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# **Preferences of Mid-Atlantic Seafood Buyers Toward Farm-Raised Hybrid Striped Bass\***

by

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## **Abstract**

A market survey of three mid-Atlantic food-fish market levels was conducted to provide information on finfish buyers' market characteristics, finfish attribute preferences, and buyers' attitudes toward farm-raised hybrid striped bass. Results showed that most firms are located in the suburban areas, and they purchased their fish from producers and wholesalers. Quality was rated as the most important finfish attribute; and, aside from restaurants, buyers are generally familiar with hybrid striped bass and indicated that it could easily substitute for wild striped bass. Most buyers were either not sure or feel hybrid striped bass could not substitute for other fish species although they all expressed a willingness to offer farm-raised hybrid striped bass. Finally, the possibility of fish farmers selling directly to all market levels has great potential if the fish size is around two to three pounds and the form is whole for the wholesaler and retailers and fillet for the restaurants.

## **Introduction**

U.S. consumption of seafood products has rapidly expanded. Per capita consumption increased over 51 percent between 1964 and 1989. Increased population, heightened consumer nutrition awareness, and increased personal income have created an unprecedented demand for seafood in the United States. Seafood purchases are projected to increase the greatest of any food group through the year 2020 (Blaylock et al.). However, production from domestic stocks of many finfish and shellfish species has neared or has achieved maximum sustainable yields (Adams).

During the 1980s, traditional agriculture in the United States has experienced a declining export market, increased commodity surpluses, and an overall decline in farm income. According to Theisen et al., the lack of production alternatives unduly exposed producers to price instabili-

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ties that often were induced by demand factors external to the U.S. economy. Senauer suggested that farmers need to produce what sells best rather than concentrate on those enterprises that may grow the best or have the greatest government subsidies. More and more, agricultural producers are seeking alternative farming enterprises.

Commercial aquaculture in the United States may represent one of the few truly profitable and expanding alternative farming areas for American agriculture (Hougart). Aquacultural production has increased from 92,000 metric tons in 1980 to an estimated 405,000 metric tons in 1990. Aquaculture is projected to account for 25 percent of all U.S. seafood production by the turn of the century.

There has been significant interest in developing an aquaculture industry in the mid-Atlantic region as an alternative to traditional grain crop and livestock enterprises. Hybrid striped bass has been identified as one of the best potential species for aquaculture development in the mid-Atlantic region (Strand et al.). The striped bass is one of the most important commercial and recreational species on the U.S. Atlantic Coast. However, between 1973 and 1983 there was an 88 percent decline in total landings of striped bass. The declines in wild striped bass populations and the closure of many commercial fisheries have created a large, unsatisfied demand for striped bass in the established East Coast seafood markets. Studies by Carlberg and Van Olst and by Helfrich, Libey, and Neves indicate the consumer demand for striped bass appears sufficient to sustain a strong mid-Atlantic aquaculture industry well into the future. Private and government marketing experts estimate a beginning market demand of 52 million pounds of hybrid striped bass products. Studies by Liao and Smith in 1987 and by Lipton and Swartz in 1988 showed that hybrid striped bass were highly acceptable to consumers, wholesalers, and retailers and appeared to be an excellent market substitute for wild striped bass.

The success of an aquacultural enterprise depends largely on the marketability of the product. The aquaculturist may distribute fish products through the conventional, established network of fish brokers and wholesalers or deal directly

with retailers and restaurants (Helfrich et al.). These seafood market levels (wholesale, retail, and restaurant) differ in their industry characteristics and requirements. A supplier has to know the market structure and the product attributes that influence buyer purchasing decisions in order to achieve maximum market penetration (Lipton, et al.).

## Objectives

The overall objective of this study is to provide the seafood industry with market information on finfish market structure and buyer preferences for farm-raised hybrid striped bass products in the mid-Atlantic region. Specifically, the objectives of this study are to determine the following:

1. Seafood market characteristics,
2. Fish buyers' attribute preferences, and
3. Fish buyers' attitudes toward hybrid striped bass.

