THE IMPACTS OF THE CRUISE SHIP INDUSTRY ON THE QUALITY OF LIFE IN KEY WEST

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City of Key West Naval Properties Local Redevelopment Authority

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EXECUTIVE SUMMARY

Introduction

Thomas J. Murray & Associates, Inc. was engaged by The City of Key West Naval Properties Local Redevelopment Authority (LRA) to conduct this assessment: "The Impacts of the Cruise Ship Industry on the Quality of Life in Key West" (Study). This report is to satisfy the requirements of this Study to analyze and make recommendations regarding the environmental and socio-economic impacts of existing and increased cruise ship activity. The report follows the seven tasks associated with the City of Key West's Request for Proposals for the Study. Each of the seven individual sections contains lists of references for that section. The overall findings are summarized here by individual task. Recommendations made as part of individual tasks are summarized here and are contained in their entirety in Section 7: Management Strategies of the Study.

Economic Impact

The economic base of Key West has shifted increasingly toward tourism. Since 1970, the tourism cluster consisting of retail trade, eating and drinking establishments, lodging, and entertainment has increased from 25.7 to 38.7% of employment. The local share of employment in the tourism sector is now twice the national average of 19.6%. Government activity over the same time period declined from 18.5 to 10.0% of employment.

While the city's traditional tourism sectors have continued to grow, in recent years there has been a decided shift from the traditional tourism base to greater cruise ship tourism activity. Since 1990, the inflation adjusted bed tax revenues are up by 59%, and deplanements are up by 51%. The more dramatic increase over that same time period has been in terms of cruise ship activity where passenger counts have increased by 745% from 132,840 to 1,122,100.

Cruise ship passengers surveyed during 2004 and 2005 spent an estimated average of $32.10 per capita while in Key West.[1] The largest expenditures were for clothing ($6.07), souvenirs ($5.90), and jewelry, china, perfume ($4.00). Based on these expenditure patterns, it is estimated that a total of $28.4 million dollars was spent by cruise ship passengers during the 2003-04 tourist season.

Crew members shopping locally averaged an estimated $65.80 in purchases, resulting in an estimated $13.1 million in crew member expenditures in Key West during the same time period. Cruise ship lines expended $14 million in local purchases.

Collectively, passenger and crew expenditures and cruise ship purchases resulted in a direct economic impact from cruise ship activity of $55.6 million during the 2003-04 tourist season. The largest impacts were for arts, entertainment and recreation (21.5%), clothing and apparel (18.6%), other retail purchases (19.1%), and docking and disembarkation fees (18.2%). Passenger expenditures account for just over half of those direct expenditures (51.2%) followed by ship expenditures (27.6%) and crew expenditures (25.8%).

[1] The average expenditure estimates ranged from $27.40 to $32.10 per capita. The higher estimate was used herein for calculating both fiscal and economic impacts of the cruise ship passengers.

Based on surveys of non-cruise ship tourists, estimated expenditures in the 2003-2004 tourist season amounted to $659.3 million. The largest expenditure categories were lodging at $299.4 million followed by restaurants/eating establishments at $231.5 million. Together lodging and eating establishments account for 74.9% of total expenditures with drinking establishments accounting for another 10.4% of expenditures.

Combining cruise ship and non-cruise ship activity, tourism accounts for $714.9 million dollars in annual direct expenditures in the local economy (Table S1). Those expenditures represent 46.3% of total sales in Key West, and a direct employment impact of 8,114 jobs. Cruise ship activity accounts for an estimated $55.6 million in direct expenditures (7.2% of total tourism expenditures) and accounts for direct employment of 631 full time equivalent jobs.

TABLE S.1: TOTAL ECONOMIC IMPACTS OF TOURISM AND CRUISE SHIP EXPENDITURES KEY WEST 2004

	Direct	Indirect	Total
All tourism			
Output	$714,970,282	$426,228,614	**$1,141,198,896**
Employment	8,114	4,162	**12,276**
Cruise Ship Tourism			
Output	$55,622,944	$33,159,546	**$88,782,490**
Employment	631	324	**955**

Including secondary impacts of tourism activity, it is estimated that tourism as a whole accounts for $1.14 billion dollars in direct and indirect impacts and for 12,276 jobs. Cruise ship tourism's share of that total amounts to $88.7 million in direct and indirect expenditures and 955 jobs.

Fiscal Impact

The city of Key West generated $31,288,802 in revenue in the last fiscal year (FY 2003-04). Based on relative shares of commercial activity as well as direct payments, it is estimated that tourism generates an estimated $15,122,200 million per year in revenues or 48.3% of the city budget. Cruise ship tourism accounts for $5,121,755 million or 16.4% of total city revenues. Cruise ship payments from disembarkation and dockage fees and utilities were $4,367,881 million.

Tourism related expenditures were broken down based on level of effort as provided by city department heads. Effort was apportioned based on property and non-property related activity, and within each sub-area into residential and tourism shares. It is estimated that tourism activity accounts for $14,761,295 million or 46.0% of city expenditures. Cruise ship tourism accounts for $3,278,823 of that total, accounting for 10.2% of city expenditures.

On balance, revenues exceed expenditures for cruise ship activity by $1.8 million. That represents a ratio of 1.56. For tourism as a whole, the fiscal balance is down to $360,905. The adjusted tourism column includes the 2.5% of bed tax revenues that are returned to the city. With that adjustment, the fiscal balance increases to $4.9 million or a fiscal balance ratio of 1.33.

TABLE S.2: FISCAL BALANCE FOR TOURISM AND CRUISE SHIP TOURISM ACTIVITY

	Cruise Ship Tourism	All Tourism	Adjusted Cruise Ship Tourism	Adjusted All Tourism
Revenues	$5,121,755	$15,122,200	$5,446,331	$19,630,200
Expenditures	$3,353,596	$14,836,068	$3,353,596	$14,836,068
Fiscal Balance	$1,768,158	$286,132	$2,092,734	$4,794,132
Fiscal Balance Ratio	1.53	1.02	1.62	1.32

Assessing impacts by pier with port operation and other city service requirements, the estimated budget balance is $1.39 million. Surpluses range from $610,173 at the Outer Mole to $221,061 at Pier B.

It is important to note that the expenditure estimates included here are those expenses directly attributable to cruise ship and tourism activity. There may be other indirect costs not allocated here. In addition, the costs that are allocated are primarily operating costs with the exception of the capital fund at the Outer Mole. Full accounting of both operating and capital costs should be used to provide a full cost accounting of tourism activities.

Environmental Impact

There appears to be no evidence that cruise ship discharges are either occurring illegally or, other than through turbidity and re-suspended sediment, contributing to water quality declines in the area. EPA investigations conclude that Cruise Industry practices result in high dispersion levels with minimal negative impacts on the environment.

In addition to cruise ships being subject to international and federal laws and regulations, the industry and the State of Florida have entered into a specific waste management agreement for state waters. The Florida Department of Environmental Protection has found that cruise ship waste management practices and procedures meet or exceed the standards set forth in applicable Florida laws and regulations.

The Florida Keys National Marine Sanctuary (FKNMS) is proposing initiation of regulatory changes to expand the existing no-discharge zone in state waters in the Keys to include the entire FKNMS. NOAA will pursue a no-discharge zone regulation for the federal waters of the Sanctuary in 2005.

In recent years, the cruise lines have taken the lead in preventing environmental damages by assigning environmental officers on many ships, developing environmental training programs, and cooperating on developing agreements with various states setting forth environmental standards, compliance practices and procedures.

The U.S. EPA recently determined that air emissions from cruise ships were too insignificant to regulate. According to the FDEP in Marathon, the state air regulatory agency, no complaints have been received related to cruise ships air emissions.

Future large vessel traffic in Key West may increase following channel and harbor deepening and pier modifications at the Outer Mole. These projects possibly will result in up to a 15% increase in the annual naval traffic.

Impacts from cruise ships and other large deep draft vessels are occurring to water quality and bottom habitats in the area of the main channel and harbor in Key West. However, the

belief by some that cruise ship turbidity in the channel and harbor is affecting the entire lower Keys region appears unfounded.

Recent efforts to mitigate the adverse impacts of large vessels include the ongoing $38 million Navy dredging and monitoring project, the reconfiguration of Pier B to reduce turbidity, limits on the size and draft of vessels brought into the harbor, managed use of the main engines of cruise ships, and educational efforts of agencies and NGOs in the Key West area.

Natural Resource-Based Industries

Commercial Fishing Industry

Key West's commercial fishing industry believes that the cruise ship industry, as a tourism sector, presents economic and social challenges, particularly by increasing property and rental rates, contributing to the increasing cost of living, and generating congestion. While these impacts do degrade the region's quality of life, commercial fishermen do not believe that the cruise ship industry has similar impacts on the region's marine resources and conditions.

Commercial fishermen observe that the passage of cruise ships in and around the harbor and main ship channel does cause increased turbidity, but feel that the effects are temporary and do not result in chronic, environmental damage.

Commercial fishermen do not fish the area through which cruise ships navigate because of the potential loss of trap gear that would become entangled and cut by cruise ships not, because of any physical damage caused by the ships on the environment or decreased catch rates.

In comparing the pre-cruise ship era to current conditions, most respondents believed that resource conditions remained the same. The economy was better overall, but a majority reported a decline in overall quality of life conditions.

Charter Boat Operators and Flat Fishing Guides

Charter and guide boat operators feel that cruise ship activities are responsible for impacts on marine biodiversity, and believe that cruise ships negatively affect the local marine benthos and degrade water quality.

The most common complaint among charter boat operators was that cruise ship activity increases turbidity by suspending sediments. Many felt that the crowding that cruise ship tourism generates is detrimental to the clientele to which they cater.

Charter operators generally felt that cruise ship tourism should be limited, mainly by limiting the number of cruise ships that can visit Key West per year. Some operators suggested that this may be accomplished by raising the disembarkation fee, arguing that by doing so, the city and its businesses would still generate similar revenues from a smaller base of more affluent visitors.

Water Based Operators

Operations that take out tourists on "non-consumptive" water excursions were split in their opinions on the impact of cruise ships on the marine environment. Half believed that cruise ships have an adverse impact on local marine biodiversity and the benthos. Most believed that cruise ships negatively affect water quality and that cruise ship tourism is not as important as the other tourism sectors and they rely on cruise ship passengers for only a small percentage of their total customer base.

Overall

The three groups of resource-based users agree that changes have occurred in the local marine environment. Only a majority of the charter boat operators and flats fishing guides would argue that the impacts are a result of cruise ships.

Many respondents from all three groups believed that while unregulated cruise ship tourism may very well lead to greater environmental problems, current regulations prevent many of those violations. Thus, as a regulated industry, most respondents agreed that cruise ships may pose limited environmental impacts.

Affordable Housing

The issue of housing affordability has become more severe in recent years due to increased demand, to limited land availability and geographic isolation, and to mandated growth management constraints. The median value of owner-occupied units in Key West increased from $143,600 in 1990 to $265,800 in the year 2000, a 40.4% increase. That rate of growth was 70% higher than the growth rate in Monroe County and 160% higher than the national average.

Between 1990 and 2000, the percentage of households paying more than 30% of their income on housing increased from 39.3 to 48.7 for those holding mortgages in Key West. That figure compares to a national average in 2000 of 26.6%. For rental units in Key West, the percentage of households paying more than 30% of their income for housing rose to 45.2% compared to a national average of 36.8%.

Based on recent evidence, it appears that housing affordability indicators are still less favorable. Average prices for single family homes in Key West were up to $435,000 in 2003, an increase of 50.3% since the year 2000. Condominium prices were up 89.1% over this same time period. Less than 1% of home sales in 2003 were for units less than $200,000.

The ratio of median sales price to median income also rose during this time period from 6.27 in 2000 to 9.46 in the year 2003. For condominium units the ratio was up from 3.90 to 7.39.

Clearly the housing market is tight, and the affordability issue is becoming more severe.

Character and Quality of Life

Public Meetings

Two public meetings were held on August 11th at Key West High School and August 26th at the Old City Hall. The attendance at the first meeting was 110 with 57 at the second meeting. Economic issues including the important role of tourism and cruise ship tourism and quality of life issues were stressed by vocal groups on both sides of the issue.

Resident Survey

Surveys were mailed to 4000 households with a 29.0% response rate.

In terms of impacts on quality of life, 60.3% of residents had a favorable response for tourism, while 25.2% had an unfavorable response. For cruise ship tourism, 38.4% of responses were favorable, and 43.7% of responses were unfavorable. Old Town residents had slightly less favorable responses to both types of tourism than the city as a whole.

More regulation of tourism was favored by 46.7% of residents; 16.9% wanted less. For cruise ships, 59.0% wanted more regulation; 12.3% wanted less.

In terms of managements strategies, the ratings were – enforcement of best management practices (4.33 out of 5); increasing tariffs/disembarkation fees (4.02), limiting port calls (3.63), imposition of black out days (3.49), and increasing the length of stay (2.95).

Business Survey

700 businesses were surveyed with most having a direct tie to tourism - 31.0% responded.

Among sales to tourists, 79.3% are to overnight tourists, 12.1% to cruise ship passengers, and 8.6% to day trippers.

The effect of tourism on business operations was deemed positive by 90.9% of respondents and negative by 1.9%. For cruise ships, 49.2% indicated a positive effect, while 21.8 indicated a negative effect.

When asked the proper level of tourism activity, 53.8% wanted more; 12.8% wanted less. For cruise ships, 42.9% wanted more, and 32.9% wanted less.

In terms of regulation, 31.6% wanted more regulation of tourism, while the same percentage (31.6) wanted less. With cruise ship tourism, 43.8% wanted more regulation, and 29.8% wanted less.

In terms of management strategies, use of best management practices had the highest rating (4.05 out of 5) followed by increasing tariffs/fees (3.51), increasing the length of stay (3.31), limiting port calls (3.01), and imposing black out days (2.91).

Employee Survey

68.8% indicated that they lived in the city, while 31.3% lived outside the city.
Of those individuals living in the city, 55.6% live in the older part of town west of Bertha and First Streets, while 44.4% live east of that line.

For those workers living outside of Key West, the number one reason for living outside the city was housing affordability (60.8%) with quality of life a distant second (13.7%).

The most common issues in getting to work are traffic congestion (35.2%) and parking (29.6%).

When asked what factors would make Key West a more attractive place to work, the most frequent response was affordable housing. Collectively, transportation issues ranging from parking and reducing cars to road and sidewalk improvements and alternative transportation appeared on a third of all responses.[2]

Cruise Passenger And General Visitor Survey

The largest share of general (non-cruise) visitors were from the Southeast and Gulf region (40%). Floridians comprised over 23% of the sample. 35% of the cruise passengers were from the northeast followed by those from the southeast (30%), midwest (16%), foreign nations (15%), and the west (4%).

Cruise passengers spent an average of 3.1 hours off their vessel in Key West. Cruise passengers spent an average of $32.10 per trip, compared to over $446.42 spent by general visitors per trip.

Over 64% of cruise passengers surveyed had not been to Key West previously. Of the 36% who had been to Key West previously, 47% stated that the city was "better" now than it was when they last visited. Only 5.6% felt that the city was "worse" now than before. 54% of the general visitors were repeat tourists, and among these, 68% felt that Key West was "better" now than it was when they last visited the city.

Shopping and visiting restaurants and bars represented the most popular activities among respondents from both samples, and the opinions were very positive. In particular, over 86% of both cruise passengers and general visitors agreed that Key West bars and restaurants were either "above average" or "excellent", compared to only 1% who disagreed.

Tourists greatly enjoy their experience in Key West, regardless of whether they are cruise passengers spending an average of three hours on the island or longer-term visitors spending an average of four days. The approval ratings, which are close to 90% for both groups, suggest that Key West is meeting or exceeding tourist expectations.

Most cruise ship passengers rated Key West very highly as a destination, 68.3% of cruise ship visitors stated that they would return for a longer, non-cruise ship trip. Among general visitors, 84.7% stated that they would return for another longer-stay vacation.

Tourists did complain about crowding, congestion, and traffic issues when providing information on what they liked and disliked about Key West. Notably these complaints did not affect their opinions on overall experience, and on activities in which they participated, as well as their stated willingness to return.

Management Measures

Based upon assessments conducted as part of this study, potential measures to deal with local cruise ship impacts are summarized below. The issue of whether to encourage or discourage cruise ship activity is a policy issue to be determined by local officials with public input. This study has reviewed local cruise ship policies at other heavily impacted ports of

[2] At the 95% confidence level, the resident survey was conducted with a 2.8 % confidence interval; the business surveys a 6.29% confidence interval, the employee survey a 7.7% confidence interval., the cruise passenger survey a 3.2 % confidence interval; the air-based passenger surveys a 4.25% confidence interval and the land-based visitor survey a 4.87% confidence interval.

entry and examined restrictions on vessels and passenger disembarkations as well as fees used to recoup both public service requirements and mitigate other local impacts.

Best Management Practices

The management strategy receiving the highest ranking for both residents and business establishments was the use of best management practices. Issues of water quality and stress on the adjacent coral reef system are important concerns affecting the quality of life of residents and the economic vitality of the tourism industry. Ongoing monitoring should address sediment resuspension and redistribution, harbor dredging, prop wash excavation, and off-shore anchorage.

Best management practices apply not only to the cruise ship industry but also to other commercial and recreational users. It is recommended that a task force be established with representation to include the cruise ship industry, other resource dependent industries, residents, and local officials with input from Florida Department of Environmental Protection, Army Corps of Engineers, Florida Keys National Marine Sanctuary, and the Navy. The task force would review ongoing monitoring activity and recommend appropriate management approaches to accommodate increased utilization without substantial deterioration of the resource base.

Cruise Ship Fees

Cruise ship revenues currently provide 16.4% of the city's budget (FY2003-04). Netting out port operations and other attributable city expenses, the fiscal balance for cruise ship activity ranges from $1.4 to 1.8 million. Still, there are other costs that are not being considered, and cruise ship fees should represent a full cost accounting. The fee base should include:

- port operations,
- port security, and
- non-port related public services.

In addition, the fee structure should address associated capital and environmental costs. Components of the fee structure should include:

Port Development Fee

A capital fund has been established with the Navy for the Outer Mole Pier with 40% of disembarkation fees allocated to a capital improvement. A similar fund for improvements and maintenance at Mallory Pier or other facilities that may be needed at a future date should be established.

Infrastructure Fund

For non-port related infrastructure including in particular transportation infrastructure, a capital improvements fund should be established. Transportation issues were frequently identified by each of the interest groups including congestion, road and sidewalk improvements, and alternative transportation needs. Levels of service for basic infrastructure have declined with tourism expansion. Improvements including the prospect of turning Duval Street into a pedestrian way benefit the tourist industry as well as residents and capital costs should be allocated equitably with tourists including cruise ship tourists meeting an apportioned share of those capital costs.

Environmental Conservation Fee

Environmental conservation is critical to both residents and the tourism sector. Deterioration of environmental quality has economic cost that bears compensation. Tourism including cruise ship tourism should provide tangible support for environmental protection and enhancement.

Differential fees are appropriate given the private status of Pier B and the use of Navy facilities at the Outer Mole Pier where a capital fund has been established. Non-port related operating and capital costs as well as an environmental conservation fund should be fully recoverable with periodic price adjustments. The city must remain competitive within the region so that price gouging is not an option. Still, the city must assure that the revenue stream from cruise ship activity covers fully related expenses. Failure to address basic infrastructure needs will detract from the quality of life for residents and the quality of the recreation experience for tourists.

Limitations/Quotas

Limitations and blackout days were popular with residents, but had mixed reviews in the business community. Some destinations have imposed restrictions with some using a carrying capacity approach. Much of the reason for development of the cruise tourism sector was to provide activity in the shoulder months to extend the high season. Differential seasonal pricing and capacity constraints may make sense. Decisions as to whether to impose restrictions and at what level ultimately rest with city officials with public input.

Efforts to Capture Greater Economic Benefit

There does appear to be a positive correlation between length of stay and individual expenditures. Fewer ships with longer stays may well balance out in terms of economic impact. Several ports of call have tried to require the purchase of local inputs from ships and promoted local crafts to cruise tourists. Key West is usually an early port of call so that restocking requirements are low, and there are few legitimate indigenous crafts. Local businesses could benefit from the receipt of greater shares of attraction and excursion revenues. A maximum service charge for museums, tours, and other local activities sold on ship would be of benefit to area merchants.

Cruise ship tourists are not spending a great deal of money per capita in Key West whether it is the length of stay, lack of substantial duty free shops, placement on the cruise itinerary, or passenger clientele. Efforts should continue to be pursued to bring in quality cruise ship traffic and to establish an environment that provides for higher economic return from given levels of cruise ship activity. Marketing efforts to bring in higher end cruise traffic and to capture more return vacation traffic should be continued.

Affordable Housing

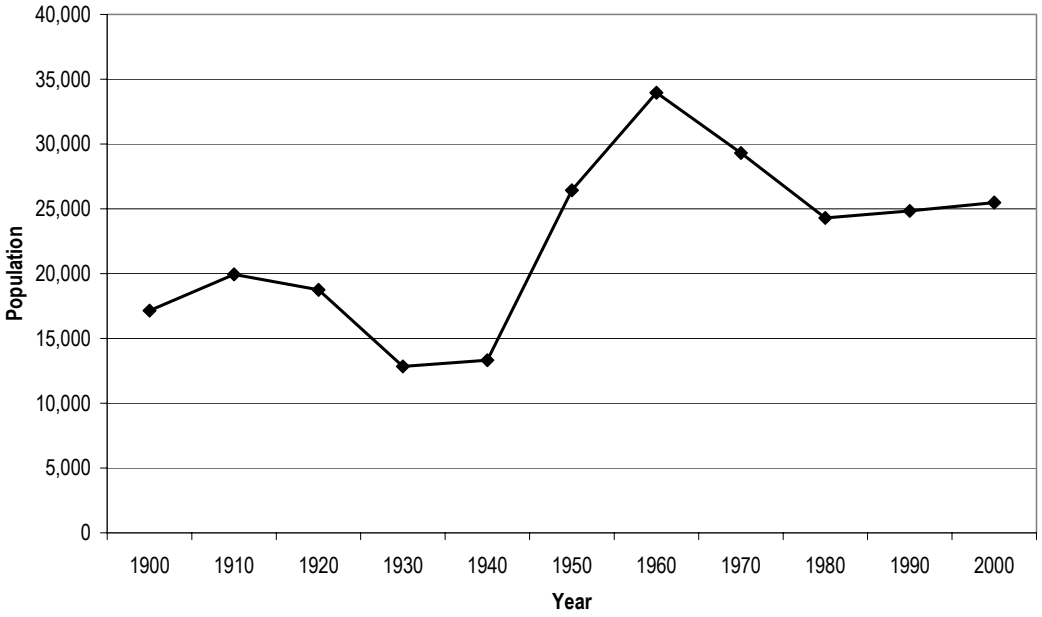
Housing prices have continued to escalate, and affordability is a serious issue for the city's workforce. Both public and private involvement are necessary to address this housing crunch. Private development options should include density bonuses, tax credits for housing investment and employer initiated housing programs. Public initiatives to provide housing options for teachers and other essential public employees also are necessary.

1. THE ECONOMIC IMPACT OF TOURISM ACTIVITY ON THE CITY OF KEY WEST

1.A Demographic Trends

As late as 1890, Key West was the largest city in the state of Florida. Since that time, the population of Key West has fluctuated under changing economic circumstances. Originally heavily dependent on resource extractive enterprises, the expansion and contraction of naval operations and the rise of the tourism-based economy have dictated the significant swings in city size. As indicated in Figure 1.1, Key West had a population of 17,144 in 1900. After a gradual decline in the early part of the last century, the city nearly doubled in population during the Second World War with the navy build-up. Growth continued during the post-war era with the city's population peaking at 33,956 in 1960. Again the city declined due to a cutback in navy operations. This decline was followed by gradual growth over the past two decades. As of the 2000 Census, the population of Key West stood at 25,478. Because of growth management efforts in the Florida Keys, it is likely that population growth will be moderate in the foreseeable future.

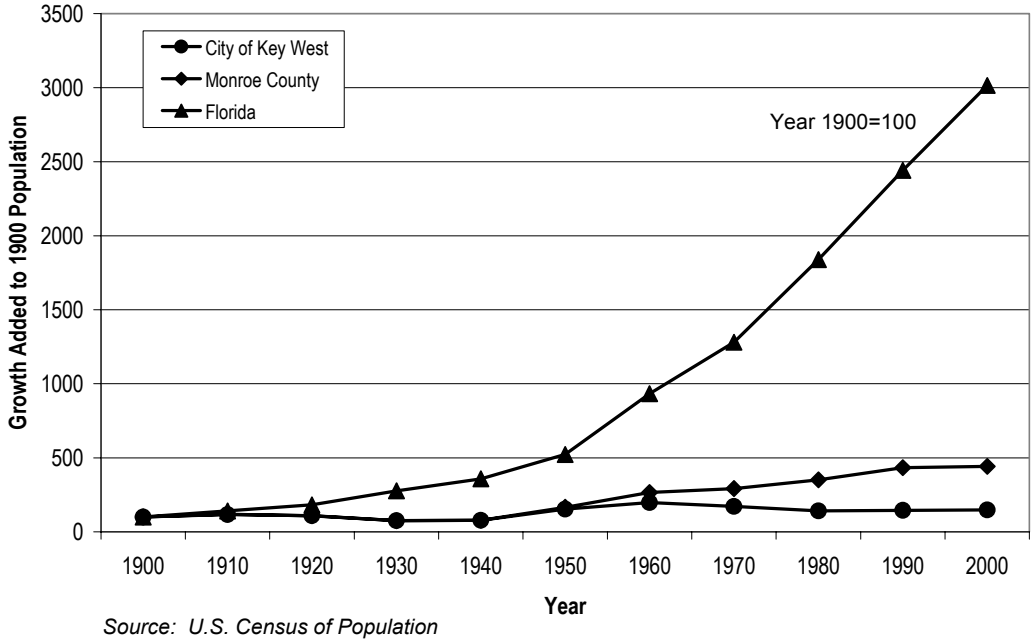
FIGURE 1.1: POPULATION OF KEY WEST, 1900-2000



Source: U.S. Census of Population

Comparing Key West to Monroe County and the state of Florida over this same time period indicates that in 1900 Key West represented 95% of the population of Monroe County. Since that time, the city grew by 48.6%. Meanwhile, Monroe County has grown four-fold and the state of Florida's population has grown 40-fold as indicated in Figure 1.2.

FIGURE 1.2: POPULATION OF KEY WEST, MONROE COUNTY AND STATE OF FLORIDA, 1900-2000



Source: U.S. Census of Population

Recent trends in each of these three jurisdictions are shown in Table 1.1. Since 1970, the population of Key West has declined by 13.1% with modest increases over the past two decades of 2.2 and 2.6%. At the same time, the population of Monroe County grew by 51%, while the state of Florida grew by 135%.

TABLE 1.1: POPULATION AND CHANGE IN POPULATION FOR KEY WEST, MONROE COUNTY AND STATE OF FLORIDA, 1970-2000

Total Population	1970	1980	1990	2000
City of Key West	29,312	24,292	24,832	25,478
Monroe County	52,586	63,188	78,024	79,589
State of Florida	6,790,000	9,750,000	12,940,000	15,980,000
Percentage Change		**1970-1980**	**1980-1990**	**1990-2000**
City of Key West		-17.13%	2.22%	2.60%
Monroe County		20.16%	23.48%	2.01%
State of Florida		43.59%	32.72%	23.49%

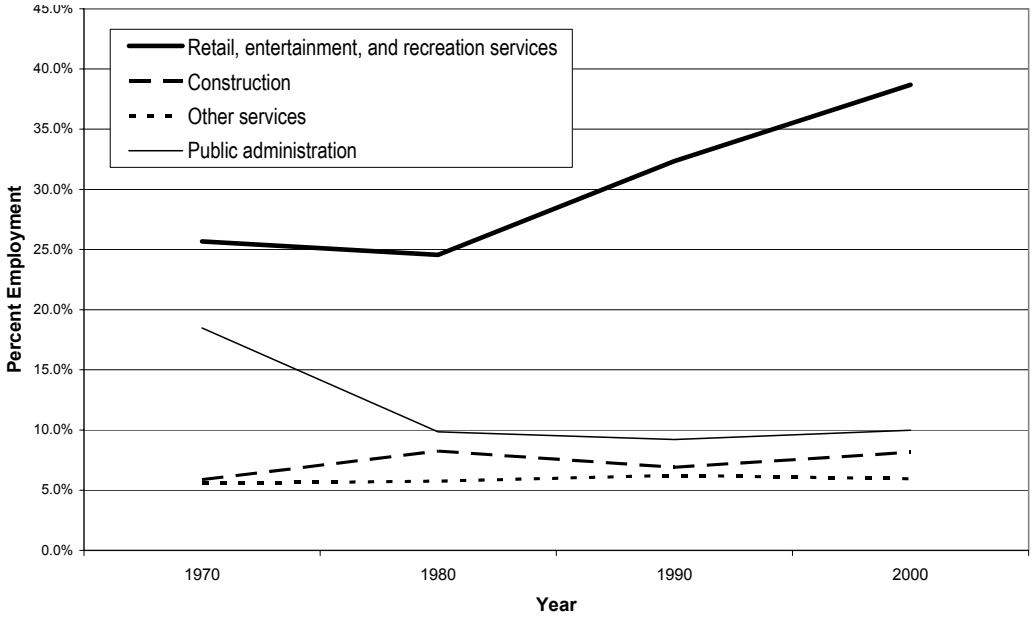
Source: U.S. Census of Population

1.B Economic Trends

While population has declined since 1970, employment has risen by 83%. This figure is all the more significant as these are employment figures taken at the respondent's place of residence. They indicate that Key West is growing jobs for its own residents, and not just for the residents of surrounding areas. Some of the comparisons between 2000 and preceding census years are difficult because of the switch from the SIC to NAICS industrial classification systems. Most notable in the Key West economy is the shift between the 1990 and 2000 census years of eating and drinking places out of retail trade to a new sector that includes accommodations and entertainment and recreation. Grouping together key tourism sectors including retail trade, eating and drinking establishments, entertainment, and accommodations/lodging into what might be called a tourism cluster gives a better representation of trends in the Key West economy. Since 1970, employment in this tourism cluster has increased by 176%. Construction and other services also grew by 154 and 131%, respectively. The government sector lost ground in the 1970s with further navy cutbacks most of which were recouped primarily with local government growth since that time.

Although the trade and service sectors are often non-basic sectors in local economies, that is not the case in Key West. Some of retail, restaurant and entertainment activity is residentiary, but growth in this sector despite stable population levels suggests greater dependence on tourism as the local economic base. In Figure 1.3, the increased importance of tourism is borne out with the tourism cluster expanding from 25.7 to 38.7% of employment over this time period. By comparison, these same sectors account for 19.6% of employment in the U.S. Government activity declined from 18.5 to 10.0% of the employment base.

