Results and Implications

1999 US Tropical Fish Wholesalers Survey

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1999 U.S. Tropical Fish Wholesalers Survey: Results and Implications

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Abstract

A survey of marine life wholesalers was initiated in 1999 as a first step towards understanding the nature of Florida's marine life industry, the demand for Florida products, and the need for changes in the way the industry is regulated. Florida firms deal primarily in marine species and collect much of their own product. Wholesalers outside of Florida handle more freshwater species and purchase most of their inventory, the majority from overseas suppliers. Dealers predict that the average firm size will continue to grow as the industry consolidates. Niche markets for eco-friendly product will gain momentum. In Florida, marketing strategies should point to the high quality of Florida species with emphasis on the growing popularity of invertebrates. Wholesalers should look to provide buyers of Florida product with more consistent quantities throughout the year. Resource managers will be challenged to find ways to protect over-harvested species without interfering with the collection of abundant species while considering the effect of new regulations.

Key Words

Aquarium fish market, live ornamental fish, marine invertebrates

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I. Introduction

The tropical fish keeping hobby is currently the second most popular in the United States (Pet Industry Joint Advisory Council or PIJAC). More importantly, interest in home aquariums continues to grow (PIJAC). Industry growth has been especially prevalent for the establishment of "artificial reefs", which could be due to recent technological advances and breakthroughs in the care of such species. Marine aquariums rely on live specimens – fish and invertebrates such as plants, rock, sand, and crustaceans – collected from the wild. In the United States, such collection is primarily restricted to South Florida and Hawaii.

The recent awareness of the plight of coral reefs, such as the designation of 1997 as the "International Year of the Reef", has begun to highlight the marine life collection industry. According to the World Resources Institute (WRI), almost all reefs of the Florida Keys are at (at least) a moderate threat from human activities, including the overfishing of target species. In addition,

> At a minimum, overfishing results in shifts in fish size, abundance, and species composition within reef communities. Evidence suggests that removal of key herbivore and predator species may ultimately affect large-scale ecosystem changes. For example, removal of triggerfish has been linked with explosions in burrowing urchin populations, their prey, who subsequently accelerate reef erosion through feeding activities. In the Caribbean, decades of overfishing has led, in many places, to very low levels of grazing fish species. Because of this, herbivorous sea urchins (a nonburrowing species) have played an increasingly important role in keeping down algae growth.

The commercial collection of marine ornamentals in Florida was formally recognized as an industry in 1990, at which time data collection began. Since 1990, commercial collectors have landed approximately 180 species of marine finfish and 150 species of marine invertebrates, of which nearly 65 percent (in total value) has been collected in the Florida Keys (Florida Marine Research Institute, 1999). The Florida industry has experienced a number of changes in recent years, particularly in regards to resource management. Since 1994, the industry has shifted from specializing in the collection of fish species to collecting primarily invertebrates. Using data collected by the state of Florida, the total commercial harvest of all live marine life (including such products as live rock, live sand, angelfish, starfish, clams, crabs, plants, sharks, rays, etc.) was valued at less than $5 million annually (Florida Marine Resource Institute, 1999). This value represents the dockside value of product landed, the first point of transaction. Based on conversations with wholesalers described in this paper, it is likely that the product value increases

four-fold as it moves through the marketing chain. If so, the retail value of Florida-caught products is estimated at approximately $20 million.[1]

In Florida, collection practices have been regulated since the early 1990s with passage of Florida Statute 46-42. However, until 1998, participation (and hence fishing effort) has been effectively unrestricted. Senate Bill 1506 placed a four-year moratorium (beginning July 1, 1988) on the issue of new "marine life endorsements," without which marine life collected in Florida cannot be sold (Florida Statute 370.06(2)(d)2). Following the moratorium, limited-access legislation may be instituted. The current moratorium (and potential future limited entry system) could produce a wide variety of economically beneficial effects by eliminating myopically-driven practices that lead to a disregard for other fishers, recreational divers, reef health, fish mortality rates, and lower revenues (as smaller fish are collected and sold for a lower price). Given the diversity of species collected, additional regulations may be needed to protect species in greatest demand.

The objective of this paper was to summarize results of a 1999 survey of U.S. marine ornamental wholesalers. The survey instrument was created following the analysis of the commercial collection industry data (maintained by the Florida Marine Information System) and the trade data (collected by U.S. Customs Service and U.S. Fish and Wildlife Service), which are described in companion reports (Florida Sea Grant TP-111 and TP-113, respectively). The survey was designed to provide insight concerning the following issues:

- Recent market trends and channels for imported and domestic products.
- Importance of imports into the United States.
- Differences in marketing imported versus domestic products.
- Marketing advantages and disadvantages of species collected in Florida.
- Identification of major foreign competitors in the domestic market.
- Factors influencing sales of live marine fish and invertebrates.
- Expectations on the future of the industry

The results were expected to yield information needed by collectors, wholesalers, retailers, and resource managers regarding the state of the industry and to provide suggestions for successful future management policies and marketing campaigns. The descriptions and opinions of industry members, especially Florida collectors and dealers, are crucial to the accurate understanding and ultimate success of future regulations in Florida.

[1] To our knowledge, similar data is not available on the Hawaiian industry.

II. Survey Development, Design, and Implementation

The wholesaler survey was designed to tract the flow of product through marketing channels and geographically. We also sought information on the dominance of Florida products both nationally and internationally. As such, this work represents the first study to document the economics of the marine life industry in Florida. Survey questions were written to provide information on the total quantity and value of products purchased and sold in 1998. We asked dealers about product prices, quantities sold, and how Florida products compared to imported species. We queried wholesalers on their annual sales volume by species type, collection points, distribution outlets, and expectations about industry trends. We asked firms to describe their market channels (supply and demand side) and solicited their opinions about the state of the industry. We requested information about firm demographics to distinguish market groups.

The survey questions were pre-tested during several personal and telephone interviews of Florida wholesalers conducted in March and April 1999. The pre-testing revealed that it would be necessary to interview all Florida wholesalers by telephone since none kept regular business hours and most operated out of their home. The out-of-state interviews were also conducted by telephone since the cost of travel was prohibitively expensive. To increase the response rate, all firms were mailed a personalized letter with a description of the project and a request for cooperation during a telephone survey. See Appendix A for a copy of the letter. To maintain consistency, two interviewers were employed, one for the Florida firms and another for the out-of-state firms. Each firm was then contacted by phone between August 1999 and February 2000. See Appendix B for a copy of the survey instrument.

Our contact list included all Florida wholesalers licensed to purchase marine life and having reported handling marine life species in either 1997 or 1998 (i.e., firms with active marine life endorsements or MLEs), a total of 90 firms. Next, we identified dealers located outside of Florida using the trade magazine *Pet Supplies Marketing Directory*, which has been renamed the *Pet Products News Buying Guide* (Fancy Publications Inc.).[2] In this manner, 84 domestic firms dealing in "saltwater livestock" were added to our contact list[3] for a total of 174 firms.

[2] Per the suggestion of the (then) president of the AMDA.

[3] The directory actually listed a total of 91 firms; however, initial contact with these firms revealed that two firms were listed multiple times under different names and five did not handle marine species. These seven firms were eliminated from the list.

III. Survey Results

III.A. Response Rate

Of the 174 firms initially identified as marine life wholesalers, 54 firms (31 percent) were removed from the list because they did not participate in the market in 1999 or had their telephone disconnected and left no forwarding number (i.e., were "inactive"). Of the remaining 120 firms, 52 firms (43 percent) completed the survey, 7 explicitly refused to answer, and 61 provided incomplete responses. Every attempt was made to gather the survey information including contacting some firms up to eleven times. Several surveys were interrupted and never completed. Some firms promised to call back but never did. In many cases, the interviewer was forwarded to another individual within the organization to complete part of the survey and the other individual could not be contacted. Using multiple individuals within a firm to complete the survey was expected given the depth and scope of the subject matter. Firms contacted during pre-testing also used a number of employees (e.g., the sales manager, purchaser, owner, collectors, etc.) to complete the survey. A summary of response rate statistics appears in Table 1.

Table 1. Response Rate Summary

	Firm Location		Overall	
Variable	Florida	Other States	Number	Percent
Total Firms	90	84[a]	174	100%
Active Firms:				
Completed Survey	25	27	52	30%
Refused to Answer	6	1	7	4%
Incomplete survey	25	36	61	35%
			120	
Inactive Firms:				
Did not participate in 1999	21	0	21	12%
Telephone Disconnected	13	20	33	19%
			54	
Summary:				
Total Firms	28%	32%		30%
Active Firms	45%	42%		43%

[a] Number of unique firms that handle live marine species (i.e., excludes firms listed under multiple names and those incorrectly categorized as handling marine species).

Of the 52 completed surveys, 25 firms (48 percent) are licensed wholesalers in Florida and 27 firms were from other States. Thirty-seven percent of the Florida firms active 1998 did not participate in the industry in 1999. Twenty-four percent of the wholesalers listed in the most current Pet Supplies Marketing Directory did not participate in the fishery in 1999, that is, they did not report any purchases or claimed they were "out of business". Of the active firms in Florida, nearly 11 percent refused to answer any survey questions. Of the non-Florida firms, only one refused to answer (1.6 percent of firms).

The total number of firms in Florida include all dealers licensed by the State to purchase live marine aquarium species. Of the top 25 firms in Florida (firms collectively accounting for 75 percent of sales in 1998), 40 percent completed our survey. Similar information was not available for firms located in other States.

III.B. Firm Demographics

The wholesalers in this study were well established, averaging 17 years of experience in the market for Florida firms and nearly 19 years of experience in all other states. The mean and standard deviations (in parentheses) of firms surveyed are summarized in Table 2.

