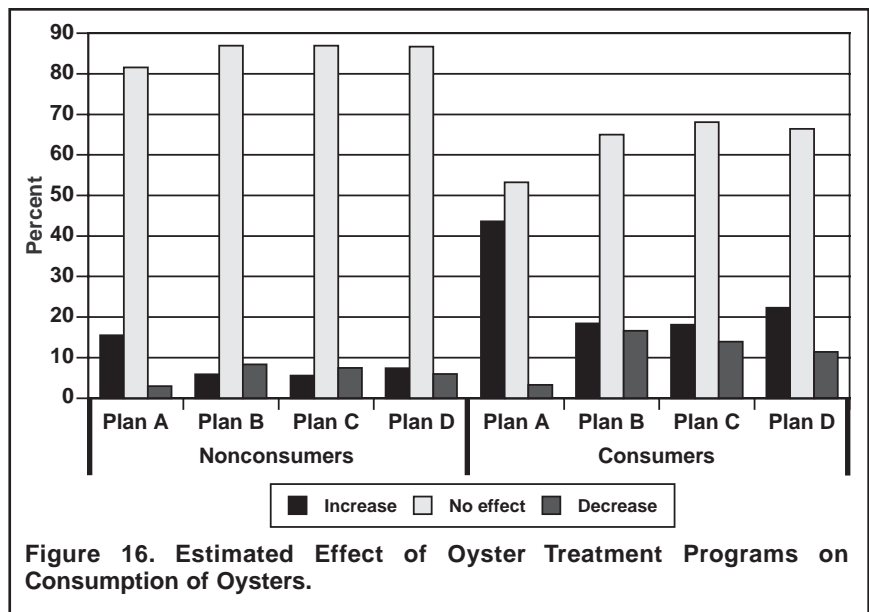


Figure 16. Estimated Effect of Oyster Treatment Programs on Consumption of Oysters.

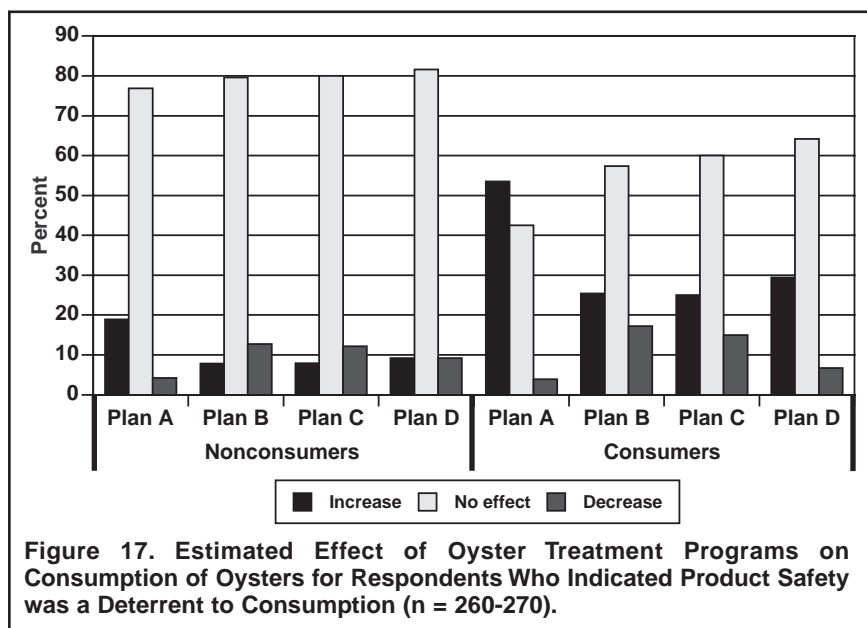


Figure 17. Estimated Effect of Oyster Treatment Programs on Consumption of Oysters for Respondents Who Indicated Product Safety was a Deterrent to Consumption (n = 260-270).

this type of seafood inspection program would decrease consumption, compared with 8% for third-party certification and 3% for government visual inspection. Respondents who believed oysters were the least safe of all seafood products and respondents who indicated product safety was a reason for not eating oysters (or not eating oysters more frequently) were significantly

more likely to indicate government visual inspection and third-party certification plans would increase consumption and that HACCP would decrease consumption. Keep in mind that only 6% of respondents indicated an awareness of HACCP, so while the latter result is true, the meaning may not be indicative of people knowledgeable of this program.