FIGURE 1.3: EMPLOYMENT TRENDS IN KEY WEST FOR SELECTED KEY SECTORS, 1970-2000



The "Other services" category includes business, repair, personal, health, educational, welfare, religious, nonprofit, and professional services.
Source: U.S. Census of Population

The city's tourism dependency is shown further in Table 1.2 with location quotients for the city of Key West. Location quotients show the percentage of employment in a given sector for the local economy divided by the percentage of employment in that same sector in the base economy. A location quotient equal to 1.0 suggests that the local economy has the same relative share of activity in that sector as the base economy, in this case the national economy. Locations quotient greater than 1.0 indicate an area of concentration in the local economy.

For Key West, the highest concentration (3.43) is in entertainment and recreation services which include eating and drinking establishments and lodging. The magnitude of this concentration suggests the importance of this sector to the local economic base. Public administration has the next highest concentration of activity with a location quotient of 2.08 considerably down from the 1970 figure of 3.73 suggesting a shift in the primary economic base for the city. Other areas that remain important include resource based industries/ fisheries, utilities, construction, and business services.

TABLE 1.2: LOCATION QUOTIENTS BY INDUSTRY IN KEY WEST BY PLACE OF RESIDENCE, 1970-2000

Industry	Location Quotient 1970	Location Quotient 2000	Change 1970-2000
Agriculture, forestry, and fisheries	1.406	1.552	10.4%
Mining	-	-	-
Construction	1.092	1.201	10.0%
Manufacturing	0.180	0.119	-33.9%
Transportation and warehousing	0.741	0.824	11.2%
Communications	1.397	0.603	-56.8%
Utilities and sanitary service	3.017	1.660	-45.0%
Wholesale trade	0.488	0.506	3.8%
Retail trade	1.717	0.997	-41.9%
Finance, insurance, real estate and rental and leasing	0.812	0.966	19.1%
Business, repair, and personal services	1.633	1.451	-11.1%
Entertainment and recreation services	1.649	3.427	107.8%
Health services	0.276	0.662	140.2%
Educational services	1.169	0.504	-56.9%
Welfare, religious, and nonprofit organizations	1.108	-	-
Legal, engineering, and misc. professional services	0.991	0.532	-46.3%
Public administration	3.773	2.084	-44.8%
Total	**1.341**	**1.139**	**-15.0%**

[1] In the 2000 Census, sanitary service is included under "Business, repair and personal services" rather than "Utilities" as before.
[2] In the 2000 Census, food services and restaurants industries were placed under "Entertainment and recreation services" rather than "Retail trade" as before and accommodations were added.
[3] Many categories were combined to form the "Business, repair, and personal services" category including "Administrative and support and waste management services" and "Other services" from the 2000 Census, and "Business and repair service," "Private households" and "Other personal services" from the 1970-1990 Censuses.
[4] "Welfare, religious, and nonprofit organizations" was not a category in the 2000 Census.
Source: U.S. Census of Population

TABLE 1.3: EMPLOYMENT BY INDUSTRY BY PLACE OF RESIDENCE IN KEY WEST FOR SELECTED SECTORS, 1970-2000

	1970		1980		1990		2000		
Industry	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Change 1970-2000**
Retail, entertainment, & recreation services	1,930	25.7%	2,560	24.6%	4,052	32.4%	5,328	38.7%	176.1%
Construction	442	5.9%	860	8.2%	865	6.9%	1,123	8.2%	154.1%
All services	2,092	5.6%	3,001	5.8%	3,911	6.2%	3,283	6.0%	131.0%
Public administration	1,389	18.5%	1,028	9.9%	1,154	9.2%	1,375	10.0%	-1.0%
Total of All Sectors	**7,518**	**100.0%**	**10,425**	**100.0%**	**12,524**	**100.0%**	**13,777**	**100.0%**	**83.3%**

Source: U.S. Census of Population

1.C Tourism

Tourism continues to be the primary economic base for the city of Key West and Monroe County. Accessible via air, land, and sea, Key West contains a number of tourist amenities, ranging from coastal and marine resources, a rich cultural history, and a variety of dining, lodging, and related tourism destinations. The best visitation numbers are figures compiled for Monroe County by Leeworthy and others in a series of reports as part of a project examining economic issues related to recreation visitation in the Florida Keys. (Leeworthy and Vanasse 1999 and Leeworthy and Wiley 2003). Visitation and visitor characteristics were compiled beginning in the 1995-96 tourist season with the last update for the 2000-01 season. Recreating visitors in Monroe County were estimated at 3,109,397 in the combined winter and summer seasons for the tourist year 2000-01 (December 2000-November 2001). (Table 1.4).

TABLE 1.4: TOURIST VISITATION TO MONROE COUNTY FOR SELECTED TOURIST YEARS

Year	1995-96	1996-97	1997-98	2000-01
Auto	1,997,702	1,950,356	2,181,302	2,551,930*
Air	221,474	219,124	217,707	-
Cruise Ship	321,312	476,166	523,485	557,467
Total	**2,540,488**	**2,645,646**	**2,922,494**	**3,109,397**

* Includes auto and air for the year 2000-01.
Source: National Oceanic and Atmospheric Administration—Coastal and Ocean Resource Economics project

While data has not been collected continuously, there are other data sources to help track trends in the tourism sector. As a proxy for lodging activity, Table 1.5 shows bed tax revenues for Key West and Monroe County since 1990. The third penny of the bed tax has been in place in Key West since 1986 and in Monroe County since 1987. Bed tax revenues are up by 124% in Key West and by 108% in Monroe County since 1990.

TABLE 1.5: BED TAX REVENUES IN KEY WEST AND MONROE COUNTY, 1990-2003

	Total		Percentage Change	
Year	Key West	Monroe County	Key West	Monroe County
1990	$2,978,499	$5,970,852	-	-
1991	3,282,886	6,106,101	10.2%	2.3%
1992	3,391,592	6,399,061	3.3%	4.8%
1993	3,828,627	7,357,919	12.9%	15.0%
1994	4,059,544	7,433,356	6.0%	1.0%
1995	4,297,481	7,939,804	5.9%	6.8%
1996	4,795,515	8,778,828	11.6%	10.6%
1997	5,237,446	9,570,966	9.2%	9.0%
1998	5,408,216	10,015,873	3.3%	4.6%
1999	5,696,390	10,490,820	5.3%	4.7%
2000	6,106,351	11,372,113	7.2%	8.4%
2001	6,607,018	12,371,524	8.2%	8.8%
2002	6,275,443	11,682,776	-5.0%	-5.6%
2003	6,673,302	12,426,739	6.3%	6.4%
Change 1990-2003	**$3,694,803**	**$6,455,887**	**124.0%**	**108.1%**

Source: Monroe County Tourist Development Council

Adjusting for inflation using the Consumer Price Index[3], bed tax revenues in Key West rose 59.1% between 1990 and 2003 (Table 1.6). Revenues dipped in 2002 in both nominal and real dollar terms in the aftermath of September 11th. Since 1995, daily room rates are up by 22.5%, but adjusted for inflation the increase is only 1.4%.

TABLE 1.6: CHANGE IN BED TAX REVENUE AND DAILY ROOM RATES IN KEY WEST, 1990-2003

Year	Bed Tax Current	Bed Tax Constant	Percent Change	Daily Room	Daily Room	Percent Change
1990	$2,978,499	$4,193,143	-	-	-	-
1991	3,282,886	4,435,030	5.8%	-	-	-
1992	3,391,592	4,447,990	0.3%	-	-	-
1993	3,828,627	4,875,207	9.6%	-	-	-
1994	4,059,544	5,040,190	3.4%	-	-	-
1995	4,297,481	5,188,560	2.9%	$117.76	$142.18	-
1996	4,795,515	5,623,803	8.4%	128.84	151.09	6.3%
1997	5,237,446	6,004,299	6.8%	128.26	147.04	-2.7%
1998	5,408,216	6,104,980	1.7%	130.34	147.13	0.1%
1999	5,696,390	6,291,331	3.1%	135.60	149.76	1.8%
2000	6,106,351	6,524,789	3.7%	149.36	159.59	6.6%
2001	6,607,018	6,864,434	5.2%	150.11	155.96	-2.3%
2002	6,275,443	6,418,463	-6.5%	144.09	147.37	-5.5%
2003	$6,673,302	$6,673,302	4.0%	$144.23	$144.23	-2.1%
Change 1990-2003			**59.1%**			**1.4%**

Source: Key West Finance Department, Tourist Development Council

[3] The Consumer Price Index tracks inflation rates and is found on the United States Bureau of Labor Statistics website.

Plane arrivals at Key West Airport are up by 51% since 1990 with the majority of that increase occurring by the mid-1990s (Table 1.7). Since 1996, the increase in deplanements is up by a more modest 7.2%.

TABLE 1.7: DEPLANEMENTS AT KEY WEST INTERNATIONAL AIRPORT, 1990-2003

Year	Deplanements
1990	192,777
1991	185,438
1992	198,562
1993	216,372
1994	243,404
1995	242,147
1996	271,714
1997	267,732
1998	257,574
1999	268,940
2000	275,386
2001	255,850
2002	259,314
2003	286,833
2004	291,501

Source: Key West International Airport

By far the largest increase in tourism activity has been in cruise ship tourism (Table 1.8). Cruise ships started calling in Key West in 1990, and since then, the number of cruise ship *passengers* disembarking in Key West has increased from 132,840 to 1,122,100, a 745% increase. Cruise ship *revenues* are up substantially from $763,798 in the 1994 fiscal year, to $5,201,279 in fiscal year 2003; and now represent 17.1% of city budget revenues (FY 2003-04 Budget).

TABLE 1.8: CRUISE SHIP REVENUES AND PASSENGERS IN KEY WEST, BY FISCAL YEAR 1990-2003

Year	Passengers	Revenue
1990	132,840	-
1991	112,810	-
1992	139,680	-
1993	255,570	-
1994	452,300	$763,798
1995	398,370	799,620
1996	393,340	1,559,341
1997	561,550	2,837,894
1998	586,390	3,143,360
1999	609,860	3,350,862
2000	662,910	3,954,641
2001	619,130	2,824,399
2002	942,630	4,171,286
2003	1,122,100	$5,201,279

Source: Key West Finance Department

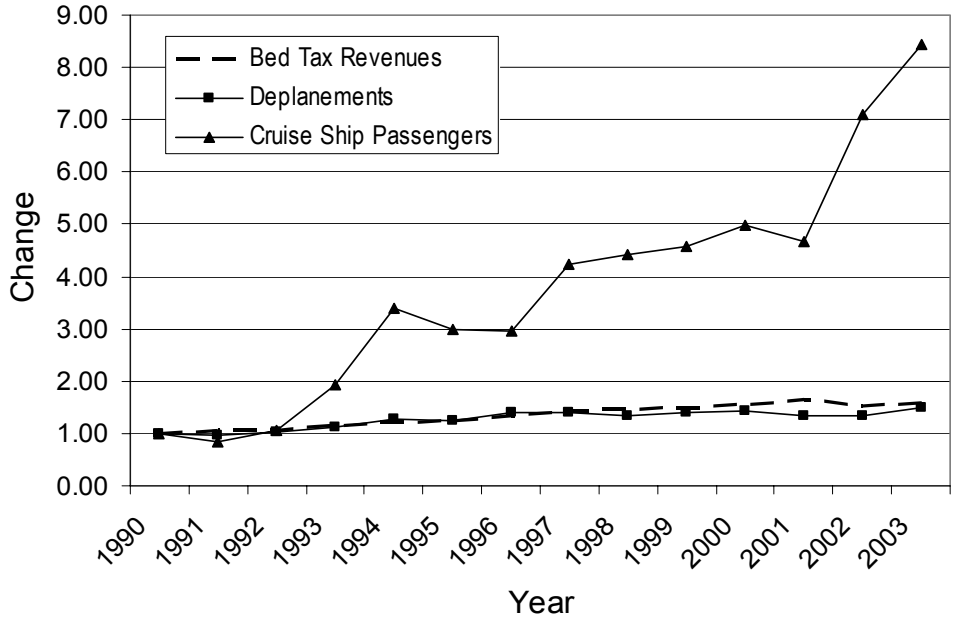
Combining tourism indicators in Table 1.9 and Figure 1.4, lodging and air travel are up by more that 50%, since 1990, while cruise ship tourism, as indicated above, has risen by 745%. The expansion of cruise ship activity is depicted relative to the city's traditional tourism base in Figure 1.4 which compares relative change with a 1990 base year of 100.

TABLE 1.9: GROWTH OF TOURISM INDICATORS IN KEY WEST, 1990-2003

	Total			Percentage Change		
Year	Bed Tax Revenues[1]	Deplanements	Cruise Ship Passengers	Bed Tax Revenues[1]	Deplanements	Cruise Ship Passengers
1990	$4,193,143	192,777	132,840	-	-	-
1991	4,435,030	185,438	112,810	5.8%	-3.8%	-15.1%
1992	4,447,990	198,562	139,680	0.3%	7.1%	23.8%
1993	4,875,207	216,372	255,570	9.6%	9.0%	83.0%
1994	5,040,190	243,404	452,300	3.4%	12.5%	77.0%
1995	5,188,560	242,147	398,370	2.9%	-0.5%	-11.9%
1996	5,623,803	271,714	393,340	8.4%	12.2%	-1.3%
1997	6,004,299	267,732	561,550	6.8%	-1.5%	42.8%
1998	6,104,980	257,574	586,390	1.7%	-3.8%	4.4%
1999	6,291,331	268,940	609,860	3.1%	4.4%	4.0%
2000	6,524,789	275,386	662,910	3.7%	2.4%	8.7%
2001	6,864,434	255,850	619,130	5.2%	-7.1%	-6.6%
2002	6,418,463	259,314	942,630	-6.5%	1.4%	52.3%
2003	$6,673,302	286,833	1,122,100	4.0%	10.6%	19.0%
%Change 1990-2003				**59.1%**	**48.8%**	**744.7%**

[1]In constant 2003 dollars
[2] Budgeted estimate
Source: Key West Finance Department, Key West International Airport, Tourist Development Council

FIGURE 1.4: GROWTH OF TOURISM INDICATORS IN KEY WEST, 1990-2003



Source: Key West Finance Department, Key West International Airport, Tourist Development Council

For the purposes of this study, the economic impact of tourism activity is divided into two parts – cruise ship tourism and non-cruise ship tourism. Each of these sub-sectors is discussed in the following sections.

1.C.1 The Impact of Cruise Ship Activity

Visitation records for cruise ship passengers and crew are readily available based on the city's disembarkation records. Over the past tourism year (December-November), passenger and crew arrivals are down by 12.4 and 9.0%, respectively, due in large part to the temporary closure of the Outer Mole Pier from May through October 2004 (Table 1.10). Seasonally, the winter season accounts for 60.3% of passenger arrivals and for 63.2% of crew arrivals.

TABLE 1.10: CRUISE SHIP PASSENGER AND CREW ARRIVALS, 2002-03 AND 2003-04

	2002-03		2003-04	
	Passenger	Crew	Passenger	Crew
December	114,870	48,584	111,954	44,450
January	104,177	55,346	90,980	39,793
February	106,177	47,721	71,819	38,900
March	103,453	42,914	108,987	59,685
April	101,903	44,054	88,213	39,265
May	74,466	30,064	75,110	29,530
June	76,122	28,681	69,907	24,680
July	71,078	26,641	46,355	23,111
August	84,158	29,497	62,023	21,810
September	65,507	26,341	37,725	17,306
October	59,253	26,286	64,920	26,427
November	73,942	31,670	78,704	33,359
Total	**1,035,106**	**437,799**	**906,697**	**398,316**
Winter	605,046	268,683	547,063	251,623
Summer	430,060	169,116	359,634	146,693
Total	**1,035,106**	**437,799**	**906,697**	**398,316**

Source: Key West Local Redevelopment Agency

Cruise passengers were surveyed over the past year with 521 surveys administered in summer 2004 and 398 surveys administered in winter 2005. *See Section 6 of this report for more detail on survey procedures and findings*. Among the key findings of the survey were expenditure records for cruise ship passengers. Responses were recorded as either individual or group expenditure patterns. Some adjustments to the survey responses were made to adjust for attractions and excursions that might have been paid for on ship. With those adjustments, it is estimated that passengers spent on average $79.37 per group (Table 1.11). Adjusting to a per capita basis, cruise passengers spent an average of $32.10 while in Key West. The largest expenditures were for clothing ($6.05), souvenirs ($5.88), land excursions ($4.10) and jewelry, china, perfume ($3.99).

Expenditures varied by season with summer visitors spending $36.39 and winter visitors spending $27.22. This large seasonal disparity was a little surprising as winter tourists had higher income levels and slightly longer stays. Survey responses were reviewed to see if weather had an influence as the two week survey period was colder than normal with mean temperatures of 63.1°F. Separating out survey periods actually suggested that mean expenditures were nearly a dollar higher in January than in the two week February survey period with a mean average temperature of 69.2°F. There was little rainfall during either

period. Winter visitors did spend higher amounts on land excursions influenced in part by a slightly longer time in port. There may also be some blurring between excursions and attractions with higher attraction spending in the summer months. For other purchases, winter passengers may be saving a larger share of his/her purchases for later ports of call.

TABLE 1.11: EXPENDITURES BY CRUISE SHIP PASSENGERS

	Total			Per Group			Per Capita		
	Summer	Winter	Total	Summer	Winter	Total	Summer	Winter	Total
Eating establishments	$2,680	$2,151	$4,831	$5.14	$5.40	$5.26	$2.21	$2.03	$2.13
Drinking establishments	$1,837	$1,124	$2,961	$3.53	$2.82	$3.22	$1.52	$1.06	$1.30
Ground transport	$0	$158	$158	$0.00	$0.40	$0.17	$0.00	$0.15	$0.07
Water excursions	$580	$378	$958	$1.11	$0.95	$1.04	$0.48	$0.36	$0.42
Land excursions	$2,138	$8,346	$10,484	$4.10	$20.97	$11.41	$1.77	$7.87	$4.61
Attractions	$3,717	$1,432	$5,149	$7.13	$3.60	$5.60	$3.07	$1.35	$2.27
Clothing	$10,252	$3,538	$13,790	$19.68	$8.89	$15.01	$8.47	$3.33	$6.07
T-shirt apparel	$5,346	$3,430	$8,776	$10.26	$8.62	$9.55	$4.41	$3.23	$3.86
Health products	$0	$415	$415	$0.00	$1.04	$0.45	$0.00	$0.39	$0.18
Jewelry/china/perfume	$3,450	$5,640	$9,090	$6.62	$14.17	$9.89	$2.85	$5.32	$4.00
Artwork	$1,100	$380	$1,480	$2.11	$0.95	$1.61	$0.91	$0.36	$0.65
Souvenirs	$11,684	$1,713	$13,397	$22.43	$4.30	$14.58	$9.65	$1.61	$5.90
Business services	$150	$68	$218	$0.29	$0.17	$0.24	$0.12	$0.06	$0.10
Personal services	$0	$0	$0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Other	$1,129	$102	$1,231	$2.17	$0.26	$1.34	$0.93	$0.10	$0.54
Total	**$44,063**	**$28,875**	**$72,938**	**$84.57**	**$72.55**	**$79.37**	**$36.39**	**$27.22**	**$32.10**

Previous studies had slightly higher cruise passenger expenditures in Key West, although Key West generally registers lower expenditure patterns than other Caribbean ports-of-call. PriceWaterhouse (1994) had cruise passenger expenditures in Key West at $53, while a study for the Florida Caribbean Cruise Association (FCCA) by PriceWaterhouseCoopers (2001) had per capita expenditures in Key West of $41. In both cases, Key West was last among a group of ports-of-call examined – 7 Caribbean ports in the earlier Price Waterhouse study and 10 in the FCCA study. The current survey is by far the most comprehensive survey of passenger expenditures in Key West to date. In previous studies of tourism in the Florida Keys including those by Leeworthy et al., cruise ships were not the primary focus and samples were limited. The low expenditures at eating and drinking establishments are tied in large part to the all-inclusive nature of cruise ship travel and to the short on land stays. Time constraints were often cited as the reasons that more attractions and excursions were not experienced, and on-board entertainment is increasingly competing for available passenger dollars. Per capita expenditures are also being influenced by the expansion and increased affordability of cruise tourism making it a less exclusive tourism experience and increasingly accessible to a middle class clientele. As for general purchases, clothing and souvenirs were the primary expenditures, but because Key West is often the first port-of-call passengers may well be waiting for to make the bulk of their purchases at duty free shops later in their cruise.

As Table 1.12 shows below, breaking down expenditures further, the largest expenditure items were for miscellaneous souvenirs (32.0%), clothing and apparel (30.0%), and

attractions and excursions (24.5%). Applying passenger disembarkation counts to the survey expenditure patterns results in an estimated $28.5 million dollars in expenditures by cruise ship passengers. Again, the largest expenditure items are miscellaneous souvenirs ($9.1 million) and clothing and apparel ($8.5 million).

TABLE 1.12: EXPENDITURES BY CRUISE PASSENGERS, –2004-05

	Summer	Winter	Total	%age
Eating establishments	$895,653	$1,023,835	$1,919,489	6.7%
Drinking establishments	$613,924	$535,003	$1,148,926	4.0%
Clothing and apparel	$5,212,836	$3,316,637	$8,529,473	30.0%
Miscellaneous souvenirs	$5,425,387	$3,680,762	$9,106,149	32.0%
Attractions & Excursions	$2,150,571	$4,834,065	$6,984,635	24.5%
Other Services	$50,130	$32,367	$82,497	0.3%
Other	$377,311	$321,287	$698,598	2.5%
Total	$14,725,811	$13,743,956	$28,469,767	**100.0%**

Cruise ship crews were not surveyed as part of this study. An earlier PriceWaterhouse study (1994) estimated expenditures by cruise ship crews in Key West at $53 per crew member. Using that figure and adjusting for price changes brings crew member expenditures up to $65.80. The basis for crew member's expenditures is the number of crew ship workers from 2003-04 landings adjusted by an estimated 50% of crew members leaving ship.[4] Expenditures by category were distributed based on crew member purchases indicated in the earlier study. On that basis, it is estimated that crew members spent $13.1 million in the 2003-04 year. Although cruise ship passengers seem to be tight with their money in Key West, it seems that crews do spend money in Key West because of better prices on clothing and food and better infrastructure for communication services than other ports-of-call in the region (Table 1.13).

TABLE 1.13: EXPENDITURES BY CREW, 2003 - 2004

	Amount	Percentage
Food & beverage	$1,048,414	8.0%
Clothing	1,834,725	14.0%
Other retail	1,310,518	10.0%
Entertainment	1,048,414	8.0%
Attractions/sightseeing	3,931,553	30.0%
Taxis/ground transportation	524,207	4.0%
Telephone Communications	131,052	1.0%
Other purchases	3,276,294	25.0%
Total	**$13,105,178**	**100.0%**

Source: PriceWaterhouse

[4] Personal Communication City of Key West Local Redevelopment Agency

Finally, the cruise ships also spend money in the local economy. Most of those expenditures are made through local agents who arrange purchases in advance and/or as needed. In the last calendar year (2004), cruise ships contracted for $14 million in local purchases (Table 1.14). By far the largest expenditure was for disembarkation and dockage fees at $9.9 million, 70.5% of the total. The bulk of remaining expenditures were for piloting and tug and boat tender services collectively accounting for 24.1% of expenditures.

TABLE 1.14: EXPENDITURES BY CRUISE SHIPS, 2004

	Amount	Percentage
Passenger Fees & Dockage	$9,900,000	70.5%
General Purchases	117,000	0.8%
Tender boat services	136,000	1.0%
Tug services	544,000	3.9%
Medical payments, crew	123,000	0.9%
Customs services	224,000	1.6%
Pilotage	2,703,000	19.2%
Other	301,000	2.1%
Total	**$14,048,000**	**100.0%**

Source: Caribe Nautical Services, Cruise Ship Expenditures.

Totaling passenger and crew expenditures and cruise ship purchases results in a direct economic impact from cruise ship activity of $55.6 million (Table 1.15). Primary impacts are split evenly among entertainment and recreation (21.5%), clothing and apparel (18.6%) and other retail purchases (19.1%) and docking and disembarkation fees (18.2%) (Figure 1.5). Passenger expenditures account for over half of those direct expenditures (51.2%) followed by ship expenditures (25.3%) and crew expenditures (23.6%) (Figure 1.6).

TABLE 1.15: TOTAL DIRECT EXPENDITURES BY CRUISE SHIP TOURISM, 2003 - 2004

	Passengers Expenditures	Crew Expenditures	Cruise Ship Expenditures	Total
Food ,Eating/Drinking Establishments	$3,068,415	$1,048,414	$0	$4,116,829
Clothing and Apparel Stores	8,529,473	1,834,725	0	10,364,198
Other Trade	9,106,149	1,310,518	210,000	10,626,667
Transportation Sales & Rentals	0	655,259	3479000	4,134,259
Arts, Entertainment, and Recreation	6,984,635	4,979,967	0	11,964,603
Docking/Disembarkation Fees			10,124,000	10,124,000
Other	781,095	3,276,294	235,000	4,292,389
Total	**$28,469,767**	**$13,105,178**	**$14,048,000**	**$55,622,944**

FIGURE 1.5: EXPENDITURES FROM CRUISE SHIP TOURISM BY EXPENDITURE CATEGORY

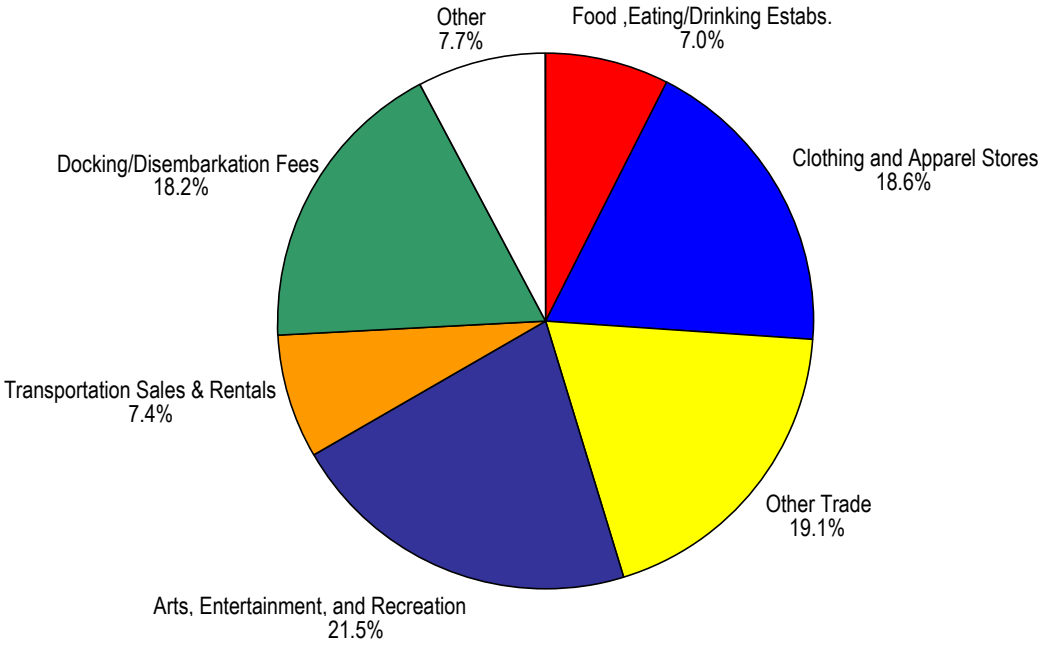
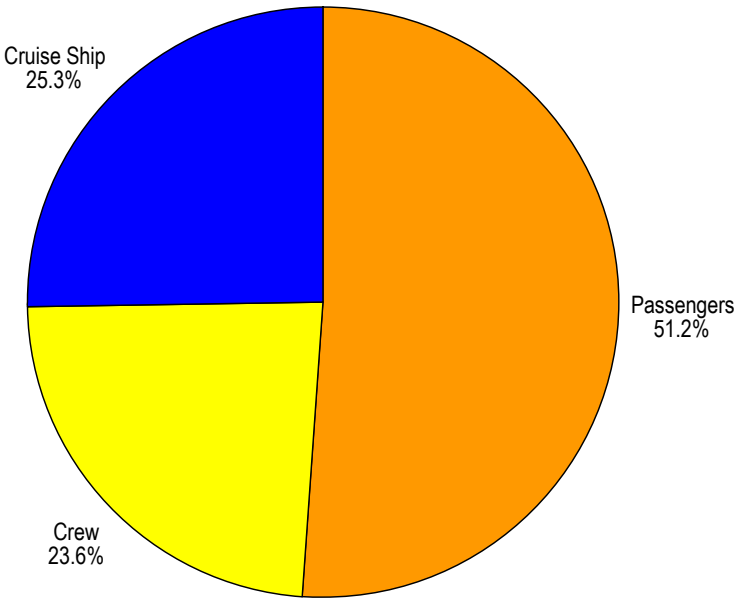


FIGURE 1.6: EXPENDITURES FROM CRUISE SHIP TOURISM BY SEGMENT



1.C.2 The Impact of Non-Cruise Ship Tourism Activity

As indicated earlier, the most authoritative visitation statistics for the Florida Keys were compiled in a series of studies by Leeworthy and others as part of a NOAA study of recreating visitors to the Keys (Leeworthy and Vanasse 1999 and Leeworthy and Wiley 2003). However, the last year available from that series is the 2001-02 travel season as shown in Table 1.18. To extend those estimates, a number of indicators were considered. The most reasonable indicator seemed to be lodging activity. Over the six year period for which the NOAA estimates were available, visitation estimates were up by 14.99%. For the same time period, inflation adjusted bed tax revenues were up 14.13%. Based on lodging activity since 2001-02, visitation for Monroe County by non-cruise ship tourists is projected to increase to 2,692,475 for the 2003-04 tourist season, a 5.5% increase since the last Leeworthy estimates. This figure includes both overnight and day visitors.

TABLE 1.16: NON-CRUISE SHIP VISITATION IN MONROE COUNTY FOR SELECTED YEARS

Year	Visitation	Annual Rate of Change
1995-96	2,219,176	-
1996-97	2,169,480	-2.2%
1997-98	2,399,009	10.6%
2001-02	2,551,930	1.6%
2002-03	2,633,312	1.6%
2003-04	2,692,475	2.2%

Source: Leeworthy and Vanasse, Leeworthy and Wiley, Monroe County Tourist Development Council adapted.

Visitation in Key West was estimated as a relative share of county visitation. Relative shares were estimated using the ratio of city sales by individual sector to county sales[5]. Sales in each individual industrial sector were weighted by the relative share of sales in that sector made to tourists based on the survey expenditure data. Summing across all sectors, it is estimated that 54.3% of tourist related expenditures in the county occur in Key West. That ratio is used to scale county visitation to an estimated 1,462,638 visitors in Key West for the 2003-2004 tourist season as indicated in Table 1.17.

