

Final Report

AN ECONOMIC ANALYSIS OF THE MIAMI RIVER MARINE INDUSTRY

PREPARED FOR
THE MIAMI RIVER COMMISSION

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Introduction and Summary

This report contains a review of several economic studies and other research documents published since 1990 that are relevant to demonstrating the significance of the Miami River economy. The second section contains a brief history of the economic activities on the River. A description of the three reaches of the River, the Upper River, Middle River and Lower River, follows in the third section. An analysis of the land uses in the three reaches concludes that the distribution of land uses along the riverfront shows a pattern that reflects a classical distribution from the center of an urban area:

- commercial (including office and high rise residential) uses are relatively important in the downtown (Lower Reach),
- residential (especially single family) uses are some distance from the downtown (Middle Reach). The region also contains significant commercial and industrial uses.
- industrial uses are farthest away from the downtown (Upper Reach).

A major change in the structure of the marine industry along the Miami River occurred in the 1960s when a number of marine boat manufacturing and repair businesses moved to Broward County to take advantage of less cumbersome local government permitting and restrictions. In response, entrepreneurs purchased used European shallow draft cargo ships, refurbished them and put them into service in the Caribbean. The construction of cargo terminals and warehousing facilities created an important seaport along the River. This was about the time when containerized shipping was introduced world wide, and containerized cargo gradually supplanted the break bulk cargos that were initially dominant on the River.

Waterborne commerce through the Miami River port doubled between an annual level of about 250,000 short tons in the early 1970s to about 500,000 in the early years of the new century. Foreign trade accounts for most of the commerce through the Miami River Port. Exports dominate the Port's commerce, accounting for over 75 percent of the total. In the 1970s, exports had averaged 56 percent of the total. Most of the Miami River's foreign trade is with the nearby countries of the Caribbean, especially the Dominican Republic, Haiti and the Bahamas. This reflects the suitability of the Miami River for shallow draft vessels which serve the many shallow draft ports in the Caribbean.

The Miami River controlling depth was 13 feet at the end of the twentieth century although it had been originally dredged to a depth of 15 feet. The U.S. Army Corps of Engineers produced an economic analysis of the dredging project in 2005 in a report entitled *Supplement to Miami River Dredged Material Management Plan*. The analysis is a standard Army Corps of Engineers assessment of the benefits and costs of dredging River to its original federally authorized depth. The national project benefits are measured as the reduction in costs per short ton of cargo shipped through the port over a 50 year planning horizon. A benefit cost ratio of over unity is obtained for the remainder of the dredging project yet to be completed. This means that the remainder of the project will generate more benefits than costs. Regional benefits from the construction phase of the project were projected to be low because the equipment and manpower would be imported from outside the region. Regional benefits from the ongoing operations of the improved port were not estimated, nor were the economic benefits of the dredging project to river-based recreational boating, boatyards and marinas and other non-cargo related

marine activity. Positive environmental benefits were anticipated from the removal and appropriate disposal of contaminated sediment and increased seagrass beds at the mouth of the River.

The shipping operations of the Miami River create direct expenditures as a result of the spending of shipping companies, indirect expenditures as a result of services supplied to the companies, and induced expenditures as a result of the expenditures of the employees of the businesses affected by the shipping companies and their suppliers. There are additional impacts resulting from the reduced transportation costs provided by the Port to Miami-Dade exporters and the location of additional businesses in the County to take advantage of the port. These impacts result in increased production in the County, increased earnings by Miami-Dade households and increased taxes. Hazen and Sawyer in a 2005 report entitled *Biscayne Bay Economic Study* estimated these impacts for 2004 in an economic study of Biscayne Bay prepared for the South Florida Water Management District.

The estimates were derived using the IMPLAN model, a standard input output model widely used by economists for economic impact studies. The model was competently applied to the Miami River case. The researchers had to make assumptions to make up for a lack of detailed data, but the assumptions appear reasonable in almost all cases.

Hazen and Sawyer estimated the impact of the Miami River shipping industry on Miami-Dade county production in 2004 at \$682.5 million, creating 6,106 jobs, with earnings of \$338.9 million. These numbers show that the industry is a significant part of the county's economy.

Hazen and Sawyer estimated the impact of the Miami River shipping industry on southeast Florida production in 2004 at \$805 million, creating 6,741 jobs, with earnings of \$406 million. These numbers show that the industry has an even greater impact on the region's economy.

The previous analysis focused on the shipping industry on the Miami River. The River, however, has always contained non-shipping marine industry activities including, especially, boat manufacturing and repair. Some of the activities of this industry support the shipping industry, but the industry also serves the needs of other commercial boating, including commercial fishing, tour boats, boats that serve the cruise industry and mega yachts¹. A survey of Miami River businesses conducted for the Miami River City Commission reported in Lipner, *Miami River Economic Study 2000* concluded that the non-shipping industry had annual sales about equal to the sales of the shipping industry.

One part of the non-shipping industry, the mega yacht industry, has attracted a lot of attention in recent years. Thomas J. Murray & Associates undertook a study for the Marine Industries Association of South Florida and the Broward Alliance in 2003, *Recent Growth, Current Activity, and Economic Impacts of Mega Yachts in South Florida 1997-2002*. The U.S. ranked second in mega yacht construction (after Italy), and southeast Florida (consisting of Broward, Miami-Dade and Palm Beach counties) represents a significant cluster of professional services and talents necessary for the world's mega yacht industry. In 2002, the average expenditures of 1,300 mega yachts were \$140,000 at boatyards in the region resulting in a direct impact of \$181 million. About one-third of the mega yachts were non-U.S. based vessels.

The mega yacht business also generated commissions for southeast Florida brokers and charter firms. One of every two mega yachts listed for sale worldwide was handled by local brokers in 2002, generating \$90 million in commission income. Local charter firms represented 45 percent of mega yachts available for charter worldwide and received \$21.5 million in commissions.

The direct impact of the mega yacht business was \$293 million, creating 2,577 jobs and \$102 million in earnings. Average earnings per job were \$39,581 in 2002, equivalent to \$48,351 in 2007.² The average wage across all occupations in the region was \$38,060 in May 2006.³ Adding indirect and induced impacts, the resulting total increase in the output of the tri-county area was \$576 million, with a total increase in jobs of 5,968 jobs and earnings of \$276 million.⁴ Clearly, the mega yacht business is important to the economy of southeast Florida both because of its size, its growth and its source of high wage jobs.

A major mega yacht project has recently been proposed for the Miami River, namely, the modernization and expansion of the Merrill-Stevens dry dock ship repair facilities. Merrill-Stevens commissioned an economic impact study as reported in Washington Economics Group, *The Economic Development Impacts of Merrill Stevens Comprehensive Revitalization of the Miami River through the Modernization and Expansion of its Dry Dock Ship Repair Facilities.* The construction phase will have a transitory impact on the county economy, but there will be an ongoing impact from the operations of the new facility once the project is complete. The IMPLAN economic impact model was used to estimate indirect and induced impacts on county output, jobs and earnings.

The direct expenditures of the construction phase will amount to \$55 million, and the report does not indicate how these expenditures are broken down during the years when construction is being undertaken. During the construction phase, 642 jobs will be generated resulting in \$26 million of earnings. Indirect expenditures by industries supplying the firms involved, together with the induced expenditures by employees of the construction and supplying industries, will amount to \$45 million, leading to an increase in total county output of \$100 million, an increase in county jobs of 1,090 jobs and increased earnings of \$53 million. The indirect and induced effects are consistent with the results obtained from the IMPLAN model in other applications.

Once the new facility is completed, Merrill-Stevens anticipates ongoing revenues of \$90 million annually, with 40 percent of the activities focused on the repair of mega yachts. There will also be tourist-type expenditures by the crews of the mega yachts while the repairs are being undertaken. Estimates of these impacts were obtained using the visitor profiles of Miami-Dade tourists obtained from the Greater Miami Convention and Visitors Bureau. There will be similar expenditures generated by the owners of mega yachts during visits to the boatyard during the repair projects. The study estimates these tourist-type expenditures will amount to \$20 million annually, a figure that this reviewer thinks is too high because yacht crew members will have lower daily expenditures than vacationing tourists and business travelers who are the source of the data produced by the Greater Miami Convention and Visitors Bureau. If repairs involved an extended stay, many crew members would go to their homes; if the stay was relatively short, many crew members would be likely to share hotel rooms in order to reduce expenses since they are accustomed to tight quarters on the yachts. Additionally, the economic impact of the use

of the property if the new project is not constructed should also be netted out to properly calculate the impact of the new project.