**Table 4. Willingness to Pay for Preferred Oyster Safety Treatment Program that Would Guarantee a Safe Oyster Product.<sup>1</sup>**

Treatment	Number who preferred plan	Willingness to pay per oyster <sup>2</sup>						
		Mean	\$0.00	\$0.10 or less	\$0.11 - \$0.25	\$0.26 - \$0.50	\$0.50 - \$1.00	> \$1.00
		\$	%	%	%	%	%	%
A - Depuration	391	0.34	34	23	15	12	13	4
B - Ozonation	84	0.25	37	24	14	17	5	4
C - Irradiation	65	0.18	38	32	18	2	8	2
D - Pressurization	95	0.29	42	22	15	5	14	2

<sup>1</sup>Chi-Square probability = 0.09.  
<sup>2</sup>This willingness-to-pay amount is in addition to the initial raw oyster price.

**Table 5. Effect of Safety Programs on Seafood Consumption.**

Plan as described in survey	Increase	No effect	Decrease
	%	%	%
<b>Plan A</b> Food companies are legally required to maintain their own food safety programs using detailed record-keeping procedures.	14	59	26
<b>Plan B</b> Food companies are legally required to have government agencies visually inspect along with taste tests. If the plant receives a passing grade, their product is labeled with a uniform product safety seal.	55	43	3
<b>Plan C</b> A private, independent third party is hired to monitor the food company and determine if the product is safe for consumption and if the plant is operating under sanitary conditions.	41	51	8

## Increasing Consumption

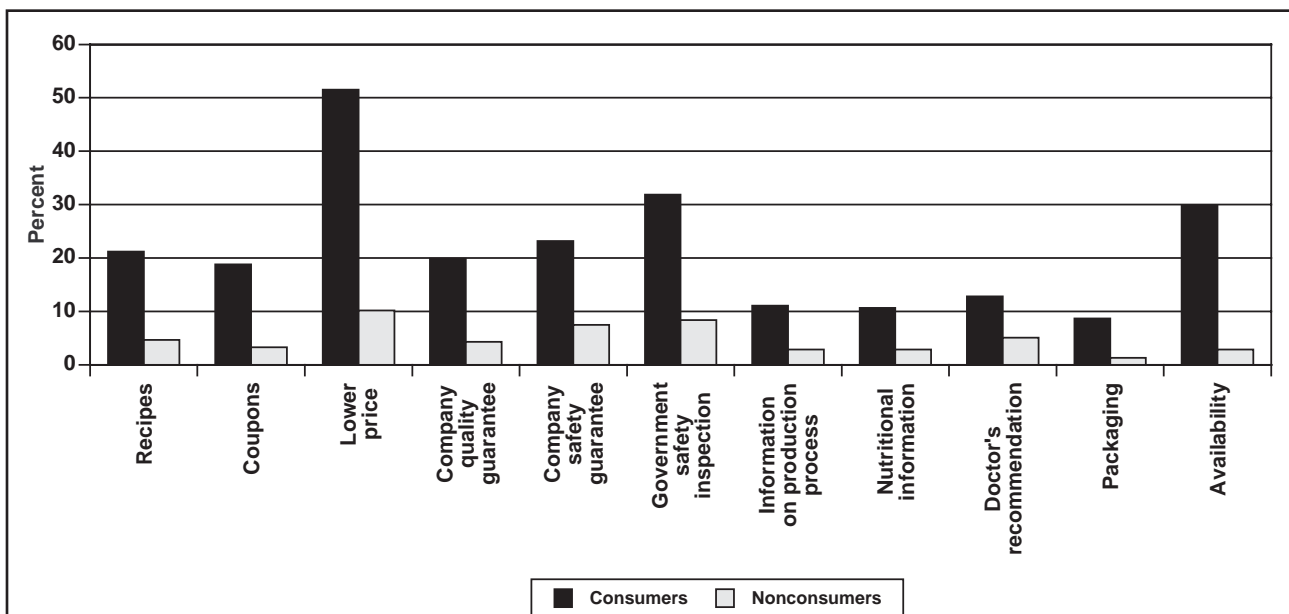
Respondents were asked to identify factors that might increase their consumption of oysters. Choices included recipes, coupons, company quality guarantee, company safety guarantee, government safety inspection, nutritional information, doctor's recommendation, packaging (convenience/microwavable), availability of quality products, information on production processes, and lower prices. The percent of respondents who indicated these factors would increase consumption are presented in Figure 18. Overall, 53% of the respondents did not select any of the 11 factors, indicating none of these reasons would increase their consumption. As expected, those who did not consume oysters were more likely to indicate nothing could increase consumption (76% of nonconsumers) compared with oyster consumers (only 22% indicated nothing could increase consumption). The likelihood of factors (reasons) indicating nothing could increase consumption of oysters was also significantly tied to the