TABLE 1.17: ESTIMATED NON- CRUISE SHIP VISITATION IN KEY WEST, 2003-04

Location	Visitation
Key West	1,462,638
Monroe County	2,692,475

Applying per capita expenditures from survey results with estimated visitation, yields expenditures from non-cruise ship tourists in the 2003-2004 tourist season of $659,347,338 (Table 1.18 and Figure 1.7). The largest expenditure categories are lodging at $299.4 million followed by restaurants/eating establishments at $163.0 million. Together lodging and eating

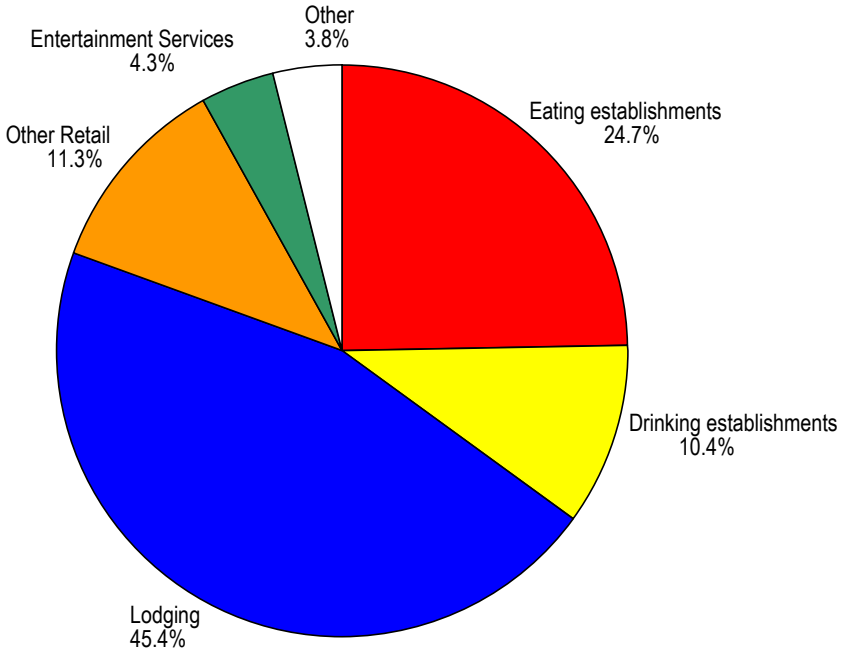
[5] Florida Department of Revenue "Sales Tax report for Industry Types Monroe County and Key West-March 2005"

establishments account for 70.1% of total expenditures with drinking establishments accounting for another 10.4% of expenditures.

TABLE 1.18: ESTIMATED NON-CRUISE SHIP TOURISM EXPENDITURES IN KEY WEST, 2003-04

Sector	Expenditures
Eating establishments	$ 162,962,551
Drinking establishments	68,576,584
Groceries	23,811,464
Clothing	24,542,783
Other Retail	26,335,119
Transportation	2,061,568
Lodging	299,409,859
Entertainment Services	28,569,811
Bus Services	957,907
Other	22,119,692
Total	**$ 659,347,338**

FIGURE 1.7: EXPENDITURES BY NON-CRUISE SHIP TOURISM BY EXPENDITURE CATEGORY



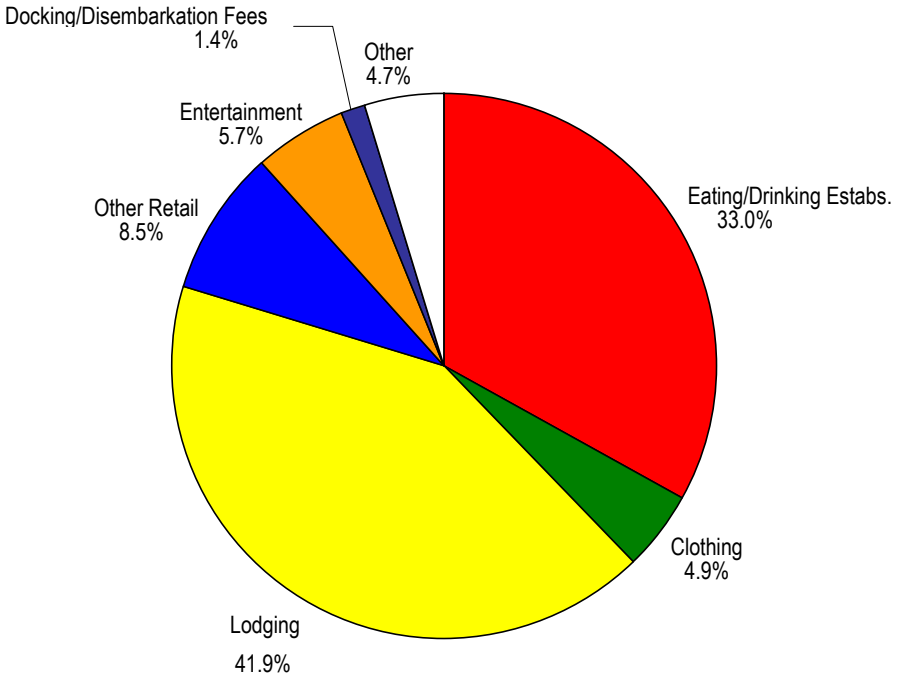
1.C.3 Total All Tourism

Combining cruise ship and non-cruise ship activity, tourism accounts for annual expenditures of $715.0 million dollars. Lodging/accommodations account for $299.4 million of the total (41.9%) followed by eating and drinking establishment at $235.7 million (33.0%). Other retail including clothing adds $95.7 million (13.4%), while arts, entertainment, and recreation add $40.5 million (5.7%) (Table 1.19 and Figure 1.8). Cruise ship tourism accounts for an estimated 7.8% of all tourism expenditures in Key West.

TABLE 1.19: TOTAL TOURIST EXPENDITURES BY TYPE IN KEY WEST, 2003-04

	Cruise Tourists	Non-Cruise Tourists	Total All Tourists	Percentage of Total
Eating/Drinking Establishments	$4,116,829	$231,539,135	$235,655,964	33.0%
Clothing	10,364,198	24,542,783	34,906,981	4.9%
Other Retail	10,626,667	50,146,583	60,773,250	8.5%
Transportation	4,134,259	2,061,568	6,195,827	0.9%
Lodging/Accommodation		299,409,859	299,409,859	41.9%
Arts, Entertainment, Recreation	11,964,603	28,569,811	40,534,413	5.7%
Docking/Disembarkation Fees	10,124,000	0	10,124,000	1.4%
Other	4,292,389	23,077,599	27,369,988	3.8%
Total	**$55,622,944**	**$659,347,338**	**$714,970,282**	**100.0%**

FIGURE 1.8: TOTAL TOURIST EXPENDITURES BY EXPENDITURE CATEGORY



Comparing estimated tourist expenditures with sales figures for the city of Key West as reported by the Florida Department of Revenue for 2003 gives a good indication of the relative share of tourism impacts in the city (Table 1.20). It is worth noting that the total sales figures are for the year 2003 and that tourists are likely reporting after tax rather than before tax expenditures. Nonetheless, tourism expenditures are estimated to account for 46.3% of annual sales for the city of Key West. For the lodging sector, the estimated lodging expenditures account for 93.7% of sales. For eating and drinking establishments, the relative share is high. There may be some cross hauling where some of those expenditures occur outside of city limits, but the larger disparity is for drinking establishments suggesting that some non-bar drinking expenditures are showing up in this category. Attractions and

transport sectors are blurred as some of the entertainment activities are land and water excursions. For that reason, the two sectors have been combined. Beyond those classification issues, these expenditure estimates seem to provide a reasonable estimate of the direct economic impact of tourism activity on the city of Key West.

TABLE 1.20: TOTAL TOURIST EXPENDITURES BY TYPE IN KEY WEST, 2003-04

	Total All Tourists	Total Sales Key West	Percentage of Total
Eating/Drinking Establishments	$235,655,964	$221,843,193	106.2%
Clothing	34,906,981	73,725,639	47.3%
Other Retail	60,773,250	464,031,442	13.1%
Attractions/Transportation	46,730,240	190,445,665	24.5%
Lodging/Accommodation	299,409,859	319,565,519	93.7%
Docking/Disembarkation Fees	10,124,000	-	N/A
Other	27,369,988	273,084,004	10.0%
Total	**$714,970,282**	**$1,542,695,462**	**46.3%**

Based on relative shares in the key sectors, tourism generates an estimated 8,060 jobs in the city of Key West. Of that total, cruise ship tourism generates an estimated 577 full time equivalent jobs (Table 1.22).

TABLE 1.21: SALES AND EMPLOYMENT IN KEY WEST BY SOURCE, 2003-04

	Key West Total	Key West Tourism	Cruise Ship Tourism
Sales	$1,542,695,462	$710,206,629	$50,859,291
Employment	17,508	8,060	577

1.D Indirect Impacts

Indirect or secondary impacts associated with tourism in Key West were tracked based upon purchasing patterns of the tourist sector and projected subsequent spending rounds. From the survey of business establishments, it was estimated that 31.4% of non-personnel expenditures are to suppliers within the city of Key West. Accounting for the primary sectors involved, a comparison was made between first and second round impacts in Key West and standard impact assessment.models.[6] On that basis, it estimated that direct and indirect expenditures amount to $1.14 billion annually (Table 1.22). That represents a multiplier of 1.6. For employment, the direct and indirect impact is 12,276 jobs within the city of Key West, suggesting that 70.1% of jobs are tied directly or indirectly to tourism. The employment multiplier is 1.51, a little lower than the expenditure multiplier due largely to the high labor ratio in the tourist sector in the initial spending round. For cruise ship tourism, it is estimated that $88.78 million in direct and indirect economic activity is attributed to cruise ship activity. Cruise ships account directly and indirectly for 955 jobs within the city. These jobs are full time equivalent employees. The number of individuals that are impacted for at least a part of their livelihood is considerably higher.

[6] James B. London with William Schaffer. The Impact of the Medical University of South Carolina on the State and Region, 1985. The Charleston economy is larger but adjustments for leakage in the second round scaled the multiplier back.

The present assessment includes both indirect and induced effects.[7] In general, tourism-based multipliers are not large as the primary sectors of services and retail trade tend to have below average multiplier effects. Still, the cumulative effect of tourism on the economy of Key West is substantial.

TABLE 1.22: DIRECT AND INDIRECT IMPACTS OF TOURISM AND CRUISE SHIP EXPENDITURES KEY WEST

	Direct	Indirect	Total
All tourism			
Output	$714,970,282	$426,228,614	**$1,141,198,896**
Employment	8,114	4,162	**12,276**
Cruise Ship Tourism			
Output	$55,622,944	$33,159,546	**$88,782,490**
Employment	631	324	**955**

[7] Indirect effects occur as business establishments make purchases from suppliers traced through subsequent spending rounds. Induced effects occur when employees spend their wages and salaries on household items.

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2. FISCAL IMPACTS

Tourism is the primary economic base for the city of Key West. In addition to its economic contribution, tourism related activity is a primary source of city revenue. The cruise ship industry alone generates $4.4 million per year in disembarkation and service fees (Fiscal Year 2003-2004). The following sections evaluate the city budget in terms of both revenue sources and expenditure requirements as indicated in Figure 2-1. Revenues and expenditures are separated among resident and tourist populations. Tourism-related revenues and expenditures are then allocated between cruise ship and non-cruise ship activity.

2.A Revenue Sources

The city of Key West generated $31,288,802 in revenue in the last fiscal year (FY 2003-04). Primary revenue sources are property taxes (36.3%), service revenues (21.0%), and intergovernmental revenues (16.2%) (Table 2.1).

TABLE 2.1: SUMMARY OF BUDGET REVENUES (FY 2003-04)

Source of Revenue	FY 03-04	Percentage of Total
Ad Valorem and Other Taxes	$12,293,196	39.3%
Licenses and Permits	$2,048,713	6.5%
Intergovernmental Revenue	$5,064,983	16.2%
Services	$6,564,887	21.0%
Fines and Forfeitures	$985,764	3.2%
Miscellaneous and Interest	$295,190	0.9%
Rental Income	$1,263,452	4.0%
Charge for Services (Interfund)	$2,603,100	8.3%
Other Income	$147,765	0.5%
Transfers from Other Funds	$8,400	0.0%
Prior Year Balances	$0	0.0%
Total General Fund Revenue	**$31,288,802**	**100.0%**

To assess the revenue impact of tourism activity, the detailed revenue budget for FY 2003-2004 was allocated among tourism and non-tourism activity. The tourism allocation is further broken down by cruise ship tourism and non-cruise ship tourism activity.

Direct revenue streams such as dockage and disembarkation fees for cruise ships and cruise ship passengers and transient rental licenses are easily identified and are assigned accordingly. Other revenue streams including shares of property tax and sales tax revenues were apportioned based on relative shares. Key assumptions made include:

Property Taxes:

- Commercial Share - The commercial share of property related revenues is assigned at 84%. That figure is high, but the allocation is based on the current commercial/residential mix of property tax revenues in the city of Key West and

serves as a basis for allocating property tax related revenues to the commercial sector.

- Tourism Share - The tourism share of property related revenues is 46.3% of commercial property revenues. That figure is based on estimated total sales from the tourism sector as a share of total retail sales in the city.
- Cruise Ship Share - Cruise ship tourism's share of property related revenues from tourism is 7.8%. That figure is based on the estimated share of total tourism sales from the cruise ship sector.

Other Apportioned Taxes/Fees:

- Tourism Share of Commercially Generated Funding - The tourism share of other commercially based revenues is assigned at 46.3% of total revenues. For cruise ship activity again, 7.8% of tourism based revenues are assigned. That figure is applied to sales tax revenues, professional and occupational license fees, and municipal revenue sharing funds.
- Tourism Share of Other Revenue Streams – Most of the remaining revenue streams are relatively small. They are allocated based upon anticipated source of revenue. 60% of parking meter revenues and 50% of parking ticket fines (the difference being collection slippage) and 90% of rents from most city concessions that cater primarily to tourists.

These allocations are depicted in Table 2.2. Some of the detailed budget categories have been collapsed under major headings if no tourism allocations are being made.

It is estimated that 48.3% of all city revenues or $15,122,200 are attributable directly to tourism activity. The largest single sources of revenues from tourist-related activity accrue from property tax revenues and cruise ship fees. Property related revenue streams generate $4,415,477, accounting for 14.1% of total city revenues and 38.9% of total property tax revenues. Cruise ship revenues from disembarkation, dockage, and cruise ship utility fees collectively bring in comparable revenues of $4,367,882 or another 14.0% of city revenues. The half-cent sales tax contributes another $1,532,388 or 10.1% of tourism based revenues.

For cruise ships, it is estimated that $5,121,755 in revenue is derived when combining all revenue sources. That figure represents 16.4% of the city general fund revenues and 33.9% of tourism related revenues. The bulk of that revenue comes directly from disembarkation fees at $4,280,251. Additional revenues accrue from relative shares of commercial activity attributed to cruise ship activity including property taxes at $344,407 (6.7%), sales tax revenues at $119,526 (2.3%), and amusement franchise taxes at $101,126 (2.0%).

FIGURE 2.1: FISCAL BALANCE FOR CRUISE SHIP ACTIVITY

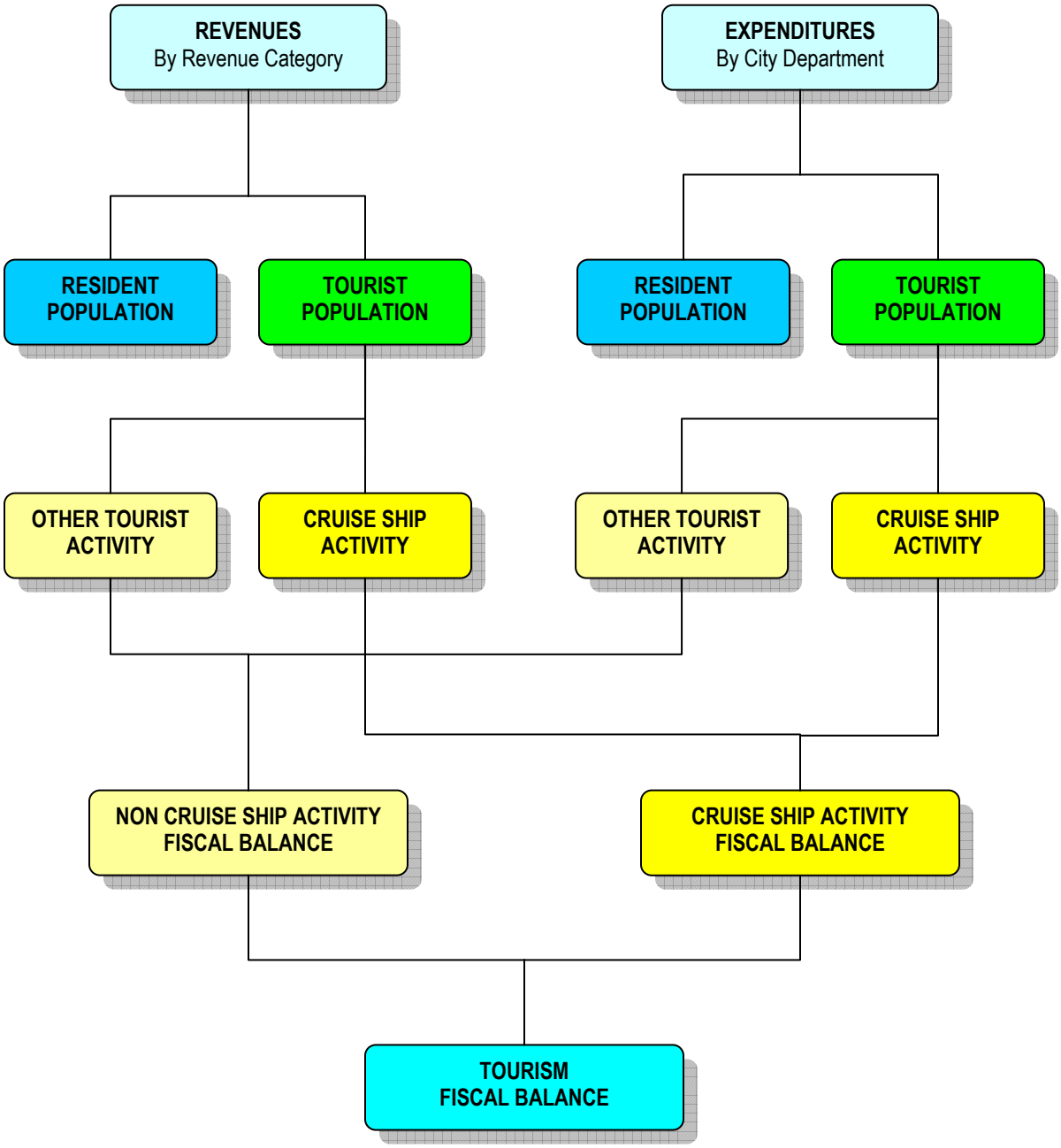


TABLE 2.2: REVENUE ALLOCATION FROM TOURISM AND CRUISE SHIP TOURISM ACTIVITY, FY 2003-04

			All Tourists			Cruise Ship Tourists		
Source of Revenue	Actual FY 03-04*	Basis	Tourist Impact%	Tourist Impact $	Share of Total	Tourist Impact%	Tourist Impact $	Share of Total
AD VALOREM AND OTHER TAXES	**$12,293,196**							
AD VALOREM TAX-REAL PROPERTY	$11,353,176	84%	46.3%	$4,415,477	29.2%	7.8%	$344,407	6.7%
AD VALOREM TAX-PERSONAL PROPERTY	$0	84%	46.3%	$0	0.0%	0%	$0	0.0%
DELINQUENT AD VAL TAX-REAL PROPERTY	$3,087	84%	46.3%	$1,201	0.0%	7.8%	$94	0.0%
DELINQUENT AD VAL TAX-PERSONAL PROPERTY	$9,633	84%	46.3%	$3,746	0.0%	7.8%	$292	0.0%
TELECOMMUNICATIONS SERVICES TAX CST	$429,140		46.3%	$198,692	1.3%	7.8%	$15,498	0.3%
CATV 5% FRANCHISE TAX	$0		46.3%	$0	0.0%	7.8%	$0	0.0%
AMUSEMENT FRANCHISE TAX	$498,160		100%	$498,160	3.3%	20.3%	$101,126	2.0%
LICENSES & PERMITS	**$2,048,713**							
PROFESSIONAL & OCCUPATIONAL LICENSES	$941,265		46.3%	$435,806	2.9%	7.8%	$33,993	0.7%
BUILDING PERMITS	$1,086,314	84%	46.3%	$422,489	2.8%	7.8%	$32,954	0.6%
PUBLIC SERVICE TAXI PERMITS (Was 342.91)	$12,517		46.3%	$5,795	0.0%	7.8%	$452	0.0%
HARC APPLICATION FEES	$1,965							
BICYCLE REGISTRATION	$0							
DOMESTIC PARTNERSHIP REGISTRATION	$2,542							
CITY EASEMENTS	$3,129							
NEWS BOX REGISTRATION	$980							
TRANSIENT RENTAL LICENSE @$125 per	$0		100%	$0	0.0%	0%	$0	0.0%
INTERGOVERNMENTAL	**$5,064,983**							
FEDERAL REVENUES	**$115,226**							
H.I.T.D.A. PROGRAM	$32,290							
CRIME PREVENTION & LLBG	$23,147							
C. O. P. S. FAST	$0							
LOCAL REDEVELOPMENT AGENCY	$0							
BICYCLE / PED COORD & EDUCATION	$0							
OTHER FEDERAL GRANTS	$59,789							
STATE REVENUES	**$4,949,758**							
HISTORIC-CEMETERY PRES.	$25,938							
RECREATION	$22,195							
OTHER STATE GRANTS	$162,087							
MUNI. CIGARETTE TAX	$0							

TABLE 2.2: REVENUE ALLOCATION FROM TOURISM AND CRUISE SHIP TOURISM ACTIVITY (CONTINUED)

			All Tourists			Cruise Ship Tourists		
Source of Revenue	Actual FY 03-04*	Basis	Tourist Impact%	Tourist Impact $	Share of Total	Tourist Impact%	Tourist Impact $	Share of Total
MUNI. REV. SHARING-SALES/GAS. TAX	$855,044		46.3%	$395,885	2.6%	7.8%	$30,879	0.6%
MOBILE HOME LICENSES	$7,370							
ALCOHOLIC BEVERAGE LICENSES	$72,952		46.3%	$33,777	0.2%	7.8%	$2,635	0.1%
LOCAL GOVT. HALF-CENT LOCAL SALES TAX	$3,309,693		46.3%	$1,532,388	10.1%	7.8%	$119,526	2.3%
PUBLIC SAFETY	$5,850							
MOTOR FUEL TAX REBATE	$25,407							
LOCAL GOV'T GRANTS - OTHER	$8,144							
SHARE OF COUNTY OCCUPATIONAL LICENSES	$120,965	50%	46.3%	$28,003	0.2%	7.8%	$2,184	0.0%
P.I.L.O.T. - KEY WEST HOUSING AUTHORITY	$8,114							
P.I.L.O.T. - KEYS ENERGY SYSTEM	$325,998	50%	46.3%	$75,469	0.5%	7.8%	$5,887	0.1%
SERVICES	**$6,564,887**							
ZONING & SUBDIVISION FEES	$125,723	50%	46.3%	$29,105	0.2%	7.8%	$2,270	0.0%
SALES OF MAPS & PUBLICATIONS	$102							
CERTIFICATION, COPYING, & RECORD SEARCH	$3,389							
ELECTION QUALIFYING FEES	$700							
RETURNED CHECK CHARGES	$774							
POLICE SERVICES	$6,502							
PROTECTIVE INSPECTION FEES	$98							
OTHER PUBLIC SAFETY	$0							
PUBLIC SERVICE OPC / TAXI PERMIT (See 323.00)	$0							
PUBLIC SERVICE TAXI PERMIT PHOTOS	$1,740		60%	$1,044	0.0%	7.8%	$81	0.0%
FANTASY FEST	$0		100%	$0	0.0%	0%	$0	0.0%
CONSERVATION & RESOURCE MGT FEES	$7,250							
CEMETERY FEES	$15,075							
CEMETERY VAULTS	$15,800							
CRUISEPORT UTILITIES	$11,492		100%	$11,492	0.1%	100%	$11,492	0.2%
DISEMBARKATION - MALLORY	$581,334		100%	$581,334	3.8%	100%	$581,334	11.4%
DOCKAGE - MALLORY	$76,138		100%	$76,138	0.5%	100%	$76,138	1.5%
DISEMBARKATION - PIER B	$1,507,305		100%	$1,507,305	10.0%	100%	$1,507,305	29.4%
PENALTIES	$0		100%	$0	0.0%	100%	$0	0.0%
DISEMBARKATION-OUTER MOLE	$2,191,613		100%	$2,191,613	14.5%	100%	$2,191,613	42.8%

TABLE 2.2: REVENUE ALLOCATION FROM TOURISM AND CRUISE SHIP TOURISM ACTIVITY (CONTINUED)

			All Tourists			Cruise Ship Tourists		
Source of Revenue	Actual FY 03-04*	Basis	Tourist Impact%	Tourist Impact $	Share of Total	Tourist Impact%	Tourist Impact $	Share of Total
DOCKAGE-OUTER MOLE	$0		100%	$0	0.0%	100%	$0	0.0%
NAVY OUTER MOLE PAYMENTS	$0		100%	$0	0.0%	100%	$0	0.0%
PARKING METERS	$996,729		60%	$598,037	4.0%	5%	$29,902	0.6%
PARK CARD SALES	-$24		60%	-$14	0.0%	5%	-$1	0.0%
MALLORY SQUARE PARKING	$704,311		90%	$633,880	4.2%	5%	$31,694	0.6%
RESIDENTIAL PARKING PERMITS	$2,988		0%	$0	0.0%	0%	$0	0.0%
COMMERCIAL PARKING PERMITS	$205,512		0%	$0	0.0%	0%	$0	0.0%
PARKING FEES - CITY HALL GARAGE	$70,648		10%	$7,065	0.0%	0%	$0	0.0%
PARKING METERS - SMATHERS BEACH	$19,590		90%	$17,631	0.1%	0%	$0	0.0%
OTHER PARKS & RECREATION	$741							
NAVY PROPERTY USE CHARGES	$11,500							
OTHER CHARGES FOR SERVICES	$7,859							
FINES	**$985,764**							
COURT FINES	$113,270							
FINES / RESTITUTION	$3,743							
PARKING TICKET FINES (Net of Accts. Receivable)	$664,765		50%	$332,382	2.2%	0%	$0	0.0%
HANDICAPPED PARKING FINE ACCOUNT	$12,750		50%	$6,375	0.0%	0%	$0	0.0%
POLICE EDUCATION	$7,465							
BICYCLE CITATIONS	$0							
VIOLATIONS OF CODE ORDINANCES	$67,369	50%	46.3%	$31,192	0.2%	0%	$0	0.0%
INVESTIGATIVE COST RECOVERY	$0							
VIOLATIONS OF TREE ORDINANCES	$1,510							
VIOLATIONS OF BUILDING ORDINANCES	$114,894	50%	46.3%	$53,196	0.4%	0%	$0	0.0%
MISCELLANEOUS & INTEREST	**$308,541**							
MISCELLANEOUS INCOME	$13,351							
INTEREST & PROFIT ON INVESTMENTS	$295,190							
RENTS	**$1,263,452**							
ISLAND TENNIS	$4,723							
KEY WEST PLAYERS	$500							
TROPICAL SHELL & GIFT	$679,897		100%	$679,897	4.5%	0%	$0	0.0%
A1 BOAT YARD	$40,082							

TABLE 2.2: REVENUE ALLOCATION FROM TOURISM AND CRUISE SHIP TOURISM ACTIVITY (CONTINUED)

			All Tourists			Cruise Ship Tourists		
Source of Revenue	Actual FY 03-04*	Basis	Tourist Impact%	Tourist Impact $	Share of Total	Tourist Impact%	Tourist Impact $	Share of Total
GARRISON BIGHT - ANGELFISH PIER	$23,958							
ISLAND RENOVATIONS - South Beach Restaurant	$57,981		90%	$52,183	0.3%	0%	$0	0.0%
CABLE HUT	$6,882							
GARRISON BIGHT MARINA - PARCEL	$12,534							
GRM ENTERPRISES	$54,090		90%	$48,681	0.3%	0%	$0	0.0%
ISLAND ADVENTURES / DUTY FREE (CABLE)	$23,830							
KEY WEST ART CENTER	$3,750							
AT&T MICROWAVE TOWER	$16,000							
ISLAND WINDSURF / SUNSET WATER SPORTS	$39,537		90%	$35,583	0.2%	0%	$0	0.0%
TROPICAL SAILBOATS INC.	$8,053		90%	$7,248	0.0%	0%	$0	0.0%
819 OLIVIA (2005)	$0							
K.W. RESORT GOLF COURSE	$126,137		20%	$25,227	0.2%	0%	$0	0.0%
CULTURAL PRESERVATION SOCIETY	$44,528		100%	$44,528	0.3%	0%	$0	0.0%
PIER HOUSE JOINT VENTURE	$3,600		100%	$3,600	0.0%	0%	$0	0.0%
KEY WEST SAILING CLUB	$5,594							
KEY WEST TOYOTA	$0							
LIFEFLEET AMBULANCE	$0							
TELEPHONE COMMISSIONS	$0		90%	$0	0.0%	0%	$0	0.0%
CHAMBER OF COMMERCE	$0							
TANTALUS / FLIPPERS	$0							
CONCH CHARTERS	$0							
CAYO HUESO PARTNERS	$111,769		90%	$100,592	0.7%	0%	$0	0.0%
MISC. YEARLY LEASES	$8							
CHARGE FOR SERVICES (INTERFUND)	**$2,603,100**							
OTHER INCOME	**$147,765**							
TRANSFERS IN	**$8,400**							
PRIOR YEAR BALANCES	**$0**							
GENERAL FUND REVENUE	**$31,288,802**			**$15,122,200**	100.0%		**$5,121,755**	100.0%
	100.0%			**48.3%**			**16.4%**	

2.B Expenditures

The city budget for Fiscal Year 2003-04 shows expenditures of $32,122,273. The largest expenditure lines are police (27.7%), fire (17.2%), general government (12.2%), and parks and recreation (6.5%). City administration collectively accounts for 12.7% of revenues.

TABLE 2:3: CITY EXPENDITURES BY BUDGET CATEGORY, FISCAL YEAR 2003-04

Department	Expenditures	Percentage of Total
City Commission	$265,932	0.8%
City Manager	403,892	1.3%
City Clerk	309,207	1.0%
Citizen Review Board	66,350	0.2%
Asst City Manager	163,371	0.5%
Finance	978,292	3.0%
Human Resources	346,523	1.1%
Information Technology	685,106	2.1%
Training	68,478	0.2%
City Attorney	440,635	1.4%
City Planner	347,663	1.1%
Redevelopment Authority	332,654	1.0%
General Government	3,906,266	12.2%
City Engineer	0	0.0%
Civil Service Board	2,139	0.0%
Elections	29,953	0.1%
Fleet Service Management	774,739	2.4%
Public Works	2,138,123	6.7%
Engineering Services	382,680	1.2%
Police	8,891,991	27.7%
Bicycle Grant	4,630	0.0%
HIDTA Grant	45,429	0.1%
Other Police Grants	9,071	0.0%
Fire	5,521,686	17.2%
Building Services	1,274,584	4.0%
Emergency Preparedness	13,463	0.0%
Hurricane Expenses	0	0.0%
Tree Commission	25,471	0.1%
Cemetery	120,136	0.4%
Mallory Square	362,757	1.1%
Port Operations	1,573,442	4.9%
Parks & Recreation	2,080,110	6.5%
Homeless Center Operations	130,412	0.4%
Bicycle Pedestrian Safety	118,023	0.4%
Truman Waterfront Property	145,759	0.5%
Cultural Preservation Society	163,309	0.5%
Total	**$32,122,273**	**100.0%**

Source: City of Key West Annual Budget FY '03.