## Procedure

A three-page market survey was developed and mailed to 2,483 mid-Atlantic seafood wholesalers, retailers, and restaurants. Complete addresses of the mid-Atlantic seafood buyers were supplied by Dun's Marketing, a division of Dun and Bradstreet Company. Table 1 lists the sample area and the sample size for each of the three traditional food-fish market levels.

The market survey was designed to determine market characteristics, buyer attitudes toward finfish and preferences toward farm-raised hybrid striped bass products. All business participants were asked to provide information about the business' weekly volume of fish sales, seasonality of demand for fish purchases, sources of fish, and business location (rural, urban, etc.). The finalized market survey was pre-tested by seafood buyers from each market level.

The wholesaler and retailer surveys were identical. The restaurant survey differed by the following questions. Wholesalers and retailers were asked specific questions regarding the distribution of sales between retail and wholesale

Table 1. Survey Sample Area and Size by Market Level

<u>Sample Area</u>	<u>Wholesale</u>		<u>Market Level Retail</u>		<u>Restaurant</u>		<u>Total</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)
New York	204	8.2	243	9.8	79	3.2	526	21.2
New Jersey	135	5.4	176	7.1	101	4.1	412	16.6
Pennsylvania	53	2.1	76	3.1	58	2.3	187	7.5
Delaware	9	0.4	15	0.6	18	0.7	42	1.7
Maryland	130	5.2	103	4.1	171	6.9	404	16.3
Washington, D.C.	6	0.2	12	0.5	14	0.6	32	1.3
Virginia	149	6.0	91	3.7	131	5.3	371	14.9
North Carolina	<u>112</u>	<u>4.5</u>	<u>74</u>	<u>3.0</u>	<u>323</u>	<u>13.0</u>	<u>509</u>	<u>20.5</u>
Total	798	32.1	790	31.8	895	36.0	2483	100.0

Table 2. Location of Fish Buyer, by Market Level

<u>Area</u>	<u>Wholesale</u>		<u>Market Level Retail</u>		<u>Restaurant</u>		<u>Total</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)
Rural	23	25.8	14	16.9	21	17.4	58	19.8
Suburban	26	29.2	46	55.4	38	31.4	110	37.5
Urban	36	40.4	20	24.1	36	29.8	92	31.4
Resort	<u>4</u>	<u>4.5</u>	<u>3</u>	<u>3.6</u>	<u>26</u>	<u>21.5</u>	<u>33</u>	<u>11.3</u>
Total	89	100.0	83	100.0	121	100.0	293	100.0

Source: Survey and Calculations.

Table 3. Location of Fish Buyer by State, by Market Level

<u>State</u>	<u>Wholesale</u>		<u>Market Level Retail</u>		<u>Restaurant</u>		<u>Total</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)
New York	13	14.6	12	14.6	10	8.3	35	12.0
New Jersey	17	19.1	26	31.7	17	14.0	60	20.5
Pennsylvania	5	5.6	10	12.2	7	5.8	22	7.5
Delaware	4	4.5	3	3.7	9	7.4	16	5.5
Maryland	18	20.2	9	11.0	29	24.0	56	19.2
Washington, D.C.	2	2.2	1	1.2	2	1.7	5	1.7
Virginia	12	13.5	11	13.4	17	14.0	40	13.7
North Carolina	<u>18</u>	<u>20.2</u>	<u>10</u>	<u>12.2</u>	<u>30</u>	<u>24.8</u>	<u>58</u>	<u>19.9</u>
Total	89	100.0	82	100.0	121	100.0	292	100.0

Source: Survey and Calculations.

accounts; the distribution of wholesale sales among different outlets (hotels, food chains, institutions, etc.); and the processing services offered to customers. Restaurants, on the other hand, were asked specific questions regarding their seating capacity; average entree price; and percentage of entrees which include seafood.

The surveys, along with a cover letter, were sent out in July 1989 and collection was completed by mid-September 1989. A total of 296 usable surveys were returned resulting in a 12 percent response rate. The response rate is underestimated by about 50 percent because a large portion of the seafood businesses surveyed only sold shellfish. By state, the percentage carrying finfish are: New York (65%), New Jersey (65%), Maryland (42%), and Virginia (42%) (New York Department of State, 1988; New Jersey Department of Agriculture, 1988; Maryland Department of Agriculture, 1988; Virginia Department of Agriculture, 1988). This gives an adjusted response rate of about 22 percent (based on the average percentage of businesses carrying finfish weighted by the number of seafood businesses in each state).