**Table 6. Relationship Between Reasons for Not Consuming Oysters and Indicating Factors that Would Increase Consumption of Oysters.**

Reason for not consuming oysters	Likelihood anything would . . .	
	NOT increase consumption	Increase consumption
	%	%
Taste	47	10
Texture	40	13
Smell	26	6
Product safety	15	27
Price	8	39
Lack of fresh products available	4	19
Lack of preparation knowledge	7	14
No custom	3	5
Nutrition/Health	2	6
Too time-consuming to prepare	2	7

reasons for not increasing consumption of oysters (Table 6).

As can be observed from Table 6, those who indicated taste and texture as reasons for not consuming (or not increasing consumption of) oysters were less likely to be convinced to increase their oyster consumption than those who indicated their reason for not consuming oysters was price, product safety, and lack of fresh product availability. More relationships between these



**Figure 18. Factors that Respondents Indicated Would Increase Consumption of Oysters.**



variables exist. For example, of those who indicated product safety as a reason for not consuming oysters, 38% indicated government safety inspection, 32% indicated company safety guarantee, and 19% indicated company quality guarantee would increase consumption of oysters. These numbers increase when oyster consumers are exclusively considered. Among oyster consumers who indicated product safety as a reason for not consuming oysters more frequently, 57% indicated government inspection, 43% indicated company safety, and 30% indicated company quality guarantees would increase consumption.

Factors that can lead to increased oyster consumption are recipes, coupons, and lower prices. A majority (54%) of oyster consumers citing lack of knowledge of preparation stated that the availability of recipes would

increase their consumption. Of consumers who indicated price reduced consumption, 75% reconfirmed that a lower price would increase consumption, as opposed to 27% who supported coupons. The majority (61%) of oyster consumers who indicated lack of availability of fresh products as a reason for not consuming more frequently indicated availability of fresh products would increase their consumption.

Another relationship was found concerning information on food safety programs. Of those respondents who indicated the government safety inspection program would increase consumption of seafood in general (Appendix 1, question 10), only 25% indicated that government safety inspection would increase their consumption of oysters.

## CONCLUSIONS

The results of this survey identified characteristics and opinions of oyster consumers and nonconsumers that can be used to develop marketing segments and better understand consumer attitudes toward oysters. Of a sample of 1,376 respondents to a nationwide mail survey on seafood consumption, 43% consumed oysters at least occasionally. The average oyster consumer ate oysters 2.6 times per month. This bulletin provides a summary of the data collected and can be used to provide general directions, but not specific recommendations, as further econometric analysis is needed to establish specific recommendations. Another potential limitation of use of this report is that respondents to the survey were mainly seafood consumers. Sociodemographic data indicated respondents were slightly older and wealthier than U.S. averages, as well as more educated than the national average. Although most respondents were seafood consumers, we believe this not to be a major limitation because only 43% of the respondents ate oysters.