To allocate tourism related effort on the part of city government, department heads of the eight largest departments including administration were contacted to estimate their level of effort. Review of the budget and discussions with city officials were used to allocate the remainder of budget categories. To apportion effort, activity within individual city departments was broken down first between property and non-property effort. A breakdown of property-related effort is shown in Table 2.4; non-property effort is shown in the next table, Table 2.5. The fire department, for example, expends the majority of its effort toward property related activity, i.e. putting out fires. The Police Department is more evenly divided in terms of effort. Property-related activity was allocated among commercial, residential, and transient residential properties. Tourism-related effort was apportioned from the commercial share of activity based on tourism's share of sales plus transient property related effort. Cruise ship-related effort was calculated from the commercial property base as a share of total tourism sales.

Overall, property-related effort is estimated at 58.4% of budget expenditures or $18,751,490 (Table 2.4). Of that total, tourism accounts for $7.01 million of property-related effort or 21.8% of the total budget. The largest impacts based on relative shares of tourism-related property effort are fire (33.9% of tourism impact), police (22.0%), and general government (16.6%). Property-related impacts from cruise ships are relatively small accounting for 1.2% of the total budget.

TABLE 2.4: PROPERTY RELATED EFFORT EXPENDED FOR TOURISM AND CRUISE TOURISM ACTIVITY

	Total Expenditures	Property Share	Commercial Property	Residential Property	Transient Property	Tourism Share	Cruise Share
City Commission	$265,932	$239,338	$119,669	$95,735	$23,934	$79,341	$4,322
City Manager	403,892	363,503	181,751	145,401	36,350	120,501	6,564
City Clerk	309,207	278,286	139,143	111,314	27,829	92,252	5,025
Citizen Review Board	66,350	59,715	29,857	23,886	5,971	19,795	1,078
Asst City Manager	163,371	147,034	73,517	58,813	14,703	48,742	2,655
Finance	978,292	880,463	440,232	352,185	88,046	291,873	15,899
Human Resources	346,523	311,870	155,935	124,748	31,187	103,385	5,631
Information Technology	685,106	616,596	308,298	246,638	61,660	204,401	11,134
Training	68,478	61,630	30,815	24,652	6,163	20,430	1,113
City Attorney	440,635	396,571	198,286	158,629	39,657	131,463	7,161
City Planner	347,663	312,897	156,448	125,159	31,290	103,725	5,650
Redevelopment Authority	332,654	299,388	149,694	119,755	29,939	99,247	5,406
General Government	3,906,266	3,515,639	1,757,820	1,406,256	351,564	1,165,434	63,482
City Engineer	0	0	0	0	0	0	0
Civil Service Board	2,139	1,925	962	770	192	638	35
Elections	29,953	0	0	0	0	0	0
Fleet Service Management	774,739	697,265	348,633	278,906	69,727	231,143	12,591
Public Works	2,138,123	0	0	0	0	0	0
Engineering Services	382,680	0	0	0	0	0	0
Police	8,891,991	4,445,995	3,334,497	1,111,499	0	1,543,872	120,422
Bicycle Grant	4,630	0	0	0	0	0	0
HIDTA Grant	45,429	0	0	0	0	0	0
Other Police Grants	9,071	0	0	0	0	0	0
Fire	5,521,686	4,969,518	2,981,711	993,904	993,904	2,374,435	107,681
Building Services	1,274,584	1,147,125	573,563	458,850	114,713	380,272	20,714
Emergency Preparedness	13,463	6,732	3,366	2,693	673	2,232	122
Hurricane Expenses	0	0	0	0	0	0	0
Tree Commission	25,471	0	0	0	0	0	0
Cemetery	120,136	0	0	0	0	0	0
Mallory Square	362,757	0	0	0	0	0	0
Port Operations	1,573,442	0	0	0	0	0	0
Parks & Recreation	2,080,110	0	0	0	0	0	0
Homeless Center Operations	130,412	0	0	0	0	0	0
Bicycle Pedestrian Safety	118,023	0	0	0	0	0	0
Truman Waterfront Property	145,759	0	0	0	0	0	0
Cultural Preservation Society	163,309	0	0	0	0	0	0
Total	**$32,122,273**	**$18,751,490**	**$10,984,196**	**$5,839,793**	**$1,927,501**	**$7,013,184**	**$396,683**

The remainder of budget expenditures amounting to $13,370,783 (41.6%) are allocated to non-property related activities (Table 2.5). The largest shares are for police (33.3% of non-property effort), public works (16.0%), parks and recreation (15.6%), and port operations (11.8%). Of non-property effort, 58.5% is allocated to tourism ($7,822,884). Cruise ship tourism accounts for 37.8% of tourist generated non-property effort with $2,956,913. Slightly over half of that effort is expended for port operations.

TABLE 2.5: NON-PROPERTY RELATED EFFORT AND TOTAL EFFORT EXPENDED FOR TOURISM AND CRUISE TOURISM ACTIVITY

	Total Expenditures	Non-prop Share	Residential Share	Tourism Share	Cruise Share	Tourism Total	Cruise Total
City Commission	$265,932	$26,593	$18,615	$7,978	$5,585	$87,319	$9,906
City Manager	403,892	40,389	28,272	12,117	8,482	132,618	15,046
City Clerk	309,207	30,921	21,644	9,276	6,493	101,528	11,518
Citizen Review Board	66,350	6,635	4,644	1,990	1,393	21,786	2,472
Asst City Manager	163,371	16,337	11,436	4,901	3,431	53,643	6,086
Finance	978,292	97,829	68,480	29,349	20,544	321,222	36,443
Human Resources	346,523	34,652	24,257	10,396	7,277	113,781	12,908
Information Technology	685,106	68,511	47,957	20,553	14,387	224,955	25,521
Training	68,478	6,848	4,793	2,054	1,438	22,485	2,551
City Attorney	440,635	44,063	30,844	13,219	9,253	144,682	16,414
City Planner	347,663	34,766	24,336	10,430	7,301	114,155	12,951
Redevelopment Authority	332,654	33,265	23,286	9,980	6,986	109,227	12,392
General Government	3,906,266	390,627	273,439	117,188	82,032	1,282,622	145,513
City Engineer	0	0	0	0	0	0	0
Civil Service Board	2,139	214	150	64	45	702	80
Elections	29,953	29,953	29,953	0	0	0	0
Fleet Service Management	774,739	77,474	54,232	23,242	16,270	254,386	28,860
Public Works	2,138,123	2,138,123	1,069,061	1,069,061	534,531	1,069,061	534,531
Engineering Services	382,680	382,680	191,340	191,340	95,670	191,340	95,670
Police	8,891,991	4,445,995	1,778,398	2,667,597	266,760	4,211,469	387,182
Bicycle Grant	4,630	4,630	3,704	926	0	926	0
HIDTA Grant	45,429	45,429	45,429	0	0	0	0
Other Police Grants	9,071	9,071	9,071	0	0	0	0
Fire	5,521,686	552,169	414,126	138,042	41,413	2,512,478	149,094
Building Services	1,274,584	127,458	101,967	25,492	12,746	405,764	33,459
Emergency Preparedness	13,463	6,732	3,366	3,366	673	5,597	795
Hurricane Expenses	0	0	0	0	0	0	0
Tree Commission	25,471	25,471	15,283	10,189	2,038	10,189	2,038
Cemetery	120,136	120,136	120,136	0	0	0	0
Mallory Square	362,757	362,757	145,103	217,654	10,883	217,654	10,883
Port Operations	1,573,442	1,573,442	0	1,573,442	1,573,442	1,573,442	1,573,442
Parks & Recreation	2,080,110	2,080,110	624,033	1,456,077	145,608	1,456,077	145,608
Homeless Center Operations	130,412	130,412	130,412	0	0	0	0
Bicycle Pedestrian Safety	118,023	118,023	82,616	35,407	0	35,407	0
Truman Waterfront Property	145,759	145,759	131,183	14,576	8,746	14,576	8,746
Cultural Preservation Society	163,309	163,309	16,331	146,978	73,489	146,978	73,489
Total	**$32,122,273**	**$13,370,783**	**$5,547,898**	**$7,822,884**	**$2,956,913**	**$14,836,068**	**$3,353,596**

Combining both property and non-property commitments, it is estimated that tourism accounts for $14,836,068 or 46.2% of city services. The highest service demands are placed on police ($4.2 million), fire ($2.5 million), port operations ($1.5 million), and parks and recreation ($1.5 million). Cruise ship tourism accounts for $3,353,596 or 10.4% of expenditure requirements. The highest service demand requirements are from port operations ($1.5 million), public works ($0.5 million), and police ($0.4 million). Overall, tourism-related effort is split evenly 47.5/52.5% between property and non-property requirements (Table 2.6). For cruise ship tourism, the bulk of those requirements (88.2%) are non-property related with half of requirements allocated for port operations.

TABLE 2.6: COMBINED PROPERTY AND NON-PROPERTY RELATED EFFORT EXPENDED FOR TOURISM AND CRUISE SHIP TOURISM ACTIVITY

	Cruise Tourism Share		Tourism Share		Total City Budget	
Type of Expenditure	Expenditure	Percentage	Expenditure	Percentage	Expenditure	Percentage
Property	$396,683	11.8%	$7,013,184	47.3%	$18,751,490	58.4%
Non-Property	2,956,913	88.2%	7,822,884	52.7%	13,370,783	41.6%
Total	$3,353,596	100.0%	$14,836,068	100.0%	$32,122,273	100.0%

2.C Fiscal Balance

Combining revenue generation and expenditure requirements gives some indication of the fiscal balance associated with tourism and cruise ship tourism activities. For cruise ship tourism, the fiscal balance is positive with $5.1 million in revenue generation and $3.4 million in expenditure requirements (Table 2.7). The net result is a positive balance of $1,768,158 or a fiscal balance ratio (revenues/expenses) of 1.53. For all tourism activity, $15.1 million in revenue is generated compared to $14.8 million in expenditure requirements. The net effect for tourism is slightly positive with a fiscal balance of $286,132 and a fiscal balance ration of 1.02.

Among the revenue sources that show up only partly in the General Fund are sales and bed tax revenues. Of the 11.5% total, 6% in sales tax revenues go to the state – a portion of that money ($855,044 in FY 2003-04) is returned as state shared revenue and has already been counted above. 3% (the three penny tax) goes to the Tourist Development Council (TDC) for tourism support and promotion. The remaining 2.5% is allocated as follows – 1.0% to Monroe County for land acquisition and infrastructure, 0.5% or half a cent in city sales tax revenue to the city general fund, and 1.0% to the city for infrastructure (City Planning Office 2005). The half cent sales tax is already accounted for in the budget figures above. The remaining 2% does not appear in the General Fund and has not been accounted for as yet. The 1% to city infrastructure fund appears in a separate capital fund. The 1% split between the County Land Authority and County Infrastructure Fund does support programs within the city as requested. The city's infrastructure surtax is budgeted at $4.9 million as a portion is shared with other jurisdictions. In terms of county shared revenues for land acquisition and infrastructure, the city may or may not fully recoup its share of county sales revenues in any given year. To be somewhat conservative, it is estimated that the two funds will generate $9.8 million per year. Applying relative shares to tourism and to cruise ship tourism as above, it is estimated that tourism as a whole will generate an adjusted fiscal balance of $4.8 million and a fiscal balance ratio of 1.32. For cruise ship tourism, the adjusted fiscal balance is $2.1 million with a fiscal balance ratio of 1.62.

TABLE 2.7: FISCAL BALANCE FOR TOURISM AND CRUISE SHIP TOURISM ACTIVITY

	Cruise Ship Tourism	All Tourism	Adjusted Cruise Ship Tourism	Adjusted All Tourism
Revenues	$5,121,755	$15,122,200	$5,446,331	$19,630,200
Expenditures	$3,353,596	$14,836,068	$3,353,596	$14,836,068
Fiscal Balance	$1,768,158	$286,132	$2,092,734	$4,794,132
Fiscal Balance Ratio	1.53	1.02	1.62	1.32

It does appear based on this assessment that cruise ships and tourism in general (if the additional revenue sources are included) are paying their way from a fiscal perspective. It should be pointed out that the analysis here is based on directly attributable expenditure requirements. There are likely other imputed costs that were not captured in this analysis. In addition, costs that are included in this assessment are primarily operating costs and do not include the capital costs of expanding infrastructure to meet increased demand and maintain level of service. Those costs can be particularly high for tourist based communities. It is important that full capital costs from the city's Capital Improvements Plan be assessed and allocated equitably among resident and tourist populations.

Scaling down to expenses at the three individual piers gives another perspective on revenue and expenditure streams. Disembarkation and dockage fees are taken from the city budget FY 2003-04. Non-apportioned revenue and expenditure entries were allocated based on numbers of passengers. Some of the entries including contract security and pier-side entertainment were not assigned to Pier B as it provides those services as a private concern. Collectively, cruise ship revenues amounted to $4,541,925. Netting out for expenses including both port operations and other city services attributed to cruise ship activity, a positive balance of $1,390,430 accrues to the city. Net revenues vary from a high of $610,173 at the Outer Mole to $221,061 at Pier B (Table 2.8). It should be noted that passenger counts by pier are somewhat atypical for FY 2003-04 as the Outer Mole was closed for part of the year due to repairs being made to the pier.

Tourism is Key West's economic base. The city has begun to rely increasingly on tourism-based revenues in recent years particularly cruise ship disembarkation fees. On the surface, it appears that the fiscal balance is positive. Yet because of the relative importance of tourism including cruise ship activity, there should be a full cost accounting of associated revenues and expenditures. An assessment of effort expended by individual city departments came to a fuller understanding of some of those costs – 55% of those attributable costs for cruise ship activity are for activities other than port operations. Still, these costs are primarily operating costs and do not include capital costs required for improvements or to maintain level of service. The primary exception may be the capital improvements fund for the Outer Mole. In addition, the infrastructure surtax does generate an estimated $4.9 million per year of which an estimated $2.3 million is attributable to tourism activity and $176,959 per year is attributable to cruise ship tourism.

TABLE 2.8: FISCAL BALANCE BY PIER

	Mallory	Pier B	Outer Mole	Anchorage	Total
Calls	51	261	102	20	434
Passengers	61,657	587,025	214,604	17,056	880,342
Current Disembarkation Fees*	10.00	2.50	10.00		
Security Surcharge	0.63		0.63		
Revenues					
Disembarkation Fees**	$581,334	$1,507,305	$2,191,613		$4,280,251
Security Surcharge	38,844		135,201		174,044
Cruiseship Utilities	2,565		8,927		11,492
Dockage Revenues	76,138	0	0		76,138
Total Revenues	**$698,880**	**$1,507,305**	**$2,335,741**		**$4,541,925**
Expenses					
Contract Security	$3,157		$10,990		$14,147
Port Welcoming/Entertainment	1,428		4,972		6,400
Outer Mole Lease			912,519		912,519
Outer Mole Transportation			326,864		326,864
Other Port Operations	10,306	98,121	35,871		144,298
Other Operating Expenses	124,792	1,188,123	434,353		1,747,267
Total Expenses	**$139,684**	**$1,286,244**	**$1,725,568**		**$3,151,495**
Surplus/Deficit	**$559,196**	**$221,061**	**$610,173**		**$1,390,430**

* Disembarkation fees were raised effective January 6, 2004 from $8.00 to $10.00 per passenger with a $0.63 security fee added. Because Pier B is a private operation, the city collects only 25% of the fee. At the Outer Mole the city returns 40% of disembarkation fees to the navy into a capital improvement fund.

** Disembarkation fees are base on city receipts for FY 2003-04.

Other infrastructure needs should be addressed as it appears that levels of service in areas such as transportation are being impacted. Transportation improvements to address congestion and safety are important to both resident and the tourist populations. Those improvements include road improvements and alternative means of transportation including transit. Sidewalk improvements and the prospect of turning Duval Street into a pedestrian way come with capital costs that need to be shared between residents and tourists. Failure to address these basic infrastructure needs will impact the quality of life of residents and the recreation experience of tourists.

Finally, there are distributional issues that should be addressed. With an admittedly less than full cost allocation, Pier B despite contributing two-thirds of passengers in FY 03-04 contributed 16% of the estimated surplus. With the inclusion of off-site capital costs, Pier B may not be paying its way. Anchorage landings, although comparatively small in number, are currently not assessed disembarkation fees, despite impacts that accrue on land and the environmental costs of anchoring offshore.

2.D List of References

City of Key West Budget Office. Annual Budget: Fiscal Year 2003-2004. With updates.

Input on city expenditure patterns – based on survey of department heads.

- Joe April, Director, Building Services
- Raymond Archer, Director, Port Operations
- Julio Avael, City Manager
- Roland Flowers, Director, Public Works and Engineering
- Myra Hernandez, Director, Department of Transportation
- Bill McNeal, Captain, Police Patrol
- Randy Sterling, Director, Community Services
- Billy Wardlaw, Chief, Fire Department

Input on city revenue sources as well as expenditures:

- Dennis Grote, City Budget Analyst

3. THE IMPACT ON THE MARINE ENVIRONMENT

3.A Historical Review of Key West Channel and Harbor

This section focuses on the history of the main ship channel and harbor at Key West, and explores the historic and current use by large (greater than about 50 feet long), deep draft vessels and cruise ships. The main ship channel south of Key West is used by transit in and out of the Port of Key West and the harbor is used for turning of large vessels. Prior to formal settlement in the early 1800s, the deep natural channel and deep protected harbor were likely used by native Americans, pirates, Bahamian wreckers, and the Spanish while in transit from the Caribbean, Cuba and the Bahamas to parts north and into the Gulf of Mexico. Prior to the completion of the Overseas Railroad to Key West in 1912 all commerce in and out of Key West occurred via vessels of all sizes. From the beginning "Key West's early settlers found that the surrounding waters, at worst, provided a livelihood, and at best, brought them wealth. Few family heads arrived without some type of sailing craft, and owners of large sloops and schooners found wealth in Havana and the West Indies trade." (Langley 1973).

The long and interesting history of Key West has resulted in excellent chronicles of changes and transitions from one period to another - changes often defined by changes in the maritime industry and associated trades. As the island changed from boom to bust and back again on several occasions, its insular nature and the interest of its citizens appears to have provided for detailed documentation of events. The various volumes referenced and noted below are a great resource for this maritime history. The excellent historic resources at the Key West Public Library include considerable focus on the channel and harbor and its use. Authors such as Jefferson Browne, Stephen Nichols, Stan Windhorn, Joan and Wright Langley, John Viele, Chris Sherrill, Tom Haimbright, Dan Gallagher, Ed Little and others use photography (including from the 1800s) and old maps as a means of showing the true nature of the west part of the island and its change over time.

Following are general reviews of various aspects of the history of the channel and harbor concluded with a chronology of significant events related to the development and evolution of the Port of Key West. Sources of information are provided with the Chronology at Section 3.A.7 and in Section 3.B with the environmental assessment.

3.A.1 History of Use as a Navigational Channel and Anchorage as a Center of Commerce

Key West has a long history as a major center of maritime commerce and as a U.S. Navy port, and for many years it was one of the richest cities in Florida and the U.S. But it also has been one of the poorest, especially during the depression era when the military left and commerce slowed. But all the while, commerce, be it the shipment of goods and passengers, fishing, and the like, along with the military, plied the waters of the channel and harbor. The importance of maritime trade to the island, as well as the tremendous productivity of the surrounding marine resources is evidenced by the fact that in Key West there was a population at times over 20,000 people prior to Flagler's railroad reaching Key West in 1912 and connecting the island to the mainland. This review includes a general history of maritime

commerce in and out of Key West. A history of activity by the U.S. Navy and the cruise ship industry is reviewed in Sections 3.1.3 and 3.1.5 that follow.

The early days saw wrecking prosper and through wrecking "the richest cargoes in the world, lace, silks, wines, silverware - in fact everything that the commerce of the world afforded - reached Key West" (Browne 1912). In the mid-1800s in the Key West Federal Court "the amount of business on the admiralty side of the court was quite large, but as steamships took the place of sailing vessels and light-houses were built on the most dangerous points of the Florida Reefs, the number of wrecks gradually diminished" (Browne 1912). Sharing the port with the wreckers were fishermen who made up a large part of the population at the time.

The U.S. military, beginning in 1822, was instrumental is the early development of Key West as a port, and there were times when the naturally deep harbor was full of military sailing vessels (Figure 3.A.1), and commerce related to maintaining and provisioning those vessels was active. Sailing vessels of the 1800s using Key West took many forms and sizes and included deep well fishing boats, sponge boats, inter-island freight and passenger boats, pleasure boats, mail boats, pilot vessels, oceangoing schooners, and wrecking vessels, in addition to the ever present military. Commerce in and out of the port during the 1800s included salvage from wrecking, seafood of many types, beef cattle, freight, passengers, mail, salt, pineapples, vegetables, tobacco and cigars, ice, and charcoal. Vessel activity later came to include considerable more tourism, recreational fishing, and pleasure boating.

During the Civil War there were more ships stationed in Key West than at any other port in the U.S., and later in the 1800s large steamships began to frequent Key West and participate in the ever expanding maritime trades there. Passenger service to a number of ports had been established. Boat building and repair was an active local trade and the waterfront soon included wharfs, boatyards, marine railways, storage facilities, seafood markets and the like. By the late 1800s Key West was the wealthiest city in Florida, and one of the wealthiest in the U.S. Local fishing vessels were harvesting millions of pounds of seafood for local and other markets. Wrecking diminished after the reef lights were placed from 1852 to 1882 but there were still many wrecks of not only sailing vessels but also modern motor ships and wrecking remained an important part of the maritime commerce.

FIGURE 3.A.1. U.S. NAVY FLEET AT KEY WEST IN 1823 (STATE ARCHIVES OF FLORIDA).

By 1870, the cigar business in Key West, using tobacco imported mostly from Cuba on vessels, was the largest in the world. By 1880 there were 25 inter-Keys freight schooners carrying farm produce from Keys plantations to Key West for reshipment to other ports by steamship. During this period there were an estimated 450 sailing vessels, primarily spongers built in Key West, operating out of Key West. By 1884 Key West was the busiest port in Florida, and shortly thereafter, a line of steamers considered the very best and fastest steamships that could be built, begin running from Port Tampa to Key West and Havana. By the 1890s fifty to eighty foot schooners carrying up to 25 passengers each began running between Key West and Miami.

In about 1890 a factory for canning turtle soup from green turtles was constructed on the harbor and cigar tobacco importation and cigar production had reached its peak. By the turn of the century, the Key West sponging industry was very active, sales at sponge markets were brisk, and the industry employed a couple of thousand men and was earning about $1,000,000 per year (Figure 3.A.2).

By the early 1900s large propeller driven, deep draft commercial and Navy steamships were regularly coming and going in Key West. In 1907, "Mallory and Co." established a steamship line between New York and Mobile touching at Key West both ways - with 4 to 6 ships stopping at Key West weekly. Flagler completed the railroad to Key West in 1912, and channel commerce from large vessels loading and unloading from the end of the railroad at the newly expanded Trumbo Point increased. Around 1912 power vessels began replacing traditional sailing vessels for as fishing.

FIGURE 3.A.2. SPONGE MARKET ON KEY WEST HARBOR IN 1898 (STATE ARCHIVES OF FLORIDA).

Following World War I, Key West mariners were looking for new maritime activities. When prohibition was enacted, bootlegging liquor via vessels from Havana became big business. Commercial fishing based along the Harbor continued to be an active enterprise, and during the winter of 1919/1920 nearly 3,000,000 pounds of mackerel were landed at Key West. Other forms of commercial fishing continued out of Key West, including turtling, although this resource was by now becoming depleted. Active commerce in vegetables and fruits to and from distant ports was still taking place.

Passenger ships and ferries routinely traveled between Key West and Havana by 1928. In an effort to encourage new commerce during the depression, the Navy permitted private yacht owners to use the sub basin (Truman Harbor) for berthing. In 1938 the Overseas Highway was completed and a new era of transport of commerce began in Key West. Commercial fishing out of Key West remained an active industry and employed many people even though the sponge industry was decimated by the sponge blight in 1939. In 1949 pink shrimp (pink gold) were discovered in commercial quantities in the Tortugas and by 1954 shrimping - there and near Key West- involved as many as 500 shrimp boats catching over 30 million pounds per year. Many shrimp boats docked in Key West while not fishing and contributed significantly to the commerce there for many years.

In the mid 1950s the car ferry *City of Key West* carrying up to 50 autos and 700 passengers began running from between Key West and Cuba, and by 1956 Key West was one of the country's leading ports of foreign travel averaging about 13,000 passengers per month. In 1969, the Port of Key West received what is considered to be its first regularly scheduled cruise ship - the *Sunward*.

With an increase in tourism in the 1970s and 1980s, and with the growing popularity of scuba diving and salt water sport fishing, vessel traffic in Key West harbor became very busy with small commercial and recreational vessels of all sizes and power. Head boats carrying fishermen to the reef were common and used Key West Channel. Commercial and recreational fishing for snapper, grouper, mackerel, and spiny lobster took place inshore and on the reefs, while an active offshore blue water fishery was conducted by numerous large charter boats docked in Key West Harbor, Key West Bight, and Garrison Bight. By the 1990s recreational and pleasure vessels had mostly replaced the commercial vessels that historically dominated the harbors of Key West. Key West Bight and Garrison Bight were filled to capacity during the 1980s and 1990s with docking facilities, many of which now include large power vessels for pleasure use and fishing.

The use of large sailboats and schooners for tourism increased in the late 1990s and is common today. Large dive boats ferry upwards of 150 snorkelers and divers at a time to reefs off Key West. Many small vessels catering to the tourism related diving and fishing industry travel the various channels radiating out from Key West as do numerous private boats. During busy periods the Harbor becomes crowded with boats of all sizes and interaction between boats is routine. The U.S. Coast Guard is kept busy protecting navigation within the boundaries of the marked channel from vessels anchoring. Hundreds of live-aboard vessels of diverse character now encircle Key West, a significant increase compared to the 1970s when there were relatively few. Formal anchorages have been established by the City north of Key West in an attempt to manage live-aboards and their vessels.

The 2000s saw the reinstitution of ferry traffic between Key West and the west coast of Florida, with runs to Ft. Myers and Marco Island. Navy and Coast Guard vessels active in the area, continue to come and go for a variety of purposes, and are part of the Key West commerce related to use of the channel and harbor. Along with cruise ships, Navy vessels are the other truly large deep draft vessels that frequent the channel and harbor. Most of the historic maritime waterfront of Key West has been converted to hotel rooms, restaurants and bars (Figure 3.A.3), with Key West Bight retaining some of the types of establishments that support a maritime commerce. Commercial docking facilities are currently near the maximum that can safely be accommodated in the Harbor and the Bight.

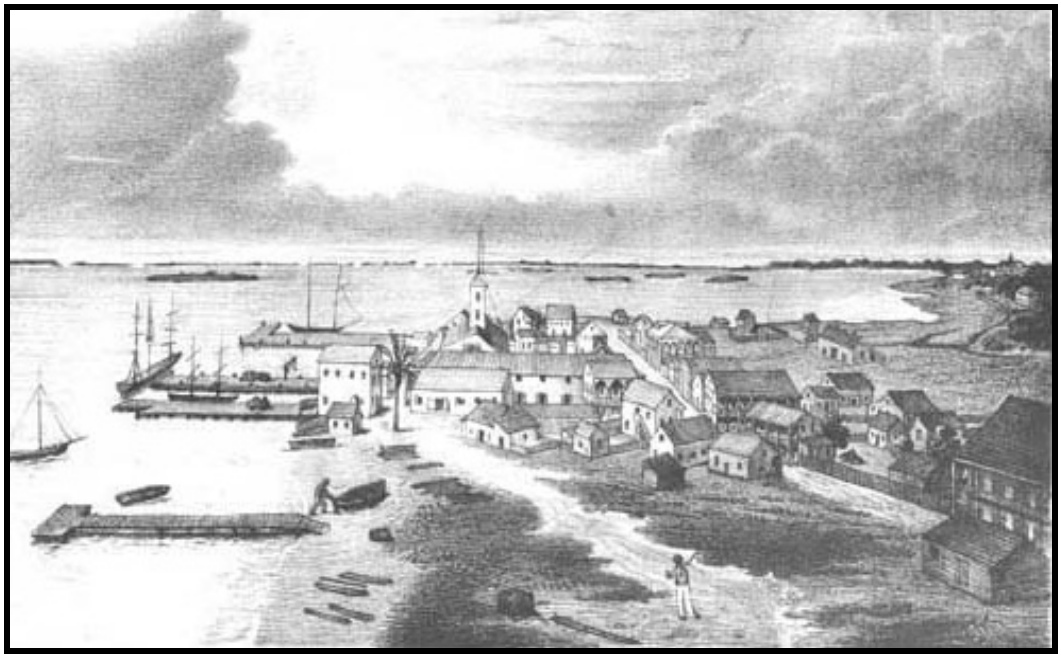
FIGURE 3.A.3. KEY WEST BIGHT (TOP) AND THE NORTHWEST CORNER OF KW IN 1987 (MCDONALD COLLECTION).

Extensive docks have been installed in Key West Bight since 1987.

3.A.2 History of Dredge and Fill and the Physical Alteration of the Key West Channel and Harbor

Jefferson Browne in 1912 described the uniqueness of Key West harbor prior to the large scale dredging and filling there - "It's harbor, landlocked by keys and reefs, in which the largest ships can float, has four entrances: the southwest passage has thirty-three feet of water on the bar; the main ship channel thirty feet; the southeast thirty-two feet and the northwest fourteen feet. A vessel leaving the harbor of Key West by the southwest passage has but seven miles to sail before she can shape her course to the port of destination, and through the main ship channel, but five miles. At very little expense the northwest passage can be deepened to twenty-four feet; this would enable the entire commerce of the gulf to pass through the harbor of Key West...." The dredging of the northwest channel never occurred although it was protected early on by long jetties. Early Key West settlers selected the high ridge on the northwest side of the island adjacent to deep water to build houses (Figures 3.A.4 through 3.A.6).

FIGURE 3.A.4. WHITEHEAD SKETCH OF THE NORTHWEST CORNER OF KEY WEST IN 1838 (STATE ARCHIVES OF FLORIDA).



The island of Key West nearly doubled in size by dredging and filling from about 1575 acres in 1829 to about 3000 acres in 1971 (Sherrill and Aiello 1978). Much of this increase was on the west shoreline including the creation of the Trumbo Point area in the early 1900s, the filling around Ft. Taylor that progressed through the mid 1900s, the filling of Truman Annex and the piecemeal filling of the shoreline for commercial uses that exist today. The filling of the Trumbo Point area of the north side of Key West was initiated in about 1911 to provide a terminus and offloading point for the Overseas Railroad (Figure 3.A.7). Commercial activity before the era of dredge and fill was concentrated on the north and northwest shorelines of the island (Figure 3.A.6).