Holding space for Florida firms averaged 21,036 gallons while firms in other states had an average holding capacity of 82,371 gallons. Florida firms hired (on average) fewer than 2 full-time employees while firms in other states hired on average of 17.7 full time personnel. Holding capacities ranged from zero[4] to 200,000 gallons in Florida and from 700 gallons to 800,000 gallons in other states. The largest Florida wholesaler employed seven full-time workers. The largest non-Florida firm maintained 130 full-time positions.

One measure of firm size is the reported total dollar sales of marine fish in 1998 (question 25, Appendix B). Comparison of the average sales figures indicates that Florida wholesalers sold $369,519 in marine fish in 1998, which is 37 percent higher than the average reported by wholesalers in other states. The standard deviations indicate that there was relatively more variability in this figure among the Florida wholesalers (sales ranged from $3,000 to $300,000).

Since the aquarium market at the retail level often includes non-fish species (e.g., invertebrates, live rock, live sand), freshwater species, and dry goods (e.g. tanks and equipment, food, etc.), a more general measure of sales value may better reflect firm size. Using the reported annual sales shares by product type and tank environment (questions 2 and 3, Appendix B), it was possible to create a proxy for annual sales of all live aquarium species. In summary, these total sales figures were over four times the size of the live marine sales; Florida firms averaged annual sales of nearly $1.8 million compared to $1.1 for wholesale firms located in other states. The average Florida firm size (in terms of sales value) remained larger since marine species accounted for 90 percent of their total

[4] Firms reporting no holding capacity reflect individual collectors with dealer licenses who sell their product immediately.

inventory. This large average marine share masked the smaller share of inventory (in terms of value) accounted for by fish species, which are relatively more expensive in general.

Table 2. Characteristics of Marine Life Wholesalers

	Values for Florida and All Other States[a]	
Characteristic	Florida	All Other States
Experience (years)	17.1 (12.0)	18.8 (11.5)
Holding Space (gallons)	21,036 (47,798)	82,371 (184,751)
Employees (FTE)	1.9 (2.1)	17.7 (25.9)
Value of Marine Fish Held in 1998	$369,519 (756,305)	$269,500 (260,020)
Share of Marine Inventory Value Comprised of Fish	46% (0.26)	65% (0.21)
Share of Total Inventory Value Comprised of Marine Species	90% (0.25)	61% (0.39)
Approximate Annual Sales of Live Aquarium Species[b]	$1,788,106 (4,489,234)	$1,089,378 (1,393,865)
Share of Firms that Sell Dry Goods	22%	52%
Of Firms that Sell Dry Goods, Share of Total Sales from Dry Goods	11% (0.10)	25% (0.27)

[a] Values in parentheses are standard deviations.

[b] Average is based on the 19 Florida firms and 24 firms from other states that provided us with sales information

Aside from sales of live aquatic specimens, wholesalers can also deal in dry goods. The majority of firms located in other states (52 percent) offered dry goods compared to just 22 percent of Florida firms; however, dry goods accounted for less than a quarter of total sales. Given the relatively low significance of dry goods on total sales, further analysis by firm size is restricted to the sales of live aquatic specimens. This statistic also was characterized by having the largest standard deviations relative to the means. The approximate average annual sales value of live aquarium species are summarized by firm size and location in Table 3.

Table 3. Sales Characteristics for Small, Medium, and Large Firms

Variable	Florida [a]	Other States [a]
Size Distribution[a]		
Small	47%	21%
Medium	21%	50%
Large	32%	29%
	100%	100%
Annual Sales of Live Aquarium Species[b]		
Small	$151,098 (175,009)	$145,249 (89,062)
Medium	$703,333 (866,179)	$1,307,507 (1,717,686)
Large	$4,969,966 (7,357,877)	$1,460,727 (913,844)
Number of respondents	19	24

[a] As determined by responses to the following question: "Would you consider the size of your firm to be small, medium, or large relative to your competitors?"

[b] Values in parentheses are standard deviations.

The majority of wholesalers in Florida (47 percent) considered their firm to be "small" compared to their competitors. For wholesalers in other states, the majority considered their firm to be "medium" compared to their competitors. These self-categorizations were used to compute average sales by firm size. Self-categorizations were used in place of quantitative measures based on survey answers because for some dealers the survey design was likely to capture only a subset of firm activities.

"Small" Florida firms sold an average of $151,000 worth of product annually. Reported sales ranged from $7,500 to $500,000. "Small" firms in other states averaged $145,000 in sales based on annual sales ranging from $37,000 to $270,000. "Medium" Florida firms averaged sales of $703,000 per year. Sales of "large" Florida firms ranged from $303,000 to $18.5 million with average sales of about $5 million. In other states, "medium" firm sales ranged from $185,000 to $6.4 million and "large" firms ranged from $270,000 to $2.5 million. Amongst all of the surveyed companies reporting live product sales, firms with the smallest and the largest annual sales were located in Florida.

III.C. Market Channels

Since the characteristics of Florida marine life wholesalers differed from firms located in other domestic states as evidenced in Tables 1-3, figures describing the marketing channels are distinguished by firm location. In particular, the reported sources of marine life inventory are described in sections *III.C-1* and *III.C-2* (figures 1 and 2) for firms in Florida and the other states, respectively. Then the product distribution chains for live marine life are described in sections *III.C-3* and *III.C-4* (figures 3 and 4) for firms in Florida and the other states, respectively. The findings are summarized in the last section (i.e., *III.C-5*).

III.C-1. Sources of Marine Life Procured by Florida Wholesalers

Figure 1 (on the following page) depicts the sources of marine life procured by marine life wholesalers in Florida. In terms of the value of inventory procured by Florida marine life wholesalers in 1998, 90 percent were marine species. Of the marine species, fish species accounted for 49 percent, invertebrate species accounted for 44 percent, and live rock and live sand accounted for the remaining 7 percent of average annual inventory purchases reported by Florida wholesalers.

Of the 93 percent of the fish and invertebrate inventory held by Florida wholesalers in 1998, 84 percent was obtained from U.S. sources. Approximately 37 percent of their inventory (weighted by value) was obtained from collectors employed by their firm full-time as many of these firms were "owner-operated." Florida wholesalers obtained 30 percent of the value of their inventory from other local collectors; these are individuals that were part-time collectors. The remaining 33 percent of inventory value was obtained from other wholesalers, of which 62 percent were located in Florida. Hence, approximately 57 percent of the inventory value held by Florida wholesalers was obtained in Florida. Of the 38 percent obtained from other states, 68 percent was from firms located on the East Coast and most often, Atlanta, Georgia.

Of the 19 percent of product value imported from foreign companies, 81 percent was from firms located in the Caribbean; many of these firms cited close ties with firms in Florida (e.g., Caribbean firms operate as "satellite" collecting stations for U.S. companies).

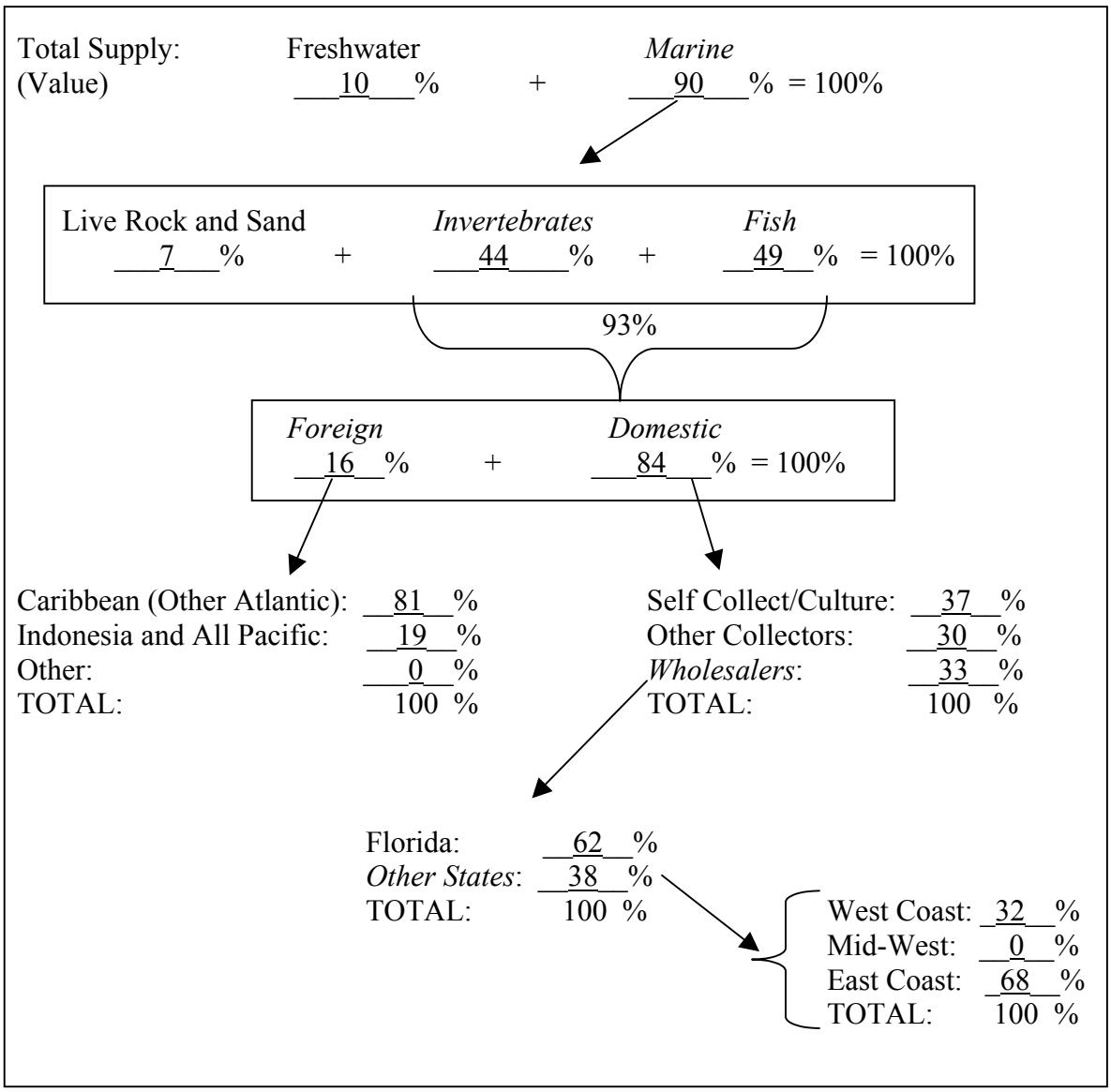

Figure 1. Sources and Average Shares of Live Marine Life Inventory Procured by Wholesalers Located in Florida

III.C-2. Sources of Marine Life Procured by Wholesalers in Other States

Figure 2 depicts the sources of marine life procured by marine life wholesalers located in other states (i.e., excluding those located in Florida and discussed in section *III.C-1*). In terms of the value of inventory procured by Florida marine life wholesalers in 1998, 61 percent were marine species. Of the marine species, fish species accounted for the largest component (64 percent), however, invertebrate species accounted for 25 percent.