Results of an econometric study (House, Hanson, and Sureshwaran) indicate that there are statistically significant differences among the reasons why people choose to eat oysters and the reasons why oyster consumers choose how often to eat oysters. For this reason, this study divides the data into consumers of oysters and nonconsumers and examines their characteristics. Targeting existing consumers for increased sales is called market penetration, while targeting nonconsumers for consumption is termed market development.

This study provides guidance toward addressing the challenges confronted by the oyster industry, which is pursuing both market penetration and development to increase sales.

Reasons for eating oysters included enjoyment of the flavor (80% of consumers) and addition of variety to the diet (37%). Oyster consumers identified the main reasons for not consuming oysters more often as price (38%), product safety (29%), and lack of availability of fresh product (20%). People who indicated product safety and lack of fresh product were likely concerned about the same underlying reason — the safety of the oyster product. Enhancing product safety appears to be an important need to improve their image among oyster consumers. Approximately 44% of oyster consumers rated oysters as the least safe of all seafood products when offered the choice of four shellfish and eight finfish products.

The possibility of using a process such as depuration to increase consumer confidence in oysters being a safe product was examined. Overall, 43% of oyster consumers in total and 54% of those concerned about product safety indicated their consumption of oysters would increase if depuration was used as a method to increase the safety of oysters. In response to additional inquiries, 61% of the 635 respondents stated a preference for the depuration cleansing process and indicated a mean willingness to pay of an additional \$0.34 per oyster. The oyster industry may be able to increase the perception of safety through implementation of a pro-

gram of depuration and thereby pay for the program through higher selling prices. This would be profitable if the depuration costs do not exceed the increase in cost that the consumer is willing to pay. Consumers did not indicate a preference or nonpreference for farm-raised (cultivated) oysters, nor did they indicate that a cultured oyster product is a reason to consume oysters or consume oysters less frequently. Further research could be conducted to determine if consumers would perceive cultured oysters to be safer with certain advertising messages. If depuration efforts were associated with cultured oysters, consumers could possibly be educated to view cultured oysters as a safer oyster product.

Finally, consumers were asked what would increase their consumption of oysters. Respondents who indicated price, product safety, and lack of availability of fresh products were most likely to indicate that there were factors that could increase consumption. Consumers indicated a lower price would increase their frequency of consumption, but other factors, such as government safety inspection, availability of fresh products, and company safety and quality guarantees were indicated as factors that might increase consumption for at least 20% of consumers. Again, the importance of perception of a fresh, safe product was emphasized.

Nonconsumers had different reasons for not consuming oysters, mainly taste, texture, and smell, followed by product safety concerns. As flavor is the

most important reason consumers ate oysters, it appears to be the biggest reason why nonconsumers do not eat oysters. Although product safety is again important, it is unlikely the industry could persuade nonconsumers to eat oysters through the same methods as those used to convince oyster consumers to eat them more frequently.

Changing nonconsumer perceptions of taste, smell, and texture is likely more difficult to achieve than perceptions of safety or price. In focus groups, nonconsumers who focused on taste, texture, and smell generally had very strong negative reactions to discussing oysters. These results suggest that the industry should focus expansion activities on those who currently eat oysters. Additionally, identifying characteristics about the demographics of oyster consumers might provide insight into the types of people who will likely be future oyster consumers and the regions from where they will come. For instance, larger percentages of consumers were in the South East Atlantic, East South Central, and West South Central regions of the United States, suggesting that these regions may be fertile grounds to target advertising (particularly of cleansing methods [depuration] that produce a safe oyster product). Oyster consumption also increased with education and in the number of males compared with females. These characteristics could be targeted in promotional campaigns.

Similar bulletins of U.S. consumer opinions and attitudes toward catfish, shrimp, and tuna will be available soon.