## Results and Discussion

### *Market Characteristics*

Overall, the seafood firms responding to the survey tended to be concentrated in the suburban (37.5%) and followed by the urban areas (31.4%). The other categories were rural (19.8%) and resort (11.3%) (Table 2). Specifically, over 40 percent of the wholesale firms surveyed were located in the urban area while the majority (55.4%) of the retail firms surveyed were located in the suburbs. Seafood restaurants, however, were found to be located quite evenly throughout the areas considered in this study. The particular states in which the respondent firms were located are given in Table 3.

Seafood firms responding to the study indicated several sources from which they purchased finfish. The wholesale firms reported close to 40 percent of their purchases came from producers (fisherman and fish farmers) and then, running a close second, from other seafood wholesalers

(30.9%). The seafood retail outlets and restaurants reported an overwhelming tendency to do business with seafood wholesalers rather than producers or brokers. Retail outlets and restaurants, on average, purchased 68.3 and 75.5 percent, respectively, of their finfish from a wholesaler (Table 4). Purchasing fish from seafood brokers was minimal by all three market levels.

In terms of weekly finfish sales, respondents in all three market levels showed a wide range. Table 5 summarizes the weekly sales for the three market levels. Wholesalers sold an average of 36,203 pounds of finfish per week, ranging from a low of 50 pounds per week up to a high of 500,000 pounds per week. Retailers sold 1,379 pounds per week, on average, with a range from 40 up to 9,000 pounds per week. Seafood restaurants averaged 723 pounds per week, with a low of 20 pounds and a high of 10,000 pounds.

The survey results for seasonal demand for specific finfish species indicate that the overall demand for finfish in the mid-Atlantic region is not seasonal. The majority of wholesalers (69.8%), retailers (62.2%) and restaurants (78.0%) reported no seasonality of demand for finfish (Table 6). This implies that fish farmers providing year-round supplies could find a ready market for their products.

However, of those firms indicating seasonality in demand for their seafood products, the wholesale and retail firms reported their highest demand season as the winter months and their lowest occurring during the summer. Restaurants, on the other hand, reported the slowest months as the winter and the most active months as the summer (Table 7). This indicates that a portion of the population prefer their seafood away from home during the summer months and at home during the winter months.

The wholesale and retail seafood firms were asked specifically to indicate the percentage of seafood sales retailed directly to consumers and the percentage sold wholesale. As expected, the wholesale firms made mostly wholesale transactions (84.8%) and the retail outlets sold primarily retail to consumers (82.6%) (Table 8). For those firms engaging in the wholesale seafood business,

**Table 4. Sources of Finfish Purchase by Market Level**

<u>Source</u>	<u>Market Level</u>					
	<u>Wholesale</u>		<u>Retail</u>		<u>Restaurant</u>	
	mean percent/(S.D.*)					
<b>Producers</b>	39.1	(38.8)	15.2	(24.6)	10.0	(20.0)
<b>Brokers</b>	16.0	(27.9)	9.8	(23.5)	8.9	(19.8)
<b>Wholesalers</b>	30.9	(36.5)	68.3	(36.5)	75.5	(33.1)
<b>Other</b>	3.0	(14.9)	0.7	( 3.3)	2.9	(15.3)

**Source: Survey and Calculations.**

\* Standard Deviation

**Table 5. Finfish Buyer Sales Volume, by Market Level**

	<u>Market Level</u>		
	<u>Wholesale</u>	<u>Retail</u>	<u>Restaurant</u>
	(pounds per week)		
<b>Mean</b>	36,203	1,379	723
<b>Standard Deviation</b>	80,102	1,771	1,281
<b>Minimum</b>	50	40	20
<b>Maximum</b>	500,000	9,000	10,000