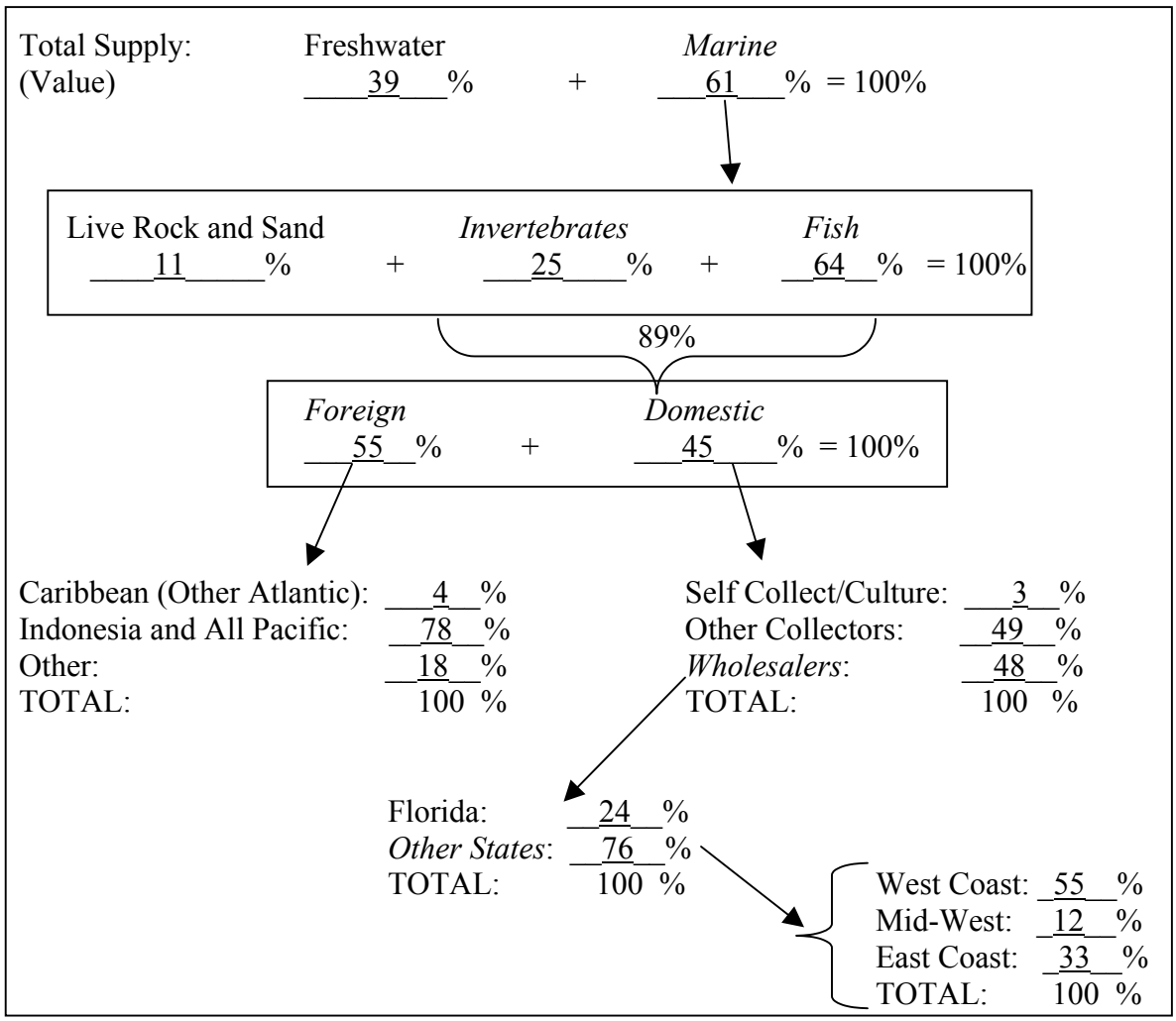

Figure 2. Sources and Average Shares of Live Marine Life Inventory Procured by Wholesalers Located in Other States

Of the marine fish and invertebrate inventory held by wholesalers in other states in 1998, 55 percent was from foreign sources and 45 percent was from domestic suppliers. Collectors and wholesalers supplied 97 percent of the domestic inventory. The remaining 3 percent of inventory was supplied by full-time collector employed by the firm. Florida wholesalers provided 24 percent of the inventory held by wholesalers in other states in the West Coast[5], Mid-West and East Coast.

Of the 55 percent of product value imported from foreign companies, 78 percent was from firms located in Indonesia and the Pacific (Singapore, Philippines). Caribbean nations accounted for only 4

[5] Los Angeles, California was often listed as a West Coast supply source.

percent on average, however, two firms obtained all their imported product from this area. The remaining 18 percent, on average, was obtained from South America and the Red Sea.

III.C-3. Distribution Chain for Wholesalers Located in Florida

Other domestic markets are the primary outlet for marine life wholesalers located in Florida (Figure 3); on average, 80 percent of the value of inventories held by Florida wholesalers are destined for other cities in the U.S.

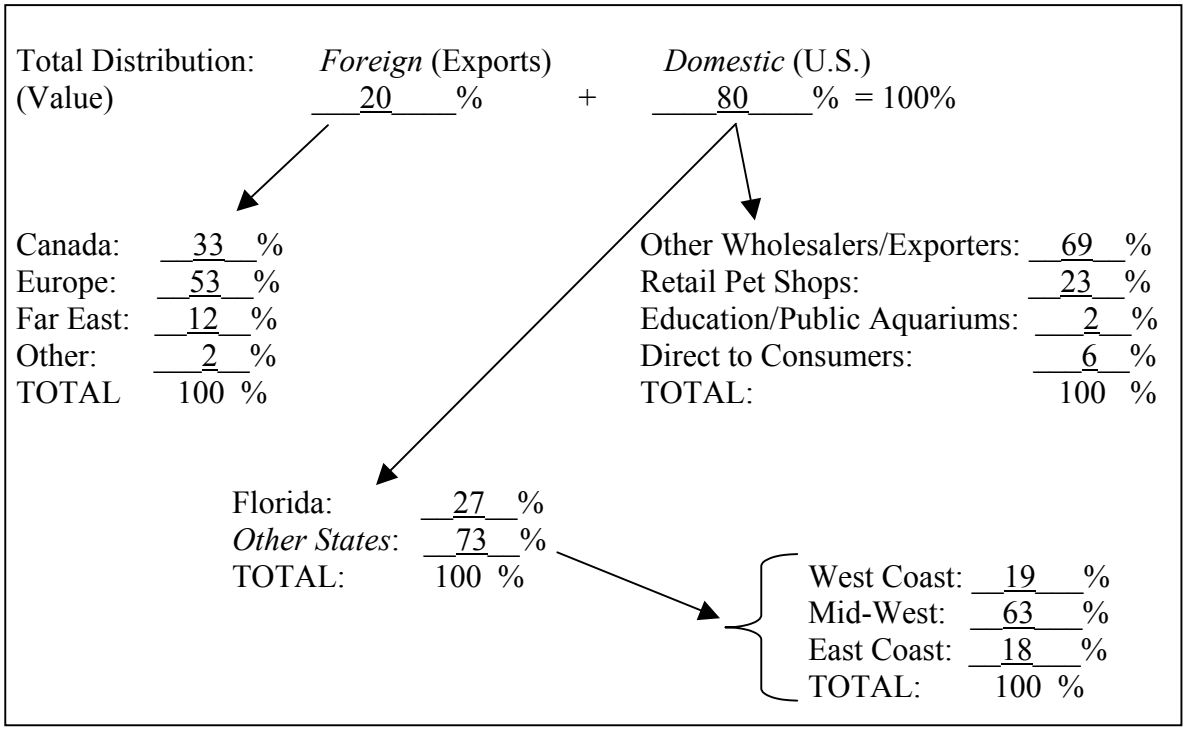

Figure 3. Distribution Chain and Average Shares for Live Marine Life Sold by Wholesalers Located in Florida

The exported share primarily goes to Europe and Canada (53 percent and 33 percent, respectively). The domestic share is dominated by other wholesalers and exporters, which account for 69 percent of volume-weighted sales. Retail pet shops account for the next largest share (23 percent), followed by consumers (6 percent) and educational outlets such as public aquariums (2 percent). The vast majority of these domestic outlets are located in states other than Florida, 73 percent on average, with 63 percent going to states in the Mid-West.