## REFERENCES

- ABC News.** 1998. "Oysters Cause Illnesses." <http://abc-news.go.com/sections/living/DailyNews/oysters980723.html>.
- Billups, A.L.** 2001. "Seafood Safety." University of Florida, Research and Graduate Programs, Explore Magazine Vol. 2(1).
- Center for Science in the Public Interest (CSPI).** 2000 "FDA Inaction on Raw Oysters Means More 'Deaths on the Half Shell.'" <http://www.cspinet.org/new/oysters.html>.
- Center for Disease Control and Prevention (CDC).** 1993 "Multistate Outbreak of Viral Gastroenteritis Related to Consumption of Oysters — Louisiana, Maryland, Mississippi, and North Carolina, 1993." Morbidity and Mortality Weekly Report Series, Vol. 42(49).
- House, L., T. Hanson, and S. Sureswaran.** 2002 "Decision to Consume and Frequency of Oyster Consumption in the United States." Presented at the annual meeting of the Southern Association of Agricultural Economics, Orlando, FL.
- United States Department of Agriculture, National Agricultural Statistics Service.** 2000. 1997 Census of Agriculture. Washington, D.C. AC97-SP-3.
- United States Department of Agriculture, Economic Research Service.** 1999 "Food Consumption, Prices, and Expenditures." J. Putnam and J. Allshouse.
- United States Department of Commerce, National Oceanic Atmospheric Administration, National Marine Fishery Service.** 2001. "Fisheries of the U.S., 2000." Current Fishery Statistics No. 2000. Silver Spring, MD. (<http://www.st.nmfs.gov/commercial/index.html>).
- Wallace, R.K.** 2001. "Cultivating the Eastern Oyster, *Crassostrea virginica*." Southern Regional Aquaculture Center Publication No. 432.
- The World Almanac and Book of Facts, 1999.** Mahwah NJ: World Almanac Books.

# **Appendix I**

## ***Survey Instrument***

# **2001 SURVEY OF U.S. FISH AND SEAFOOD CONSUMPTION**

Conducted by

**Dr. House and Dr. Hanson, Mississippi State University,  
Department of Agricultural Economics**

and

**Dr. Sureshwaran, South Carolina State University,  
Department of Agribusiness and Economics**

**NOTICE: Any information reported below is strictly confidential. This data will be used only by persons engaged in this survey, and will not be disclosed or released to others for any purpose.**

This research is supported by grants from the USDA Higher Education and Mississippi-Alabama Sea Grant Programs and the survey was reviewed by Mississippi State University's Institutional Review Board of the Regulatory Compliance Office, docket number 99-297.

**Directions:** Please have the member of the household that usually decides what food you purchase fill out this survey. Refer to following definitions to aid you when in doubt if the item is shellfish or finfish. Thank you in advance for taking the time to fill out this survey.

**Definitions:**

**Shellfish:** an aquatic animal with a shell (e.g., oyster, clam, mussel, crab, crawfish, lobster, and shrimp)

**Finfish:** a true fish as distinguished from a shellfish (e.g., cod, catfish, carp, trout, tilapia, tuna, bass, sole, flounder, haddock, perch, snapper, and salmon)

The following three charts will ask you to estimate the number of times you eat various kinds of meat for dinner, lunch, and breakfast. **AT-HOME** refers to eating food at home, or prepared at home. **AWAY-FROM-HOME** refers to eating food prepared by others (i.e., restaurants). In answering the following questions, refer to your average eating habits over the last three years.

1a. Please indicate how often you eat each of the following products for **BREAKFAST AT-HOME** by placing an X in the appropriate box.

	Daily	4-6 times weekly	2-3 times weekly	1 time per week	More than 1 time monthly, but less than weekly	Infrequently (less than once per month)	Never
Catfish							
Tuna							
Other finfish							
Shrimp							
Oysters							
Other shellfish							

1b. Please indicate how often you eat each of the following products for **BREAKFAST AWAY-FROM-HOME** by placing an X in the appropriate box.

	Daily	4-6 times weekly	2-3 times weekly	1 time per week	More than 1 time monthly, but less than weekly	Infrequently (less than once per month)	Never
Catfish							
Tuna							
Other finfish							
Shrimp							
Oysters							
Other shellfish							

1c. Please indicate how often you eat each of the following products for **LUNCH AT-HOME** by placing an **X** in the appropriate box.

	Daily	4-6 times weekly	2-3 times weekly	1 time per week	More than 1 time monthly, but less than weekly	Infrequently (less than once per month)	Never
Catfish							
Tuna							
Other finfish							
Shrimp							
Oysters							
Other shellfish							

1d. Please indicate how often you eat each of the following products for **LUNCH AWAY-FROM-HOME** by placing an **X** in the appropriate box.