The study estimates that the \$110 million in direct expenditures associated with the ongoing operation of the new boatyard would result in \$85 million in indirect and induced expenditures, yielding a total increase in county production of \$195 million, 1,880 jobs, and \$101 million in earnings. For the reasons given above, this reviewer thinks that a more likely estimate would reduce these figures by 10 percent, but even after this adjustment, the project would still be seen to yield substantial benefits to the county economy.

The City of Miami commissioned an economic and planning study of the Miami River by Innovative Development Resources, Inc., et al., *Miami River Market Study & Economic Impact Analysis* that was completed in 2004. The economic impact was a small part of 1,200 pages of reports. The analysis used the RIMS II Model, a standard economic impact model produced by the Bureau of Economic Analysis of the U.S. Department of Commerce that is widely used by academic and professional economists for economic impact analysis. The results presented in the analysis are consistent with other applications of the model familiar to this reviewer.

Data on multipliers, jobs created, and average earnings per job for selected components of five industries proposed for consideration along the Miami River (maritime commercial, residential, food services and drinking places, and retail trade) were developed from the economic impact analysis in the study.⁵ The estimated output multipliers ranged between a low of 1.23 for owner occupied dwellings to a high of 2.08 for water transportation. Relatively high output multipliers were found for maritime

commercial, health care and medical offices, and retail investments; they were low for residential investments.

There is some evidence that industries that created the largest number of jobs from a \$1 million investment (fishing, and retail activities) were associated with a relatively low earnings per job, while investments in industries that yielded lower numbers of jobs were associated with higher average earnings (water transportation, ship building/repair, home health care). However, both the number of jobs created and the average earnings per job figures were low for investment in real estate.

The report combined the results of the economic impact analyses with an assessment of market strengths and weaknesses and impacts on infrastructure and nearby residential communities to develop recommended land uses for vacant parcels in the Miami River area. An assessment of these recommendations is beyond the scope of this study.

Historical Background

Prior to the 20th century the Miami River ran four miles from a northwesterly direction before emptying into Biscayne Bay. When the Spanish arrived in the western Hemisphere at the end of the fifteenth century, there was a human settlement at the mouth of the River – a settlement inhabited by a people they called the Tequestas. Towards the end of the twentieth century, an archaeological site associated with this prehistoric people was discovered near the mouth of the River. The highlight of the site was a large limestone rock called the “Miami Circle.” The rock, which contains architectural features and stratified accretionary midden deposits, was likely the footprint of a prehistoric building and prehistoric artifacts found at the site have been dated from 500 BC to about 1,500 AD.⁶

In 1836 as the Second Seminole War broke out, Fort Dallas was constructed on the ruins of an old slave plantation on the north side of the Miami River near Biscayne Bay. It was established as a military post and cantonment and, most likely, it was surrounded by a stockade in its early days.⁷ After it was abandoned in 1857, it fell into private hands. In 1891, Julia Tuttle purchased 640 acres of land on the north side of the River, across from the trading post and post office of William Brickell. In 1896, Tuttle and Brickell gave grants of land around the River to Henry Flagler as an inducement to extend his Florida East Coast Railroad south from West Palm Beach. Flagler used the land to establish the new city of Miami, establishing his famous Royal Palm Hotel at the mouth of the River.

As the city grew at the beginning of the century, the River quickly became a working river. The Florida East Coast Railroad built warehouses and docks to serve the area's growing trade. Winter vegetables came in by water over Biscayne Bay and were loaded on freight cars for shipment north. Boat building and marine repair enterprises sprouted along the River.⁸

Beginning in 1909, as part of the state's efforts to drain the Everglades, the Miami Canal was constructed from Lake Okeechobee in a southeastern direction towards Miami, and by 1913, it was connected to the Miami River. The River was lengthened and widened, and it was dredged to a 15 foot depth by 1933. In 1945, a salinity dam was constructed on the Miami Canal 5.5 miles from the River mouth in order to prevent salt water intrusion, and this became the limit of navigation.

Reaches of the River

The River is traditionally divided into three reaches: the Lower River near its eastern mouth on Biscayne Bay, the Upper (western) River east of the Miami International Airport, and the Middle River in-between.



Map Created by CUES (www.cuesfau.org)
Source: Miami-Dade Property Appraiser

TABLE 1 shows the number of riverfront parcels in each reach, as obtained from the files of the Miami-Dade County Property Appraiser.⁹ The Lower River has the smallest number of parcels, but their value exceeds the total value in the other two reaches. The Middle River has over 40 percent of the parcels along the riverfront, but it

accounts for about 35 percent of the total value. The Upper River is in the middle of parcels but has the lowest total value.

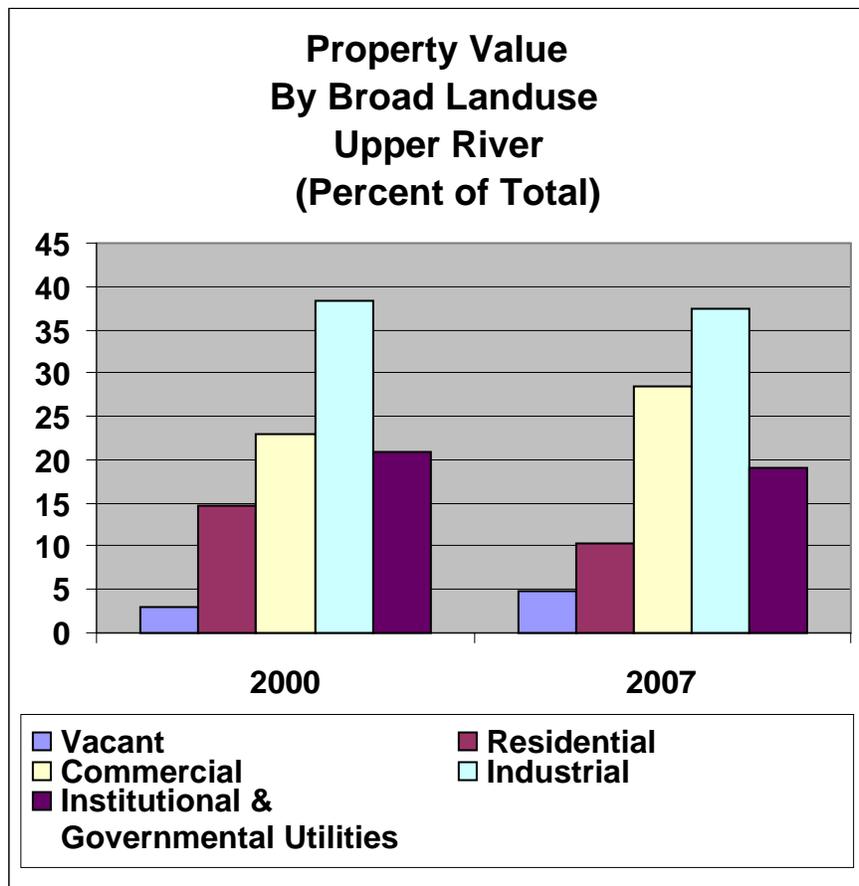
TABLE 1			
Reaches on the Miami River			
Number of Parcels of Property and Aggregate Market Values			
Reach	West-East Boundaries	No. Parcels	2007 Value Millions of Dollars
Upper River	NW 39 Ave-NW 22 Ave	141	\$166.8
Middle River	NW 22 Ave – NW 8 Ave	191	\$241.5
Lower River	NW 8 Ave – Biscayne Bay	101	\$410.4
Total		437	\$678.6

Notes: Computed from Miami-Dade County Property Appraiser Data. Properties selected by GIS methods to be on North and South River Drives and closer to the River. Equivalent distances used in the Lower Reach.

Upper River

The largest land use in the westernmost reach, namely, the Upper River, consists of industrial which accounted for 37.4 percent of the total property value in 2007. Commercial accounted for the second largest share of property value (28.5 percent in 2007). The importance of these land uses reflects the significant marine industry in the Upper River. There is relatively little residential use and it declined in importance between 2000 and 2007. Commercial uses increased between 2000 and 2007.