**Source: Survey and Calculations.**

**Table 6. Fish Buyer Seasonality of Demand, by Market Level**

<u>Response</u>	<u>Market Level</u>					
	<u>Wholesale</u>		<u>Retail</u>		<u>Restaurant</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)
<b>Yes</b>	26	30.2	31	37.8	26	22.0
<b>No</b>	60	69.8	51	62.2	92	78.0
<b>Total</b>	86	100.0	82	100.0	118	100.0

**Source: Survey and Calculations.**

Table 7. Seasonal Rating<sup>1</sup> of Respondent Firms Experiencing Seasonal Demand, by Market Level

<u>Season</u>	Market Level					
	<u>Wholesale</u>		<u>Retail</u>		<u>Restaurant</u>	
	mean rating/(S.D. <sup>a</sup> )					
Spring	3.09	(1.02)	2.75	(1.08)	2.76	(1.09)
Summer	1.76	(1.14)	2.21	(1.45)	3.44	(1.16)
Fall	3.00	(0.93)	2.90	(1.23)	2.36	(1.22)
Winter	3.36	(1.18)	3.10	(1.26)	1.32	(1.35)

Source: Survey and Calculations.

<sup>1</sup> Rating of 0 = no demand, 4 = high demand.

<sup>a</sup> Standard Deviation

Table 8. Distribution of Seafood Sales for the Wholesale and Retail Market Levels

<u>Customer</u>	Market Level			
	<u>Wholesale</u>		<u>Retail</u>	
	mean percent/(S.D. <sup>a</sup> )			
Consumers	31.5	(32.4)	82.6	(24.6)
Wholesale	84.4	(25.1)	31.7	(32.0)

Source: Survey and Calculations.

<sup>a</sup> Standard Deviation

Table 9. Destination of Wholesale Seafood Sales for the Wholesale and Retail Market Levels

<u>Buyer</u>	Market Level			
	<u>Wholesale</u>		<u>Retail</u>	
	mean percent/(S.D. <sup>a</sup> )			
Institutional	12.0	(12.4)	21.5	(32.9)
Restaurants	47.4	(31.2)	66.3	(35.2)
Hotels	19.4	(16.9)	12.0	( 4.5)
Food Chains	20.4	(20.4)	26.3	(26.3)
Retail Seafood Mkts.	28.3	(28.0)	38.5	(29.3)
Other Wholesalers	39.2	(31.2)	36.4	(38.6)

Source: Survey and Calculations.

<sup>a</sup> Standard Deviation

the survey requested the percentage of sales to institutional outlets, restaurants, hotels, food chains, retail seafood markets, and other wholesalers or distributors. The wholesale firms indicated that the primary customers were restaurants (47.4%), other wholesalers and distributors (39.2%), and retail seafood markets (28.3%). The retail outlets that also sold wholesale reported that the major customers were restaurants (66.3%), other retail seafood markets (38.5%), and other wholesalers and distributors (36.4%) (Table 9).

The market survey provided information about three important seafood restaurant characteristics: seating capacity, entree price, and percentage of entrees that included seafood. Restaurants that responded showed wide ranges in both seating capacity and entree price, suggesting that the respondents represented both large and small, and inexpensive and expensive seafood restaurants. The average seafood restaurant seated 212 people, with the seating capacity ranging from 30 to 818 people. Seafood restaurant entree price averaged \$11.74, with a low of \$3.75 and a high of \$25.00 (Table 10). Overall, 94 percent of the reporting restaurants reported that over 50 percent of their entrees included seafood (Table 11). This indicates that seafood was the responding restaurants main source of attraction to customers.

#### *Buyer Attribute Preferences*

Survey participants were asked to rate seven key finfish attributes in terms of the relative importance of these attributes in the business' purchasing decisions. These attributes were quality, fresh/frozen, fish size, size uniformity, product form, seasonality and purchase price. The selection of attributes for this study was based on past fish marketing studies, and discussions with fish buyers in the mid-Atlantic region (Lester; Arnold). Respondents were instructed to use a rating scale from 0 to 10, with 10 being the best possible rating. Table 12 enumerates the average ratings by market level and provides attribute importance rankings. The relatively high ratings given to the attributes implies that these factors are important to these three market levels. The attribute ratings were tested to find if the ratings given to each product attributes by market

are significantly different from each other at the .05 level.