FIGURE 3.A.5. 1855 NAVIGATIONAL CHART #469 OF THE WEST SIDE OF KEY WEST. AND THE HARBOR. DEPTHS ARE IN FATHOMS (NOAA).

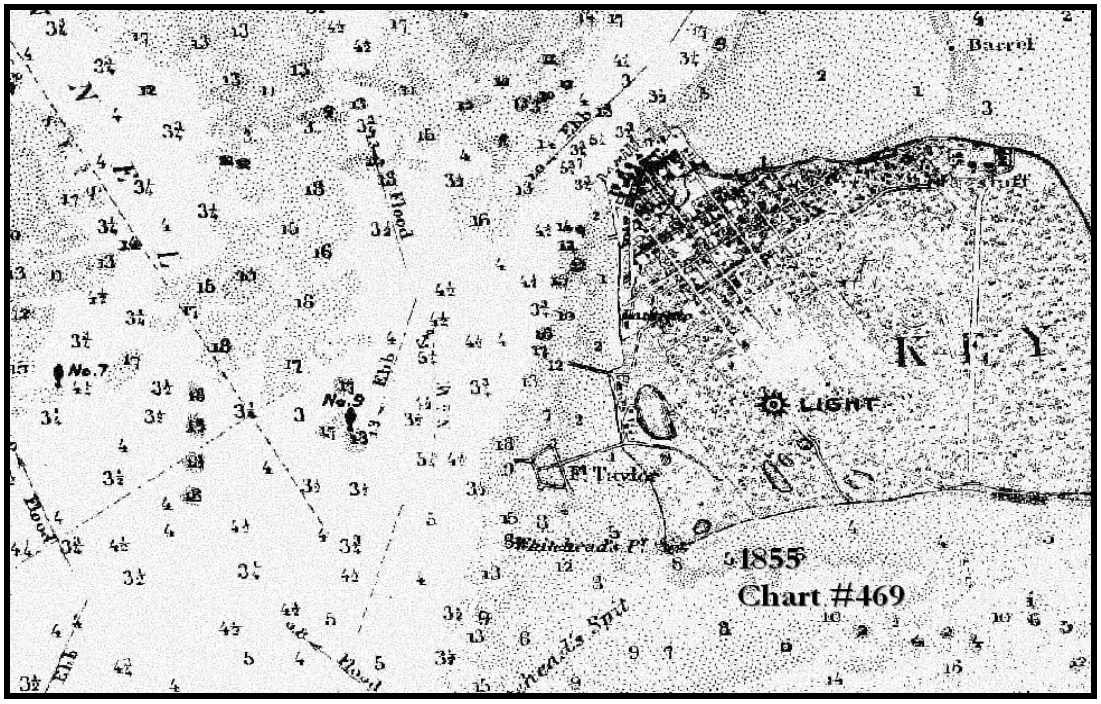


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FIGURE 3.A.6. 1870 SKETCH OF KEY WEST HARBOR WITH A VIEW TO THE SOUTHEAST.

Ft. Taylor is on the extreme right and the Front Street area is in the foreground (state archives of Florida).

Hydraulic dredges were used to pump up baybottom in the area. Fleming Key was created by dredging and filling. The Outer Mole was constructed by the Navy sometime between 1923 and about 1929. During World War II the Navy extended the 30 foot deep channel north to Trumbo Point to expand its operation there, Truman Harbor (a submarine base) was deepened and the shoreside facility there improved. Ft. Taylor, originally built in the sea and connected by a long access way, was eventually surrounded by fill that progressed seaward after World War II. (Figures 3.A. 8 through 3.A.11).

Current conditions along the harbor are provided a portion of the 1989 navigational chart #11441 at Figure 3.A.12. The radical conversion of the spoil island on the west side of the harbor originally known as Tank Island can be seen in Figure 3.A.13. Locations of the 3 cruise ship berths discussed in this assessment (Outer Mole, Pier B, Mallory Dock) are provided in Figure 3.A..14.

FIGURE 3.A.7. 1919 NAVIGATIONAL CHART (NOAA).

Reflecting filling on the northwest corner of the island and the long structure extending NW from Ft. Taylor. - depths in feet

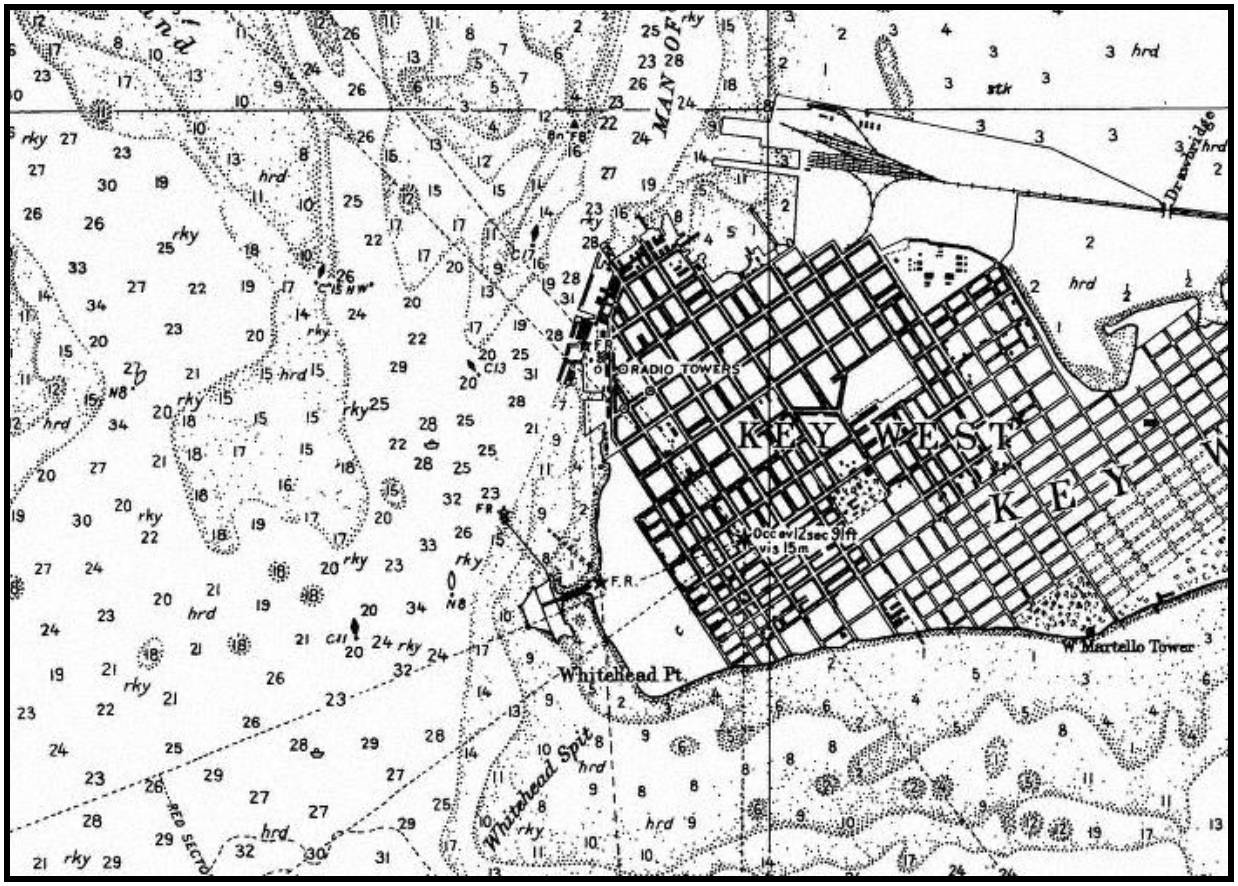


FIGURE 3.A.8. 1933 NAVIGATIONAL CHART (NOAA).

Showing Outer Mole connected to Ft. Taylor. The Trumbo Point complex has been filled and filling is progressing along the northwest corner of the island. Christmas Tree Spoil Island has been partly filled. Depths are in feet

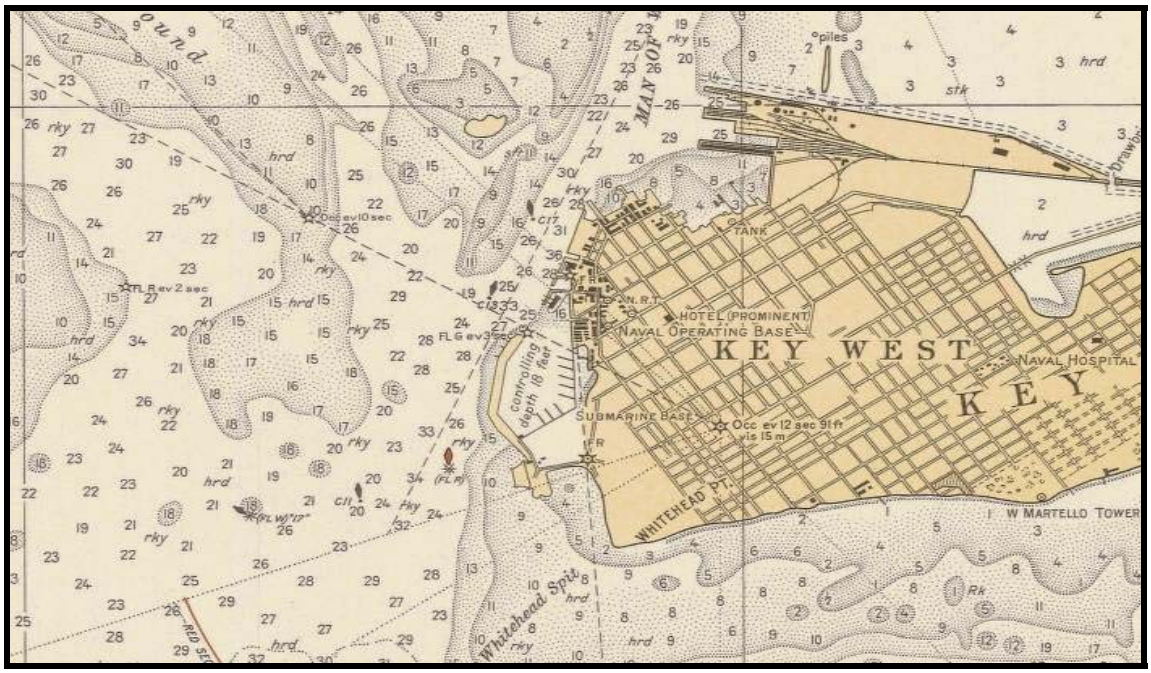


FIGURE 3.A.9. THE OUTER MOLE, SUBMARINE HARBOR, AND FILLING OF THE AREA AROUND FT. TAYLOR IN 1951 (FARALDO COLLECTION).

FIGURE 3.A.10. FILLING PROGRESSING OFFSHORE AROUND FT. TAYLOR AND ON TANK ISLAND IN THE 1950S (FARALDO COLLECTION).

FIGURE 3.A.11. 1966 NAVIGATIONAL CHART #576. (NOAA).

The era of large scale dredging and filling is nearly complete. Dredging of the channel and harbor recently completed. Depths are in feet

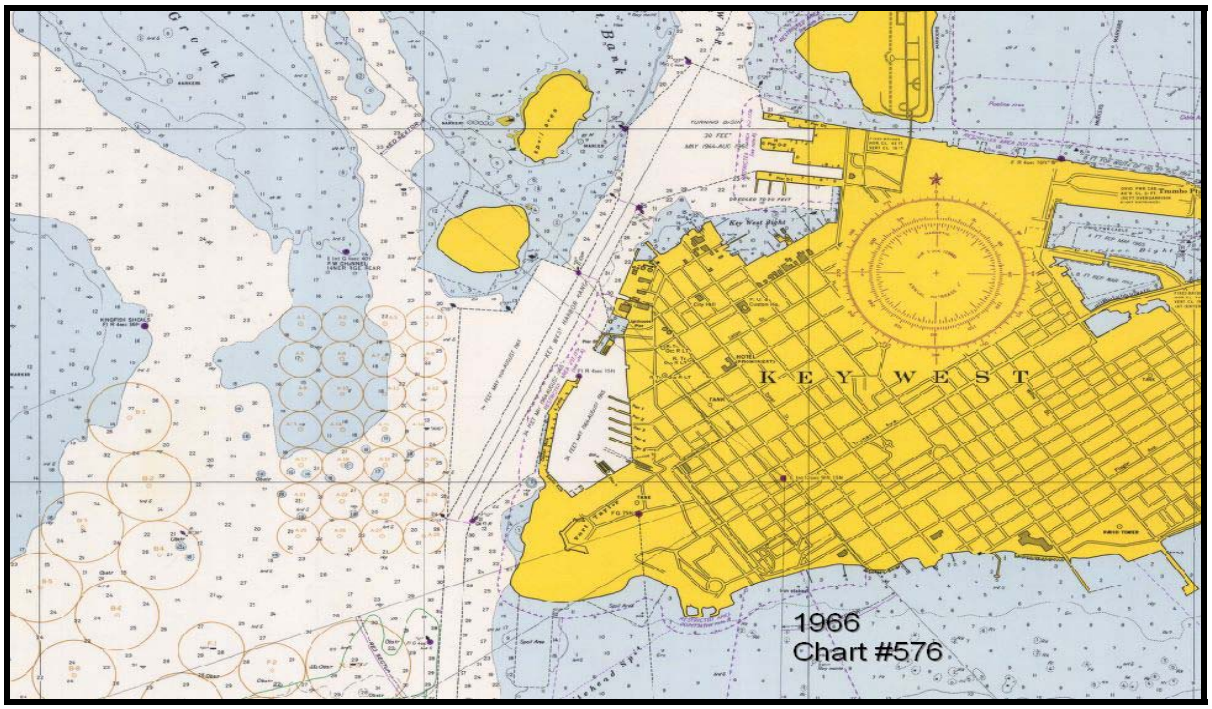


FIGURE 3.A.12. 1989 NAVIGATIONAL CHART REPRESENTS THE CURRENT EXTENT OF FILLING ALONG THE WEST SIDE OF THE ISLAND. DEPTHS ARE IN FEET (NOAA).

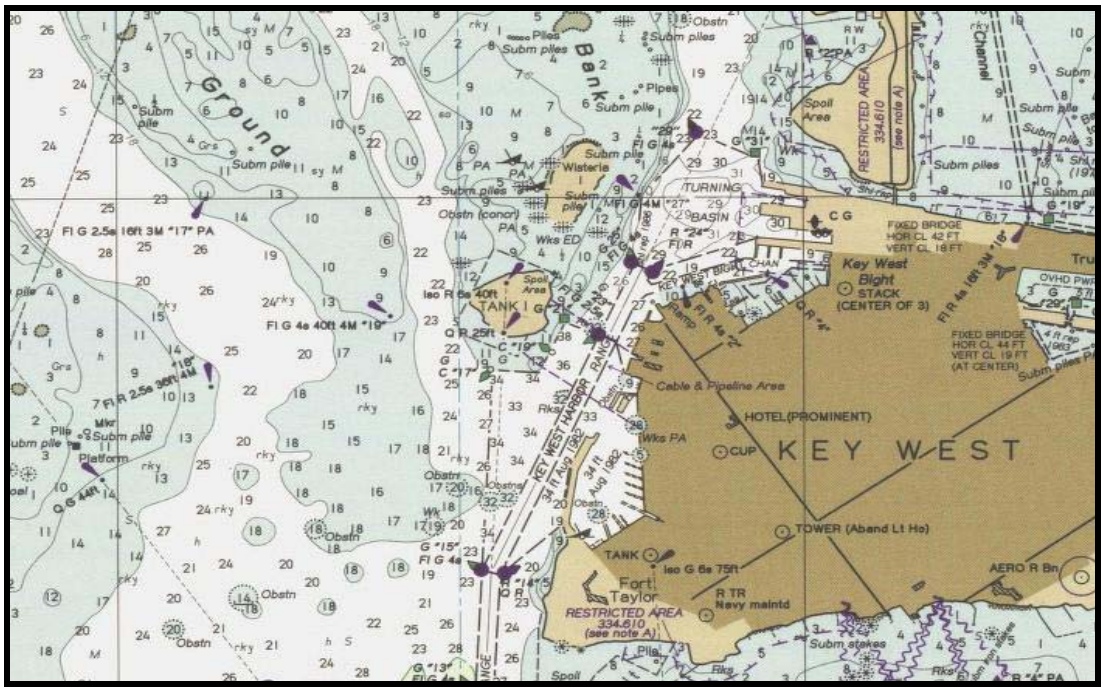


FIGURE 3.A.13. TANK ISLAND (SUNSET KEY), LATE 1990S VIEW. (MCDONALD COLLECTION).

On the west side of Key West Harbor, is a spoil island created by earlier dredging in the area later converted to luxury homes. The late 1990s view is towards the northwest corner of Key West across the channel. Anchored live-aboard vessels are common on the edge of the main channel

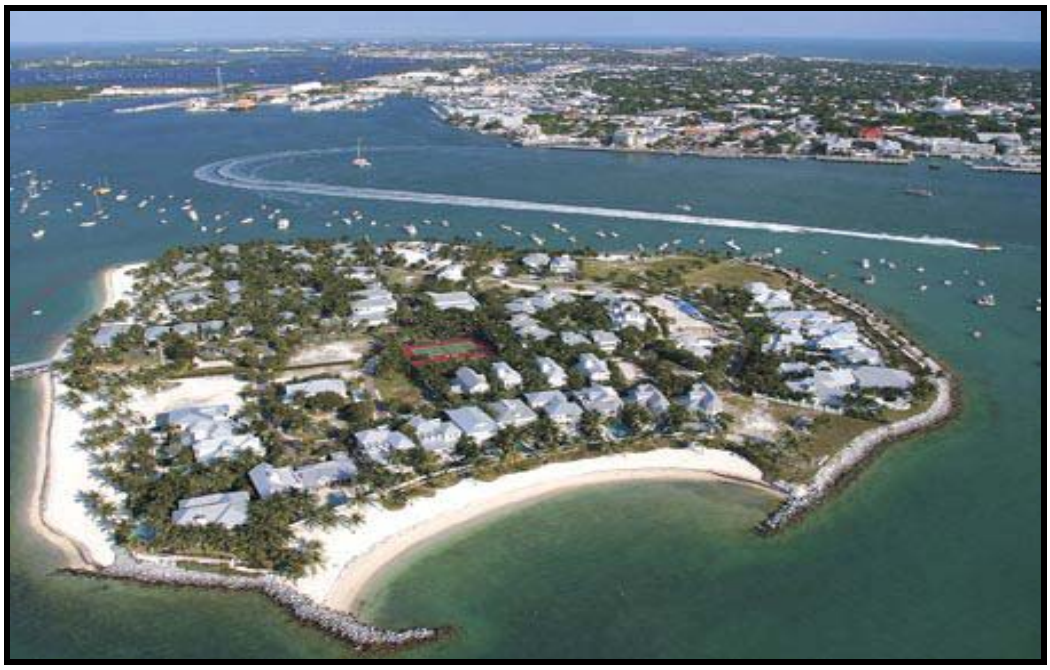


FIGURE 3.A.14. 1994 AERIAL VIEW OF KEY WEST CHANNEL AND HARBOR WITH CRUISE SHIP BERTHS NOTED.

A "Dredge History of Key West Ship Channel and Truman Harbor" was produced for the Navy by one of is contractors during the review of the Navy's permit application in 2003 (Anonymous 2003). It references old Navy permits and documents but includes little detail on when dredging actually occurred. The channel and harbor was designated a federal navigation channel in the early 1900s, to be managed by the Army Corps of Engineers. A long time resident of Key West, Ray Blazevic, relates that early harbor dredging occurred just after the turn of the century and the Dredge History refers to the removal of "reefs" in the main ship channel in 1908. Other references to the dredge history included early dredging in Truman Harbor in 1919; dredging during World War II, in the early 1950s, and large scale dredging again in the mid 1960s. Blazevic also relates that Tank Island was filled during World War II. Figure 3.A.8 shows that a small part of Wisteria (Christmas Tree) Island to the north had been filled as of 1933.

Major dredging took place in the mid 1960s and achieved controlling depths of about -34 feet mean low water (MLW). New dredging permits were issued to the Navy in 2004 by state and federal agencies, to include maintenance of previously dredged areas to the original design specifications, and new dredging that would remove a number of hardbottom areas in the main channel and remove an additional 2 feet of bottom as "advanced maintenance", with a 1 foot allowable over dredge. A maximum depth of -37 MLW was ultimately authorized over about 456 acres (Figure 3.A.15). The Navy's purpose for the dredging is discussed in Section 3.A.3 that follows. The Florida Department of Environmental Protection issued a Consolidated Environmental Resource Permit and Sovereign Submerged Lands Authorization (# 0207625-001-EI) in June 2003, and a permit was issued by the Army

Corps of Engineers (permit #200300203 (IP-PK)) in July of that year. The Florida Keys National Marine Sanctuary exempted the dredging from permit requirements and the need for formal authorization, considering it all maintenance work. They did review and comment on the Navy's 2003 draft Environmental Assessment (EA), and made recommendations for mitigation and monitoring.

A general description of the area to be dredged is included in the final Navy EA in 2003 - "The maintenance dredge of the Federal project channel in the waters off Key West would include the main Ship Channel beginning at its southern terminus, extending north and including cuts A, B, and C, the channel widener at cut C known as the turning basin, and Truman Harbor. The proposed maintenance dredge project would allow safe passage of additional types of Navy vessels making port calls to NAS Key West. Draft requirements of cruiser and destroyer class vessels preclude their entrance into Truman Harbor under existing conditions."

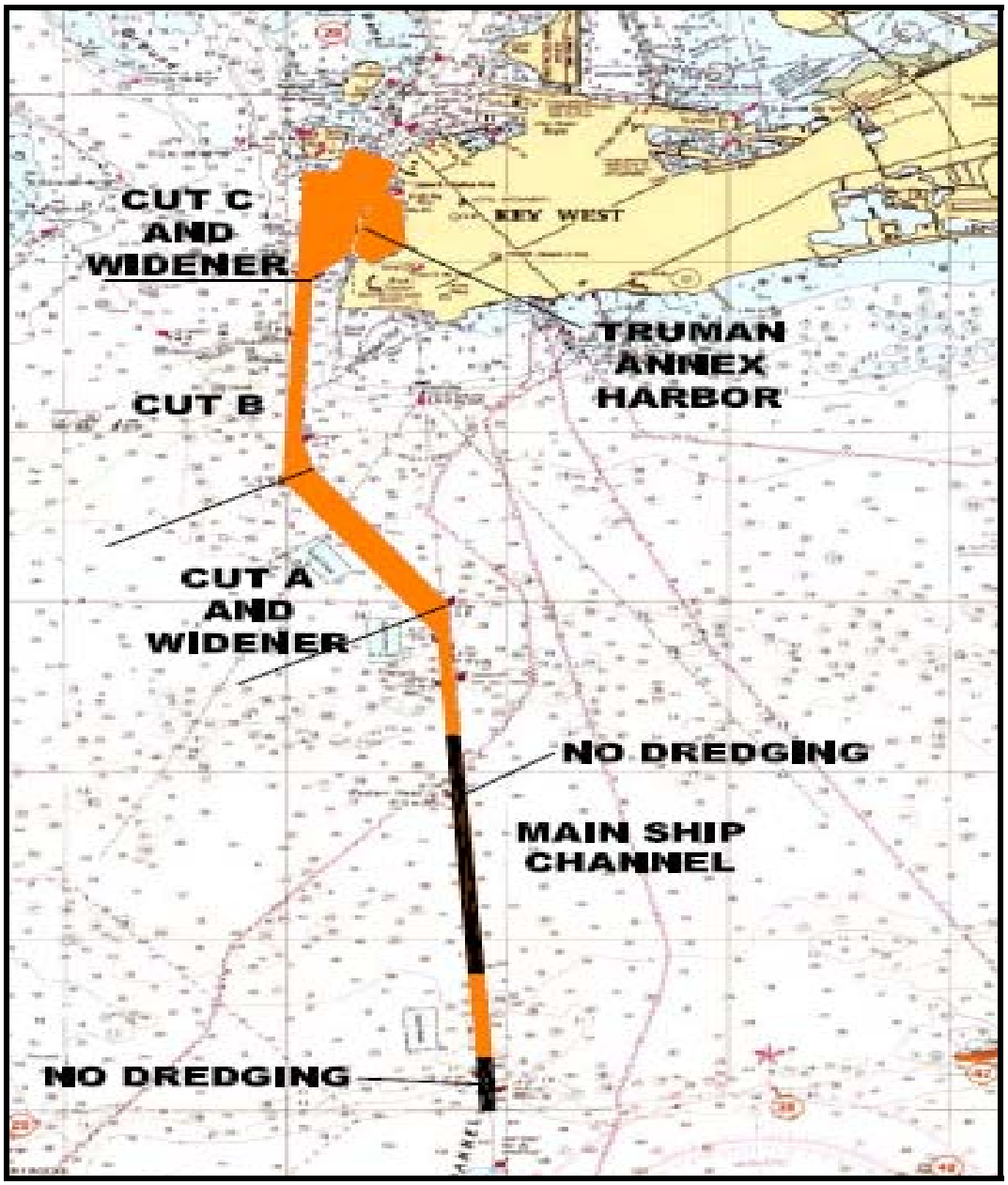
Pre-dredging bathymetry as of 2001 is reported in the 2003 Navy EA as "Depths in the Main Ship Channel range from about 32 ft to greater than 40. The depth less than 34 ft occurred along the sides of the north end of the Main Ship Channel. Depths in the next portion of the Ship Channel toward Key West (Cut A) range from less than 34 ft to over 40 ft. Depths in the center of the channel are generally greater than 35 ft In the next section of the channel toward Key West (Cut B), water depths in the channel were greater than 35 ft . In the basin outside of the Truman Annex Harbor (Cut C), water depths were typically greater than 35 ft. A contour plot of the depths in Truman Harbor was developed based on preliminary bathymetric data collected by Continental Shelf Associates, Inc. Water depths in the center of the harbor were greater than 35 ft. Shallower areas were observed along the eastern and southern boundaries of the harbor. Near the entrance of the harbor, depths of less than 34 ft were observed." The Navy's channel and harbor deepening project was initiated in 2004, is ongoing, and is expected to be completed later in 2005.

3.A.3 History of U.S. Navy Use of the Channel, Harbor, and Docks

The Navy provides summarizes its history in Key West in the 2003 EA for the current dredging project - "The U.S. Navy's presence in Key West dates to the early 1800s, when a Naval base was established to support the fledgling nation's war on piracy. The base expanded and contracted over the years until World War I, when a Naval Submarine Base and Naval Air Base were commissioned to support the effort to interdict the German Navy. During the period between WWI and WWII, the Navy presence was greatly reduced and facilities were abandoned or sold. Activity at NAS Key West increased at the outbreak of WWII, and it was designated as a NAS. Although the Navy presence in Key West was greatly reduced and consolidated after the war, the Navy retained NAS Key West as a training site. After the Cuban Missile Crisis and during the DOD Cold War build up, the NAS facilities and missions grew. In the last decade, the Station's Atlantic Fleet support missions have changed: various properties have been excessed and home ported aircraft and ship squadrons have been decommissioned or relocated. These downsizing efforts continued with the Base Realignment and Closure Commission determinations of 1995.".

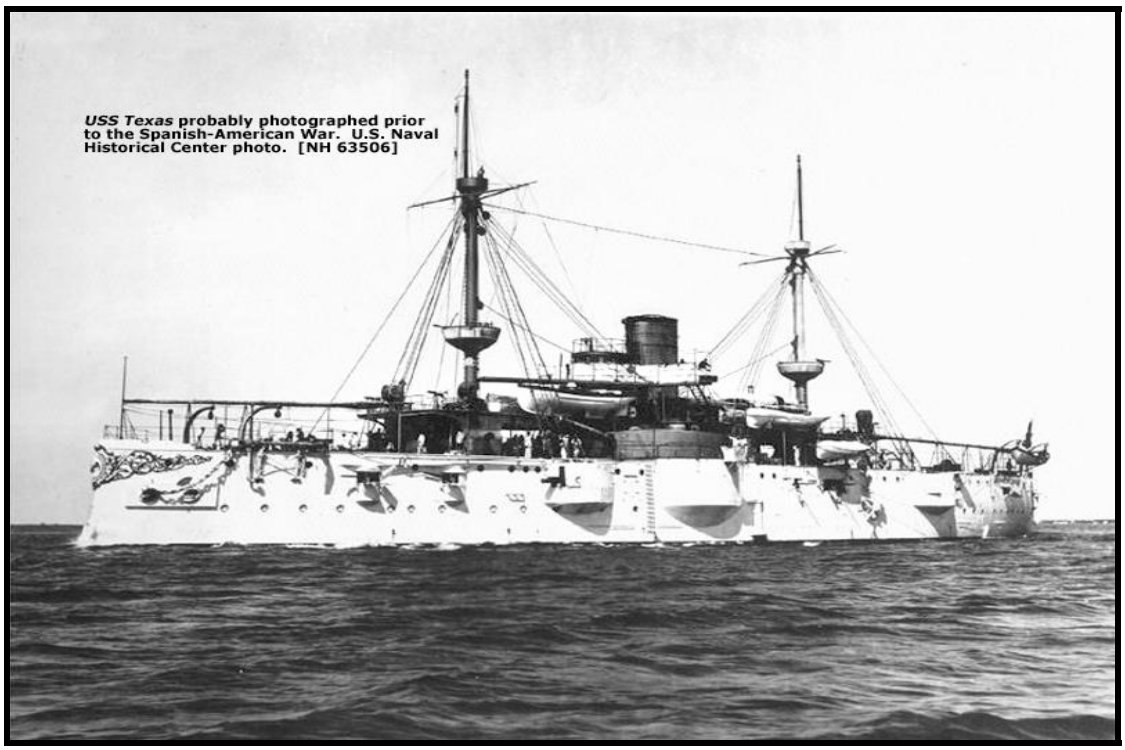
FIGURE 3.A.15. AREAS TO BE DREDGED IN CURRENT NAVY DREDGING PROJECT. (NAVY 2003.)

The main ship channel and cut b are 300 feet wide



The Navy presence in Key West was expansive and an impressive display of power at times, especially during periods of war or external threats, and usually included many of the largest and most capable vessels afloat. These periods include the days of piracy (Figure 3.A.1) and the Civil War when Key West was the headquarters of the Eastern Gulf Blockading Squadron, with more ships berthed than anywhere else in the U.S. The Spanish American War, as close as nearby Cuba in the very late 1800s, resulted in the American Battle Fleet being based in Key West along with steel cruisers and battleships from the North American Flying Squadron that was blockading Cuba. One of the large Navy vessels to visit Key West during the war was the *USS Texas* from the North Atlantic Squadron (Figure3.A.16). The steel *Texas* was 308 feet long, had a draft of nearly 23 feet, was rated at 6,315 tons, and had a top speed of about 17 knots.