Figure 2

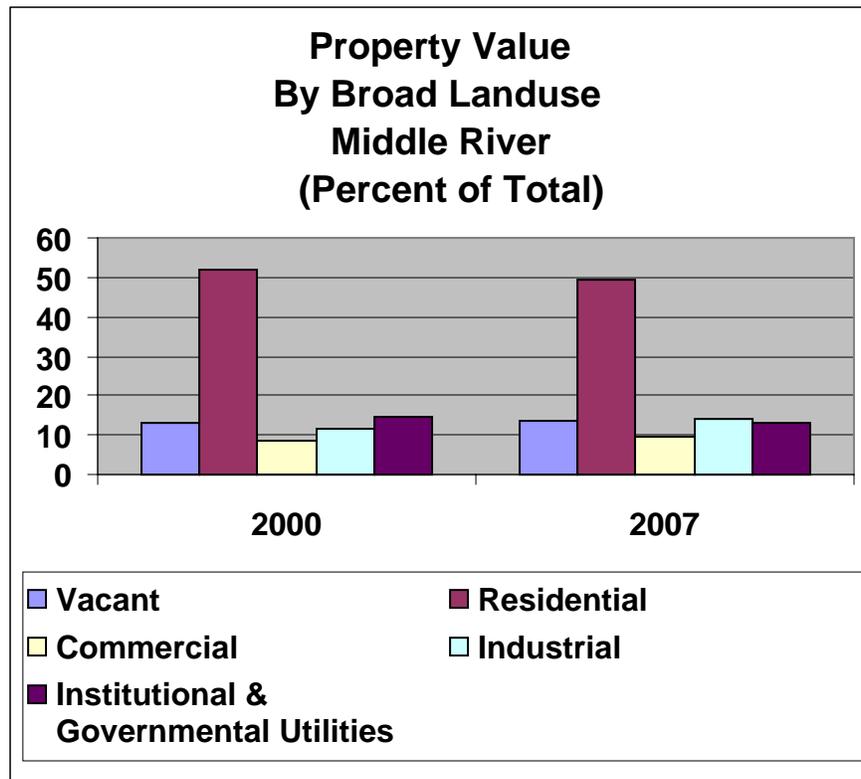


Notes: Computed from Miami-Dade County Property Appraiser Data. Properties selected by GIS methods to be on North and South River Drives and closer to the River. Equivalent distances used in the Lower Reach.

Middle River

The largest land use in the Middle River is residential, including two large public housing projects owned by the Miami-Dade County Housing Agency. There are also significant industrial and commercial properties, again reflecting the historic marine industry. There are some industrial properties in the Middle River but their share of property value is much less than in the Upper River. There are also some commercial uses but they are relatively less important than in the Lower or Upper River reaches.

Figure 3



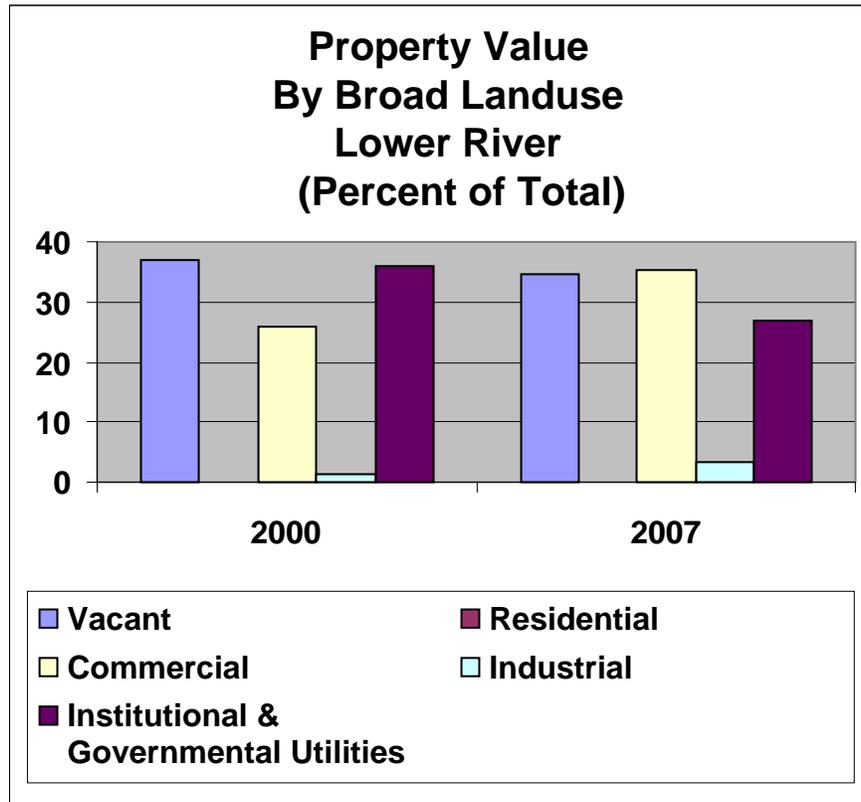
Notes: Computed from Miami-Dade County Property Appraiser Data. Properties selected by GIS methods to be on North and South River Drives and closer to the River. Equivalent distances used in the Lower Reach.

Lower River

Commercial properties account for the largest portion of the privately owned, developed property value in the Lower River. There is virtually no industrial value and, although there is no reported residential value, there are several mixed use projects which the Property Appraiser designates as commercial, although they have large high density residential components.

Government-owned properties account for the second largest share of the developed property value in the Lower River area (26.8 percent in 2007). One valuable property is the Miami Circle archaeological site and another is related to the Miami Convention Center. A third parcel is the City of Miami Administration Building. There is also a large substation owned by Florida Power and Light.

Figure 4



Notes: Computed from Miami-Dade County Property Appraiser Data. Properties selected by GIS methods to be on North and South River Drives and closer to the River. Equivalent distances used in the Lower Reach.

The distribution of land uses along the riverfront presented above shows a pattern that reflects a classical distribution from the center of an urban area:

- commercial uses (including offices and high rise residential) uses are relatively important in the downtown (Lower Reach).
- residential uses some distance from the downtown (Middle Reach).

There are also some commercial and industrial uses associated with the historic marine industry.

- industrial uses furthest away from the downtown (Upper Reach).

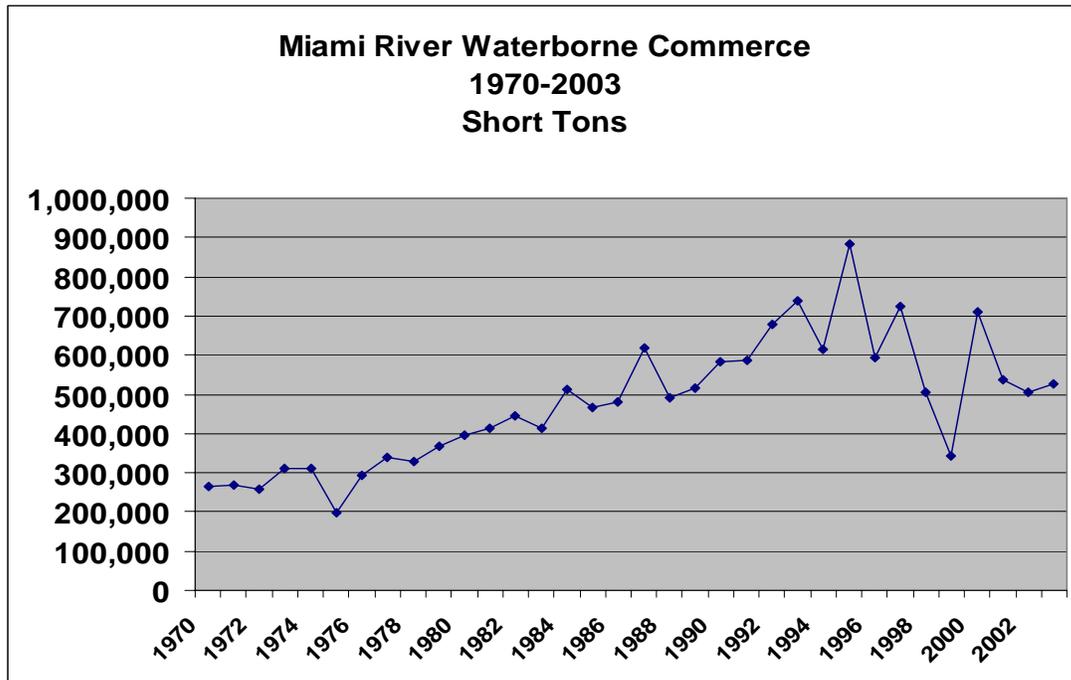
The Miami River Shipping Industry

A major change in the structure of the marine industry along the Miami River occurred in the 1960s when a number of marine boat manufacturing and repair businesses moved to Broward County to take advantage of less cumbersome local government permitting and restrictions. In response, entrepreneurs purchased used European shallow draft cargo ships, refurbished them, and put them into service in the Caribbean. The construction of cargo terminals and warehousing facilities created an important seaport along the River. This was about the time when containerized shipping was introduced worldwide, and containerized cargo gradually supplanted the break bulk cargos that were initially dominant on the River. At the beginning of the twenty-first century, more than 80 percent of cargo handled at the Miami River Port is containerized.