Quality was generally the most highly rated as reported by seafood buyers in all market levels. Only in the retail market was there no statistical difference found to exist between the quality rating and the rating for fresh/frozen or fish size. Therefore, quality is one controllable attribute which fish farmers can use to differentiate their product from wild stocks.

Although wholesalers rated purchase price (8.63) as the second most important product attribute, with fresh/frozen (8.45) as third, the ratings for purchase price and fresh/frozen were so close in value there was no significant difference found between these two attributes, making them the second most important features for this market. Product form, size uniformity, and seasonal availability were found to be the least important attributes and the ratings were not significantly different among them.

As indicated earlier, retailers rated quality, fresh/frozen, and fish size equally as important since their ratings were not statistically different. Similar to wholesalers, retailers rated product form, size uniformity, and seasonal availability as the least important attributes. The ratings given by retailers to product form, size uniformity, and seasonal availability were also found not to have any statistical difference among them.

Although seafood restaurants rated the fresh/frozen attribute (8.73) as second in importance, and purchase price (8.51) third, there exists no statistical difference between these two attributes, indicating they are equally as important after the quality attribute. Product form, size uniformity, and fish size were rated as less important attributes, and again the ratings were found not to be statistically different from each other. Seasonal availability was rated as the least important fish attribute by the wholesale and restaurant markets. However, the relative insignificance of seasonal availability was not hypothesized, since previous studies suggested that year-round supplies of a species was extremely important so that restaurants could consistently list the species on their regular menu.

Table 10. Seafood Restaurant Seating Capacity and Average Entree Price

	<u>Seating Capacity</u> (no.)	<u>Entree Price</u> (\$)
Mean	212.73	11.74
Standard Deviation	140.21	4.22
Minimum	30.0	3.75
Maximum	818.0	25.00

Source: Survey and Calculations.

Table 11. Percentage of Respondent Restaurant Entrees that Include Seafood

<u>Percent</u>	<u>Restaurant</u> (no.      %)	
0 - 25	1	0.9
26 - 50	6	5.1
51 - 75	28	23.9
76 - 100	<u>82</u>	<u>70.1</u>
Total	117	100.0

Source: Survey and Calculations.

Table 12. Fish Buyers' Rating and Ranking of Fish Product Attributes, by Market Level

<u>Attribute</u>	<u>Market Level</u>		
	<u>Wholesale</u>	<u>Retail</u>	<u>Restaurant</u>
	mean rating/(rank)		
Quality	9.93 (1)	9.82 (1)	9.60 (1)
Fresh/Frozen	8.45 (3)	9.68 (2)	8.73 (2)
Fish Size	7.42 (4)	8.45 (3)	7.26 (6)
Size Uniformity	6.80 (6)	5.57 (7)	7.47 (5)
Product Form	7.01 (5)	5.87 (5)	7.62 (4)
Seasonality	5.92 (7)	5.77 (6)	6.02 (7)
Purchase Price	8.63 (2)	8.20 (4)	8.51 (3)

Source: Survey and Calculations.

Generally all market levels rated quality, fresh/frozen, and fish size as much more important fish attributes than size uniformity, product form, and seasonality. The one exception exists in the restaurant market, which rates product form relatively high.

### *Buyer Attitudes Toward Farm-Raised Hybrid Striped Bass*

The majority of wholesalers (73%) were familiar with hybrid striped bass, also marketed as "sunshine bass." Only a slight majority of retailers (51.2%) were familiar with the hybrids. However, only a small percentage of restaurateurs (29.4%) were familiar with hybrid striped bass (Table 13). These results suggest that there is a need for seafood buyer educational programs at the retail and restaurant levels. Until these programs are developed, fish farmers will find the greatest buyer acceptance for hybrid striped bass products to be seafood wholesalers.