III.C-4. Distribution Chain for Wholesalers Located in Other States

Marine life wholesalers in other states are heavily dependent on domestic markets, which accounted for approximately 95 percent of sales value. In terms of location, 94 percent went to states other than Florida (i.e., only 6 percent was shipped to locations in Florida); however, the majority was shipped to the East Coast (45 percent). The value of domestic shipments going to the mid-west accounted for an additional 38 percent. In terms of the type of buyer, 77 percent was sold to retail pet shops. Sales direct to consumers accounted for an additional 4 percent. Other wholesale firms received 15 percent. In terms of the exports, on average, 87 percent of the value of inventories held by wholesalers in other states are destined for the Far East, with the majority of the remainder being exported to Europe.

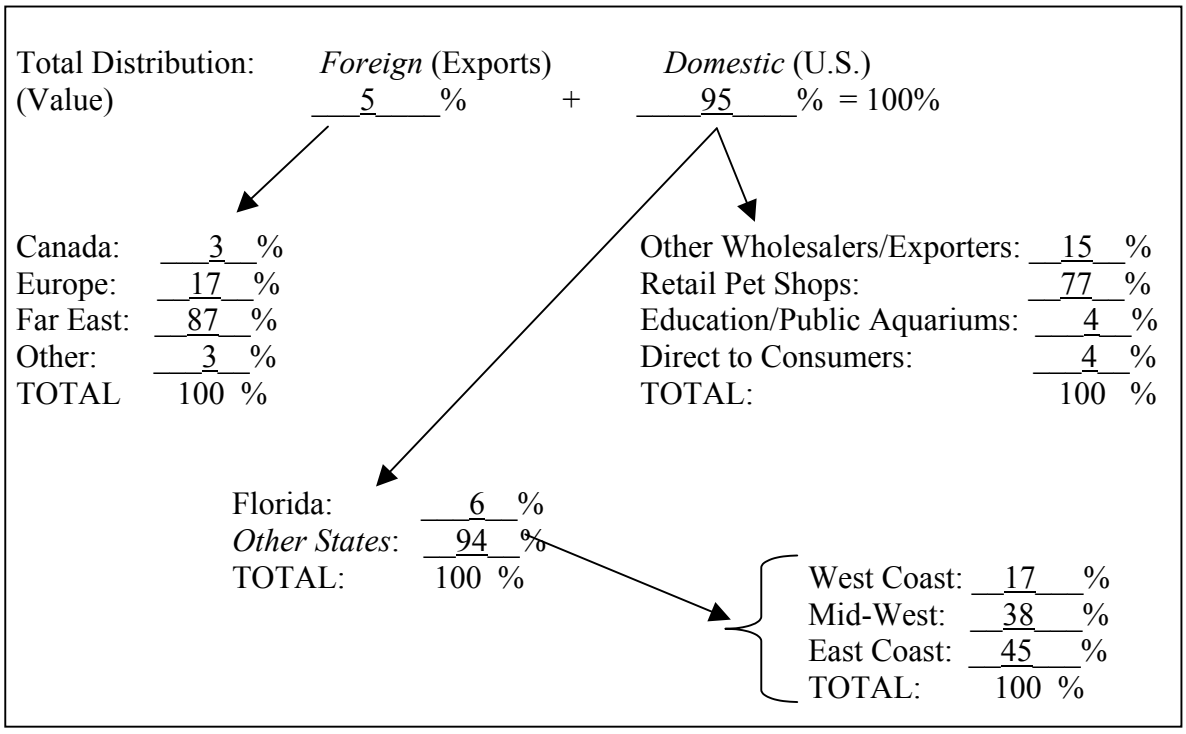

Figure 4. Distribution Chain and Average Shares for Live Marine Life Sold by Wholesalers Located in Other States

III.C-5. Comparison of Marketing Channels between Florida and the Other States

Figures 1 and 2 depict the sources of marine life procured by marine life wholesalers in Florida and the remaining states. The inventory of Florida marine life wholesalers comprises 90 percent marine species and 10 percent freshwater species. Of the marine species, 49 percent are fish, 44 percent are invertebrates, and 7 percent live rock and sand. In other states, firms' inventories comprise 61 percent marine species on average (64 percent are fish) and 39 percent freshwater species.

Florida wholesalers obtained 84 percent of marine inventory from domestic sources and 16 percent of foreign sources, primarily the Caribbean/Atlantic (81 percent). Wholesalers in other states import 55 percent of their marine inventory, primarily from Indonesia and Pacific sources (78 percent).

Florida wholesalers sell 80 percent of their marine life product domestically and 20 percent outside of the country, primarily to Europe. Wholesalers in other states sell 95 percent of their marine life product domestically and 5 percent to foreign markets, primarily the Far East. The bulk of Florida's domestically sold product (69 percent) is intended for other wholesalers and exporters in the U.S. Outside of Florida, domestic wholesalers' primary outlet is the retail pet market (77 percent). Florida firms' domestic product distribution is divided between intrastate sales (27 percent) and interstate sales (73 percent). Sixty-three percent of interstate sales are to firms in the Mid-West. Firms located in other states sold 6 percent of their domestic product to Florida and 94 percent to all other states.

Florida firms differ from firms in other states by holding a larger proportion of inventory in marine species, invertebrates, and domestic product. Florida firms send more product to the Midwest than to the East Coast or West Coast. In other states, firms sell more product to the East Coast than to the Midwest or West Coast.

III.D. Perceptions and Opinions

Qualitative data provided valuable insights into industry-wide trends and developments, with emphasis on the Florida market.

Respondents were asked a series of open-ended opinion-based questions. The questions were intended to assess opinions regarding industry strengths and weaknesses that could ultimately be used to aid marketing campaigns and establish consensus regarding the effectiveness of regulatory measures. The questions concerned: (1) the advantages and disadvantages of Florida-caught products relative to imports, (2) explanations for observed trends in the collection of fish and invertebrates in Florida, (3) expected changes in the wholesale market within five years, and (4) factors limiting sales of Florida species. The questions and responses, ranked beginning with “1” (where the number 1 response is the mode, i.e., the most commonly cited response) for the Florida wholesalers are presented in Tables 4-7. The responses are ordered by share for Florida firms. Note that the number of responses does not equal the number of firms since response was optional and firms could provide multiple responses.

III.D-1. (Dis)Advantages of Florida Caught Species

One of the open-ended questions queried respondents, about the advantages and disadvantages of species collected in Florida compared to a similar import. The responses are summarized in Table 4.

Table 4. Ranking and Incidence of Responses to the Following Question: "In comparing Florida marine species with an identical import, what unique (dis)advantage, if any, do Florida species have?"

Responses (Rank 1 = mode for Florida wholesalers)	Florida	Other States
Advantages:[a]	(*n*=24)	(*n*=26)
1. "Products are Generally of Higher Quality"	42%	50%
2. "Products can be Obtained at a Lower Cost"	17%	8%
2. "None"	17%	0%
4. "Product is Unique, Import is not Identical"	12%	4%
5. "Better Collector Relations"	8%	38%
6. "No Import Paperwork or Other 'Red Tape' "	4%	0%
Disadvantages:	(*n*=31)	(*n*=17)
1. "Supply Volume is Limited"	32%	12%
2. "Products Generally Sell for a Higher Price"	22%	35%
3. "Attributes are Weak"	16%	12%
4. "Supply is Seasonal, Lowest in Winter"	13%	12%
5. "Collectors are Unprofessional/Unscrupulous"	10%	12%
6. "Lack of Species Variety"	6%	12%
7. "Poor Water/Environmental Quality"	0%	6%

[a] Duplicate rankings reflect ties.

The primary advantage of Florida-caught species, according to Florida industry wholesalers, is that they are higher quality. When asked, respondents defined quality in terms of higher survival rates (e.g., by packing fewer fish per box or the shorter travel time). This was also the most cited advantage from wholesalers in other states who claimed that Florida fish were less stressed and received better care.

The second most frequently cited advantage of Florida-caught species, as perceived by Florida wholesalers, was that the products can be obtained for a lower cost. This is because most Florida wholesalers also function as collectors. Interestingly enough, the lower cost advantage was cited as often as "none", that is, there is no advantage to Florida-caught species. Uniqueness was fourth, better relations with local collectors fifth, and no import paperwork was sixth. This latter advantage was most

prevalent among smaller dealers in terms of annual sales; for this group the import regulations and the additional fees are major deterrents to greater participation in the international market.

The remaining advantages, as perceived by wholesalers located in other states, were viewed quite differently from Florida firms. The second highest incidence of responses concerned relationships with collectors, that is, 38 percent of the opinions concerned positive relationships with Florida collectors. Many stated that they have established business relationships with particular collectors and, thus, receive more information regarding specific species and better care is given to species during packing and transport.

As with the cited advantages, the most frequently cited disadvantage of Florida-caught species depends on location of the firm. Florida wholesalers cited the lack of sufficient quantity and relatively higher prices (32 percent and 22 percent of opinions, respectively) as the primary disadvantages of using Florida products. Several respondents expressed frustration at higher labor costs and being unable to deliver the total quantities requested of them or having to procure supplies from other dealers. Wholesalers in other states cited the higher price of Florida products as the primary disadvantage; this was mentioned by 35 percent of respondents. The “higher price” response was interesting given that “'lower cost” was cited as an advantage by Florida wholesalers. These responses are indicative of the multiple wholesale levels in the industry, the collector/wholesalers in Florida are primarily “first receivers”; wholesalers in other states purchasing Florida product would be considered “second receivers.”