The Structure of Miami River Waterborne Commerce

Waterborne commerce through the Miami River port doubled between an annual level of about 250,000 short tons in the early 1970s to about 500,000 in the early years of the new century. Commerce had peaked in the mid 1990s at about 700,000 short tons annually, and there was declining trend in the last decade of the data.¹⁰ Part of the reason for the decline was the desire of some port operators to switch to larger ships which require a lower channel depth. In 1995, Hyde Shipping moved its operations to Port Everglades in Broward County and in 2001 Bernuth Lines moved its operations to the Port of Miami.¹¹

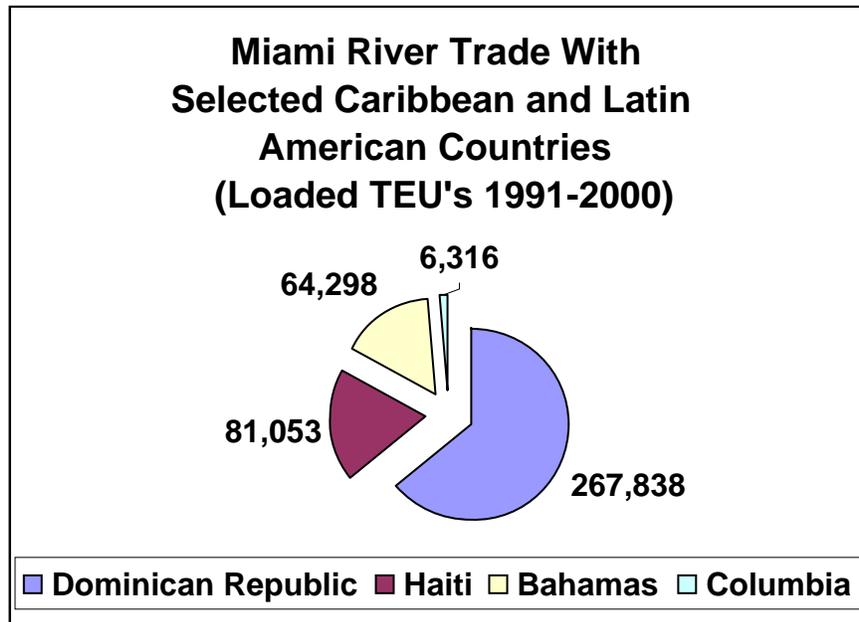
Figure 5



Source: U.S. Army Corps of Engineers, Jacksonville District (2005) "Supplement to Miami River Dredged Material Management Plan of September 2002."

Foreign trade accounts for most of the commerce through the Miami River Port. In the final ten years of the waterborne commerce data, 1994-2003, domestic trade accounted for 7.2 percent of the total. This was down from 17.7 percent in the 1970s. Foreign exports dominate the Port's commerce, accounting for over 75 percent of the total in 1994-2003; foreign imports accounted for over 16 percent. In the 1970s, exports had averaged 56 percent, and imports were at 27 percent.

Figure 6



Source: U.S. Army Corps of Engineers, Jacksonville District (2005) "Supplement to Miami River Dredged Material Management Plan of September 2002."

Most of the Miami River's foreign trade is with the nearby countries of the Caribbean, especially the Dominican Republic, Haiti, and the Bahamas. This reflects the suitability of the Miami River for shallow draft vessels which serve the shallow draft ports in the Caribbean. There was a relatively small trade with Colombia in 1991-2000 and an even smaller trade with Nicaragua.

Shipments through the Miami River to Caribbean and Latin American countries were of much the same commodities as were shipped from the other South Florida ports (Miami, Port Everglades and Palm Beach), except for "larger quantities of bulk cargo, like petroleum."¹²

2005 Supplement to Miami River Dredged Material Management Plan

In the period after 1933, the Miami River dredging project was not maintained because the material to be dredged was contaminated and a satisfactory plan for its disposal was needed. By 2002, the River had shoaled into a controlling depth of 13 feet and the lack of depth had become an impediment to the expansion of the port¹³. The Army Corps of Engineers prepared a Dredged Material Management Plan for the Miami River in 2002, and a further economic analysis was provided in the 2005 Supplement. Dredging commenced in 2004 and was suspended because of financing constraints in 2005. About 40 percent of the project had been completed. Dredging re-commenced in February 2008, with the remainder project scheduled to be completed in early 2009, with the contract expiring April 2009.

The economic analysis in the 2005 Supplement is a standard Army Corps of Engineers assessment of the benefits and costs of dredging the 5.5 mile Miami River to its original 15-foot federally authorized depth. The national project benefits are measured as the reduction in costs per short ton of cargo shipped through the Port of Miami River if the River is dredged to 15 feet, plus two feet of overdepth and two feet of tide, times the forecasted tonnage of trade with the Dominican Republic, Haiti and the Bahamas over a 50 year planning horizon. A benefit cost ratio of over unity is obtained for the remainder of the dredging project yet to be completed. This means that the remainder of the project will generate more benefits than costs. Regional benefits from the construction phase of the project were projected to be low because the equipment and manpower would be imported from outside the region.¹⁴ Regional benefits from the ongoing operations of the improved port were not estimated, nor were the economic benefits of the dredging project

to river-based recreational boating, boatyards and marinas and other non-cargo related marine industrial activity. Positive environmental benefits were anticipated from the removal and appropriate disposal of contaminated sediment and increased seagrass beds at the mouth of the River.

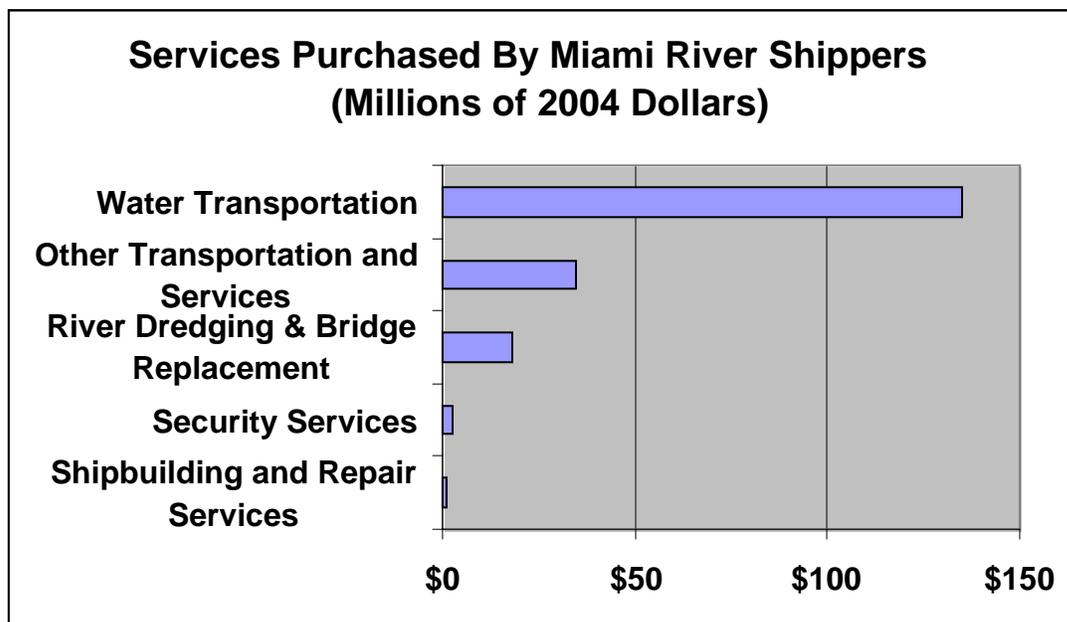
Hazen and Sawyer, *Biscayne Bay Economic Study*, prepared for the South Florida Water Management District, 2005.