Much of the literature on the market potential for farm-raised hybrid striped bass is based on the belief that hybrid striped bass is a good substitute for wild striped bass (Liao). The majority of wholesalers (61.6%) and retailers (73.2%) feel that hybrid striped bass can substitute for wild striped bass in their markets. Seafood restaurants were not as certain of the substitutability. Only 44.8 percent of restaurants feel that the hybrids can substitute for the wild striped bass. Almost as many restaurants (41.8%) are not sure about the substitutability of farm-raised hybrids for wild striped bass (Table 14). This correlates with the restaurateurs' lack of familiarity with hybrid striped bass and highlights the need for restaurant seafood buyer education.

There appears to be uncertainty about the ability of farm-raised hybrid striped bass to substitute for finfish species other than wild striped bass. As Table 15 enumerates, a majority of seafood buyers in all three market segments either do not know about substitution of hybrids for other species or else feel that hybrid striped bass will not substitute for any other species.

Those buyers who listed possible substitutes most often mentioned sea trout (weakfish) as a

finfish species for which hybrid striped bass can substitute in their markets. The implication is that a strong hybrid striped bass industry could adversely affect the commercial demand for sea trout.

In all three market levels, the majority of seafood buyers expressed a willingness to offer farm-raised hybrid striped bass if the species was readily available (Table 16). This willingness to offer hybrid striped bass suggests that fish farmers will encounter little resistance in attempts to introduce hybrid striped bass into the mid-Atlantic seafood market.

According to the results shown in Table 17, the majority of wholesalers (79.5%), retailers (57.8%), and restaurants (63.2%) said they were willing to purchase farm-raised hybrid striped bass directly from fish farmers. While these findings were expected for wholesalers and retailers, the high percentage of restaurants willing to buy directly from farmers is very surprising. According to previous seafood marketing studies, restaurants are generally averse to buying directly from commercial fishermen. This suggests that there may be a difference in seafood buyers' perceptions of farm-raised finfish in comparison with traditionally-harvested natural finfish stocks.

Seafood wholesalers and retailers have similar product form preferences for farm-raised hybrid striped bass. As shown in Table 18, whole fish, in-the-round, are most preferred by both wholesalers (51.6%) and retailers (48.8%). This result was anticipated, since fish quality is most easily gauged with whole fish. The second and third preferences in both markets are gutted fish and filleted fish, respectively. Wholesalers and retailers show very little preference for headed and gutted fish.

Seafood restaurants show a strong preference for filleted hybrid striped bass. Almost 70 percent (69.4%) of restaurateurs prefer filleted fish. Farmers wishing to sell in this market will have greatest success by offering a processed product. Farmers unwilling or unable to fillet their fish should concentrate on sales in other markets.

As Table 19 shows, there appears to be wide variation in size preference for farm-raised hybrid striped bass in the three seafood market levels. While the highest preference among wholesalers is for 2.5-pound (35.2%) hybrid striped bass, there is also reasonable preference for 2.0-pound (27.5%) fish. Similar variation is seen for the retail level of the finfish market. While highest preference is for 2.5-pound (34.5%) fish, there is essentially no difference in size preference for 2.0-pound (32.1%) fish, or fish over the size range from 1.5-pound (31.0%) to 3.0-pound (27.4%). This suggests that fish farmers selling to the retail market segment have some flexibility in determining the harvest size for farm-raised hybrid striped bass. Individual fish farmers must weigh their costs versus benefits of producing hybrid striped bass in excess of 1.5-pounds apiece.

The seafood restaurants show definite preference for a 2.5-pound (37.2%) hybrid striped bass. Second highest preference for restaurants is a 1.5-pound (24.0%) fish. These two highest restaurant size preferences can be explained by the restaurants' desire for a fish which yields 8-ounce to 10-ounce fillets. Processed hybrid striped bass gives about a 40 percent dress-out to skin-on fillets. A single 10-ounce portion fillet can be obtained from a 1.5-pound hybrid striped bass, and two 8-ounce fillets can be obtained from a 2.5-pound fish.