Weak attributes, the third response from Florida wholesalers, conveyed the sentiment that Atlantic species are “uglier”, perhaps less colorful, than Pacific species. The fourth was seasonality or a lack of consistent availability. Many respondents believed that the part-time nature of the collection industry results in lower supplies in the winter as the cool temperatures keeps divers out of the water. The fifth most commonly cited disadvantage of Florida caught species was unprofessional collectors. These wholesalers reported having not received product following payment or receiving product of such poor quality that subsequent high mortality rates made the transaction unprofitable. The wholesalers in other states also mentioned that collectors are over harvesting without regard for the future. The sixth disadvantage (in terms of incidence of response) was that there are too few species from the Atlantic/Caribbean relative to demand compared to “Pacific” species. Some respondents attributed the lack of species variety to water pollution and cited water pollution as a disadvantage of working with Florida-caught species.

III.D-2. Reasons for Recent Landing Trends in Florida

When asked why landings of fish have declined since 1994, 29 percent of responses by Florida wholesalers blamed a reduction in water quality (e.g., from Everglades run-off) that has lowered the availability of some species (Table 5). Three reasons tied for second, each garnering 17 percent of reasons, and included: a reduction in the demand for fish (due to their relatively high unit price compared to invertebrates and low survival rates in home aquariums); increasing competition from (lower priced) imports; and a decline in the number of part-time divers (due to a strong economy which has provided more economic alternatives). Poor weather conditions, which discourage divers,

and an increase in the number of regulations governing the industry in Florida were the remaining reasons for the recent reductions in fish landings in Florida.

Table 5. Ranking and Incidence of Responses to the Following Question: "Annual landings collected by the state of Florida indicate that commercial landings of the majority of fish species peaked in 1994 and fell substantially thereafter. However, landings of most invertebrates have increased since 1994. First, what could have caused the decline in fish landings? Second, what could have caused the increase in invertebrate landings?"

Responses (Rank 1 = mode for Florida wholesalers)[a]	Florida	Other States
Explanation for Declining Fish Landings:	(*n*=24)	(*n*=21)
1. "Reduction in Water Quality"	29%	10%
2. "Decline in Demand for Fish"	17%	38%
2. "Increasing Competition from Imports"	17%	14%
2. "Decline in Number of Part-time Divers"	17%	0%
5. "Recent Adverse Weather Conditions"	12%	0%
6. "More Regulations Governing the Industry in Florida"	8%	14%
7. "Poor Economic Conditions for Small Firms"	0%	24%
Explanation for Increased Invertebrate Landings:	(*n*=20)	(*n*=27)
1. "Ease of Collection with least Gear Requirements"	30%	7%
1. "Improvement in Knowledge of Invertebrate Care and Corresponding Technological Advances"	30%	22%
2. "Increasing Popularity of Reef Tanks"[b]	10%	48%
2. "Invertebrates Provide Functions Necessary to Maintain a Successful Reef Tank Environment"	10%	0%
2. "Invertebrate-based Reef Tanks are More Interesting"	10%	7%
2. "Heartier than Fish"	10%	0%
7. "Changing Regulations Favors Invertebrate Species"	0%	7%

[a] Reef tanks refer to saltwater aquariums that focus on invertebrates (e.g., anemones) and "live" base products (e.g., live rock and live sand) while minimizing the number of fish.

[b] Duplicate rankings reflect ties.

Among the wholesale firms located in other states, the primary reasons for declining fish were the declining demand (38 percent) and poor economic conditions (24 percent). This latter reason represented a rather large share of responses among firms located outside Florida but was not mentioned by Florida firms. This discrepancy could reflect regional differences in general economic conditions including lower sales prices from import competition, a recession in the hobby, and the increase in large super-chain pet stores. The differences in responses between Florida and non-

Florida wholesalers may be explained by the fact that the majority of Florida firms do not compete at the retail level (figure 3).

The relative ease of harvesting invertebrates species (such as sand dollars), including the lack of gear needed to collect them, was one of two primary explanations (each accounted for 30 percent of responses) cited by Florida wholesalers for increased invertebrate landings in Florida. This response was equaled by the belief that an improvement and transfer of knowledge regarding the care of invertebrates, and the development of affordable and effective equipment, has allowed hobbyists to successfully maintain reef tanks. Consequently, as noted in the following reason, the demand for reef tanks has increased. Other explanations included that invertebrates are needed to maintain the health of the reef ecosystem; that is, invertebrates are a necessary component in a successful reef tank. Also, invertebrate reef tanks are currently perceived as being more interesting in that they contain more living organisms. Lastly, some wholesalers perceive that keeping invertebrates is easier since they can tolerate more variable tank conditions.

For wholesalers located in other states, the primary reason for an increase in invertebrate landings was the increasing popularity of reef tanks; this response accounted for 48 percent of the reasons provided. This reason was followed by the improvement in knowledge regarding the care and keeping of invertebrate species and the dissemination of that knowledge to the public through the Internet (very inexpensive). The additional reason cited, not mentioned by the Florida wholesalers, was that some regulations had changed in favor of collecting invertebrate species.

III.D-3. Future of the Wholesale Marine Life Market

The next question discussed in this paper addressed the future of the wholesale marine life market. Responses varied with the location of the firm as shown in Table 6. Florida wholesalers expect the primary change in the wholesale market to involve an increase in the number of cultured species (19 percent of responses). Firms outside of Florida expect further consolidation as large firms continue to dominate the market (34 percent of responses). Florida firms also foresaw a reduction in the number of firms (16 percent) and a decline in live rock sales (16 percent). The predicted decline in live rock sales is surprising given an increase in the number of live rock lease sites (Antozzi 1997); however, many cited an increase in lower-cost live rock imports from Fiji as the primary reason for this opinion. Additional predictions for the wholesale market in the next five years, in order of priority include: an increase in the number of regulations, an increase in imports, a reduction in the number of tank owners to other hobbies.

Table 6. Ranking and Incidence of Responses to the Following Question: "What changes, if any, do you foresee at the wholesale level in the next 5 years?"

Responses (Rank 1 = mode)[a]	Share
Wholesalers Located in Florida (*n*=37):	
1. "Increase in the Quantity of Cultured Products"	19%
2. "Decline in Sales of Live Rock"	16%
2. "Reduction in the Number of Active Firms"	16%
4. "Increase in Regulations Governing the Industry in Florida"	13%
5. "Increase in Imports"	10%
6. "Loss of Customers to Other Hobbies"	3%
Wholesalers Located in Other States (*n*=42):	
1. "Increasing Consolidation in the Industry"	34%
2. "Increase in the Number of Small Environmentally-Conscious Firms"	14%
3. "Decline in the Number of Trans-shippers"	10%
4. "Increasingly Stringent Regulations that will Increase Costs"	8%
4. "Increase in the Number of Cultured Species"	8%

[a] Duplicate rankings reflect ties.

Although firms in all locations agreed that increasing concentration at the wholesale level and an increase in the number of cultured species are likely to occur, wholesale firms in other states posed a number of additional predictions (Table 6). In particular, these firms believe there is a growing market for small environmentally-friendly firms that do not use chemicals during capture or transport. For example, environmentally-friendly firms would guarantee specimens were harvested without the use of cyanide or other anesthetics such as quinaldine. There is a perceived decline in the number of trans-shippers, a traditional component of the market chain, resulting from the advent and commercial use of the Internet. Lastly, the establishment of additional and more restrictive collecting regulations is expected to increase harvesting costs. While real prices for many species, noted one collector, are essentially unchanged since the mid-1970s. The additional regulatory burden and constant prices could discourage continued participation in the fishery.

III.D-4. Limiting Factors to Sales of Florida Species

Florida wholesalers, many of whom are also collectors, offered several opinions concerning the future for sales of Florida-sourced live marine ornamentals (more so than for any of the other questions). Their primary concern regarded imports. Of the 23 opinions on the most important limiting factor, 22 percent specifically mentioned competitors in the Caribbean that can supply larger quantities at lower prices (most likely due to lower labor costs), despite the additional transport charges (Table 7). The next three concerns that were also mentioned at being "most important" each

accounted for 13 percent of the total and included: the lack of species diversity available (markets closer to the retail level demand a more diverse product selection), increased competition from other wholesalers (e.g., low priced super pet stores), and perceived problems with the local regulations governing the industry. Specific regulatory concerns included inappropriate size and/or bag limits, regulations that are effectively unenforceable, overzealous and uninformed Florida Marine Patrol officers, and an overabundance of required paperwork.

Table 7. Ranking and Incidence of Responses to the Following Question: "In your opinion, what are the most limiting factors to sales of Florida species?"

	Importance and Share		
Responses (Rank 1 = mode)[a]	1st	2nd-4th	Total
Wholesalers Located in Florida:	(*n*=23)	(*n*=23)	(*n*=46)
1. "Cheaper & Unrestricted Caribbean Imports"	22%	9%	15%
2. "Lack of Selection, Species Diversity"	13%	0%	7%
2. "Increased Competition from Other Wholesalers"	13%	0%	7%
2. "Inappropriate/Ineffective Regulations and 'Red Tape' "	13%	26%	20%
5. "Unscrupulous/Unprofessional Collectors"	9%	0%	4%
5. "Poor Weather"	9%	9%	9%
5. "Lack of Color Compared to Pacific Species"	9%	4%	7%
8. "Higher Freight Costs"	4%	0%	2%
8. "Poor Environmental (Water) Quality"	4%	13%	9%
8. "Not the Regulations"	4%	0%	2%
11. "Unlicensed Collectors and Dealers"	0%	26%	13%
12. "Low Margins and Declining Market"	0%	9%	4%
13. "Lack of Biological Data on Species"	0%	4%	2%
Wholesalers Located in Other States:			(*n*=37)
1. "Lack of Selection, Species Diversity"			38%
2. "Higher Price"			24%
3. "Poor Availability, Seasonal and Quantity"			14%
4. "Lack of Professionalism Among Local Collectors"			11%
5. "Quality Control Problems"			8%
6. "Lack of Color Compared to Pacific Species"			5%

[a] Duplicate rankings reflect ties.