	Daily	4-6 times weekly	2-3 times weekly	1 time per week	More than 1 time monthly, but less than weekly	Infrequently (less than once per month)	Never
Catfish							
Tuna							
Other finfish							
Shrimp							
Oysters							
Other shellfish							

1e. Please indicate how often you eat each of the following products for **DINNER AT-HOME** by placing an **X** in the appropriate box.

	Daily	4-6 times weekly	2-3 times weekly	1 time per week	More than 1 time monthly, but less than weekly	Infrequently (less than once per month)	Never
Catfish							
Tuna							
Other finfish							
Shrimp							
Oysters							
Other shellfish							

1f. Please indicate how often you eat each of the following products for **DINNER AWAY-FROM-HOME** by placing an X in the appropriate box.

	Daily	4-6 times weekly	2-3 times weekly	1 time per week	More than 1 time monthly, but less than weekly	Infrequently (less than once per month)	Never
Catfish							
Tuna							
Other finfish							
Shrimp							
Oysters							
Other shellfish							

2. What percentage of the fish (shellfish or finfish) you consume is from: (For example, if you purchase fish from a restaurant half of the time and from a grocery store the other half of the time, your answer would be 50% Grocery Store or Supermarket and 50% restaurant. All answers should total 100%.)

- |  |  |
|--|--|
| <input type="checkbox"/> Grocery Store or Supermarket    | <input type="checkbox"/> Gourmet Specialty Store |
| <input type="checkbox"/> Restaurant                      | <input type="checkbox"/> Fish Farm               |
| <input type="checkbox"/> Recreational Catch              | <input type="checkbox"/> Fish or Seafood Market  |
| <input type="checkbox"/> Fish peddler or roadside vendor | <input type="checkbox"/> Don't Purchase Fish     |

3. Are you currently aware of any government safety inspections for fish?

- YES       NO

4. Have you ever heard the phrase "HACCP"?

- YES       NO

If yes, how does "HACCP" affect your consumption of fish?

- Increases       Decreases       No Effect

5. Have you ever consumed farm-raised catfish?

- YES       NO

If YES, would you consume it again?

- YES       NO

If NO, would you consider consuming farm-raised catfish?

- YES       NO

6. Have you ever consumed farm-raised oysters?

- YES       NO

If YES, would you consume it again?

- YES       NO

If NO, would you consider consuming farm-raised oysters?

- YES       NO

7. What product forms (fresh fillets, fresh nuggets, . . . frozen fillets, frozen nuggets, etc.) of catfish do you normally purchase for home consumption? Check all that apply.

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> <b>Fresh</b>         | <input type="checkbox"/> <b>Frozen</b>        | <input type="checkbox"/> <b>No home consumption</b> |
| <input type="checkbox"/> Fillets              | <input type="checkbox"/> Fillets              |   |
| <input type="checkbox"/> Nuggets              | <input type="checkbox"/> Nuggets              |   |
| <input type="checkbox"/> Steaks               | <input type="checkbox"/> Steaks               |   |
| <input type="checkbox"/> Strips               | <input type="checkbox"/> Strips               |   |
| <input type="checkbox"/> Whole (without head) | <input type="checkbox"/> Whole (without head) |   |
| <input type="checkbox"/> Other (Write-in)     | <input type="checkbox"/> Other (Write-in)     |   |

8a. In your opinion, which of the following is the **SAFEST** shellfish or finfish product to eat? Please mark one.

- |                                  |                                     |                                  |  |                                  |
|----------------------------------|-------------------------------------|----------------------------------|--|----------------------------------|
| <input type="checkbox"/> Tuna    | <input type="checkbox"/> Shrimp     | <input type="checkbox"/> Pollock | <input type="checkbox"/> Salmon        | <input type="checkbox"/> Cod     |
| <input type="checkbox"/> Catfish | <input type="checkbox"/> Clams      | <input type="checkbox"/> Crabs   | <input type="checkbox"/> Flounder/Sole | <input type="checkbox"/> Halibut |
| <input type="checkbox"/> Oyster  | <input type="checkbox"/> No Opinion |                                  |  |                                  |

8b. In your opinion, which of the following is the **LEAST SAFE** shellfish or finfish product to eat? Please mark one.