The shipping operations of the Miami River create direct expenditures as a result of the spending of shipping companies, indirect expenditures as a result of services supplied to the companies, and induced expenditures as a result of the expenditures of the employees of the businesses affected by the shipping companies and their suppliers. There are additional impacts resulting from the reduced transportation costs provided by the Port to Miami-Dade exporters and the location of additional businesses in the county to take advantage of the port. These impacts result in increased production in the county, increased earnings by Miami-Dade households and increased taxes. Hazen and Sawyer estimated these impacts for 2004 in an economic study of Biscayne Bay prepared for the South Florida Water Management District. The estimates of the impact of the Miami River shipping industry were one part of a much larger study of the economic benefits of activities in Biscayne Bay. The estimates were derived using the IMPLAN model, a standard input output model widely used by economists for economic impact studies. The model was competently applied to the Miami River case. The researchers had to make assumptions to make up for a lack of detailed data, but the assumptions appear

reasonable in almost all cases. This reviewer makes two adjustments to the Hazen and Sawyer estimates.

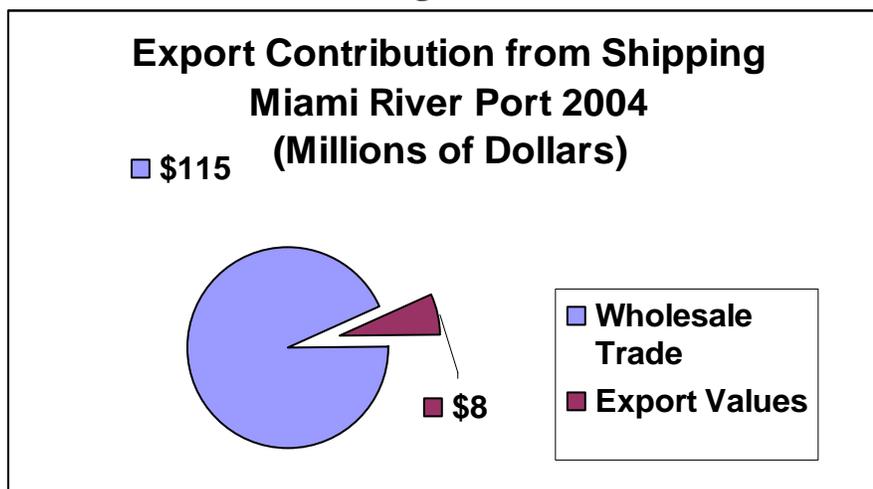
A variety of businesses in Miami-Dade County make sales as a result of the direct expenditures made by Miami River importers and exporters. Hazen and Sawyer estimated these sales at \$191 million, of which the largest part was for transportation services (\$135 million), followed by other transportation and services (\$35 million), river dredging and bridge replacement (\$18 million).¹⁵ There were also relatively small expenditures for security and ship building and repairs. The estimates derived from an economic impact study of the Port of Miami conducted by Four Gates Company. The share of the Miami River was estimated by the share of shipping tonnage in the Port of Miami total accounted for by the Miami River terminals (5.3 percent). Data on dredging and bridge replacement were obtained from the Miami River Commission and data on Miami River security were obtained from the Miami River Marine Group, Inc.

Figure 7



The value of goods produced in Miami-Dade County and exported to other countries was estimated using export data from the IMPLAN database for 2000. From this list of commodities and services, Hazen and Sawyer identified those items, or their portions thereof, likely to be exported through the Port of Miami. The largest item consisted of the services of the wholesale trade industry, since the commodities were shipped using such services. Ten of the largest 11 commodities are listed manufactures, including surgical and medical instruments, electro medical apparatus, apparel, drugs, ophthalmic goods, refrigeration and heating equipment, and miscellaneous chemicals and plastics. Total exports from Miami-Dade producers through the Port of Miami amounted to \$2.4 billion in 2000, and they had a value in 2004 of \$2.5 billion. The share of the Miami River was estimated by the share of the River in export tonnage (about 33 percent).

Figure 8



Hazen and Sawyer estimated that the loss of the Miami River Port would lead to a 1% rise in shipping costs for Miami-Dade exporters, and the result would be a decline in 1.5 percent in export demand.¹⁶ This decline would amount to \$8 million in 2004 dollars.

It appears that the elasticity was applied by Hazen and Sawyer to the value of exports rather than the volume. The result is an overestimate of the effect on export values.

Some businesses would relocate if the Miami River port were not available to export their products. Hazen and Sawyer suggest that Miami-Dade exporters would remain in the county even if the Port were not available because their motivation for locating in the county was unrelated to the Port. For example, many exporters located in the county because of the local healthcare infrastructure (University of Miami, Jackson Memorial Hospital). As a result, it was assumed that impact of a loss of the Port would affect the wholesale trade industry rather than the exporting industries. A location quotient analysis indicated that 35 percent of the output of the wholesale trade industry is exported, and it was assumed that this production would be lost if both ports were shut. The loss was apportioned between the two ports using their shares of export tonnage. Although it might be possible to shift some of the shipping from the Miami River to the Port of Miami or Port Everglades, such a shift is unlikely because the ports are short of capacity and would give preferential berthing to larger vessels.

The \$191 million in direct expenditures by importers and exporters, the \$8 million in lost exports (an under-estimate), and the \$115 million in lost wholesale services (an over-estimate) results in a loss of direct expenditures in the absence of the Miami River shipping industry equal to \$314 million. Such expenditures result in 2,075 jobs in the county with earnings of \$130 million. It is noteworthy that average earnings per job exceed \$60,000 –the jobs on the Miami River provide wages considerably above the county average.

Indirect expenditures in the county, which cause suppliers to the shipping industry to expand production, amounted to \$116 million in 2004 and an additional 1,133 jobs and \$59 million in earnings. Average earning per job in the shipping industry's suppliers are still above the county average, but they are \$10,000 less than the jobs in the industry itself. Employees in the shipping industry and its suppliers spend an additional \$252 million in the county generating 2,898 jobs. As a result, the impact of the Miami River shipping industry on the county economy is an increase of \$682 million in output, 6,106 jobs, earnings of \$339 million, and taxes of \$37.7 million.

Hazen and Sawyer also estimated the impact on the southeast Florida economy. The impacts are larger because the regional economy captures more of the production than the smaller county economy. The industry generates \$804 million in regional output and creates 6,741 jobs, with earnings of \$406.4 million. The industry also contributes \$43.9 million to the regional tax base.

Non-Shipping Marine Activities

The previous analysis focused on the shipping industry on the Miami River. The River, however, has always contained non-shipping marine industry activities, including especially boat manufacturing and repair. Some of the activities of this industry support the shipping industry, but the industry also serves the needs of other commercial boating, including commercial fishing, tour boats, boats that serve the cruise industry, and mega yachts¹⁷. A survey of Miami River businesses conducted for the Miami River City Commission reported in Lipner, *Miami River Economic Study 2000*, concluded that the non-shipping industry had annual sales about equal to the sales of the shipping industry.

Thomas J. Murray & Associates, *Recent Growth, Current Activity, and Economic Impacts of Mega Yachts in South Florida 1997-2002, 2003*.

One part of the non-shipping industry, the mega yacht industry, has attracted a lot of attention in recent years. The Murray & Associates study undertaken for the Marine Industries Association of South Florida and the Broward Alliance, concluded that the mega yacht industry continued to expand over the time period. The U.S. ranked second in mega yacht construction (after Italy), and southeast Florida (consisting of Broward, Miami-Dade and Palm Beach counties) represented a significant cluster of professional services and talents necessary for world's mega yacht industry.¹⁸ In 2002, the average expenditure of 1,300 mega yachts was \$140,000 at boatyards in the region, resulting in a direct impact of \$181 million. About one-third of the mega yachts were non-U.S. based vessels.

The mega yacht business also generated commissions for southeast Florida brokers and charter firms. One of every two mega yachts listed for sale world wide was

handled by local brokers in 2002, generating \$90 million in commission income. Local charter firms represented 45 percent of mega yachts available for charter world wide and received \$21.5 million in commissions.

The direct impact of the mega yacht business was \$293 million, creating 2,577 jobs and \$102 million in earnings. Average earnings per job was \$39,581 in 2002, equivalent to \$48,351 in 2007.¹⁹ The average wage across all occupations in the region was \$38,060 in May 2006.²⁰ Adding indirect and induced impacts, the resulting total increase in the output of the tri-county area was \$576 million, with a total increase in jobs of 5,968 jobs and earnings of \$276 million.²¹ Clearly, the mega yacht business is important to the economy of southeast Florida both because of its size, its growth, and its source of high wage jobs.

Washington Economics Group, *The Economic Development Impacts of Merrill Stevens Comprehensive Revitalization of the Miami River through the Modernization and Expansion of its Dry Dock Ship Repair Facilities*, prepared for the Merrill Stevens Dry Dock Co., 2006.