Six additional reasons were also listed as the most limiting factor to sales of Florida species. One of the most notable is the final "most important" response (i.e., number 13), which was that the local

regulations are not to blame. One of the most troubling to the Florida industry would likely be the perceived presence of unscrupulous and/or unprofessional collectors. A few respondents (both in and out of Florida) stated having a bad experience with Florida collectors. The negative experiences cited by wholesalers included low survival rates, incomplete or incorrect orders, and collectors who hustled them after gaining their business with a sample first order. These wholesalers also stated that some collectors (1) do not report all their landings, (2) produce high mortality rates, and (3) garner the name of potential clients by examining shipments at the airport.

The 2nd through 4th most often cited factors by Florida wholesalers included three additions. The incidence of unlicensed collectors and dealers received 26 percent of the 2nd-4th most important factors, which ties the inappropriateness/ineffectiveness of the regulations governing collecting in Florida. Low profit margins (from relatively stable farm-level prices) and lack of biological data on individual species were specifically mentioned.

For wholesalers located elsewhere, the lack of species diversity is the primary factor that will limit increased sales of Florida species (accounting for 38 percent of reasons). The higher prices of Florida species (due in part to higher labor costs and the need to make more money than foreign industries) was cited as the next most limiting factor and accounted for 24 percent of total responses by firms in other states. Poor product availability, lack of professionalism by collectors, quality control problems, and poor product attributes (color in particular) compared to Pacific species round out the responses to this question. Note that while some factors are determined by collectors and dealers in Florida, many are exogenous to any one individual.

III.D-5. Summary of Most Commonly Cited Opinions

When asked to state the unique advantage, if any, that Florida marine species have over imports, the most prevalent response (accounting for 42 percent and 50 percent of responses for Florida and non-Florida firms, respectively) indicated that wholesalers believe Florida products are of higher quality (Table 4). Respondents defined quality by survival rates and overall health. Higher quality products had higher survival rates (primarily due to lower packing densities) and were "less stressed" in general. Wholesalers in other states also indicated that direct contact with collectors was a unique advantage of products obtained from Florida; this response accounted for 38 percent of the total number of responses. In terms of the disadvantages, respondents cited the lack of sufficient volume (both seasonally and in total) and relatively high price (due to higher collection costs, especially for labor) of Florida products. These two responses accounted for 54 percent and 47 percent of those cited by wholesalers located in Florida and other states, respectively. In general, opinions regarding the uniqueness of species collected in Florida were largely independent of the location of the firm.

The stated reasons for the observed decline in fish landings in Florida varied by wholesaler location (Table 5). Florida wholesalers primarily cited a reduction in water quality, this response received 29 percent of the reasons cited. Wholesalers in other states believe that a decline in the demand for fish and poor economic conditions for small firms are to blame; these reasons collectively accounted for 62 percent of responses. In regards to the reasons cited for the observed increase in invertebrate landings in Florida, wholesalers (regardless of location) believe that an improvement in the

knowledge and care of keeping invertebrate species was a factor. In addition, Florida wholesalers stated that collecting invertebrates is easier than collecting fish (and requires less gear). Among the responses of Florida firms, these two reasons accounted for 60 percent of the total responses. Wholesalers in other states most frequently cited (in addition to the improved invertebrate knowledge) the increasing popularity of reef tanks. Among the responses by wholesalers located in other states, these two reasons accounted for 70 percent of the total responses.

The question concerning the anticipated changes in the wholesale market for marine aquarium species received the fewest number of distinct responses, which may indicate a greater degree of consensus within the industry (Table 6). Florida wholesalers expect an increase in the quantity of cultured products. This response could reflect an increase in sales of live rock due to the recent addition of lease sites. Alternatively, it could reflect knowledge of research projects conducted at the University of Florida that are concerned with developing culture techniques for new species. Among the responses cited by wholesalers located outside of Florida, increasing consolidation within the industry (reflecting small firms being displaced or purchased by larger chains) was most frequently mentioned.

The question eliciting the factors that limit the sales of Florida species received the highest number of distinct responses, which may indicate a lesser degree of consensus within the industry regarding this issue (Table 7). Florida wholesalers perceived import competition, regulatory issues, and illegal market participation within Florida to be the most pressing factors. Wholesalers located in other states cited the lack of natural species diversity (perhaps due to the relatively short length of the coastline) as the most limiting factor since a wide selection is desired at the retail level.

III.E. Unsolicited Comments

As a result of the open-ended nature of the questions, several interviewees offered additional comments on topics not explicitly included in the survey. These comments are summarized below.

- Most collectors fax information to their regular customers weekly that lists specimens currently available, price, and any specials.
- Typical markup: four-fold increase in price (e.g., $0.25 specimens sold by collector will sell for $1 to consumers), but this varies by species and season.
- Supply and demand conditions at the species level are very important in determining the transaction price (i.e., price premiums and discounts are common). One implication of this is that a “rare” species (i.e., one that is not commonly sold in the market) can fetch a very high price. Alternatively, if a collector has a relatively large supply of any one species, the buyer will likely pay a lower price.
- The Florida Keys is being turned into a large “marine reserve” such that all collecting will be prohibited.

- The collecting business "relocates exotic species to a better habitat, one that is not degrading."
- Cultured marine species will adequately supplement wild stocks and supply current and future hobbyists.
- Many hobbyists try, and are successful, at cultivating at least one marine species.
- Overharvesting of many fish species is unlikely due to the difficulty associated with capture (vs. invertebrate species that are collected on foot in shallow areas).
- Many collectors that have been in the business since its inception in the early 1990s (and as far back as the 1960s) have a reputation for specializing in the collection of certain species.
- Many collectors/dealers trade product amongst themselves (a result of the specialization mentioned above) in order to fill diverse orders, which are the norm.
- All of the original collectors harvest fish species, which they believe are more difficult to collect (requiring dive equipment, a boat, and at least 3 people by law), and consider themselves apart from "hit & run" entrants that target easy-to-collect invertebrate species.
- The use of the Internet by collectors for sales direct to consumers is increasing (*AMDA Newsletter*, First Quarter 2001).
- Those focusing on particular species of fish reported maintaining breeding grounds for years. By selectively "cultivating" the stock, and keeping the location private, collectors could harvest at the optimal time. This practice has only occurred with the availability of affordable Global Positioning Satellite technology and is only effective in the absence of tropical storms.
- One algae collector reported having his supply virtually eliminated (re-growth took 3-4 months) due to run-off associated with the construction of a nearby limestone plant. The location in question is Filman's Bayou and the algae is *Caulerpa prolifera*. This collector expressed frustration with not being able to find an agency with jurisdiction over brackish water.

IV. Comparison of Results with Other Related Surveys

IV.A. Florida Collectors Survey (1991)

In 1991 the Florida Marine Life Association (FMLA) funded a project through the Rosenstiel School of Marine and Atmospheric Science to examine a limited entry program for the marine life fishing industry in Florida. The FMLA is an organization that represents commercial collectors. The study was commissioned by the FMLA in response to problems related to overcrowding and low yields. Information obtained during interviews with members of the FMLA, and described in Januzzi (1991), are summarized below and compared to (or used to help explain) the results of the survey described in section III of this paper.

According to Januzzi (1991), 60 percent of commercial collectors considered themselves full-time members of the industry (i.e., it is their only profession). Of the remaining 40 percent, 71 percent work as commercial fishers in other fisheries or are employed in a marine related profession. Consequently, approximately 88 percent of commercial marine life collectors receive all their income from marine related activities. Of those that participate in other commercial fisheries, marine life is often by-catch but can account for upwards of 50 percent of the value of their landings. Thus, regulations affecting any fishing activities are likely to affect members of this industry as well. In 1991, 75 percent of collectors traveled within 10 miles of their home and 51 percent specialized in the harvest of fish species. When asked about any plans for expansion, approximately 20 percent planned to expand their collection and only 1 percent expected a decline.

As reported in 1991, the majority of marine ornamental species collected live for the aquarium market inhabit water ranging in depth from 20 to 90 feet. Thus, the fishery is comprised of skilled divers. However, this generalization may not currently be accurate given the increase in invertebrate landings, especially live rock and live sand, in the early 1990s (Adams, Larkin and Lee 2001; Antozzi 1997). The reported market channels in terms of location and type of facility as reported in the 1991 and 1998 studies are summarized in Table 8 to facilitate comparisons.

When questioned about the markets for their products in 1991, firms on average shipped 17 percent (by quantity) to foreign markets, 35 percent to other states, 3 percent within the state, and the remaining 45 percent to local firms. For comparison, Figure 3 indicated that the distribution by value was 20 percent exports, 58 percent to other states, 7 percent within Florida, and 15 percent locally (assuming that all other wholesalers were located in Florida). Although not a direct comparison due to the use of volume in the earlier study and value in the most recent study, relative allocations are similar.

Table 8. Comparison of Market Channels between Studies

Destination	Januzzi (1991) (Allocation by Volume)	This Study (1998) (Allocation by Value)
Location:		
Foreign Exports	17%	20%
Other States	35%	58%
Florida (excluding Keys)	3%	7%[a]
Florida Keys (local area)	45%	15%[a]
Type of Facility:		
Wholesalers	65%	69%
Retail Pet Stores	16%	23%
Educational/Aquariums	13%	2%
Consumers	6%	6%

[a] Percentage determined assuming all wholesalers located in Florida from Figure 3.

A follow-up question in the 1991 study disaggregated the destinations at the "local" (i.e., Florida keys) level; 65 percent of shipments were destined for other wholesalers, 16 percent to retail pet stores, 13 percent to educational and/or aquarium facilities, and 6 percent to consumers directly. For comparison, the value-based distribution in 1998 was 69 percent, 23 percent 2 percent, and 6 percent, respectively. In summary, regarding trends in the marketing channels, it appears that since 1991 more Florida-caught species are being shipped to wholesalers located in other states versus wholesalers in Florida and relatively more product is destined directly for the retail level.