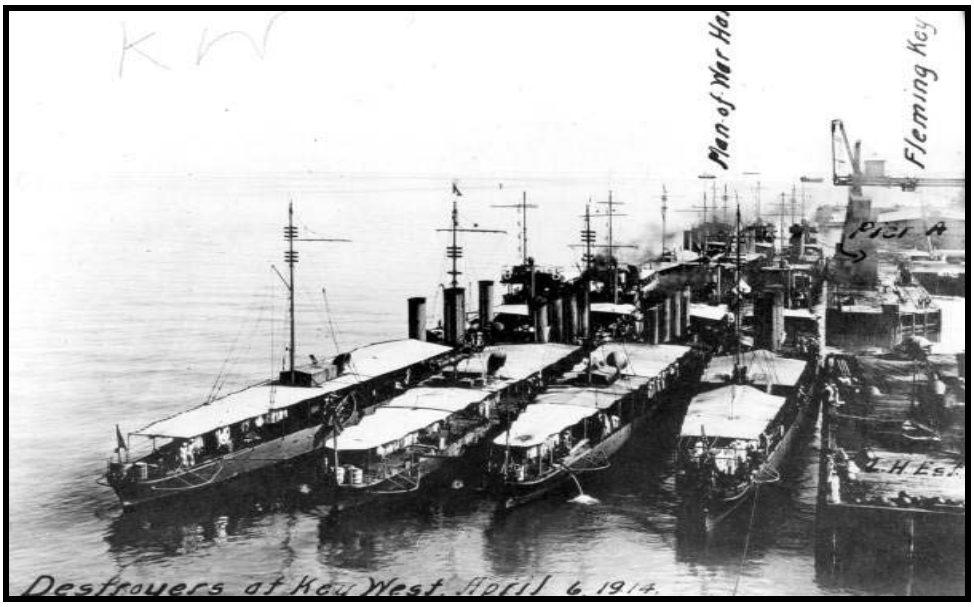
FIGURE 3.A.16. THE *USS TEXAS* IN THE LATE 1800'S (U.S. NAVY).



In 1902, the Navy condemned the southwest shore of Key West and began the construction of a Naval Base there. Naval use of the Trumbo Point area expanded around 1911 when Henry Flagler began dredging the harbor and filling baybottom there.

World War I saw Key West Naval Station activated as the Strategic Center of Caribbean Defense and docks and piers built at the Naval Station and Trumbo Point to berth coastal patrol vessels, submarines, destroyers (Figure 3.A.17), and battleships. German U-Boats patrolled water of the south Atlantic and Caribbean during World War II and from 1941 to 1945 Key West saw the busiest period for large vessels in its history when there were more than 14,000 visits by cargo and military ships. Anti-sub patrols were based out of Key West during the war and bar pilots had to be brought to Key West to help handle the large vessel traffic.

FIGURE 3.A.17. NAVY DESTROYER CLASS VESSELS IN KEY WEST IN 1914 (STATE ARCHIVES OF FLORIDA).



During the 1950s and 1960s the Naval Station was one of the largest submarine bases in the world. In 1962 Key West Naval Station supported the fleet blockading Cuba during the Cuban Missile Crisis. By 1973 all submarine activity had been discontinued and in 1974 the Naval Station closed, and all ships and shoreside facilities were closed. In 1980, the Navy assisted with handling the exodus of 125,000 Cubans traveling by sea from Cuba by all manner of crafts and vessels. Through the 1980s the Navy used the Outer Mole and other facilities for berthing military vessels in transit (Figure 3.A.18). In 1985, the Navy transferred a squadron of hydrofoils to Key West that remained until the 1990s when the squadron was decommissioned (Figure 3.A.19). In the 1990s a fleet of aerostat vessels assisted in drug interdiction as part of the Joint Interagency Task Force East based in Key West, as did other military and U.S. Coast Guard (USCG) vessels. Military vessel activity continues today for the war on drugs and terrorism.

FIGURE 3.A.18. THE U.S. NAVY VESSEL *SPIEGEL GROVE* DOCKED AT THE OUTER MOLE IN 1982 (MCDONALD COLLECTION).

This 510 foot long vessel was sunk in 2002 off Key Largo as an artificial reef.

FIGURE 3.A.19. NAVY AMPHIBIOUS SHIP AND HYDROFOILS AND USCG VESSELS BERTHED AT TRUMBO POINT IN 1988 (MCDONALD COLLECTION).

Through the 1800s the Navy's mission in Key West made use of the deep natural harbor. In the 1900s deepening and widening of the offshore main channel and the inner harbor and turning basin proceeded incrementally. The last large scale maintenance dredging by the Navy occurred in the mid 1960s with the full channel and harbor later first reflected in 1966 navigational charts (Figure 3.A.11).

The Navy's justification for the current dredging project and improvements to the Outer Mole is found in the 2003 EA - "The Navy proposes to modernize ship and aircraft support functions and facilities at the Naval Air Station (NAS) Key West including Boca Chica and Truman Harbor. The Navy needs to undertake such modernization to meet ongoing and new training readiness requirements. By making improvements to existing facilities, the Navy intends to build redundancy into east coast training locations and infrastructure support capability so that operational units can better achieve unit level, intermediate, or advanced qualifications at the most effective and efficient operations tempo. The proposed project would improve existing ship support by providing modern facilities designed for twenty-first century ships. Improvements at Truman Annex would provide modern ship berthing facilities, limited repair capability, force protection and improvements to navigational safety. Increased port visits at Truman Annex, by Naval ships are anticipated because the berthing and mooring will be designed to accommodate both cruisers and destroyers in addition to those ships that already visit (frigates, minesweepers, etc.), and the Annex would be able to accommodate more than one ship at a time. Key West's unique location between the Gulf of Mexico and the Atlantic Ocean, coupled with the capacity for upgraded/future technologies, afford the Navy efficient and effective means to support nearby at-sea readiness activities and to provide logistics and maintenance support for ships and aircraft. These support functions will facilitate timely Carrier Battlegroup (CVBG) certification before each overseas deployment. While the Navy will retain the property for Navy use, the Navy also proposes to lease the Outer Mole portion of the property to the City of Key West to allow cruise ships to moor and onload and offload tourists, in the same manner contemplated in the 2000 Draft EA. The Navy will retain priority use of the Outer Mole for occasions when needed for operational requirements. The proposed lease is incorporated herein by reference."

The Annex supports Atlantic Fleet ships with berthing, freshwater, and occasionally fuel and other support services. In addition, by agreement with the City of Key West, Truman Annex also serves as a cruise ship berth. NAS Key West at its various locations is the host facility for numerous tenant activities, including the U.S. Coast Guard, U.S. Army Special Forces Underwater Training School, and NOAA to name a few. Table 3.A.1 was derived from Navy data and their interviews with Coast Guard and Navy personnel as well as others and provides typical ship visits at Truman Annex. Combatant ships that visit Key West may be enroute to other parts of the globe or operating in the Florida area (Navy 2003).

TABLE 3.A.1.

Typical Annual Support Provided by NAF Key West: Ships (1997-2001)

Ship Type	Visits Per Year		Crew Size	Services*		
	Number	Duration (days)	(average)	Fuel	Water	Electric
U.S. Navy Small Combatant	8	3	316	O	Y	Y
U.S. Navy Mine Warfare	25	2	66	F	Y	Y
USNS	15	3	39	F	Y	Y
U.S. Coast Guard WMEC	8	3	87	O	Y	Y
NOAA	10	2	35	O	Y	Y
U.S. Navy Patrol Boats	5	2	39	F		Y
Foreign Combatants	5	5	320	O	Y	O
Other Use						
Research Vessels	5	2	25	O	Y	O
U.S. Army	4	4	16	O	Y	O
Cruise Ships	130	8-12 Hours	1,200	N/A	N/A	N/A
* O = Occasionally	F = Frequently	Y = Always	N/A = Not Applicable			

Navy combatants use NAS Key West to pick up mail, personnel and supplies and as a liberty port while operating independently or as part of a larger force. The Mine Warfare ships frequently use Key West as a way point while operating away from their home base, with typically more than one ship visiting at a time. Visiting Coast Guard Medium Endurance Cutters are usually in the area as part of JIATF interdiction patrols, and use Key West for the same purpose as the Mine Warfare ships as well as a local base of operations. They usually patrol for five to ten days and return to NAS Key West for three days. Navy Coastal Patrol Ships (PCs) and Coast Guard Patrol Boats usually patrol for three to four days and then return to Key West for two to three days. Navy ships visit Key West as part of the JIATF mission as well as other surveillance and oceanographic survey missions. Foreign Navy ships use Key West NAS as a liberty port when operating with US Navy ships and while operating independently enroute to South America and the Caribbean. Cruise ships berth at Truman Annex when the other city berths are being used. They stay about half a day and require no services (Navy 2003).

An example of large vessel activity associated with maritime activity of the U.S. Coast Guard in Key West is the vessel *Mohawk*, the last of the 270-foot "Famous" class cutters. Since the time of her commissioning in March of 1991, she has served the Coast Guard in a wide variety of missions out of Base Key West including Search and Rescue, Maritime Law Enforcement, and Alien Migrant Interdiction Operations.

The Navy's future plans for the Outer Mole and Annex is explained in a 2003 letter from the Navy to the State of Florida during the dredging permit review process ".....an expeditious review of these fast tracking repair projects is needed as they play a vital role in supporting the U.S Atlantic Fleet war fighter readiness by providing maximum support capacity for all existing operational requirements, newly generated Anti-Terrorism Force Protections initiatives and enabling the optimal use of continental U.S. based training locations and resources for Carrier Battle Groups, Amphibious Ready Groups and Marine Expeditionary Units."

3.A.4 History of the Key West Cruise Ship Industry and the Evolution of Industry Vessels Using Key West Channel and Harbor

Although passenger ships had been visiting Key West for many years picking up and delivering passengers, the initiation of the cruise industry at the Port of Key West is considered to have begun with a visit by the *Sunward* in 1969. It was the first regularly scheduled cruise ship; it moored at either the Outer Mole or Pier B, and visited about once a month (*www.keywestcity.com*). In the next 15 years City records show that the Port received 266 calls by cruise ships, averaging about 1-2 visits per month. In the early 1970s the cruise ship *Bolero* (526 feet long, 23 foot draft, 15,781 gross tons and carrying up to nearly a 1,000 passengers) began weekly visits. There is some indication that cruise ships visiting during this period used Mallory Dock (but see Figure 3.A..20); other information suggests only Pier B and the Outer Mole were being used. In 1984 the City made much needed improvements to Mallory Dock making it a full cruise ship docking facility (Figure 3.A.21). During the 1992/1993 fiscal year 256,000 cruise ship passengers visited Key West and during the 2002/2003 fiscal year 1,122,200 passengers visited the 3 cruise ship berths in the harbor (Figure 3.A.22).

Visits by cruise ships to Key West have increased in number nearly every year since the early 1990s and the number of cruise ship passengers visiting Key West increased ten fold from 1990/91 to 2002/03. At the same time the size of cruise ships has increased in the Bahamas-Florida-Mexico-Caribbean route and some vessels currently under construction are even larger.

FIGURE 3.A.20. MALLORY SQUARE DOCK IN 1961 (STATE ARCHIVES OF FLORIDA).

FIGURE 3.A.21. MALLORY SQUARE AND CRUISE SHIP BERTH IN 1987 (MCDONALD COLLECTION).

FIGURE 3.A.22. CRUISE SHIPS BERTHED AT PIER B (FOREGROUND) AND ANOTHER AT THE OUTER MOLE IN 2004 (KEY WEST CITIZEN).

View is to the south.

Calling in 1935, the *Florida* was one of the earliest passenger-cruise ships to visit Key West. It had a gross tonnage of 4,302 tons, a steel hull, and a twin screw propulsion system powered by two geared steam turbines. It was 366 feet long, 57 feet wide, yet had a draft of nearly 29 feet. It was designed for passenger service with accommodations for 742 cruising passengers. The *Florida* was built in 1931 in Newport News, Virginia, at a cost of $2.6 million. It did the Port Tampa-Key West-Havana run for many years.

An example of the current size and power of cruise ships visiting Key West - the *Enchantment of the Seas* - is one of the largest cruise ships in the world. It was built in 1997 in Finland at a cost of $300 million. It's considered a mega-class cruise liner, is 916 feet long and 106 feet wide, is rated at 74,137 gross tons, has a draft of 25 feet, carries up to 2,440 passengers, and has a maximum speed of 24 knots. *Enchantment of the Seas* is equipped with diesel-electric power plant machinery with electric propulsion motors. The main engines are four diesel engines each generating maximum power of 12,600kW. There are two main stern propellers, two 1,750kW bow thrusters, and a single 1,750kW stern thruster (*http://www.ship-technology.com/projects/enchantment/*). But, as can be seen in the above descriptions and in Table 3.A.2 , smaller size vessels do not necessarily equate to shallower drafts, but smaller vessels are usually less powerful. From the summary provided in the following table the "average" large cruise ship visiting Key West in recent years is rated at about 63,000 tons, is 810 feet long with a 25 foot draft, and can carry nearly 2,000 passengers.

TABLE 3.A.2. INFORMATION ON 30 CRUISE SHIPS VISITING (OR PROJECTED TO VISIT) KEY WEST IN RECENT YEARS, SORTED BY GROSS TONS (WARD 2005).

Cruise Ship	Gross Tons	Length (ft)	Draft (ft)	Maximum # of Passengers
Summit	91000	965	26	2450
Radiance of the Seas	90090	962	28	2500
Jewel of the Seas	90090	962	28	2500
Costa Atlantica	85700	960	26	2680
Costa Mediterranea	85700	960	26	2680
Disney Magic	83338	965	26	3325
Westerdam	81769	960	26	2272
Zuiderdam	81679	951	26	2272
Rhapsody of the Seas	78491	915	24	2435
Mercury	77713	866	25	2681
Enchantment of the Seas	74137	916	25	2446
Grandeur	74137	916	26	2446
Majesty of the Seas	73941	880	25	2244
Century	70606	807	25	2150
Fascination	70367	855	26	2634
Imagination	70367	855	26	2634
Splendour of the Seas	69130	867	25	2064
Volendam	60906	781	26	1850
Veendam	55451	719	25	1627
Costa Romantica	53049	719	25	1779
Crystal Harmony	49400	790	25	1010
Seven Seas Mariner	48015	713	21	752
Celebration	47262	733	26	1896
Horizon	46811	681	24	1660
Zenith	42255	681	24	1800
Norwegian Majesty	40876	680	20	1790
Seven Seas Navigator	28550	560	21	530
Saga Ruby	24492	627	27	655
Radisson Diamond	20295	430	26	354
Wind Surf	14745	614	16	308
Average	62679	810	25	1947

A review of the current state of cruise ship construction is provided at *http://www.maritimematters.com/dakesnewships.html* - "The cruise ship industry is still considered to be a growth industry, and, as of January 2004, current tonnage on order worldwide was over 2 million gross tons. Cruise lines building vessels in European ports waiting for an improvement to the exchange rate of the Dollar to the Euro, only saw the dollar sliding further, and with their desire for more new tonnage combined with attractive multi-ship package deals, resumed placing orders for ever larger vessels at the end of 2004 and into 2005. As these new vessels come on line, the cruise industry will see significant growth from now through 2007."

The building of larger cruise ships in order to provide a better guest experience is expected to continue, but the number of smaller ships (of about 100 passengers) is also expected to increase. The larger ships are already constrained by draft so it is not expected that they will also be deeper draft vessels - they are expected to simply be longer. Some older ships will be "stretched" insofar as they will be cut, and a new midsection added, then put back together. The niche market of smaller cruise ships - more intimate and more unique in their itinerary (Galapagos Islands, ice breaking, river cruises, etc.) - is also expected to increase as eco-tourism continues to grow (S. Collins, pers. comm.).

The Berlitz *Ocean Cruising and Cruise Ships 2005* volume reports that twelve new large ocean-going cruise ships are predicted to debut from 2005 to 2007 - all are being built in European shipyards (Ward 2005*)*. They represent large investments by 11 different cruise lines, range from 81,000 to 160,000 tons, from 951 to 1,115 feet in length, and carry up to 3,600 passengers. Royal Caribbean International (RCI) recently announced the keel being laid on *Freedom of the Seas*, a cruise ship much like the RCI Voyager class vessels that will be the largest cruise ship in the world when completed. The large Royal Caribbean Cruise Lines ships now visiting Key West (*Enchantment of the Seas, Rhapsody of the Seas,* and *Majesty of the Seas*) are about one-half the size (~70,000+ tons) of the RCI Voyager class (~130,000 tons). Currently the Voyager class ships due to their 29 foot draft don't make port calls in Key West.

Pier B was renovated in about 2000 to better accommodate cruise ships and incorporated an engineered design hoping to reduce resuspended sediment from the movement of large ships due to changes in the angle of the berthing piers. Mallory Dock was renovated in 1984 and again in the 1990s to better accommodate large cruise ships and the Outer Mole was reconstructed in 2004 to better handle both military and cruise ships.

3.A.5 History of Use of the Outer Mole

Permits were issued in 1919 by the Department of the Army to the Navy "...to construct a breakwater, seawall, and piers, and to dredge a basin and fill behind the seawall at the proposed submarine base, Key West, Florida" (Anonymous 2003). The breakwater referred to is likely the beginning base section of the Outer Mole extending out from Ft. Taylor. Although some reference is made in the literature to construction of the Outer Mole during World War I, the full breakwater doesn't appear on 1919 (Figure 3.A.7) or 1923 navigational charts of Key West, but it does appear on a 1933 chart (Figure 3.A.8).

Operational use of the Outer Mole in its early years was likely strictly for military vessels but during the depression the Navy allowed private vessel owners to use the "sub basin" and probably the Outer Mole itself for private use. During World War II the Outer Mole was

undoubtedly a very active wharf as large numbers of military and convoy vessels visited and were home ported in the limited waters of Key West harbor and Truman Harbor as the sub basin came to be known later.

As Truman Harbor became one of the largest submarine bases in the world during the 1950s and 1960s, the Outer Mole was likely an integral part of the base, functioning as both a protective breakwater and a loading dock and berth for large vessels. There is some indication in the literature that the first true cruise ships to visit Key West, the *Sunward* and later the *Bolero*, might have docked at the Outer Mole at times beginning in about 1969.

In 1996 the Navy allowed the City to use the Outer Mole for dockage of cruise ships on an emergency basis. This led to a request from the City to the Navy to allow shared use of the Outer Mole and in 1998 scoping for the Draft Environmental Assessment - Disposal and Reuse of the Truman Annex Waterfront was conducted as part of the Key West Chapter 288 Base Reuse Plan as required by the City's Comprehensive Plan and Principles for Guiding Development.

A current description of the Outer Mole (Mole Pier) area and plans for its use and reuse is provided in the 2003 Navy EA - "The Truman Waterfront area consists of about 45 acres of land, including the Mole Pier. The 7.6 acre Mole Pier includes the pier facilities (breakwater, berthing wharf, electrical distribution line, sanitary sewer line, waste distribution line, pipeline, telephone lines, street lighting, paved roads) and two buildings totaling 1,679 square ft. The significant amount of infrastructure at the pier was constructed as part of a 1986 improvement plan to ready the basin to homeport a surface attack Fleet but the plan was never carried out. The Truman waterfront commands almost a mile of deepwater harbor waterfront, and must remain a port in perpetuity. The Mole Pier currently is used to berth cruise ships and military vessels. The City has a license with the Navy to provide cruise ship berthing at the outer Mole Pier. Berthing uses have also been granted to the inner Mole berths. In 1995, NOAA, the State of Florida and the city of Key West identified parcels for use and plans were developed to transfer ownership. In 2002, the Atlantic Fleet identified a possible need to retain approximately 30% of the 53 plus acres proposed for transfer to the city. The 16 acres the Navy proposes to retain include the Mole Pier and some buildings previously used for ship maintenance. The Navy is proceeding with transferring slightly more than 32 acres on the east side of the harbor for use as parkland and a marina by the City. Under the proposal, the Navy will maintain joint use privileges with the city for cruise ship berthing at the outer Mole Pier."

About $13 million of renovations to the Outer Mole by the Navy were initiated in mid 2004 and included strengthening the pier and installing ship services that will provide moored ships electrical power, telecommunications and sewage removal. A portion of the end of the pier was removed effectively widening the access channel into Truman Harbor.

3.A.6 History of Scientific Work Conducted in and Around Key West Channel and Harbor and Data Available from That Work

Benthic communities in the Key West and Lower Keys areas have been described, summarized, and mapped by marine scientists. Water quality has been monitored and physical processes investigated. Fishery resources have been inventoried and managed. Older surveys and assessments of existing marine habitats and resources in the area were probably conducted during the permitting review for previous Navy dredging work but were not available for this review. For purposes of this historical account and the more specific reviews in Section 3.B, the focus will be on studies that include the immediate vicinity of Key West, especially south of Key West and the channel and harbor area. Studies are noted and referenced here if they provided useful data bases to help synthesize information or determine changes over time and space - due to either natural or human causes. Those that only document conditions at one point in time have limited utility but can provide general information for specific sites.

A synthesis of available biological, geological, chemical, socioeconomic, and cultural resource information for the South Florida area, including around Key West, was developed in the late 1980s by the Federal Minerals Management Service in anticipation of oil leasing in the southeast Gulf of Mexico. Fishery Management Plans by the Gulf and South Atlantic Fishery Management Councils were developed for a number of species and habitats found near Key West including for coral (GMFMC 1982, SAFMC 1995). A community profile of the ecology of south Florida coral reefs was developed in 1984 (Jaap 1984), and a species profile on reef- building corals in 1987 (USFWS 1987). The 1985 Coastal and Ocean Zones Strategic Assessment Data Atlas prepared by NOAA includes distributional and biological data on many important species that occur in the Key West area, as well as information on the physical environment and human activity that shapes the marine environment of the region. Extensive water quality information was accumulated and reported by the State for the Outstanding Florida Waters (OFW) designation in the mid 1990s. Keys marine habitats and ecosystem processes were extensively described in the Final Management Plan and Environmental Impact Statement for the FKNMS in 1996. Compilation and synthesis of information on the biology, geology, oceanography, ecology, and history of the Florida Keys were undertaken by Chiappone (1996) and provides a detailed view of the Keys marine habitats and physical processes, including around Key West. In 1997, the Monroe County Environmental Story was updated and published through a community effort and includes many articles on the history, natural history and cultures of the Florida Keys, including those of Key West.

Management plans for neighboring the Key West National Wildlife Refuge and the Great White Heron National Wildlife Refuge include descriptions and information on marine and fish and wildlife resources of these unique areas (USFWS 1997). Detailed multi-species recovery plans produced by the U.S. Fish and Wildlife Service include descriptions of the biology and habitats of many listed species that occur in the Key West area (USFWS 1999). Ecological characterizations for the unique habitats of the south Florida area have been written. Socioeconomic monitoring of fisheries in the Florida Keys National Marine Sanctuary have been conducted including for the Key West area, and fisheries production in the area is well documented with annual statistics. The 2000 Atlas of Marine Resources

developed by the Florida Fish and Wildlife Commission includes data sets on important marine resources that occur near Key West.

In 2000, the Navy prepared a Final Environmental Assessment for Disposal and Reuse of Truman Waterfront that generally addressed resource issues in the area. In 2002, the Navy produced the Integrated Natural Resources Management Plan for Naval Air Facility Key West. The 2003 Navy EA provides a detailed review of what is known about the resources and habitats around the channel and harbor area. The Army Corps of Engineers contracted for turbidity monitoring and bathymetry survey work from 2001 through 2003. Two work groups addressed large vessel activity in the Key West area, reviewed information available, and provided summaries and recommendations (LVWG 2002-2004).

The FKNMS Water Quality Protection Plan began in 1994 and consists of status and trends monitoring of three components: water quality, coral reefs and hard-bottom communities, and seagrasses. Sanctuary-wide status and trends monitoring based on monitoring at many stations, including some near Key West, is designed to detect large-scale ecosystem changes associated with Everglades restoration and other regional-scale phenomena. A part of the WQPP, turbidity has been monitored along with other a number of water quality parameters at Western Head Reef off Key West and in the main ship channel offshore. Quarterly data collection began in 1995 and continues.

The second scale of monitoring is associated with the Sanctuary's 24 fully protected zones, including near Key West the Sanctuary Preservation Areas (SPA) at Eastern Dry Rocks, Rock Key, and Sand Key to the west of the main channel entrance, and the Western Sambos Ecological Reserve to the east. These are monitored through the Zone Monitoring Program (ZMP). The goal of this program is to determine whether the zones are effective in protecting marine biodiversity and enhancing human values of the FKNMS. Coral Reef Ecosystem Process Studies are another aspect of the long-term monitoring of resources in the FKNMS, including at reefs near Key West. Data are available for these variable scale monitoring projects through 2003 and 2004. Measures of management effectiveness include the abundance and size of fish, macroinvertebrates, and algae. The ZMP includes monitoring changes in ecosystem structure (size and number of invertebrates, fish, corals, and other organisms) and functions such as coral recruitment, herbivory, and predation. Routine and systematic coral monitoring, including for species cover, diversity, density and size, and species richness also take place offshore near the main channel at Western Head Patch Reef and Cliff Green Patch Reef (http://www.floridakeys.noaa.gov/research_monitoring/2001.htm).

Reef Fish Monitoring occurs at the SPAs near Key West. The goal of this monitoring is to assess changes in reef fish populations in zones under different levels of protective management. Field studies have been directed at comparing changes in fully protected areas to nearby reference areas that include fishing. FKNMS Volunteers assist with reef fish monitoring of species, abundance, and size at other nearby reefs. The Sentinel Lobster Fisheries project uses commercial fishing gear and techniques to evaluate the long-term effectiveness of the Western Sambo Ecological Reserve as a refuge for spiny lobster. Spiny lobsters have been monitored in the marine reserves of the FKNMS since they were closed to fishing in July 1997 with a goal of determining if the reserves are effective in protecting this highly mobile species from exploitation. Data available includes abundance, size, frequency of occurrence, habitats used, and other parameters.

The Queen Conch Marine Reserve Monitoring conducted by the Florida Fish and Wildlife Institute has a goal of determining the effects of the fully protected zones on queen conch. Data on the density, abundance, and distribution of queen conch, and habitats occupied in waters offshore of Key West are included in the monitoring.

The Florida Natural Areas Inventory in 1994 reported on an ecological survey of U.S. Navy Property in the Lower Keys and additional surveys have been conducted since then in the Key West that note occurrence records and locations of state listed species. Aerial surveys for manatees, sea turtles, and bottlenose dolphin have been reported for the Key West area.

Monitoring of geophysical processes, physical parameters, and water circulation occur in the area and throughout the FKNMS using real time data links. Goals include the assessment of the interaction and exchange of Florida Bay with the connecting coastal waters of the Gulf of Mexico and the Atlantic Ocean, and to provide necessary boundary conditions and validation for physical, water quality and biological models. Data on physical parameters including wave height and currents, water temperature, and salinity are provided in real time by sea buoys in waters offshore from Key West (see Section 3.B). Reef framework and the geologic record of reefs in the lower Keys and Key West have been studied for many years by the U.S. Geological Survey. The U.S. EPA studied the mixing of tidal currents and water masses offshore of Key West at the old sewage outfall in the 1990s and reported their findings as the "initial and near-field subsequent dilution at the Key West outfall" (Tsai et al 1997).

In 2001, Foresight Surveyors performed a "project condition survey" on the main ship channel through Key West Bight and Northwest Channel for the Corps of Engineers. Bathymetry of the channels and harbor was the main dataset reported. Also, in 2001, the NOAA Vessel *Whiting* used multi-beam sonar technology to develop imagery of the channel and harbor bottom as well as surrounding bottoms on either side of the channel. In 2003, Sea Systems, Inc., in advance of the Navy dredging project reported to the Corps on a Geophysical Data Acquisition and Hydrographic Survey of the Key West channel and turning basin and Truman Harbor. Side-scan sonar technology was used to create highly detailed maps of the channel and harbor bottoms, including bathymetry (See Sections 3.B.1 and 3.B.2).

Several studies have looked specifically at turbidity in waters of Key West, especially following complaints of increased turbidity and resuspended sediment to the City of Key West and the Army Corps of Engineers, the agency responsible for the federal navigation project in Key West Channel and Harbor. In 1953, a general study was made of turbidity in an active Key West channel and harbor using visual measurements of water clarity (secchi disk). In 1998 and 1999 the Florida DEP collected turbidity data from plumes resulting from cruise ship activity at and near the Outer Mole, Pier B, and in the anchorage offshore, as well as background levels at the time. As a monitoring requirement attached to a DEP Environmental Resource Permit to reconstruct and reconfigure the cruise ship berth at Pier B, turbidity monitoring was required on a near daily basis during the arrivals and departures from 1999 to about 2002 and then later (resulting from a permit modification) between 0800h and 1700h during the period November through February.

Results of a September, 2001, *Key West Harbor Turbidity Monitoring* effort was submitted to the Corps of Engineers in 2002 by PPL Environmental Labs and included datasets of turbidity,

tidal cycle, weather, and vessel traffic. The Corps sponsored project *Key West Harbor Area Background Turbidity Monitoring, October 2003*, was reported in 2004 by PPL Labs and included turbidity data on background conditions, turbidity associated with ship traffic, and currents. This monitoring was planned to continue through the life of the Navy's dredging project and is generating data on turbidity and other physical parameters in waters near Key West. Turbidity monitoring is being conducted 15 feet deep, or about mid-depth in the channel and harbor. Levels of sediment resuspension related to the dredging and other physical effects are being monitored in various habitat types near the channel and harbor and may provide unique datasets for assessment of the effects of settlement of resuspended sediment on biological processes along the channel. The Navy is also contracting other water quality and turbidity studies along Fleming Key north of the harbor.

3.A.7 Creation of an Annotated Chronology of Significant Events

1815 - private ownership of the island of Key West began with the grant by the Spanish government to J. Salas [14]

1818 - returning from the Bahamas, John Whitehead lay at anchor off Key West for several days while passing through to Mobile and acquired a knowledge of its "excellent harbor and other advantages." [2]

1821 - J. Whitehead purchases Key West from J. Salas in Havana [2]

1822 - Commodore Perry arrived to investigate potential of Key West as a Naval Station; Key West established as a Port of Entry and a Customs Officer appointed; by the end of the year the island was a regularly constituted naval depot and station; Simonton bought a share of the island from Whitehead - he could foresee development potential of a deep water port; the harbor entrance was marked [2 ,14]

1823 - Commodore David Porter sent to Key West with steam vessel *Sea Gull* with side paddle wheels and established a naval base with a unique squadron of fast, shallow draft vessels to pursue pirates in the Gulf of Mexico and Caribbean; argument made by Porter to keep Key West as a naval station due to it's strategic location and "excellence of its harbor" [2, 4, 6, 14]

1825 - wrecking takes off as a major economic influence, when not wrecking crews fished; Congress passed laws mandating that all salvage from wrecking on Florida's reefs and shoals be brought to a port of entry in the U.S.; nearly $300,000 of wrecked property was sold in Key West during year; the first Sand Key lighthouse was built; Naval Base moved to Pensacola due to summer diseases in Key West; wrecking soon defined the town - wharves, shipyards and chandleries lined the harbor shore [2, 7, 9, 10]

1826 - 167 ships enter Key West Harbor; during 1826-1828 on behalf of the Mexican government Porter used Key West as a staging post to raid Spanish shipping [6, 10]

1828 - Town of Key West incorporated; fishing vessels (smacks) hauled live grouper and snapper to Havana; of over 400 early settlers at Key West - about 100 were fishermen [2, 8]

1829 - Nearly $200,000 in export and import commerce shipped through Harbor; William Whitehead surveyed and mapped the City including the harbor shoreline; first mail service began between Key West and Charleston; Porter in support of keeping Key West as a Naval Base - "The advantages of its location as a military and naval station has no equal except Gibraltar" [2, 9]

1831 - 303 ships harbored in Key West during year; movement of very high quality tobacco from Cuba to Key West began when the first cigar plant was opened [2, 10]

1833 - Key West is the richest per capita community in the South; value of marine commerce reported was about $100,000 derived from 86,000 tons of shipping [2, 10]

1835 - About twenty good-sized sailing craft of 10 to 50 tons displacement engaged in wrecking, with a few smaller; a hurricane strands twelve to fourteen large vessels on the reefs near Key West and most Key West wrecking vessels suffered damage; boat building

and repair industry begins in Key West [2, 12]

1838 - Whitehead creates sketch of the west (harbor) shoreline of Key West [2, 7]

1839 - Wrecking going gangbusters; 130 foot cable laying schooner *Western Union* built in Key West [10, 12]

1845 - Construction of Ft. Taylor started - Navy calls Key West the "Gibraltar of the Gulf" [10]

1846 - Ft. Taylor under construction is destroyed by a major hurricane as are Key West lighthouse and the light on Sand Key; construction is begun again on Ft. Taylor, as well as Ft. Jefferson [2, 10]

1848 - A fast and comfortable steamer of about 1000 tons (*Isabel*) was put into mail and passenger service between Key West and Charleston [2]

1849 - A new taller and relocated lighthouse is built on Key West; the first sponge cargo is shipped to New York [10, 12].