A major mega yacht project has recently been proposed for the Miami River, namely, the modernization of the expansion of the Merrill-Stevens dry dock ship repair facilities. The construction phase will have a transitory impact on the county economy, but there will be an ongoing impact from the operations of the new facility once the project is complete. The IMPLAN economic impact model was used to estimate indirect and induced impacts on county output, jobs, and earnings.

The direct expenditures of the construction phase will amount to \$55 million, but the report does not indicate how these expenditures are broken down during the years when construction is being undertaken. During the construction phase, 642 jobs will be

generated resulting in \$26 million of earnings. (Indirect) expenditures by industries supplying the firms involved during the construction phase, together with the induced expenditures by employees of the construction and supplying industries, will amount to \$45 million, leading to an increase in total county output of \$100 million, an increase in county jobs of 1,090 jobs, and increased earnings of \$53 million. The indirect and induced effects are consistent with the results obtained from the IMPLAN model in other applications.

Once the new facility is completed, Merrill-Stevens anticipates ongoing revenues of \$90 million annually, with 40 percent of the activities focused on the repair of mega yachts. There will also be tourist-type expenditures by the crews of the mega yachts while the repairs are being undertaken, and estimates of these impacts were obtained using the visitor profiles of Miami-Dade tourists obtained from the Greater Miami Convention and Visitors Bureau. There will be similar expenditures generated by the owners of mega yachts during visits to the boatyard during the repair projects. The study estimates these tourist-type expenditures will amount to \$20 million annually.

Details on the derivation of the estimate of tourist-type expenditures (which was provided by Merrill-Stevens) are not presented in the report, and the estimate appears high to this reviewer. If the average spending of a crew member (and owner) was \$1,000 during their visit, the estimate implies 20,000 crew members would make tourist expenditures in the County annually. A smaller number of visitors would imply a larger expenditure per person.

Yacht crews would be unlikely to make expenditures like other tourists, vacationers or business travelers, who are the source of the expenditure data obtained

from the Greater Miami Convention and Visitors Bureau. Crews would be likely to economize on accommodation costs by sharing hotel rooms (which would be similar to their accommodations on the mega yachts), and they would leave the area if the length of stay became significant. Yacht owners would be unlikely to make large expenditures to their crews when no labor services were being provided.

In deriving the economic impacts of the ongoing operations of the Merrill-Stevens boat yard, the study does not net out the expenditures from the existing yard. It is possible that the existing yard might close in the absence of the new construction project, but it is likely there would still be some use made of the site, even if Merrill Stevens ceased using the property.

The study estimates that the \$110 million in direct expenditures associated with the ongoing operation of the new boatyard would result \$85 million in indirect and induced expenditures, yielding a total increase in county production of \$195 million, 1,880 jobs, and \$101 million in earnings. The implied multipliers are consistent with those usually obtained from the IMPLAN model. For the reasons given above, this reviewer thinks that a more likely estimate would reduce these figures by 10 percent, but even after this adjustment the project would still be seen to yield substantial benefits to the county economy from annual operations by the boatyard.

Innovative Development Resources, Inc., et al., *Miami River Market Study & Economic Impact Analysis*, prepared for the City of Miami, Florida 2004.

The City of Miami commissioned a market study and economic impact analysis for the Miami River that was completed in 2004. The economic impact was a small part

of 1,200 pages of reports. The analysis used RIMS II Model, a standard economic impact model produced by the Bureau of Economic Analysis of the U.S. Department of Commerce that is widely used by academic and professional economists for economic impact analysis. The results presented in the analysis are consistent with other applications of the model familiar to this reviewer.

Although the report indicates that six major industries were selected for inclusion in the economic impact analysis it appears that an additional industry (retail trade) was also included. The industries consisted of:

- Maritime Commercial
- Maritime Recreational
- Health Care
- Office and Mixed-Use Development
- Residential – Apartment and Condominium
- Food Service and Drinking Places
- Retail Trade

The data on multipliers, jobs created, and average earnings per job were developed from the economic impact analysis in the study.²² The estimated output multipliers ranged between a low of 1.23 for owner occupied dwellings to 2.08 for water transportation. Relatively high output multipliers were found for maritime commercial, health care and medical offices, and retail investments; they were low for residential investments.

There is some evidence that industries that create the largest number of jobs from a \$1 million investment (fishing, and retail activities) were associated with a relatively low earnings per job, while investments in industries that yielded lower numbers of jobs were associated with higher average earnings (water transportation, ship building/repair,

home health care). However, both the number of jobs created and the average earnings per job figures were low for investment in real estate.

TABLE 2 Output Multipliers, Jobs Created, and Earnings Per Job Resulting from a \$1 million Increase in the Row Industry			
	Output Multiplier	Jobs Created	Earnings/Job
Maritime Commercial			
Water Transportation	2.08	11.4	\$34,553
Ship Building/Repair	1.65	11.5	\$35,791
Boat Building	1.50	8.7	\$31,034
Warehousing/Storage	1.84	18.5	\$30,351
Fishing	1.86	38.2	\$11,723
Maritime Recreational			
Health Care and Medical Offices			
Physicians Offices	1.92	18.0	\$34,553
Home health Care	1.93	28.0	\$35,791
Other Ambulatory	2.07	21.0	\$31,034
Hospitals	2.01	20.0	\$30,351
Nursing & Recreational Care	1.98	28.0	\$11,723
Office and Mixed-Use Development			
Residential Apartment/Condominium Development			
Owner Occupied Dwelling	1.23	2.0	\$26,850
Real Estate	1.55	10.0	\$22,120
Rental & Leasing	1.44	9.0	\$26,211
Retail Trade			
Retail Trade	1.86	22.0	\$22,791
Food Service & Drinking Places	1.93	28.0	\$20,332

Notes: No multipliers available for maritime recreational, office and mixed use development and residential apartment/condominium development. The data in this table were computed by this reviewer from the data in the report.

The report combined the results of the economic impact analyses with an assessment of market strengths and weaknesses, and impacts on infrastructure and nearby residential communities to develop recommended land uses for vacant parcels in the Miami River area. An assessment of these recommendations is beyond the scope of this study.

Appendix

Peer Reviews of “An Economic Analysis of the Miami River”

1. Dr. Phyllis Isley
2. Dr. Gary Jackson
3. Dr. Rupert Rhodd

Peer Review:
Evaluation Report of the
Miami River Economy Studies by Dr. W. B. Stronge

Dr. Phyllis Isley, Director
Bureau of Business Research and Economic Development
Georgia Southern University
Statesboro, Georgia

February 29, 2008



Introduction

Per request by the Center for Urban & Environmental Solutions, I have reviewed the report prepared by Dr. W. B. Stronge in which he assess the various studies prepared on the marine industries and allied businesses dependent on the Miami River. I have also reviewed the following:

- “Supplement to the Miami River Dredge and Material Management Plan of September 2002,” Revised U.S. Army Corps of Engineers July 2004 and September 2005;
- “Miami-Dade County Shipping Industry,” Chapter 5, from *Biscayne Bay Economic Study, Task 3 Report, Final*;
- “The Economic Development Impacts of Merrill Stevens: Comprehensive Revitalization of the Miami River Through the Modernization and Expansion of Its Dock Ship Repair Facility,” By J. Antonio Villamil, CEO and Charles K. Yaros, Economist, May 2006;
- “Recent Growth, Current Activity, and the Economic Impacts of Mega Yachts in South Florida,” by Thomas J. Murray & Associates, Inc., October 3002; and,
- “Miami River Market Study & Economic Impact Analysis for the City of Miami,” by Innovative Economic Development Resources, Inc, et al, November 2004.

Overall Conclusions

I find that Dr. Stronge’s report presents a well rounded summary of the various reports on the Miami River economy. His report very effectively highlights the significant contributions of the two industry sectors most dependent on the functionality of the river, its use value as a working transportation system and port: 1. the shipping industry and the related dependent exporting industries; and, 2. non-shipping activities, principally the mega yachts sales and service industry.

Further, I concur with Dr. Stronge’s as to the need for, and adjustment to, estimates presented in two of the previous reports. First, he is entirely correct, in the Hazen and Sawyer report the export elasticity of demand was incorrectly applied to value of exports instead of tons of exports. This resulted in an over estimate of the impact of exports. The total adjustment downward of \$100 million made by Dr. Stronge, reducing the Hazen and Sawyer impact of lost wholesale trade is an appropriate and reasonable adjustment. Dr. Stronge’s finding that even after this adjust the industry remains at a an annual contribution of \$466 million in output, 4,168 jobs and \$213 million in earning underscores the vital economic impact of Miami River shipping industry on the Miami-Dade economy.