The discussion regarding the proposed limited entry program conveyed that the majority of collectors favored stiff penalties for violators including fines, permanent revocation of licenses following multiple violations, and seizure of gear (with profits from the sale of the gear and harvest going to current license holders). Given the continued frustration voiced in regards to some collectors (Tables 4 and 7), these problems continue and may be magnified in response to the implementation of several new regulations affecting commercial fishing activities in the Florida Keys (e.g., the spiny lobster trap certificate program, net ban, no fishing marine protected areas, initiation of stone crap trap program in 2001, etc.).

IV.B. U.S. Dealers Survey (1996)

The American Marinelife Dealers Association (AMDA), a non-profit organization promoting sustainable trade in living marine organisms for aquariums, queried its members (collectors, importers, wholesalers, retailers and propagators) regarding the establishment of a Marine Aquarium

Fish Council in 1995.[6] The survey sought information regarding different aspects of the practices associated with obtaining and maintaining inventories of marine fish for aquariums (Tullock 1997). Only relevant information to this study is summarized here.

The survey only solicited information pertaining to the market for marine fish (i.e., excluding invertebrates, live rock, live sand, and plants). At the retail level, each firm averaged handling approximately 165 different specimens (ranging from 12 to 500) and 2,950 in total per year at an average price of $10. However, only 50 percent of firms keep track of the number of individual specimens sold and only 64 percent of firms reported using a computer to keep inventory records.

When asked if "eco-labeling" was used as defined, 79 percent agreed to using an informal system based on direct communication with dealers. In addition, 64 percent indicated they stock only fish that have been harvested using sustainable practices as indicated by the supplier.[7] Only 14 percent would allow the use of quinaldine. This is an interesting result given the previous responses and that this chemical is currently allowed for collecting in Florida provided collectors are licensed to use it. These results may indicate that retailers are handling products that have been collected using quinaldine but are unaware of its use since (if used according to the regulations) it does not harm the fish or the environment. Only 20 percent of respondents had any formal training in the husbandry of marine fish. Half of the respondents surveyed buy directly from collectors.

In summary, the 1995 survey information explains and/or supports some of the results obtained in the 1998 survey discussed in this paper. In particular, the 1995 survey found that retailers handled on average 165 species, which supports the claim that species diversity is important at marketing channels closer to the consumers. In addition, the approximately $10 per fish final sales price supports the claim that the total mark-up is approximately four times the price paid to the collector as reported in Adams, Larkin, and Lee (2001). The use of information obtained from the supplier (i.e., collector) as a marketing tool (e.g., promotion of eco-labeled products), reflects the importance of the collector-retailer relationship mentioned in regards to the future of sales of Florida species.

[6] As a result of that survey (in part), the Marine Aquarium Council (MAC) was established. MAC is dedicated to "Certification for Quality and Sustainability in the Collection, Culture and Commerce of Marine Ornamentals." More information on the AMDA and MAC organizations can be found at the following Internet addresses, www.amdareef.com and www.www.aquariumcouncil.org, respectively.

[7] A sustainable collection technique was defined as one that does not (a) physically damage the reef, (b) impair the specimens longevity, or (c) damage non-target species.

IV.C. Industry Sales Survey (1999)

The *Pet Product News* Buying Guide Directory (formerly known as the Pet Supplies Marketing Directory) included a State of the Industry Report for 1998, the 26th annual report (Hellwig 1999). The report included the value of sales for the following product categories: dogs, cats, exotic products, reptiles/amphibian, fish, birds, and small mammals (e.g., rabbits, hamsters). In 1998, fish products remained the most popular category based on the dollars spent, generating nearly $1.2 billion (dogs were second with $853 million in sales), which represents a 22 percent increase since 1996. The fish category was also the largest in terms of the relative value of livestock sales; fish comprised 37 percent of total revenues. The value of sales for marine species in particular totaled $93 million in livestock, $97 million in food, and $13 million in 'other' products. Figures for medicines, filters/heaters, and tanks were not distinguished by the type of water environment; however, sales collectively totaled $380 million.

IV.D. European Importers Survey (1997)

Ornamental Fish International (OFI) is a non-profit organization of commercial companies that are involved in the international trade of live aquatic species and tank maintenance equipment. In late 1997, OFI sent a questionnaire to approximately 200 European live fish importers (50 percent wholesalers, 20 percent exporters, 6 percent retailers).[8] Marine fish accounted for 16 percent of imports. Shipments from North America accounted for just 8 percent of imports; North American was fourth behind Singapore (25 percent), Indonesia (9 percent), and Sri Lanka (9 percent). A total of 18 countries/regions were included indicating that supply sources were not concentrated and reflecting the need for species diversity. The Caribbean accounted for 0.5 percent of European imports.

IV.E. Marine Ornamentals Trade (1999)

In 1999, information was gathered from different segments of the marine ornamentals industry for the South Pacific Forum Secretariat and the Marine Aquarium Council. This information was summarized in the recent document by Baquero (1999). Observations on the general industry that are relevant to, or help explain responses from, the survey discussed in this paper are listed below.

- The number of hobbyists has increased in the past decade due to new aquarium technology and better understanding of the species and their habitats.
- There is a trend toward the demand for species that were obtained from ecologically sound practices.

[8] The entire text of the survey results can be found at the following Internet address: www.ornamental-fish-int.org/data.htm.

- The U.S. dominates the market for ornamental fish, accounting for approximately 60 percent of worldwide demand.
- Advances in ecological and technological knowledge have enabled the establishment of "mini-reef" home aquariums.
- Aquarium costs are estimated at approximately $200 per year with costs for mini-reefs ranging from $325 to $1,950 for 30 and 150 gallon tanks, respectively.
- The Philippines and Indonesia supply approximately 85 percent of the marine aquarium fish imported into the U.S. and Europe, with a retail value of $200 million.
- The basic "chain of custody" for marine ornamentals involves the following four market segments: collectors, exporters, importers/wholesalers, and retailers. An additional segment consisting of firms that re-bundle products, referred to as "trans-shippers", is growing.
- One of the most critical and difficult aspects of the industry concerns the ability to maintain a consistent supply.
- A wide range of skills and technologies are needed to collect and successfully ship the diversity of species involved in the trade, including invertebrates, plants, live rock and sand, and fish.
- Incentives to adopt and adhere to quality and sustainability standards exists from informed customers; "market assessments show that there is a strong demand for certified marine aquarium organisms and that this demand will increase rapidly when there is a comprehensive, international, independent certification system."
- Since the aquarium hobby has more competition during the summer, consumer demand is lowest during these months. During this same period, increasing water temperatures cause higher mortality rates in holding facilities without climate control. Both these factors result in relative low demand in the summer.
- "There are close to 100 marine ornamental wholesale companies operating in the U.S." These companies typically offer a varied inventory by obtaining species from numerous sources.
- Although developed for Canadian firms, the following seven principles for entering new markets may be helpful for any firm trying to be successful in this market. The principals include: (1) understand the target market, (2) commit to offering high-quality, eco-friendly species; (3) consider air freight costs; (4) screen foreign firms before engaging in business; (5) be reliable and willing to communicate with industry contacts; (6) adopt a targeted marketing strategy; and (7) have a price list prepared that includes all species currently in-stock.

V. Summary, Discussion, and Implications

The domestic market for marine ornamentals comprises approximately 120 firms ranging in size from $7,500 to $18.5 million in sales per year; no employees to 130 employees; and zero capacity for holding fish to 800,000 gallons of capacity. There are 56 firms in Florida and 64 firms around the rest of the country.

Firms in Florida specialize to a greater extent in marine species, invertebrate species, and domestic species than wholesalers in other states.[9] Florida-based operations are on average smaller, have smaller tank holding capacity, and hire fewer full-time workers than other firms.

Many wholesalers in Florida are also collectors. Thus, at Florida facilities, inventories contain primarily marine life harvested by the firm or by other collectors in Florida. Product is then sold to other wholesalers, exporters, and pet shops. Most Florida product remains in the U.S. About three-quarters of domestic sales occur outside of Florida, and nearly two-thirds is sent to outlets in the Midwest.

Domestic wholesalers located outside of Florida supply proportionately more freshwater product, fewer marine invertebrates, and a greater percentage of imported species than Florida firms. Most product is obtained internationally from Indonesia and the Pacific and domestically from West coast dealers and independent collectors. Less than a fourth of domestic inventory purchases are from Florida. The major outlet is pet shop retailers along the East coast and in the Midwest.

Florida marine life species are reputed to be of higher quality than overseas products with better than average post-transport survival. For many wholesalers, however, Florida products are not cost competitive with imports even though imported products are subject to inspection and fees by the U.S. Fish and Wildlife Service and transport charges to maintain an abundance of varied inventory year-around. Domestic wholesalers turn to foreign firms as a consistent source of ornamental fish. In the past, Florida firms have been less reliable in that regard.

Supplying greater volumes of wild caught Florida fish may not be the answer. Catch rates of fish in Florida have been declining and may continue. Some explanations for the decline follow. (1) Recent regulations have stymied the collection industry and reduced the number of active commercial collectors. (2) A rise in demand for more natural reef tanks and reef tank products provided active collectors with the incentive to shift efforts to invertebrate species. (3) Collecting invertebrate species requires less skill than catching fish. (4) Marine pollution has hampered fish collection in Florida perhaps by contributing to the loss of high quality habitat.