### Concluding Remarks

A market survey of the three mid-Atlantic food-fish market levels: seafood wholesalers, retailers and restaurants was conducted to provide information on seafood firm characteristics, fish buyer attribute preference for finfish, and fish buyer familiarity with and attitudes toward farm-raised hybrid striped bass. Results showed that typical seafood wholesaler came from an urban environment and sold an average of 36 thousand pounds of finfish per week which were purchased principally from producers and other wholesalers. The typical seafood retailer came from a suburban area and sold an average of almost 14 hundred pounds of finfish per week with wholesalers being the principal supplier. The typical restaurant was well represented in both the urban and suburban

environments. The average restaurant sold a little over 700 pounds of finfish per week which was principally supplied by wholesalers. Results showed that buyers are mainly in urban and suburban areas, therefore fish producers far from the major marketing areas need to have efficient marketing and distribution channels to directly sell to the different markets.

Survey participants were asked to rate the relative importance of fish attributes in the business' purchasing decisions. Quality is clearly the most important fish attribute among seafood buyers in all market levels. This is one controllable attribute which fish farmers must exploit to differentiate their product from wild stocks. Fish farmers should stress the high quality of farm-raised fish.

The survey results show that wholesalers and retailers were very familiar with hybrid striped bass. There is a need for educational programs to increase seafood restaurateurs' familiarity with hybrid striped bass, since almost two-thirds of mid-Atlantic seafood restaurant fish buyers are unfamiliar with hybrid striped bass. Until these educational programs are developed, fish farmers will find the greatest buyer acceptance at the wholesale and retail levels.

Hybrid striped bass has potential to substitute for native striped bass in the wholesale and retail markets. Moreover, when asked about farm-raised hybrid striped bass as a potential substitute for other fish species currently consumed in the mid-Atlantic region, survey respondents said that farm-raised hybrid striped bass may substitute for sea trout (weakfish) to seafood restaurants and, to a lesser extent, to wholesalers and retailers. The survey results implied farm-raised hybrid striped bass could potentially increase its seafood supply market share.

The majority of fish buyers in all three market levels expressed a willingness to offer farm-raised hybrid striped bass if the product is readily available. The buyers in all three market levels indicated that they are willing to purchase farm-raised hybrid striped bass directly from fish farmers. This result was expected for the wholesalers, since they traditionally purchase from

Table 13. Fish Buyer Familiarity with Hybrid Striped Bass, by Market Level

<u>Response</u>	<u>Wholesale</u>		<u>Market Level</u>		<u>Retail</u>		<u>Restaurant</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)
Yes	65	73.0	42	51.2	35	29.4		
No	22	24.7	37	45.1	77	64.7		
Not Sure	2	2.2	3	3.7	7	5.9		
Total	89	100.0	82	100.0	119	100.0		

Source: Survey and Calculations.

Table 14. Substitutability of Farm-Raised Hybrid Striped Bass for Wild Striped Bass, by Market Level

<u>Response</u>	<u>Wholesale</u>		<u>Market Level</u>		<u>Retail</u>		<u>Restaurant</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)	(no.)	(%)
Yes	45	61.6	41	73.2	30	44.8		
No	9	12.3	5	8.9	9	13.4		
Not Sure	19	26.0	10	17.9	28	41.8		
Total	73	100.0	56	100.0	67	100.0		

Source: Survey and Calculations.

Table 15. Substitutability of Other Finfish Species for Hybrid Striped Bass, by Market Level

<u>Species</u>	<u>Wholesale</u>		<u>Market Level</u>		<u>Retail</u>		<u>Restaurant</u>	
	mean	percent/(S.D. <sup>a</sup> )	mean	percent/(S.D. <sup>a</sup> )	mean	percent/(S.D. <sup>a</sup> )	mean	percent/(S.D. <sup>a</sup> )
Flounder	2.2	(14.7)	6.0	(23.8)	8.3	(27.6)		
Cod	3.3	(18.0)	2.4	(15.3)	4.1	(20.0)		
Sea Trout (weakfish)	15.4	(36.3)	17.9	(38.5)	27.3	(44.7)		
Bass Species	6.6	(25.0)	6.0	(23.9)	3.3	(18.0)		
Snapper	4.4	(20.6)	4.8	(21.4)	1.7	(12.8)		
Catfish	0.0	(0.0)	0.0	(0.0)	3.3	(18.0)		
Grouper	1.1	(10.5)	4.8	(21.4)	0.8	(9.1)		
Other	0.0	(0.0)	1.2	(10.9)	5.0	(21.8)		
None	40.7	(49.4)	39.3	(49.1)	26.4	(44.3)		
Don't Know	23.1	(42.4)	26.2	(44.2)	30.6	(46.3)		

Source: Survey and Calculations.