1852 - The installation of reef warning buoys begins [14]

1853 - A marine railway and dry dock (first important public venture by private citizens) powered by horse power and capable of handling vessels to 100 tons is built; the current Sand Key lighthouse is constructed [2, 10]

1856 - The clipper ship *Stephen R. Mallory* (1000 tons displacement) is launched in Key West [2]

1859 - The entire waterfront district burns [10]

1861 - Ft. Taylor is completed and remained in service until 1949;, during the Civil War Key West was the headquarters of the Union's Eastern Gulf Blockading Squadron and more ships were stationed at Key West than at any other port in the U.S.; an average of 32 large ships and as many as nearly 300 captured blockade runners would be anchored in the harbor at one time [2, 6, 7, 10]

1867 - The telegraph cable is laid between Havana and Key West by large vessels

1870 - The cigar business mostly using tobacco from Cuba is the largest in the world [10]

1873 - Spain's seizure of the American-flagged steamer *Virginius* led to the Navy being ordered to Key West to prepare for war with Spain; at the time the fleet was a collection of obsolete Civil War vessels and the seizure led to the building of a modern navy that would again use Key West as a winter training ground; nearly every available ship in the Navy was hurried to Key West which was made the base of all operations related to Spain; the Mallory Steamship Co. begins service from Key West to New York and Galveston [2, 5, 6, 14]

1874 - The amount of goods imported via vessels through the Customs House was over $660,000 [2].

1875 - Key West served by steamers from Baltimore, Charleston, Havana and New Orleans [12]

1880 - there were 25 inter-Keys freight schooners carrying farm produce from Keys

plantations to Key West for reshipment by steamer, 450 sailing vessels, most spongers and most built in Key West, were operating out of Key West [12]

1881 - Under the supervision of Lt. Robert Peary the naval wharf was rebuilt and iron piles were substituted for the wooden one [2]

1884 - Key West is the busiest port in Florida [7]

1886 - The Key West waterfront district burns

1887 - a line of steamers, considered the very best and fastest steamships that could be built, begin running from Port Tampa to Key West and Havana [2]

1888-89 - Due to the "sponging, cigar making, salvage and wrecking, fishing, mercantilism and the military Key West is the wealthiest city in Florida"; all commerce is moved via vessels; 614 foreign and domestic ships use Key West Harbor during 1888; the Customs House with a concrete seawall is built on the harbor [2, 10, 11].

1890s - Fifty to eighty foot schooners carrying up to 25 passengers begin running between Key West and Miami [12]

1890 - In about 1890 a factory for canning turtle soup from green turtles was constructed; cigar tobacco importation and cigar production reached its zenith; Key West sponging industry earns about $1,000,000 per year, from sponging by about 350 boats [2, 5, 7]

1895 - The *City of Key West* was a large side-wheeled steamer that ran between Miami and Key West; local fishing vessels caught 2,400,000 pounds of fish and lobster for local and U.S. markets; this fishery formed the beginning of an infrastructure in Key West from which local contemporary fisheries evolved [1, 8]

1898 - The USS Maine departs Key West for Havana where it blows up and the Spanish-American War begins; nearly every available ship in the Navy is hurried to Key West; "For some time before the actual hostilities between the U.S. and Spain, Key West bore the appearance of a war port"; the American Battle Fleet was based in Key West and following Spain's surrender Key West continued to be used for winter training and to support operations in the Caribbean; the North American Flying Squadron including modern steel cruisers and battleships blockaded Cuba, many were based in Key West [1, 2, 6]

1899 - The marine railway was expanded to handle vessels to 1000 tons displacement and converted to steam power [2]

1900s - Large propeller driven deep draft steamships (commercial and Navy) were coming and going regularly; at the turn of the century more than 300 vessels employing nearly 2,000 men engaged in sponging from Key West; at the turn of the century Pilot Captain Clifton brought in a large ship drawing 31 feet [4, 12]

1902 - Navy condemns the southwest shore of Key West and begins construction of a Naval Base [10]

1905 - Flagler begins construction of the Overseas Railroad.

1907 - Mallory and Co. established a steamship line between New York and Mobile touching at Key West both ways - with 4 to 6 ships stopping at Key West weekly [2]

1909 - Most harbor docking facilities and structures were destroyed by a major hurricane with a great deal of loss to shipping [2]

1910 - Seven hundred feet of a new concrete dock at Ft. Taylor was destroyed in a hurricane [2]

1911 - Trumbo Point and Hilton Haven were constructed by dredge and fill to provide a marine terminal for Flagler's railroad; the terminal at Trumbo included a 1700 foot long 134 foot wide pier with steamships docked alongside; a concrete wharf was built by the Navy to replace the one destroyed the previous year [2, 10].

1912 - Flagler completed the railroad to Key West and with that use of the military facilities in Key West increases; Key West mail service by steamship ends; large railroad car ferry ships began carrying railroad cars between Key West and Cuba; an average of about eight to ten vessels a year are still stranded on the reef; power vessels began to replace traditional Key West sailing vessels for fishing [2, 4, 6, 8]

1914 to 1918 - During WWI Key West is activated as the Strategic Center of Caribbean Defense; new piers are built and Navy activity includes destroyers and submarines; the new Naval Air Station is a base for coastal patrol vessels, battleship berthing, and submarine training; regular steamship runs carried passengers and cargo between Key West, Havana, Tampa, New Orleans, Miami, Nassau and New York; the Key West Naval Base and Navy Shipyard were in full operation; Thomas Edison stays in Key West and works on experimental depth charges and mines with the Navy; one of the first offshore power boat races took place between Key West and Miami [2, 4, 6, 7, 10]

1920 - Key West mariners are looking for new maritime activity; nearly 3,000,000 pounds of mackerel are landed at Key West during the 1919/1920 winter; prohibition is enacted and bootlegging liquor via vessels from Havana becomes big business; the Coast Guard base in Key West was greatly expanded to combat smuggling and Navy patrol craft and destroyers were called to help [8, 10, 12]

1924-1925 - Active commerce in vegetables and fruits includes pineapples from Cuba; about this time the Outer Mole is created by the filling and creation of a breakwater around the west edge of what came to be called Truman Harbor [10]

1928 - Passenger ships and ferries routinely travel between Key West and Havana [14]

1931 - The 327 foot long passenger steamship *Florida* began calling at Key West [12]

1932 - Due to depression all military facilities except for the radio station are closed [6]

1934 - With maritime commerce and the military withdrawn Key West declares bankruptcy; the Civil Works Administration built sponge docks in the Harbor to try to revitalize the Key West sponge industry; the Navy permitted private yacht owners to use the sub basin (Truman Harbor) during the depression [10, 14]

1935 - The Overseas Railroad is destroyed by the Labor Day hurricane.

1938 - The Overseas Highway is completed.

1939 - The last large sailing vessel built in Key West - the *Western Union* - is launched; President Roosevelt visits Key West and orders the base reopened to support naval operations in the Caribbean [6, 10]

1941 to 1945 – The Navy extends the 30 foot deep channel north to the Trumbo Point turning basin; Port of Key West logs more than 14,000 military and cargo ships and was the center for the Fleet Sonar School that taught more than 18,000 sonar operators; there were 15,000 service personnel stationed in Key West; Key West becomes a major convoy center and the shipyards are kept busy with repairs of convoy and military vessels; Truman Harbor was deepened and 21 acres of land added to the Naval Base there;. large disabled ships damaged by German U-boats offshore are brought into Key West for salvage or grounded on the reefs to keep them from sinking; minefields are planted in surrounding waters; anti-submarine patrols are based in Key West; vessel pilots from all over Florida are brought to Key West to handle the increased traffic; a large marine railway is constructed by the Navy in 1942 [4, 6, 7, 10, 14]

1949 Shrimp are discovered in commercial quantities in the Tortugas and hundreds of shrimp boats swarm to Key West

1950s - 1960s - Navy forces remain in Key West in strength and the Naval Station is one of the largest submarine bases in the world.

1954 - Shrimping nears its peak with as many as 500 shrimp boats catching over 30 million pounds per year; the car ferry *City of Key West* capable of carrying 50 autos and 700 passengers begins operating between Key West and Cuba - it left from the Havana Dock at the foot of Duval St three times per week; the vessel *City of Havana* (carrying up to 125 autos and 500 passengers) launches three times per week ferry service between Key West and Havana, later moving to Stock Island [12]

1956 - Key West is becoming one of the country's leading ports of foreign travel averaging 12,900 passengers per month [10]

1962 - The Key West Naval Station supported the fleet blockading Cuba during the Cuban Missile Crisis

1968 - The Navy decommissions their ship repair facility in Key West [10]

1969 - The Port of Key West receives its first regularly scheduled cruise ship – the *Sunward* – it moored at either the Outer Mole or Pier B. City records show that in the next 15 years the Port received 266 calls by cruise ships; working out of Key West Harbor Mel Fisher begins his treasure hunt for the *Atocha* [3]

1970s - The cruise ship *Bolero* started calling weekly; emergency entry of large vessels and tows working in the transport of oil industry equipment between the Gulf of Mexico and the North Sea; turtling ends with passage of the Endangered Species Act and placement of size limits on turtles [4]

1973 - All submarine activity in Key West is discontinued [10]

1974 - The Naval Station closes and all ships and shore side facilities moved or closed [6]

1980 - The Mariel Boat Lift brings more than 125,000 Cuban refugees to the U.S., most through Key West by all manner of craft and boats [5]

1984 - Construction begins on a new Mallory Dock to provide secure dockage for visiting cruise ships [3]

1985 - The Navy transferred a squadron of hydrofoil gun boats to Key West, based at

Trumbo Point; Mel Fisher locates the mother lode of the *Atocha* and renews an old form of commerce in Key West Harbor - treasure [6]

1986 - Part of the Navy's Truman Annex and Tank Island are auctioned off.

1990 - The Florida Keys National Marine Sanctuary is designated.

1990s - Naval forces in Key West are again cut and the hydrofoil squadron decommissioned; Key West was and continues to be on the front line for the Department of Defense and U.S. Coast Guard war on drugs through the Joint Interagency Task Force East; a drug surveillance fleet of aerostat ships operated out of Key West for the Task Force often coming in and out daily, they are later removed [6]

1992/1993 - 256,000 cruise ship passengers visit Key West during fiscal year [3]

1994 - During the year 368 cruise ships visit Key West [10]

1996 - Outer Mole use as cruise ship dockage begins on an emergency basis; the FKNMS Management Plan is put in place.

1998 - Scoping begins for draft environmental assessment for the Disposal and Reuse of the Truman Annex waterfront property - including the Outer Mole [3]

1999 - Chapter 288 Military Base (Truman Harbor) Reuse Plan reviewed by state and federal agencies; Florida DCA recommends that the City fully evaluate the impacts of using the mole pier for regular cruise ship berths; City formally requests federal study and action regarding vessel generated turbidity in the Key West Federal Harbor Project; City eliminates second cruise ship berth initially proposed for Outer Mole; cruise ship docking facility reconstructed at Pier B (Hilton); utility and water lines laid on channel bottom connecting Sunset Island development to Key West [3]

2002 - The Florida Keys National Marine Sanctuary Advisory Council Committee organizes and initiates meetings of the Large Vessel Working Group (LVWG) to look at environmental issues related to cruise ship and other large vessel traffic in and around Key West

2002/2003 - 1,122,200 cruise ship passengers visit Key West during 02/03 fiscal year from 603 cruise ship visits, including 177 berthed at the Outer Mole and 24 anchored out; permit application is submitted by the Navy and approved by state and federal regulatory agencies for dredging of Key West Channel and Harbor and Truman Harbor [3]

2004 - Outer Mole reconstructed by Navy to better accommodate both military vessels and cruise ships; Navy contractor initiates dredging of Key West Channel and Harbor and Truman Harbor to -34 MLLW with 2 foot advance maintenance and 1 foot of overage authorized for a total allowable depth of -37 feet MLLW; the LVWG completes it's review after 2 years of meetings and makes recommendations to the FKNMS [3]

2005 - Maintenance dredging performed at Mallory Dock to a depth of about -30 MLW; City budgets for a total of 541 cruise ship arrivals in 2004/2005 fiscal year – 95 (18%) at Mallory Square, 264 (49%) at Pier B, 160 (30%) at the Outer Mole and 23 (4%) vessels will anchor out [3]

3.A.8 Endnotes - Sources of Information for Preceding History and Chronology:

1. Artman, L.P. Jr. 1995. Key West – Turn of the Century. publ. by P. Artman, Key West, FL.

2. Browne. J.B. 1912. Key West, The Old and the New. Republished in 1973 by the Bicentennial Comm. of Florida, Univ. of Florida Press, Gainesville, 227 pp plus index.

3. City of Key West

4. Crusoe. E. 1997. Chronology of steam and/or motor ships in Key West Harbor. Key West Bar Pilots Assoc., Key West, FL, 2 pp.

5. Gallagher, D. 1997. Timeline of events in the Florida Keys. Pp 63-67 in The Florida Keys Environmental Story, D. Gallagher ed., publ. by Seacamp Assoc. Big Pine Key, FL.

6. Haimbright, T. 1997. Military History of the Florida Keys. Pp 117-120 in The Florida Keys Environmental Story, D. Gallagher ed., publ. by Seacamp Assoc. Big Pine Key, FL.

7. Langley, J. and W. Langley. 1982. Key West, Images of the Past. publ. by Belland and Swift, Images of Key West, Inc., Key West, 132 pp.

8. Little, Ed. 1997. A History of the Fishing Industry in the Florida Keys. Pp 125-127 in The Florida Keys Environmental Story, D. Gallagher ed., publ. by Seacamp Assoc. Big Pine Key, FL.

9. Marzyck. M. 1997. Commodore David Porter. Pp 159-160 in The Florida Keys Environmental Story, D. Gallagher ed., publ. by Seacamp Assoc. Big Pine Key, FL.

10. Nichols, S. 1989. A Chronological History of Key West, A Tropical Island City. publ. by Key West Images of the Past, Inc., Key West, FL.

11. Sherrill, C. and R. Aiello 1978. Key West - The Last Resort. publ. by Key West Book and card Co., Key West, FL, 192 pp.

12. Viele, J. 1997. Sponging. Pp 130-131 in The Florida Keys Environmental Story, D. Gallagher ed., publ. by Seacamp Assoc. Big Pine Key, FL.

13. Wells, S. 1997. Notes on the History of Key West. pp 95-98 in The Florida Keys Environmental Story, D. Gallagher ed., publ. by Seacamp Assoc. Big Pine Key, FL.

14. Windhorn, S. and W. Langley. 1973. Yesterday's Key West. publ. by Langley Press, Inc., Key West, FL, 144 pp.

3.B Assessment of Real and Perceived Impacts From Cruise Ship Activity on the Marine Environment

Environmental degradation for purposes of this assessment is defined as direct, indirect, and cumulative impacts on natural and depletable resources, including impacts to flora and fauna and listed species, substrates and sediments, habitats including essential fish habitat, water quality, and adjacent environmentally-sensitive areas. A thorough literature review has been conducted to evaluate the real and potential impacts associated with cruise ship use of the Outer Mole and adjacent waters on environmental resources critical to the City. Reviewed is the considerable information (scientific and other) now available for the Key West channel and harbor area, including information provided during the permit review and environmental assessment process for the current Navy dredging project. Reviews, reports, summaries, and recommendations by others, including the FKNMS Large Vessel Working Group (LVWG) have been obtained and are summarized here where appropriate. Considerable use has been made of information provided in the Navy's 2003 Environmental Assessment (EA) and the 1996 FKNMS Final Management Plan and Environmental Impact Statement (EIS).

Although a number of other ports in the U.S. (including Alaska and Hawaii), Bermuda, Mexico, and the wider Caribbean have addressed or are addressing many similar environmental issues related to cruise ships, including adequate harbor depths and infrastructure, and potential environmental degradation, this review deals mainly with activities of cruise ships and other large vessels in Key West. The situation in Key West appears to be unique in that a relatively shallow and narrow main channel and harbor (relative to vessel size) exist in close proximity to coral reef ecosystem habitats and communities that depend on clean, clear water, and that are protected by a variety of state and federal laws and regulations.

A documented decline in water quality and the quality and health of environmental resources led to the designation of the Florida Keys as an Area of Critical State Concern in 1975, Keys marine areas as Outstanding Florida Waters in 1985, and a National Marine Sanctuary in 1990, and a determination in 2002 that aspects of the natural carrying capacity of terrestrial and nearshore habitats had been exceeded.

This section also addresses the overall goal of understanding the direct linkage between environmental degradation and adverse economic impacts resulting from the use of the Outer Mole and other cruise ship activity in Key West. Adverse economic impacts resulting from environmental degradation are considered for all stakeholder groups that depend directly on the resources affected - the City defines these groups as "environmentally sensitive businesses". Among the measures and factors that an assessment should consider is an inventory of such businesses, changes in employment rates specific to these businesses, and changes in employment categories specific to these businesses.

Public perceptions of the need to protect and manage marine areas for their health and productivity, and their ability to provide resources valuable to the public, have evolved over the last few decades as well. "It is important for the tourist industry to remember that many of the tourists of the Keys are here because the environment is special. Fishermen come here because there are fish to catch - and if fishing is bad, they will no longer spend their dollars in Monroe County. Snorkelers and divers come because the reef is alive and beautiful.

They will not come in the future if the reef dies. The bird watchers, the nature lovers, the beachwalkers - all those who seek natural beauty will no longer visit the Keys if these scenic delights are degraded. Whatever the industry does to improve the quality of the environment will be repaid tenfold over time in increased tourist revenues. By our very need for economic survival businessmen should be the greatest guardian of the Keys environment." (Swift 1997).

3.B.1 Physical Environment

The physical marine environment of the Key West area is defined by bathymetry (depths) and bottom topography, as influenced by tides and tidal currents, wind and wind generated water movement, and water quality. Waters of the Keys are characterized by complex water circulation patterns over both spatial and temporal scales with much of this variability due to seasonal influence in regional circulation patterns. They are directly influenced by the Florida Current, the Gulf of Mexico Loop Current, inshore currents of the SW Florida Shelf, discharge from the Everglades, and by tidal exchange with both Florida Bay and Biscayne Bay. Influence of these external sources has significant effects on the physical, chemical, and biological composition of waters around Key West (Boyer and Jones 2002). The Lower Keys and Key West area are most influenced by large gyres spun off the offshore Florida Current and are influenced by wind and tidally driven waters of Hawk Channel that parallels the Lower Keys.

Waters around Key West experience semi-diurnal tides (4 per day), and along with the influences of wind generated water movement, the area is very complicated hydraulically. According to NOAA information provided for its primary tidal station in Key West Harbor, the average mean tidal range is about 1.3 foot and the spring range is about 3 feet. At a station 0.3 mile out into the channel west of Ft. Taylor, NOAA reports that the average maximum flood current runs about 0.6 mph and average maximum ebb about 1.1 mph. Currents during spring tides are considerably stronger, especially the ebb current. Typical average current speeds in another study in the channel area were between 0.4 and 1.8 mph (Corps 2003).

The main ship channel into Key West is over 5 miles long, with a 1.2 mile long middle stretch (Cut A) that is 800 feet wide - the rest of the offshore channel south of Ft. Taylor is 300 feet wide. In the Harbor out from the 3 cruise ship berths (the Navy's Outer Mole, the commercial Pier B, and the City's Mallory Dock) the turning basin is irregularly shaped with a maximum width of about 1,800 feet, and is mostly about 1,000 wide (Figures 3.A.11 and 3.A.12). A detailed NOAA navigational chart (#11441) exists for *Key West Harbor and Approaches* at a scale of 1:30,000.

Water masses in Truman Harbor, inside the Outer Mole, are somewhat isolated from the tidal flushing of the harbor channel area. Current monitoring has shown, as expected, that water does not move in straight lines around the harbor and spoil island areas on the west side of the harbor. Flow directions between Key West and the two islands are predictable based on tides. Flow directions south of the island might be controlled by both wind and tides and are less predictable. Turbidity monitoring in the harbor by the Corps during October, 2003, provided basic information on current patterns and tidal influences there. During rising tides, water flows northward through the harbor; falling tides carry water masses southward through the harbor. During times of strong winds from the east and

south, distinctive, often turbid, water masses from south of the island are drawn into the harbor area during rising tides. In the winter, northerly winds associated with passing cold fronts push water masses from the southeastern Gulf of Mexico south through channels around Key West. Seasonal variation in wind direction and speed in the region are a major influence on water mass movement as well as the redistribution of fine sediment. Other information on the physical nature of the marine environmental surrounding Key West can be found in Chiappone (1996), Tsai et al. (1997), PPB (2002), Sea Systems (2003), Navy (2003).

Bathymetric data of the waters around Key West reflect a wide range of bottom contours and variable bottom elevations that create a wide range of benthic conditions and habitats (Figure 3.B.1). Bathymetric surveys of the proposed Navy dredged area in 2001 resulted in color contour maps of the entire dredge area, including pre-dredge conditions in the harbor and turning basin (Figure 3.B.2).

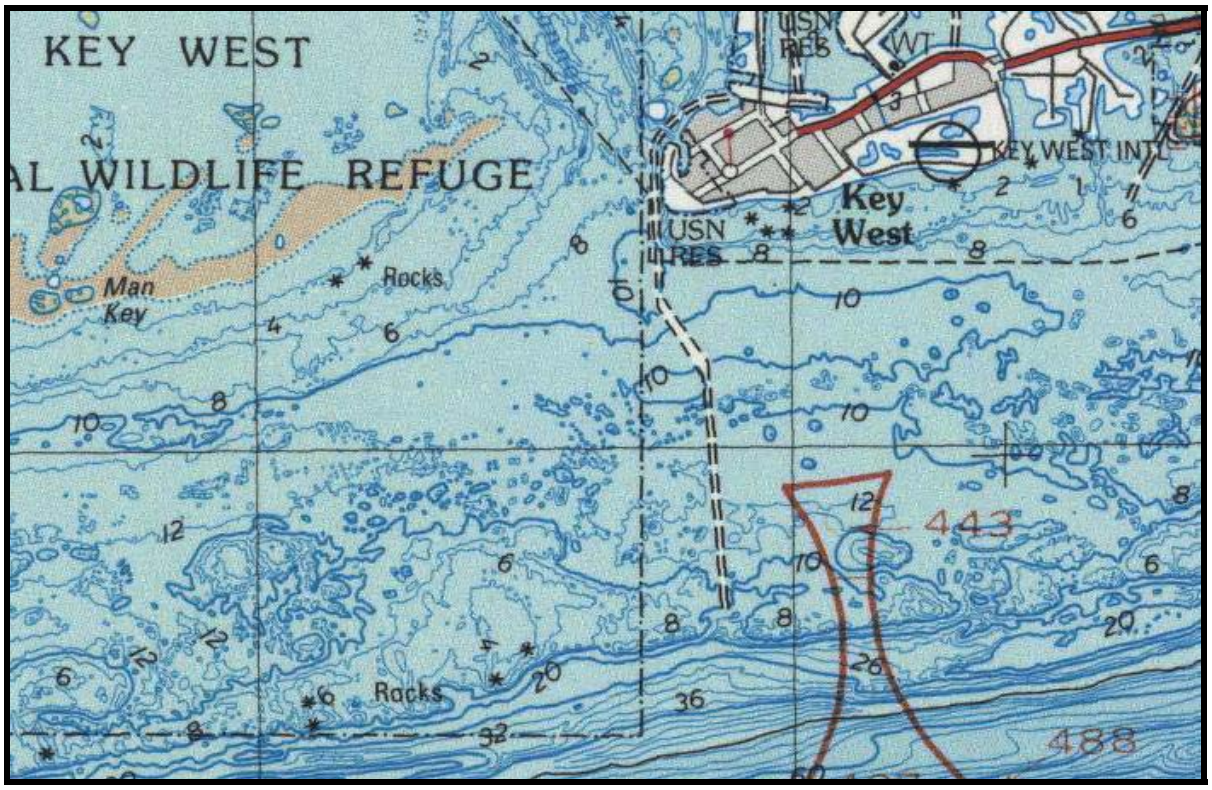
The most revealing bottom topography characterization of the channel and harbor area was collected by the NOAA vessel *Whiting* in 2001 using multi-beam sonar technology (Figure 3.B.3). The area surveyed west of the main channel and harbor is used as an anchorage for cruise ships by the Key West Bar Pilots (see Section 3.B.6).

The Corps provided the City a "Report of Channel Conditions" in December, 2001. The most detailed bathymetric data available for the channel and harbor area was collected in late 2002 and early 2003 by Sea Systems Corp. under contract to the Corps in advance of the Navy's dredging project (Sea Systems 2003). Sea Systems conducted a comprehensive survey of the full extent of the Key West Main Ship Channel and Harbor (inshore and offshore) and Truman Harbor. Specifically, the work included a bathymetric survey, side scan sonar survey, sub-bottom profile investigation and dive-supported groundtruthing operations. The objectives of the survey were to accurately map the bathymetric characteristics of the channel areas and turning basin, identify and map the horizontal extent of exposed hardbottom, rock outcrops, and manmade debris within these areas and to obtain sufficient sub-bottom data for assessment of sediment thickness over subsurface hardbottom.

Local information for a number of variables of oceanographic data including sea water temperature, salinity, and photosynthetically active radiation at different depths, air temperature, wind speed and direction, and barometric pressure is available as preliminary data provided in near real time from the Coastal-Marine Automated Network (C-MAN) Sand Key Station (http://www.coral.noaa.gov/seakeys/real_data.shtml). The Florida Institute of Oceanography's SEAKEYS project and the NOAA Atmospheric and Oceanographic Marine Lab CREWS network of remote monitoring stations maintains a 10 year dataset for Sand Key as part of its Coral Reef Watch Integrated Monitoring Network Database (http://www.coral.noaa.gov/imn/IMNQuery).

FIGURE 3.B.1. 1989 NOAA BATHYMETRIC MAP OF THE AREA WEST AND SOUTH OF KEY WEST (NOAA).

Showing a variety of bottom conditions and depths and the location of the main ship channel (dashed line). Depths in meters



Water quality in the Florida Keys has been an important issue for some time, especially those aspects related to nutrients and turbidity. An excellent review of the history of Keys water quality monitoring, including turbidity, can be found in Kruczynski and McManus (2002). The State of Florida has classified and manages waters surrounding the Keys, including Key West Channel and Harbor, as Class III waters but with an Outstanding Florida Waters (OFW) overlay (Rules 62-302 FAC). Specifically, (Rules 62-200 and 62-242 FAC), with limited exceptions, no significant degradation of OFW water quality is authorized to be permitted.[8] The regulatory significance of the OFW designation is that the Florida DEP cannot issue permits for direct pollutant discharges that would lower ambient (existing) water quality, or indirect discharges that would significantly degrade the OFW. In addition, permits for new dredging and filling must be clearly in the public interest.

[8] Burnaman,R. PA. Personal Communication.

FIGURE 3.B.2. COLOR DEPTH CONTOUR PLOT CREATED FROM 2001 PRE-DREDGING BATHYMETRIC SURVEYS IN THE TURNING BASIN OUT FROM THE OUTER MOLE AND IN THE TRUMAN HARBOR AREA.

Depths in feet at mean lower low water. Green areas are -36 to -37 feet deep, red areas are less than -34 feet.