Industry wholesalers foresee the following trends. (1) Cultured marine species will grow in importance as the supply and variety of product increases. (2) Over time, the industry will consolidate. Large firms will become bigger taking advantage of size and scope economies. (3) Small firms may prevail in some niche areas such as the provision and promotion of eco-friendly

[9] These results are reported in Larkin and Degner (2001).

products, for example the promotion of species with healthy populations; collected using environmentally sound and sustainable methods; and handled in a manner that minimizes mortality rates. (4) Domestic regulations are expected to continue to hamper the collection industry, suppress product availability, and increase operational costs.

To remain in this industry and operate successfully, firms will need to adapt, react, and change with the market. Important changes are as follows. (1) Reef tank popularity will continue to grow. (2) Information costs and transactions costs will decline with advances in e-commerce technologies. (3) Cultured product will be more widely distributed. (4) Tank technologies will continue to improve and attract more hobbyists. (5) Firms will tailor marketing efforts to specific market channels for greater effectiveness. (6) Firms will begin promoting products' eco-characteristics, for example, collection methods and handling practices.

Survey results suggest that Florida species can effectively be marketed as a high-quality marine life product. Improvements in meeting wholesaler needs in terms of providing predictable and sufficient quantities of product would go a long way towards increasing Florida's market share in this competitive industry. Regulators should consider the market impacts of any proposed policies that could affect the viability of the industry.

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Appendix A. Copy of Survey Cover Letter

<Month> <Day>, 1999

<Name, Title>
<Firm Name>
<Street Address>
<City State Zip>

Dear <Name>,

Would you be willing to spend a few minutes of your time in order to gain a better understanding of the U.S. wholesale market for marine aquarium species? The University of Florida's Agricultural Market Research Center is conducting a study to address the following issues.

Recent market trends for the most popular species collected in Florida.
Importance of imports into the United States.
Differences in marketing imported versus domestic products.
Marketing advantages and disadvantages of species collected in Florida.
Major foreign competitors in the domestic market.
Countries that compete directly with Florida product for market share.
Marketing channels for imported and domestic products.
Factors influencing sales of marine fish and invertebrates.

Our research assistant will call you this summer to conduct an interview by phone. Your answers to our survey questions will help provide the industry with valuable insights into Florida's collection industry and the U.S. wholesale market for live marine ornamentals that we hope will assist your future marketing plans.

Please be assured that this is a university study with practical applications for the marine aquaria industry. We are not affiliated with any business or regulatory agency. To maintain confidentiality, our research assistant will code only your responses to the survey (your name and address will not be entered). Using this approach, there will be no way for anyone to associate your firm with your responses.

Thank you for your time and potential involvement in this innovative project. Participants in the study will receive a copy of the final report if desired. If you have any questions, please feel free to contact me.

Sincerely,

Robert Degner
Professor and Director

Appendix B. Copy of Survey Instrument

LIVE AQUARIUM PRODUCTS WHOLESALERS SURVEY

Date/Time: _____

Firm Name: _____

Contact: _____

Address: _____

_____

_____

Phone: _____

Email: _____

Send Copy of Final Report? Yes or No (circle answer)

May I speak with _____? Hello, my name is _____ and I'm working at the University of Florida's Agricultural Marketing Center. The Center is conducting a research project to better understanding of the U.S. wholesale market for marine aquarium species. Did you receive the letter we sent explaining the project?

[If YES] Great! Do you have any questions?

[If NO] Well, the study is attempting to address market trends, the magnitude and importance of imports, major competitors, marketing channels, advantages and disadvantages of Florida species, and the like.

We are calling licensed wholesale dealers in Florida, firms listed in the Pet Supplies Marketing Directory, and firms found on the Internet.

We are not affiliated with any business or regulatory agency and everything said remains confidential since I only enter your responses. I then check your name off my list and, if you would like a copy of the final report, I will enter your address onto our mailing list. Participants in the study will receive a copy of our final report in April 2000.

Do you have any questions?

Observation No. _____

Beginning with your livestock inventory,

1. Do you handle freshwater species? Yes or No
   [If Yes] What percent of the value of your inventory is comprised of freshwater species?
   _____%

2. Considering the value of your saltwater inventory, on average, how would it be divided between the following three product groups:
   1. % Live rock and Sand? _____%
   2. % Invertebrates? _____%
   3. % Fish? _____%
   100 %

3. Considering the value of your saltwater invertebrates, on average, what percent is comprised of "critters" such as snails, starfish, crabs, cucumbers, shrimps, etc? _____%

4. Considering the value of your saltwater fish and inverts, that is excluding the value of live rock and live sand, what percent do you directly import from outside the U.S.? _____%
   [If 0] Go to next question.
   [If +] How would you divide your source of inventory by country in terms of percentage of dollars spent?
   Country:_____ (_____%)
   Country:_____ (_____%)
   Country:_____ (_____%)
   Country:_____ (_____%)
   100 %

5. Considering the value of your saltwater fish and inverts purchased domestically, what proportion is derived from the following three sources:
   1. Collected by your firm? _____%
   2. Purchased directly from other collectors? _____%
   3. Purchased from other wholesalers or importers? _____% [If 0, skip to question 8]
   100 %

6. Considering the value of your saltwater inventory purchased from other domestic wholesalers or importers, again excluding live rock and sand, what proportion is purchased from Florida?
   _____% [If 100, skip to question 8]

7. Considering the value of your saltwater fish and inverts purchased from wholesalers or importers in other states, what proportion is received from:
   1. The West Coast including Hawaii? _____%
   2. The Mid-West? _____%
   3. The East Coast? _____%
   100 %

8. For which <u>marine</u> fish and invertebrate species, if any, have foreign supplies become more important since 1995?
   Species #1:_____
   Species #2:_____
   Species #3:_____

9. In comparing Florida marine species with identical imports, that is, the same species imported from the Caribbean or South America:
   What unique advantage, if any, do Florida species have?

   What unique disadvantage, if any, do Florida species have?

10. Realizing that it will vary by species, if the price of an identical species collected in Florida equaled one dollar, what would be the F.O.B Miami price of a Caribbean or South American import? $_____ [e.g., Species: _____]

11. Annual landings figures collected by the Department of Environmental Protection indicate that commercial landings of the majority of fish species peaked in 1994 and fell substantially thereafter. However, commercial landings of most invertebrates have increased since 1994. First, what could have caused the decline in fish landings?

    Second, what could have caused the increase in invertebrate landings?

Now turning toward distribution outlets,

12. Of your dollar sales of saltwater fish and inverts, again excluding live rock and sand, what percent do you export directly out of the U.S.? _____%
    [If 0] Skip to next question (13).
    [If 100] Skip to question 15.
    [If 1-99] Considering the value of your exports just referenced, how is your business divided by country in terms of percentage of dollar sales?
    Country: _____(_____%)
    Country: _____(_____%)
    Country: _____(_____%)
    Country: _____(_____%)
    100 %

13. Considering the value of your domestic sales of saltwater fish and inverts, what portion do you sell directly in Florida? _____% [If 100, skip to question 17]

14. Considering the value of your marine fish and inverts sent to other states, what percentage are destined for the:
    1. The West Coast including Hawaii? _____%
    2. The Mid-West? _____%
    3. The East Coast? _____%
    100 %

15. Considering the value of your marine fish and inverts sold domestically, what percentage are sent to the following four destinations:

1. Other wholesalers and exporters? _____%
2. Retail pet shops? _____%
3. Direct to consumers? _____%
4. Educational institutions, public aquariums, or research laboratories? _____%

100 %

Lastly, we would like some general information and opinions. For example,

16. How many gallons of holding space do you have/use? _____Gallons

17. Would you consider the size of your firm to be SMALL, MEDIUM, or LARGE relative to your competitors? (circle answer)

18. How many years has your firm been in business? _____

19. How many full-time collectors work for your firm? _____
How many other full-time positions are there? _____
Excluding the full-time collectors, how many other collectors do you buy from? _____

20. What changes, if any, do you foresee at the wholesale level in the next 5 years?

21. In your opinion, what are the most limiting factors to sales of Florida species?

Most important: 1. _____
2nd most: 2. _____
3rd most: 3. _____

22. What species of marine life, if any, do you carry that are aquacultured or tank-raised?

Species #1: 1. _____
Species #2: 2. _____
Species #3: 3. _____

23. For purposes of evaluating differences in product flows and opinions, we'd like to ask one final confidential question: Excluding live rock, live sand, and all invertebrates, what were your approximate dollar sales of marine fish in 1998: $_____

Thanks for your help and time.
Would you be interested in receiving a copy of our final report? Yes or No
[If yes, verify mail address or ask for email address, enter on top page, return to Bob]

Science Serving Florida's Coast

For Florida's 15.5 million residents and about 50 million annual visitors, the coast and its resources are a major attraction and an important part of their environment. Nowhere else in the United States are so many people so close to such an extensive and economically valuable coastline.

Working together, all Floridians must find a socially acceptable way to satisfy the demand for these resources while protecting their ecological integrities. Florida Sea Grant has a vital role to fill in this complex endeavor. Florida Sea Grant's mission is to enhance the practical use and conservation of coastal and marine resources to create a sustainable economy and environment. Now in its 30th year, Florida Sea Grant is the only statewide university-based coastal research, education, extension/outreach and communications program in Florida. One of 30 Sea Grant programs nationally, it is a partnership program among the National Oceanic and Atmospheric Administration, Florida's universities and Florida's citizens, businesses and governments.

Florida Sea Grant has a demonstrated record of success. Its program of research, education and extension earned a rating of "Excellent" from a federally mandated review by the National Sea Grant College Program in 2000. We invite you to learn more about Sea Grant's contributions and its leadership role in helping Floridians to rationally manage continued growth in the coastal zone by reading the 2002-2005 Florida Sea Grant College Program Strategic Plan, available by visiting the Florida Sea Grant web site at:

http://www.flseagrant.org.

Science Serving Florida's Coast

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