<sup>a</sup>Standard Deviation

commercial fishermen. However, the high percentage of retail and restaurant buyers willing to purchase from fish farmers was unexpected. This willingness to purchase directly from fish farmers suggests that there may be a difference in seafood buyers' perceptions of aquaculturally-produced finfish in comparison with traditionally-harvested finfish stocks.

Hybrid striped bass product form and size preferences by seafood buyers is in agreement with previous hybrid striped bass test marketing studies by Liao and Smith and by Lipton and Swartz. The results from the survey showed that wholesalers and retailers both prefer hybrid striped bass in the round, with gutted fish listed as the second most preferred form. The seafood restaurants showed a very strong preference for fillets. As such, farmers wishing to sell to seafood restaurants should be prepared to have the hybrid striped bass processed into fillets prior to sale.

Wholesalers and retailers show wide variations of size preference. Wholesalers generally prefer hybrid striped bass in the 2.0 to 3.0 pound range versus the smaller sizes. Retailers show preference for fish in the 1.5 pound to 3.0 pound range, with little preference for hybrid striped bass smaller than 1.5 pounds. While the preferred fish size for restaurants was 2.5 pounds, smaller fish from 1.0 pound to 2.0 pounds were reasonably acceptable. Current pond production technology in the mid-atlantic region will permit a fish producer to grow a 1.5 pound hybrid striped bass in one season. Therefore, regions or technologies that could produce a larger sized fish within one growing season would have an advantage in the market place.

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Table 16. Willingness to Offer Farm-Raised Hybrid Striped Bass, by Market Level

<u>Response</u>	<u>Market Level</u>					
	<u>Wholesale</u>		<u>Retail</u>		<u>Restaurant</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)
Yes	78	86.7	70	84.3	82	68.9
No	3	3.3	2	2.4	5	4.2
Not Sure	9	10.0	11	13.3	32	26.9
Total	90	100.0	83	100.0	67	100.0

Source: Survey and Calculations.

Table 17. Willingness to Purchase Hybrid Striped Bass from Fish Farmers, by Market Level

<u>Response</u>	<u>Wholesale</u>		<u>Market Level Retail</u>		<u>Restaurant</u>	
	(no.)	(%)	(no.)	(%)	(no.)	(%)
Yes	70	79.5	48	57.8	74	63.2
No	5	5.7	11	13.3	11	9.4
Not Sure	<u>13</u>	<u>14.8</u>	<u>24</u>	<u>28.9</u>	<u>32</u>	<u>27.4</u>
Total	88	100.0	83	100.0	117	100.0

Source: Survey and Calculations.

Table 18. Fish Buyers Preferred Product Form for Farm-Raised Hybrid Striped Bass, by Market Level

<u>Product Form</u>	<u>Wholesale</u>	<u>Market Level Retail</u>		<u>Restaurant</u>
		(percent <sup>a</sup> )		
Round	51.6	48.8	12.4	
Gutted	31.9	34.5	13.2	
Headed & Gutted	13.2	10.7	25.6	
Filleted	27.5	29.8	69.4	
Other	0	1.2	1.7	

Source: Survey and Calculations.

<sup>a</sup> Percentages for each market level sum to more than 100 percent because multiple responses were allowed.

Table 19. Fish Buyer Preferred Fish Size for Farm-Raised Hybrid Striped Bass, by Market Level

<u>Size</u>	<u>Wholesale</u>	<u>Market Level Retail</u>		<u>Restaurant</u>
		(percent <sup>a</sup> )		
1.0 lb	16.5	8.3	19.8	
1.5 lb	18.7	31.0	24.0	
2.0 lb	27.5	32.1	20.7	
2.5 lb	35.2	34.5	37.2	
3.0 lb	34.1	27.4	14.9	
Other	6.6	7.1	3.3	

Source: Survey and Calculations.

<sup>a</sup> Percentages for each market level sum to more than 100 percent because multiple responses were allowed.