The second adjustment that Dr. Stronge makes is to the study on the economic impact presented in the *Economic Impact of the Development of the Merrill-Stevens Comprehensive Revitalization of the Miami River through the Modernization and Expansion of its Dry Dock Ship Repair Facilities*. The impact estimate included in that study relating to the tourist-type expenditures is too high. Again, Dr. Stronge’s

adjustment is reasonable and, like the findings with respect to the shipping industry, even the reduced annual impacts of \$195 million in output value, 1,880 jobs and \$101 million in earnings speaks to the significant potential economic contribution of the proposed Merrill-Stevens investment. Adding this proposed expansionary economic impact to the overall findings with respect to the economic importance of the mega yacht sales and services sector¹ with an annual output of \$576 million, 5,968 job and \$276 million in earning, underscores again the important and significant contribution of the Miami River as a functioning asset in the transportation system.

With respect to the other studies discussed, I agree with Dr. Stronge that the reports were all competently prepared and the use of both the IMPLAN model and RIMS II model were well with the in standard of practice by economists.

Other Notes and Conclusions

I would like to the this opportunity to make a couple of observations on the various reports prepared and several key points in Dr. Stronge's report that should not be lost.

First, it is unfortunate that there were no direct estimates available with respect to the economic impact of recreational boating, fishing and other water based, consumer uses of the river. I suspect that these are of economic importance to a vast number of small businesses. It is true that these uses may be less dependent on depth improvements and may be less affected by crowding-out effects that may result from the encroachment of such land uses as medial offices, but changes in land use can make access less inviting for the recreational user and can have a localized adverse economic impacts on a large range of small businesses.

Second, there is an interesting parallel between the progression of land uses along the reaches of the Miami River and progression of land uses along the reaches of the Savannah River. I have worked with the Georgia Ports Authority on the economic impact and economic development of the Savannah and Brunswick Ports. With respect to the Port of Savannah, it faces a constant challenge in that the port lies in the upper reaches of the river with some terminal activities located on both sides of the metropolitan development of the City of Savannah. New commercial and residential developments often appear, on paper, to have greater tax base benefits than port related businesses. However, increases in traffic associated with commercial and residential uses significantly raise the cost of moving goods into and out of the port. Further, purchases of land to secure safety buffers for land side operation also raise the cost of port operations. Protecting the use value of the functioning river as transportation asset rather than capturing only the property value enhancements, or the aesthetic value of proximity to the river, is primary to maintaining a diverse economy. The report prepared by Dr. Stronge repeatedly highlights a key value of the transportation value of the river. Not only are there a lot of jobs created by both the shipping and non-shipping economic

¹It is noted that this impact is on a tri-county area of Dade, Broward and Palm Beach, not just the impact on Miami-Dade.

sectors, but those jobs almost always exceed the average county wage in annual earnings generate.

One final point merits some discussion. Dr. Stronge does correct the calculation of the elasticity of the demand for port services presented in the Hazen and Sawyer report. However, estimates elasticity are sensitive to the time period over which adjustments are allowed to occur. In general the longer the time period for change the greater the elasticity. In the Corps of Engineers² study and a point mentioned by Dr. Stronge³ with respect to the questions about potential job losses in the shipping sector if the Miami River Port was closed both suggest that some of the potential loss will be mitigated by the use of other ports. This is a very reasonable assumption. However, I think a more dynamic analysis might lead to the conclusion that while businesses will make short-term adjustments using other ports in the region, there may be a longer-term adjustment that is likely to increase loss of businesses dependent on the smaller scale, shallow draft type of services provide by the Miami River port.

To support my view, I only have some informal evidence. One of my earliest experiences with the Port of Savannah in the mid-1990s related to a request to explore how small manufactures of processed foods and soft goods manufactures, like the cut and sew clothing industry, could get ‘better’ service via the Port of Savannah. In conversations with the Economic Development director of the Port of Savannah, Mr. Stacy Watson, he note the Port of Savannah simply could not compete with the Miami River Port on a cost basis for shallower draft, small cargo carriers. He noted the a number of the businesses that had used historically been users of the Port of Savannah had, in fact, moved to Florida to be closer to a port that better suited there business needs. Further, the overall loss by Georgia in the cut and sew industry, most of which has been a loss to other counties, had further eroded the volume of the demand for smaller scale shallow draft services making sustaining service to, and businesses relations with, the shippers in portion of the industry uneconomical. Hence, the loss of a shallow water port that specializes in the scale and operational needs of these small shippers may well over a ten to twenty year horizon lead to further migration of the non-durables manufacturers who depend on these shallow smaller scale shipping services.

²See page 14 of the Revised September 2005 “Supplement to the Miami River Dredged Materials Management Plan.”

³See page 22 of Dr. Stronge’s report.

Peer Review:
Evaluation Report of the
Miami River Economy Studies by Dr. W. B. Stronge

Dr. Gary Jackson, Director
Regional Economic Research Institute
Florida Gulf Coast University
Ft. Myers, Florida

February 22, 2008

This document is a peer review of the Miami River Economic Study by Dr. Gary Jackson, Director, Regional Economic Research Institute at Florida Gulf Coast University. The Miami River Economic Study under review was prepared by Dr. William Stronge of Florida Atlantic University's Center for Urban & Environmental Solutions (CUES).

The study reviewed numerous and diverse economic impact studies for the Miami River Port and provides a fair and unbiased summary and assessment of the various studies. The following are specific comments and suggestions on the draft Miami River Economic Study.

The study states on page 2 (second to last sentence) that the "Regional benefits from the ongoing operations of the improved port were not estimated." I suggest that the improved port be defined since many readers may assume that a deeper channel is an improved port.

The US Army Corps of Engineers 2005 report (see page iii, second paragraph) also states that "Navigational safety will be improved three ways: by the removal of debris, by removal of shoaled and excessive sediments, and by removal of bridge width constrictions. " In addition to statement about positive environmental benefits (see study paper, last sentence, page 2, I would add a sentence about the improved navigational safety).

Adjusted Hazen and Sawyer economic impacts were summarized on page 3 and explained on page 23. It is unclear how making a \$100 million dollar downward adjustment reduces \$682 million in output to \$466 million? In addition the employment falls from 6,106 to 4,168; earnings fall from \$239 million to \$231 million. The first paragraph mentions a tax value of \$37.7 million but no reduction is mentioned in the last paragraph. An explanation of how the adjustment was made to the Hazen and Sawyer study needs to be provided. Was it a percentage adjustment?

The dollar value of output is reported by the Hazen and Sawyer report. Output is defined as the dollar value of shipments plus net additions to inventory in the IMPLAN manual, page 356. Total value added includes employee compensation plus proprietor income plus other property income plus indirect business taxes. Value added is the value added to intermediate goods and services. Although output is a good measure of the dollar value of shipments and services, value added and its components are a better overall measure of the local impact on the county.

Change \$181 million to \$182 million on page 4, second paragraph, second to last sentence and page 24 second paragraph, second to last sentence.

The first paragraph on page five refers to value added as earnings. The Labor income of \$92.1 may be more appropriate to use than the \$102 value added since a comparison of value added divided by labor is made to the average wage for the region on page 25. Benefits are often 20 percent of wages so it might require an adjustment? This will

change the average annual compensation to \$35,739 from \$39,581 which is \$92.1 million divided by 2,577. The \$102.8 is value added and is payment made by industry to workers, interest, profits, and indirect business taxes so it would be appropriate to at least define earnings since the study quoted refers to the total and direct value added and not earnings. This would require changes to page 5 and 25.

Same issue about defining earnings related to the Merrill Stevens study by WEG. Here direct labor income is \$25 million and value added is \$26 million so the values are much closer. (See page 5 last sentence). This study reports Florida impacts and does not seem to report Miami-Dade County only results. The estimates would tend to overstate the impacts on the Miami-Dade County area.

Most of the overall impacts would be expected in the greater Miami area but significant benefits might be seen in surrounding counties as well. I agree with Dr. Stronge that the \$20 million per year expenditure by crew members and owners seems high.

Table 2, page 29, Fishing output multiplier should be 1.80 instead of 1.86. The Health Care and Medical Offices Earnings/Job appear incorrect. I found Physicians Offices had \$39,417, Home health care of \$25,496, Other Ambulatory of \$31,870, Hospitals of \$31,870, and Nursing & Recreational of \$23,932. The table or footnote should state that the numbers in 2003 \$.