- |                                  |                                     |                                  |  |                                  |
|----------------------------------|-------------------------------------|----------------------------------|--|----------------------------------|
| <input type="checkbox"/> Tuna    | <input type="checkbox"/> Shrimp     | <input type="checkbox"/> Pollock | <input type="checkbox"/> Salmon        | <input type="checkbox"/> Cod     |
| <input type="checkbox"/> Catfish | <input type="checkbox"/> Clams      | <input type="checkbox"/> Crabs   | <input type="checkbox"/> Flounder/Sole | <input type="checkbox"/> Halibut |
| <input type="checkbox"/> Oyster  | <input type="checkbox"/> No Opinion |                                  |  |                                  |

9. In your opinion, from which growing **REGION** do the **SAFEST** oyster products come from?

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Pacific Northwest | <input type="checkbox"/> Gulf of Mexico     | <input type="checkbox"/> Chesapeake Bay |
| <input type="checkbox"/> New England       | <input type="checkbox"/> Southeast Atlantic | <input type="checkbox"/> Mid-Atlantic   |
| <input type="checkbox"/> No Opinion        |   |   |

10a. The following statements are descriptions of three possible food inspection and safety programs. Please indicate by placing an X in the box whether a program as described would increase, have no effect on, or decrease the amount of fish or shellfish you eat.

Plan	Program Description	Increase	No Effect	Decrease
A	Food companies are legally required to maintain their own food safety program using detailed record keeping procedures.			
B	Food companies are legally required to have government agencies visually inspect along with taste tests. If the plant receives a passing grade, their product is labeled with a uniform product safety seal.			
C	A private, independent third party is hired to monitor the food company and determine if the product is safe for consumption and if the plant is operating under sanitary conditions.			

10b. If only one of the above three plans were used to ensure fish or shellfish safety, which plan would you prefer?

Plan A                       Plan B                       Plan C

11a. Each of the following treatments can be used to kill bacteria and viruses that may be present in raw oysters. Each treatment works equally well and provides a safer oyster without causing any difference in taste and texture. Please indicate whether Treatments A, B, C, and D would increase, have no effect on, or decrease the amount of oysters you eat.

Plan	Program Description	Increase	No Effect	Decrease
A	A process of flushing bacteria and viruses from the oyster with purified water.			
B	A process of exposing oysters to an indirect energy source.			
C	A process of exposing oysters to a direct light energy.			
D	A process of placing oysters in an extremely high pressure			

11b. If only one of the above four plans were used to ensure oyster safety, which plan would you prefer?

Plan A                       Plan B                       Plan C                       Plan D

11c. If you chose one of the above processes for ensuring a safe raw oyster product, how much more than the initial raw oyster price would you be willing to pay for a guaranteed safe raw oyster?

\$\_\_\_\_\_ per individual oyster.

12a. The following is a description of a finfish that can be farm-raised in the United States. After reading the description, please indicate whether or not you would be willing to purchase this product:

Fillets have a firm texture with a mild, slightly nutty flavor. Fillets are guaranteed boneless and lack the fishy odor associated with some fish products. Because the fish is farm-raised, fresh product is available year-round and is raised in a quality-controlled environment with stringent control measures (including taste testing).

12b. I would purchase this fish:

Strongly Agree     Agree     Neutral     Disagree     Strongly Disagree     No Opinion

If AGREE or STRONGLY AGREE: For boneless fillets, I would be willing to pay \$\_\_\_\_\_/pound (See below for typical meat and fish prices).

Typical prices for other products are: Ground Beef \$1.49/lb; Catfish \$3.99/lb; Boneless Chicken Breasts \$5.99/lb; Salmon Fillets \$7.99/lb; Steak \$10.99/lb; Shrimp \$9.99/lb

13. For each product, please rank up to the top three reasons (1,2,3) you EAT the product. If you do not eat the product, leave the column blank.

	Enjoy flavor	Health/nutrition	Tradition/habit	Price	Availability	Farm-raised	Convenience	Product safety	Religion	Variety in diet	Know how to prepare	Aphrodisiac properties
Catfish												
Tuna												
Shrimp												
Oyster												

14. For each product, please rank up to the top three reasons (1,2,3) you **DO NOT EAT** more of, or do not eat any of the product.

	Price	Fresh products not available	Custom	Religion	Lack of preparation knowledge	Too time consuming to prepare	Don't like texture	Don't like smell	Don't like taste	Traumatic experience	Concerned about product safety	Allergy	Vegetarian	Health and/or nutrition	Only farm-raised is available
Catfish															
Tuna															
Shrimp															
Oyster															

15. Please indicate how you feel about the following statement for the following products. Circle the number which agrees with your preference using 1 as "Strongly Agree" to 5 being "Strongly Disagree" or Zero (0) as "No Opinion."

I prefer farm-raised to wild harvested <b>Catfish</b> :	1	2	3	4	5	0
I prefer farm-raised to wild harvested <b>Tilapia</b> :	1	2	3	4	5	0
I prefer farm-raised to wild harvested <b>Salmon</b> :	1	2	3	4	5	0
I prefer farm-raised to wild harvested <b>Oysters</b> :	1	2	3	4	5	0
I prefer farm-raised to wild harvested <b>Shrimp</b> :	1	2	3	4	5	0

16. Which of the following would **INCREASE** your consumption of (place an **X** in all boxes that apply):

	Recipes	Coupons	Company quality guarantees	Nutritional information	Doctor's recommendations (diet program)	Packaging (microwavable/convenience)	Availability of quality products	Information on production process	Company safety guarantee	Government safety inspection	Lower price
Catfish											
Tuna											
Shrimp											
Oyster											

17. Do you reside in a:

- Large Metropolitan area (City) population greater than 100,000 people
- City with a population less than 100,000 people
- Small Town with a population less than 10,000 people
- Rural Area

18. What is your zip code? \_\_\_\_\_

19. How close do you currently live to a coastal area? (Check one)

- \_\_\_\_\_ Within 0-10 miles      \_\_\_\_\_ 50-100 miles
- \_\_\_\_\_ 10-50 miles            \_\_\_\_\_ > 100 miles

20. What is the closest you have ever lived (including all prior residences) to a coastal area?

- \_\_\_\_\_ Within 0-10 miles      \_\_\_\_\_ 50-100 miles
- \_\_\_\_\_ 10-50 miles            \_\_\_\_\_ > 100 miles



21. In what year were you born? \_\_\_\_\_
22. What is your gender?  Male  Female
23. Please indicate the number of members in your household in each age group including yourself.  
 \_\_\_\_\_ 0-10 years      \_\_\_\_\_ 11-20 years      \_\_\_\_\_ 21-40 years  
 \_\_\_\_\_ 41-60 years      \_\_\_\_\_ 61 years or above
24. What is the highest level of education you have achieved?  
 Less than High School  
 High school diploma or GED  
 Some college  
 Completed 2-year college degree  
 Completed 4-year degree (B.A. or B.S.)  
 Education beyond B.A. or B.S.
25. What is your current level of household income?  
 Less than \$9,999       \$10,000-19,999       \$20,000-29,999  
 \$30,000-39,999       \$40,000-49,999       \$50,000-59,999  
 \$60,000-74,999       \$75,000-99,999       \$100,000-124,999  
 \$125,000 and above
26. Please indicate your religious affiliation.  
 Catholic       Jewish       Muslim       Buddhist  
 Christian (Not Catholic)       Hindu  
 Other \_\_\_\_\_
27. Which of the following groups represents your ethnic background?  
 Black/African American       Caucasian  
 Native American       Asian or Pacific Islander  
 Hispanic       Other

**We would like to thank you for your time in completing this survey. Please return the survey in the enclosed postage paid envelope. If you have any questions about the survey, please contact us at (662) 325-7988.**



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