Peer Review:
Evaluation Report of the
Miami River Economy Studies by Dr. W. B. Stronge

Dr. Rupert Rhodd, Associate Professor of Economics
Florida Atlantic University
Boca Raton, Florida

March 10, 2008

Introduction

The Miami River is 5.5 mile (8.9 km) long and flows from the Miami Canal to Biscayne Bay. At the mouth of the river is the Port of Miami, a major port of entry and exit for goods to and from the Caribbean and to a lesser extent, Central and South America. The Miami River is the home of many small cargo terminals at which smaller ships (up to about 230 feet or 70 m in length) call to load cargo.

Over the past century, since the days of the entrepreneurial exploits of individuals that were instrumental in the establishment of the City of Miami, (Julia Tuttle, William Brickell, and Henry Flagler), many businesses have developed in close proximity to the Miami River. These businesses have served the immediate area and the counties in Florida. In recent years, the activities at the lower end of the river have changed from those supporting shipping and terminal activities to those supporting high rise offices, hotels, and living structures. In a 2004 article in the Florida Trend, David Villano reported that more than 7,600 condo units have been built or are under construction, mostly in the lower portion near downtown Miami's Brickell Avenue financial district since 2003. He also reported that there were 7,500 more condo units in various stages of permitting, and also that restaurants were popping up along the river's edge. Obviously, the Miami River area is growing in importance both as a place to live and also a place to conduct business. There is room for improvement along the Miami River and this obviously has resulted in many proposals based on different studies including *the Recent Growth, Current Activity, and Economic Impacts of Mega-Yachts in South Florida (October 2003)*, *the Miami River Market Study and Economic Impact Analysis (November 2004)*, *The Miami-Dade County Shipping Industry (April 2005)*, and *the Economic Development Impacts of Merrill Stevens Comprehensive Revitalization of the Miami River (May 2006)*.

Dr. Stronge's Report

Dr. Stronge's report assessed and reported on land use in close proximity and along the banks of the Miami River partitioned into the lower, middle, and upper "reaches" of the river. Dr. Stronge report also addressed some of the issues found in economic impact studies conducted on the Miami River area. For example, the report discussed the findings from previous studies relating to the shipping industry and the non-shipping marine activities in the Miami River area.

Dr. William Stronge's historical overview and assessment of the Miami River area include topics that are usually found in research of this nature. Based on my knowledge of the economic development of South Florida, Dr. Stronge's report can be described as an accurate description of the historical development of the region. Furthermore, Dr. Stronge's report is also an accurate description of the current economic state of the area. Overall, Dr. Stronge study is comprehensive, his analyses and conclusions are accurate and are based on factual information.

To help with my assessment of Dr. Stronge's report, I reviewed other studies that were conducted and from which Dr. Stronge made his assessment. These were economic impact studies that used the appropriate methodology and software (IMPAN or RIMS II)

to calculate the change in income and the economic impacts of the proposed activity. Although some of the assumptions in the studies were not disclosed, from what I could gather, the studies were based on sound economic theory. Also, because of my knowledge of the area, the results obtained seem to be in line with other similar studies that I have seen. The studies correctly showed total economic impacts to be the sum of direct, indirect, and induced expenditures, and for the most part the results and conclusions are what I would expect for the Miami River study area. Although I support Dr. Stronge's assessment of the report, there are some areas in the report that need further clarification. These I will present below.

I believe that the economic impacts reported in the study by Murray & Associates are overestimated. For the State of Florida (a very open economy), multipliers close to 2.0 deserve a second look. Having done numerous calculations with both IMPLAN and RIMS II packages, and being familiar with the State of Florida, I only expect to see multipliers close to 2.0 in the healthcare industry. Although I am confident that the average expenditures that were calculated are correct as well as the other estimates, and that the first round expenditures are justified, I believe that the multiplier obtained for mega yacht industry by dividing \$576 million by \$293 million (1.97) is overestimated. This I believe is based on the choice of incorrect sectors in the model. Using the same initial direct injections with shipbuilding, ship repair, and support services sectors, the multipliers I calculated varied between 1.32 and 1.38. Using the more favorable multiplier of 1.38 would produce a total effect of \$404 million. Even with this reduced amount, I still believe that the mega yacht business is important to the State of Florida but obviously not to the extent identified by Murray & Associates. I should also add a cautionary note that I used the 2006 sector allocation for Dade County. However, I do not believe the economy has changed that much since 2002 to cause such a difference in the multipliers.

Although the study by J. Antonio Villamil and Charles Yaro produced lower multipliers, they are still higher than what I think they should be. However, the fact that they are lower seems to confirm my doubt about the multiplier and impact calculated by Murray & Associates. Villamil and Yaro study on the same mega yacht industry produced multipliers of 1.82 in the construction phase and 1.77 after the construction phase. Furthermore, the study by Innovative Development Resources, Inc on the Miami River produced an even lower multiplier of 1.65 for shipbuilding and repairing. Dr. Stronge pointed out that even these estimates were high, and that they should be 10% less, in which case the multiplier would be further reduced. Also, Dr. Stronge is certainly correct when he claims that the "tourist-type" expenditures of crews of mega yachts who make their homes in Florida are too high.

Conclusion

Dr. Stronge's has produced a good report in which he has looked carefully at the studies. His report can be used as a basis for decision-making with regards to the Miami River basin. Even where we agree that some of the estimates are incorrect (for which we have given different reasons), this should not take away from the fact that all the reports were professionally done, and can be used to justify the development of the Miami River Area.

Endnotes

¹ Mega yachts are at least 80 feet in length.

² Allowing for the increase of 22.158 percent in the Miami MSA consumer price index between 2002 and 2007. See the data on the U.S. Bureau of Labor Statistics web site. www.bls.gov.

³ Data for the Miami Metropolitan Statistical Area from the U.S. Bureau of Labor Statistics website http://www.bls.gov/oes/current/oes_33100.htm#b00-0000.

⁴ The study does not indicate the source of the multipliers, but they are consistent with multipliers available from the IMPLAN or RIMS II Models.

⁵ See pp. 71-77.

⁶ Florida Department of Historical Resources, Miami Circle at Brickell Point, National Historic Landmark Nomination, November 2004.

http://www.flheritage.com/archaeology/projects/miamicircle/More/Landmark_Nomination.pdf.

⁷ <http://fcit.usf.edu/florida/docs/o/oldfort.htm>.

⁸ The Miami River Commission, One Voice for the River, <http://www.rsmas.miami.edu/groups/mrc/river3.htm>.

⁹ GIS techniques were used to select riverfront parcels. The parcels generally were located on the two roads along the river bank, namely, NW North River Drive and NW South River Drive.

¹⁰ A survey of seven terminals conducted by the Miami River Marine Group in 2005 found 854,516 metric tons of containerized cargo were shipped in 2004(776,422 short tons). Thus suggests that, at least in that year, trade had returned to mid-1990s levels.

¹¹ U.S. Army Corps of Engineers, Jacksonville District. Supplement to Miami River Dredged Material Management Plan of September 2002, p.20.

¹² U.S. Army Corps of Engineers, Jacksonville District. Supplement to Miami River Dredged Material Management Plan of September 2002, p.14.

¹³ U.S. Army Corps of Engineers, Jacksonville District. Supplement to Miami River Dredged Material Management Plan of September 2002, p.2.

¹⁴ Experience during the construction of the project in 2008 in fact showed significant regional economic benefits because of the hiring of a significant number of local subcontractors.

¹⁵ Hazen and Sawyer, Economic Study of Biscayne Bay, pages 5-5:5-8.

¹⁶ Hazen and Sawyer, Economic Study of Biscayne Bay, pages 5-5:5-8. Hazen and Sawyer used a study by MGT of America An Analysis of the Economic and Fiscal Impacts of Florida's Seaports, prepared for the Florida Ports Financing Commission, 1999, pp 3-11. It appears that the elasticity was applied by Hazen and Sawyer to the value of exports rather than the volume. The result is an overestimate of the effect on export values.

¹⁷ Mega yachts are at least 80 feet in length.

¹⁸ Murray and Associates state that the Southeast Florida cluster is the world's most significant.

¹⁹ Allowing for the increase of 22.158 percent in the Miami MSA consumer price index between 2002 and 2007. See the data on the US Bureau of Labor Statistics web site. www.bls.gov.

²⁰ Data for the Miami Metropolitan Statistical Area from the US Bureau of Labor Statistics web site http://www.bls.gov/oes/current/oes_33100.htm#b00-0000.

²¹ The study does not indicate the source of the multipliers, but they are consistent with multipliers available from the IMPLAN or RIMS II Models.

²² See pp. 71-77.

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