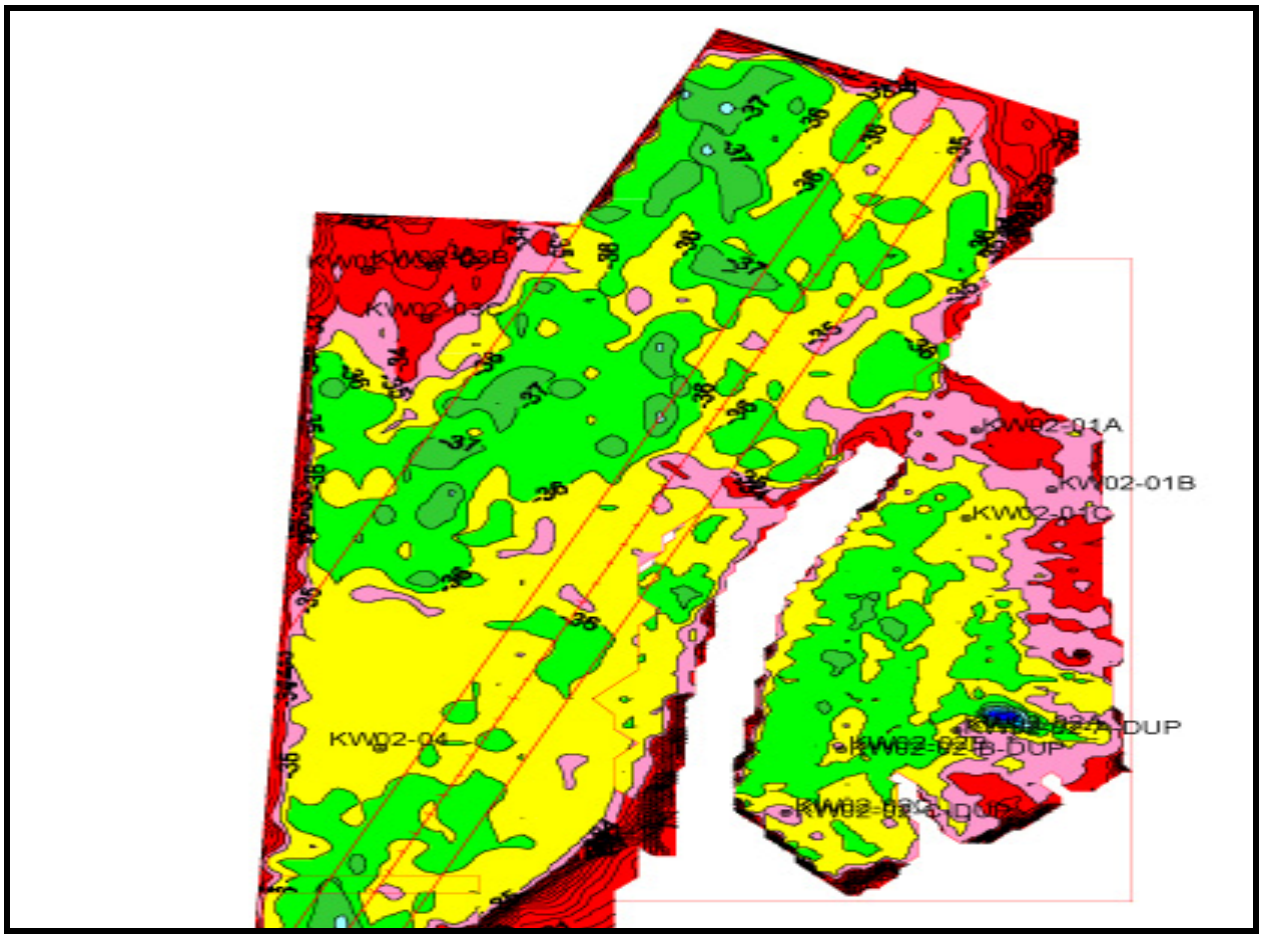
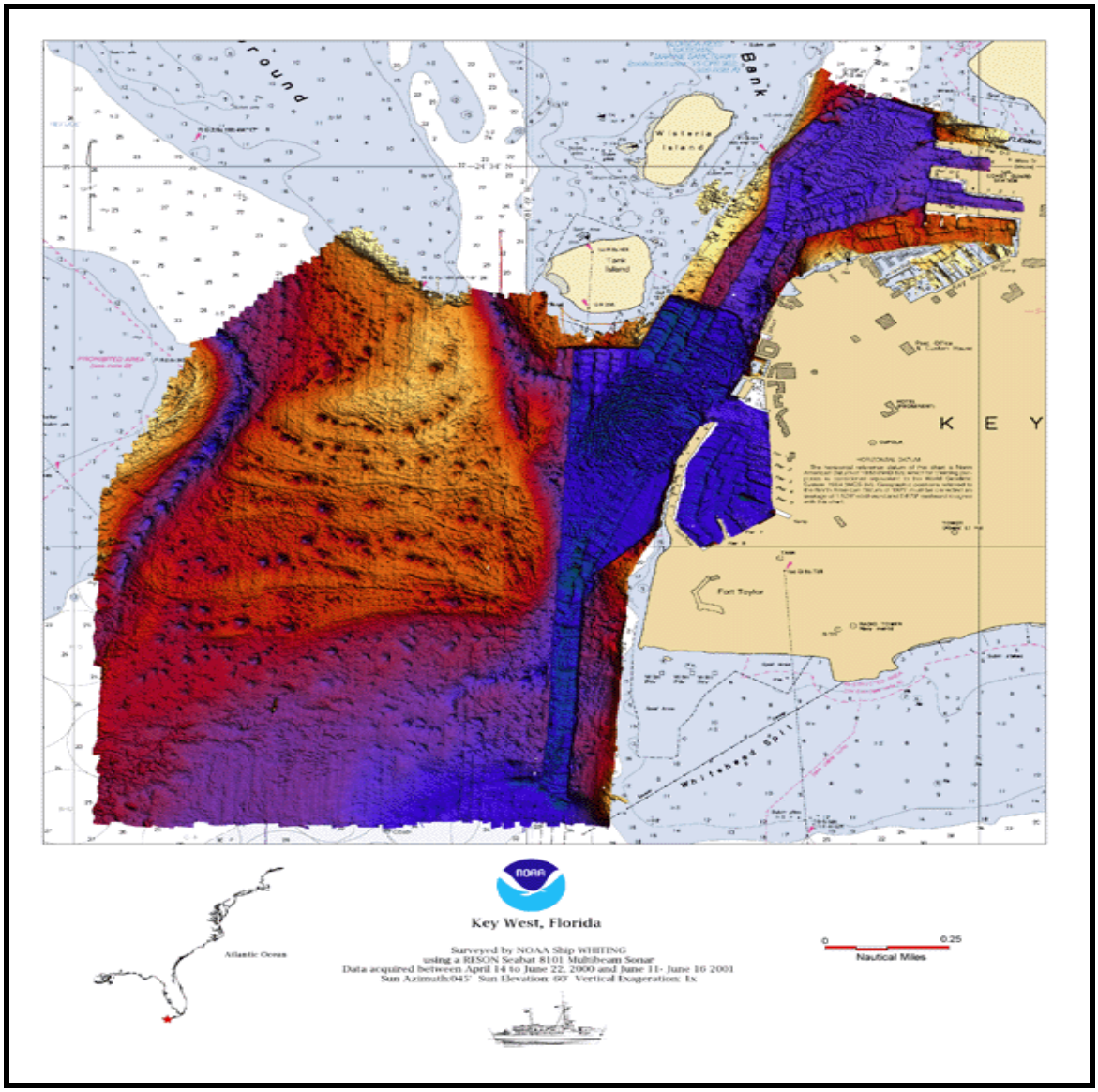


FIGURE 3.B.3. 2001 MULTI-BEAM SONAR IMAGE REFLECTING THE BOTTOM TOPOGRAPHY AND RELATIVE DEPTHS NEAR KEY WEST OBTAINED BY THE NOAA VESSEL WHITING (NOAA).

Bluish area corresponds to deeper water and previously dredged portion of the channel and harbor.



3.B.2 Substrates, Sediments, and Turbidity

For purposes of this review, substrates are defined as the type of bottom (typically hard vs. soft, consolidated vs. unconsolidated), sediments are defined as the unconsolidated portion of the bottom substrate, and turbidity is what results from resuspending unconsolidated bottom sediments. Carbonate (limestone) substrates mostly of biological origin and carbonate sediments typically with some organic matter predominate in the Key West area.

It is acknowledged that high winds and storms result in naturally occurring resuspended sediment and water column turbidity. And it is acknowledged that bottom sediments can be mobile in deep tidal channels as the result of natural processes - but typically submerged vegetation in the form of macroalgae and seagrass along with sessile invertebrates tend to stabilize channel bottoms and minimize movement of sediments. This review and assessment survey does not attempt to minimize the effects of these natural events but instead, since the very survival of the Keys coral reef ecosystem is dependant upon clear, low nutrient waters (Kruczynski and McManus 2002), focuses on human caused or induced resuspended bottom sediment and turbidity.

Turbidity is a measurement of the visibility and transparency of water and generally refers to water clarity. It can be measured based on the scattering of light by particles in the water (nephelometry), by filtering and weighing total suspended solids in the water, and direct observation of transparency. State water quality standards are measured as NTUs (nephelometric turbidity units). The U.S. Geological Survey considers turbidity a useful measurement that is growing in popularity and importance in scientific and resource monitoring programs. Uses of turbidity data include measuring water clarity for drinking water as well as ecological applications, indicating visual impairment in water, for real-time monitoring of conditions in watersheds, and as a means of measuring suspended-sediment concentration (Gray and Glysson 2003).

Along with phosphorus, turbidity is considered probably the second most important determinant of ecosystem health in the Florida Keys (Jones and Boyer 2002). Low-density carbonate sediments in the Keys are fine grained and, consequently, easily resuspended, rapidly transported, have a high light scattering potential, and increase local sedimentation rates. Presence of these resuspended sediments in the water column, as indicated by turbidity can interfere with feeding/respiration by aquatic organisms (FDEP 2005). Light levels are also reduced, which affects the health of seagrasses and corals as light extinction is directly related to water turbidity (Jones and Boyer 2002). Resuspended sediment and turbidity could also affect hard-bottom communities by smothering (Kruczynski and McManus 2002).

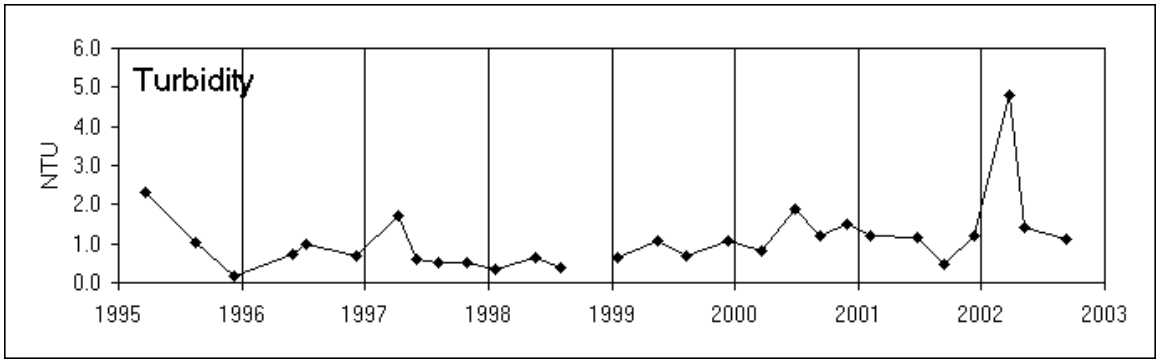
Research and reviews on the effects of suspended and redeposited sediments were conducted decades ago when large scale dredge and fill projects in the U.S. coastal zone resulted in serious biological effects such as direct habitat destruction and smothering. These lethal effects were known to result from excessively high sediment loads or high sedimentation that took place in a short period of time. More subtle lethal effects that can eliminate native species may occur at low but chronic sediment loads or sedimentation with long exposure. Under these conditions risks may exist to any life history stage, behavioral activity, reproductive ability, or metabolic function and result in decreased viability of any number of marine species in the vicinity of chronic resuspended sediment. (Sherk 1971).

There are a number of external sources that affect the water quality, including turbidity, of the lower Keys. These include Hawk Channel, Florida Bay, the Gulf of Mexico, and the boundary currents of the region. Water flow is generally westward in the nearshore areas, which can bring turbid water from these external sources to the Key West area. In addition, storms and currents move water from Florida Bay and the Gulf of Mexico, and this water exchange can affect turbidity levels in the Key West area. Another source of turbidity is stormwater runoff, which can introduce sediment into the marine environment. Increased nutrients from domestic wastewater can introduce nutrients into nearshore waters, in turn increasing concentrations of phytoplankton in the water and increasing turbidity (FKNMS 1996).

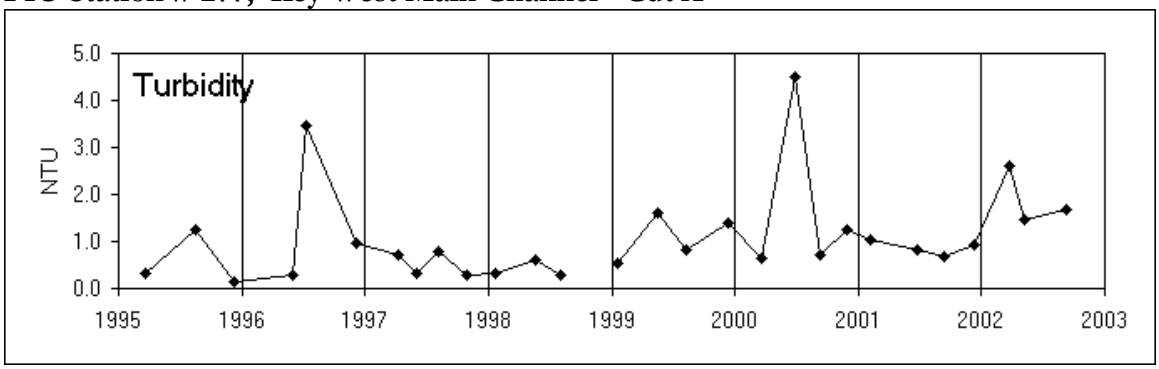
A reflection of low natural levels of turbidity in Key West waters can be found in nearly eight years of quarterly turbidity monitoring in the main ship channel offshore from Key West and adjacent to the channel (about 1/4 mile away) at Western Head Patch Reef. Monitoring by Florida International University (FIU) for the FKNMS WQPP revealed natural turbidity levels usually less than 2 NTU. Immediately outside the reef tract in deeper water measurements were usually less than 1 NTU (Figure 3.B.4).

Attempting to provide baseline data for dredging and post-dredging monitoring the Corps conducted a detailed assessment of turbidity and other conditions in the harbor in 2003. In October, a period was selected to represent calm weather days that came at the end of a several-day period of less than 5 mile per hour winds. Later that month, three days were selected during which winds generally 10 to 15 mph from the east and south created rough sea conditions. Out of 6,915 turbidity measurements made during the calm period, the mean turbidity value was 0.79 NTU, the median value was 0.70 NTU, and the maximum was 11.2 NTU. For the rough conditions, there were 5,545 measurements with mean, median, and maximum values of 3.72, 3.20, and 18.2 NTU, respectively. Turbidity levels were approximately three to four times higher during windy conditions than during the selected calm weather period (USACE 2003). Wind generated turbid water from the altered south shore of Key West was monitored as it entered the harbor area and flowed northward by the cruise ship docking area and then Fleming Key. These events sometimes would last through the entire rising tide with turbidity levels rising 5 to 10 NTUs above previous slack tide readings (USACE 2003).

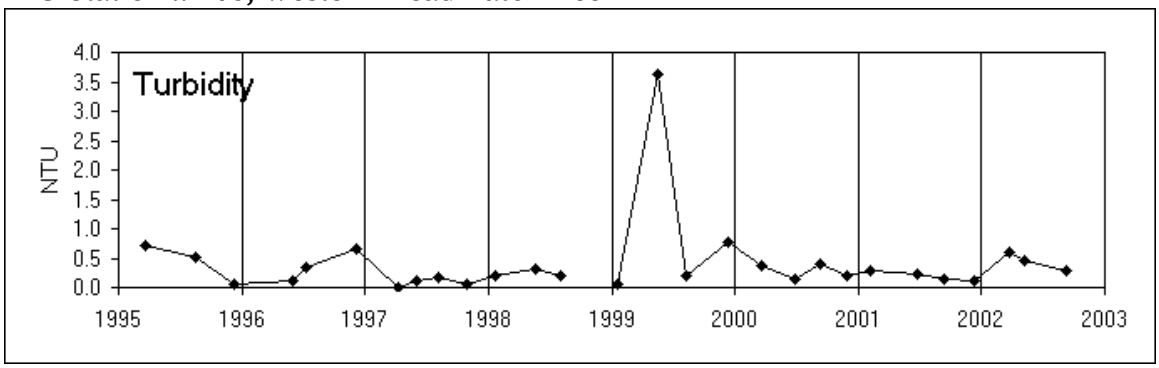
FIGURE 3.B.4. RESULTS OF QUARTERLY TURBIDITY MONITORING BY THE FKNMS WQPP NEAR KEY WEST 1995-2003 (FKNMS).



FIU Station # 277, Key West Main Channel - Cut A



FIU Station # 278, Western Head Patch Reef



FIU Station # 279, Main Ship Channel - Offshore

Results from the FKNMS WQPP monitoring showed strong onshore-offshore turbidity gradients for all Keys transects, but reef tract levels were remarkably similar (low) regardless of inshore levels. High nearshore turbidities are most probably the result of wave action resuspending sediments in shallow water but can also locally be related to human activity like dredging and filling, dock and pier construction, and vessel movement.

Natural processes that result in large scale disturbance in Keys waters are episodic, often with long intervals between events. Fine carbonate sediments in the Keys are easily resuspended by disturbances, including those caused by vessel traffic. The growing number, size, and draft of recreational and commercial vessels now using Keys waters, such as Key West channel and harbor, are creating turbid conditions considered to be chronic in places.

Vessel generated resuspended sediments is a growing concern in areas with high boat traffic, including open waters. Turbidity reduces water clarity, which reduces sunlight penetration through the water column (which can adversely affect the growth of submerged vegetation (Kruczynski and McManus 2002).

Due to the long history of maritime activity in Key West and Truman Harbor, sediment contamination has been an issue related to both sediment resuspension by large vessels and the Navy's dredging project. **S**amples were collected in September 2002 at 14 stations in Truman Harbor, the turning basin, and the Main Ship Channel. Samples from Truman Harbor and the northwest corner of the turning basin were dominated by fine-grained sediments. Coarse-grained sediments predominated in the Main Ship Channel except at a turn in Cut A where fine-grained sediments had accumulated. Overall, sediments in the project area were free of contaminants. This was substantiated by analyses performed for trace metals, cyanide, ammonia, organic pollutants, oil and grease, and total organic carbon. Trace metal concentrations varied primarily with grain size and did not reflect toxic levels. Concentrations of organic pollutants were not detected in the samples. A low concentration of oil and grease was detected at one station within Truman Harbor. Total organic carbon levels were low, as were levels of cyanide and ammonia in the sediment samples. The overall high sediment quality observed by Navy contractors was supported by previous sediment data reported by the Bar Pilots (1999) and was what might be expected in a well flushed tidal channel (Navy 2003).

Good summaries of the turbidity and sedimentation issues related to cruise ship and other large vessel traffic in the Key West area, and the associated environmental impacts, were prepared through the efforts of the LVWG organized by the FKNMS Sanctuary Advisory Council (SAC) in June 2002 (FKNMS 2003, LVWG 2002-2004). The general purpose of the Working Group initially was to investigate and then determine how best to mitigate the impacts of cruise ships and other large vessels in waters near Key West. Later a goal was identified to produce recommendations to the SAC for mitigating the impacts of large ship traffic on the marine environment and determining whether there is a basis for some perceived impacts. After two meetings the main interests and concerns were identified as turbidity, discharges, and vessel traffic (LVWG 2002-2004). The LVWG met on six occasions between October 2002 and February 2004. Meetings were daylong and attended by as many as 40-50 government agency representatives and scientists, NGO staffers, local boat captains and concerned members of the community. Full meeting transcripts are available for 4 meetings and contain a variety of useful information about the history of the channel and harbor and perceived changes over time, turbidity and sedimentation and the biological consequences of increasing levels over natural background levels, cruise ships, navigation, the Navy dredging project, future plans for the harbor, and more (LVWG 2002-2004, LVWG 2004)). Ultimately, the LVWG made the following recommendations to the SAC:

1). The SAC should receive regular updates on the Key West Harbor Dredging project from Sanctuary biologists and U.S. Army Corps environmental specialists.

2). The monitoring period for sedimentation and turbidity in the Harbor, channel and environs should be extended from the current one month to at least 12 months after completion of dredging, in order to capture a years seasonal tidal fluctuations.

3). The Sanctuary, Corps, and Navy should incorporate and evaluate existing physical oceanographic data, particularly satellite imagery, with data collected during the dredging project.

As a result, the SAC receives regular updates on the dredging project, the post-dredging monitoring was extended to 3 months as a compromise solution, and review of the dredging monitoring data is to occur in the future.

3.B.3 Environmental - Biological Resources

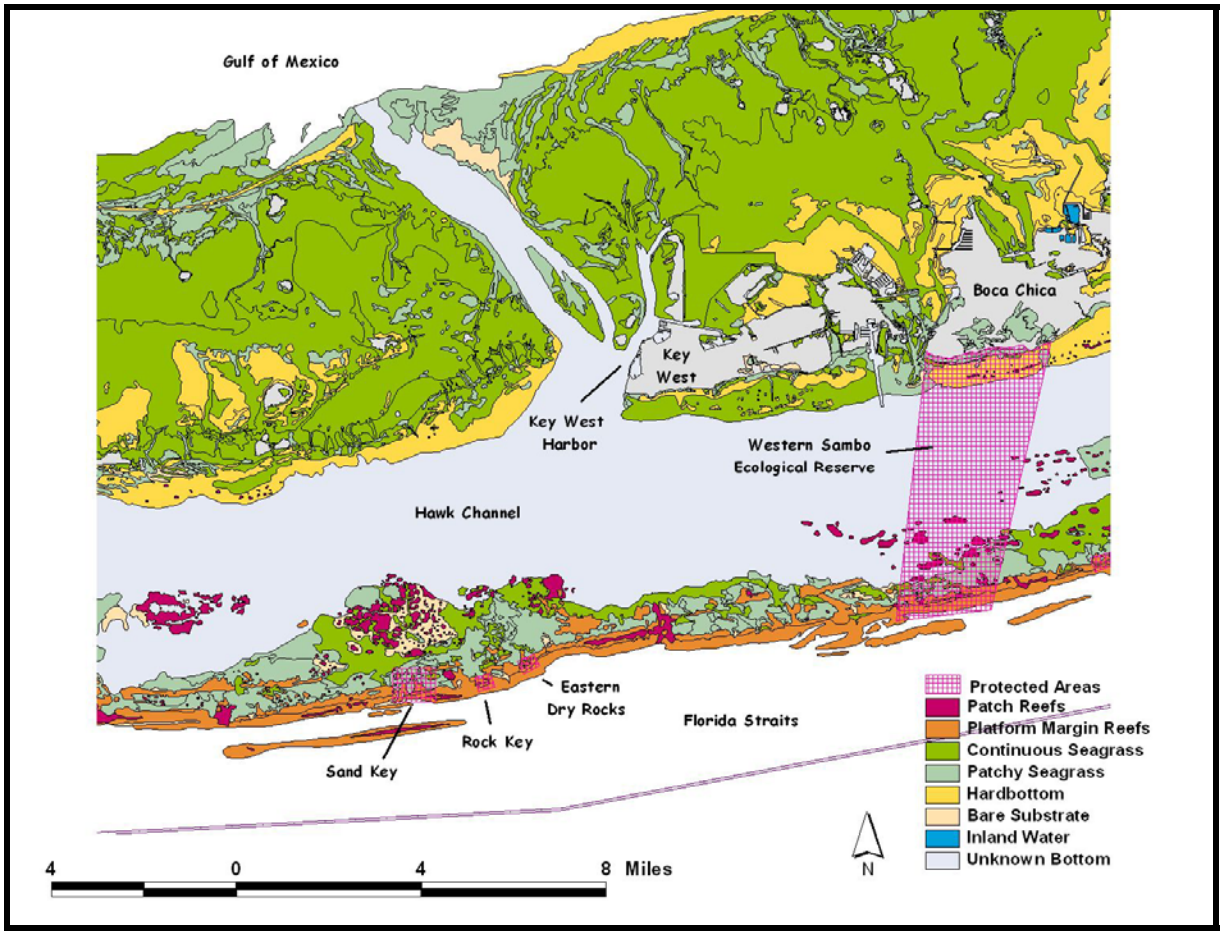
As noted in Section 3.A.6, the marine resources of the Keys and the Key West area have been documented, monitored, mapped, and described in detail as part of the various government programs implemented over the years. Probably no better source of information is available than the FKNMS Management Plan of 1996 and the Draft Revised Management Plan of 2005. Updated information and concerns are presented in these documents along with Action Plans and means of protecting and managing these public resources. An excellent set of links to other web sites containing information on the coral reef ecosystem resources of the Keys can be found at http://floridakeys.noaa.gov/links/reefs.html. The 2003 Navy EA for review of the Navy dredging project is also a good source of current information on the resources of the immediate area around Key West.

"The deterioration of the marine ecosystem in South Florida is no longer a matter of debate. Visitors, residents and scientists alike have noted the precipitous decline in the health of the coral reef ecosystem. The threats causing these visible signs of decline are numerous and often complex, ranging from direct human impacts to global climate changes. Direct human impacts include vessel groundings, anchor damage, destructive fishing, and damage to corals as a result of divers and snorkelers standing on them. Boat propellers and large ships have damaged over 30,000 acres of seagrasses and more than 20 acres of coral reef habitat in the Sanctuary. Most pressures stem from the 5 million annual visitors and 80,000 year-round residents. Their high levels of use in the Sanctuary have significant direct and indirect effects on the ecosystem. Sanctuary visitors primarily seek water-related recreation, including fishing, diving, snorkeling, and boating." (FKNMS 2005)

3.B.3.1 NATURAL HABITATS

Natural habitats and productive benthic communities surround the dredged channel and harbor used by cruise ships and other large vessels to enter and leave Key West. Benthic habitats visible in high quality aerial imagery were mapped in the mid 1990s (FMRI 1998, Zieman et al. 1995) - those mapped around Key West appear in Figure 3.B.5. General categories of these habitats include coral reefs (bank or platform margin reefs and patch reefs) hardbottom, seagrass, and bare or lightly vegetated substrates. These habitats, their functions and value to the public, have been described at length in scientific and resource management literature noted here. They are known to support important and economically valuable commercial and recreational fisheries and provide diving sites for a thriving dive industry around Key West. Much of the bottom of the deeper Hawk Channel offshore of

FIGURE 3.B.5. MAP OF BENTHIC HABITATS IN KEY WEST AREA WITH LOCATION OF SPECIALLY DESIGNATED REEF AREAS (FMRI 1998).



Key West was not mapped due to naturally turbid water that precluded a view of the bottom in the imagery. Artificial habitats in the form of sunken vessels, concrete rubble piles, bulkheads, seawalls, pilings, and rock walls and jetties also exist in the Key West area and can support important resources as confirmed by the removal and transplanting of about a thousand stony corals by the FKNMS from the concrete walls of the Outer Mole prior to its reconstruction and partial removal [9] Florida's coral reef tract is one of the largest bank-barrier reef systems in the world and contains one of nation's most diverse assemblages of flora and fauna - thousands of species of fish, mobile and sessile invertebrates, and plants. State and federal agencies address threats to reef resources in the Keys using a variety of management programs and by applying regulations intended to address both direct and indirect impacts (SAFMC 1995). In the FKNMS a network of no-take zones in mostly shallow bank reef habitats were implemented in 1997, and in 2001 the Tortugas Ecological Reserve at the Dry Tortugas west of Key West was established. Protection and wise use of

[9] McLaughlin, L, Personal Communication, FKNMS

Florida's coral reef habitat is a primary concern and the current long-term Coral Monitoring Project (CRMP) is the most comprehensive coral assessment program ever established in the Keys (FMRI 2005).

Long-term status and trends monitoring over the past eight years in the FKNMS identified the following trends in important coral reef resources (FKNMS 2005):

- Sanctuary-wide from 1996 to 2003 (105 stations), the number of stony coral species declined at 76 (72%) stations, increased at 15 (14%) stations, and remained unchanged at 14 (13%) stations.
- Sanctuary-wide, mean percent stony coral cover declined from 11.9 in 1996 to 7.4 in 1999, a decline of 38%. The greatest change occurred between 1997 and 1999 when mean percent stony coral cover declined from 11.3 to 7.4
- Sanctuary-wide, stony coral cover has not changed significantly since 1999. In 2003, mean percent stony coral cover sanctuary-wide was 7.2
- A decline in the number of stony coral species was recorded in all reef habitat types.
- In 1996, coral disease was observed at only five stations sanctuary-wide. By 2002, coral disease was observed at 102 stations. Incidences of stony coral disease were reported at 95 stations in 2003. Specifically, in 2003, White disease occurred at 72 stations, "Other disease" was recorded at 89 stations, and Black Band disease was recorded at seven stations.

Due to recent declines in populations of elkhorn coral, staghorn coral and fused staghorn coral (*Acropora* spp) in U.S. waters, including the lower Keys, and the lack of recovery from modern large scale die-offs, NOAA in 2005 proposed listing these corals and possibly designation critical habitat for them under the Endangered Species Act.

Patch reefs occur between the shoreline and outer reef line at water depths ranging from about 13 ft to nearly 40 ft, and may have heights of up to 23 ft above the surrounding seafloor. Many patch reefs occur throughout Hawk Channel off Boca Chica Key and Key West in the Lower Keys. Large, mature patch reefs are dominated by the massive stony corals as well as various species of sponges, octocorals, bryozoans, and ascidians.

CRMP monitoring at a patch reef next to the main channel offshore reveal that the number of stony coral species at 2 stations monitored at Cliff Green Patch Reef (about midway along the main offshore channel) declined by 29% from 1996 to 2004 and the total number of stony corals at 3 monitoring stations at nearby Western Head Patch Reef declined by 28% in the same time period. Cover of stony corals from 1996-2003 showed declines at the two stations at Cliff Green Patch Reef ranging from 18% to 28% while decline at the 3 Western Head stations ranged from 7% to 13% (CRMP 2005).

Optimal coral, survival, growth and recruitment occurs under low nutrient and low turbidity conditions, although coral decline in the Keys is considered to be a result of multiple stressors (Cook et al. 2002). Lower skeletal deposition of calcium carbonate in experimental transplants of hard corals into nearshore waters has been attributed to higher turbidity levels. Turbidity and water temperature have been described as major characteristics of nearshore waters that negatively affect corals on the Florida Reef Tract (Cook et al. 2002).

Seagrass communities are a dominant component of the underwater landscape of the Key West area and are found in a variety of habitat types, from large intertidal banks to deeper waters of the reef tract. Distribution of seagrasses is determined by a variety of factors including water quality, clarity, and depth, light, sediment type and thickness, exposure, wave energy and current velocities. Seagrasses near Key West include turtle grass (Thalassia testudinum), manatee grass, (Syringodium filiforme) shoal grass (Halodule wrightii), and star or paddle grass (Halophila spp.)

Seagrasses are one of the most productive natural habitats in the world. Seagrasses provide food and shelter for a majority of the economically important fish and invertebrates in the Keys (FMRI 1998). Important commercial and recreational marine species that rely on seagrass habitat during some part of their life cycle near Key West include pink shrimp, spiny lobster, stone crab, snapper, grouper, bonefish, permit, and tarpon. Some of those species use seagrass meadows for the duration of their life cycles, whereas others use them for only a distinct life-history stage (e.g., as juveniles for the purpose of refuge, or feeding as adults). Seagrasses are used as direct food source for protected species such as manatees, some sea turtles, and queen conch. Epiphytes, using seagrass blades as substrates, provide another primary food source for grazers, which in turn are consumed by larger species foraging in the beds. Seagrasses produce oxygen, which is released to the water during photosynthesis, and absorb some nutrients from the water column. Epiphytes may sequester additional nutrients from the water column. Water quality benefits also occur as seagrasses and associated epiphytes trap suspended sediment from the water-column. Finally, seagrasses stabilize sandy bottoms with roots and rhizomes, and decrease wave action where meadows are dense. These functions increase water clarity which is beneficial to primary production, species interaction, and in the recreational quality of coastal areas (USFWS 2003).

Seagrass habitats in many regions, including the lower Keys, are known to be at risk from many human induced environmental changes, including boating activity (FKNMS 2005). Seagrass habitats in Biscayne National Park and Everglades National Park are being degraded by vessel groundings and resuspended sediment from vessel passage in some areas.[10]

The Seagrass Outreach Partnership in the Keys, a collective effort of a number of local, state and federal agencies led by the FKNMS, publicizes some of the threats to seagrass habitats in its literature as follows:

- Seagrasses are disappearing at an alarming rate
- Threats to seagrass include dredge and fill projects, degraded water quality, sedimentation, and physical impacts by boat propellers and prop wash
- Seagrass destruction is a serious problem that has become more intense near shoreline communities and popular boat access areas
- Boat impacts can create barren areas where fish and other wildlife once flourished
- Boats are becoming more numerous, larger, and more powerful compounding the problem

[10] Lewis, R. Personal Communication, Lewis Environmental Services, Inc.

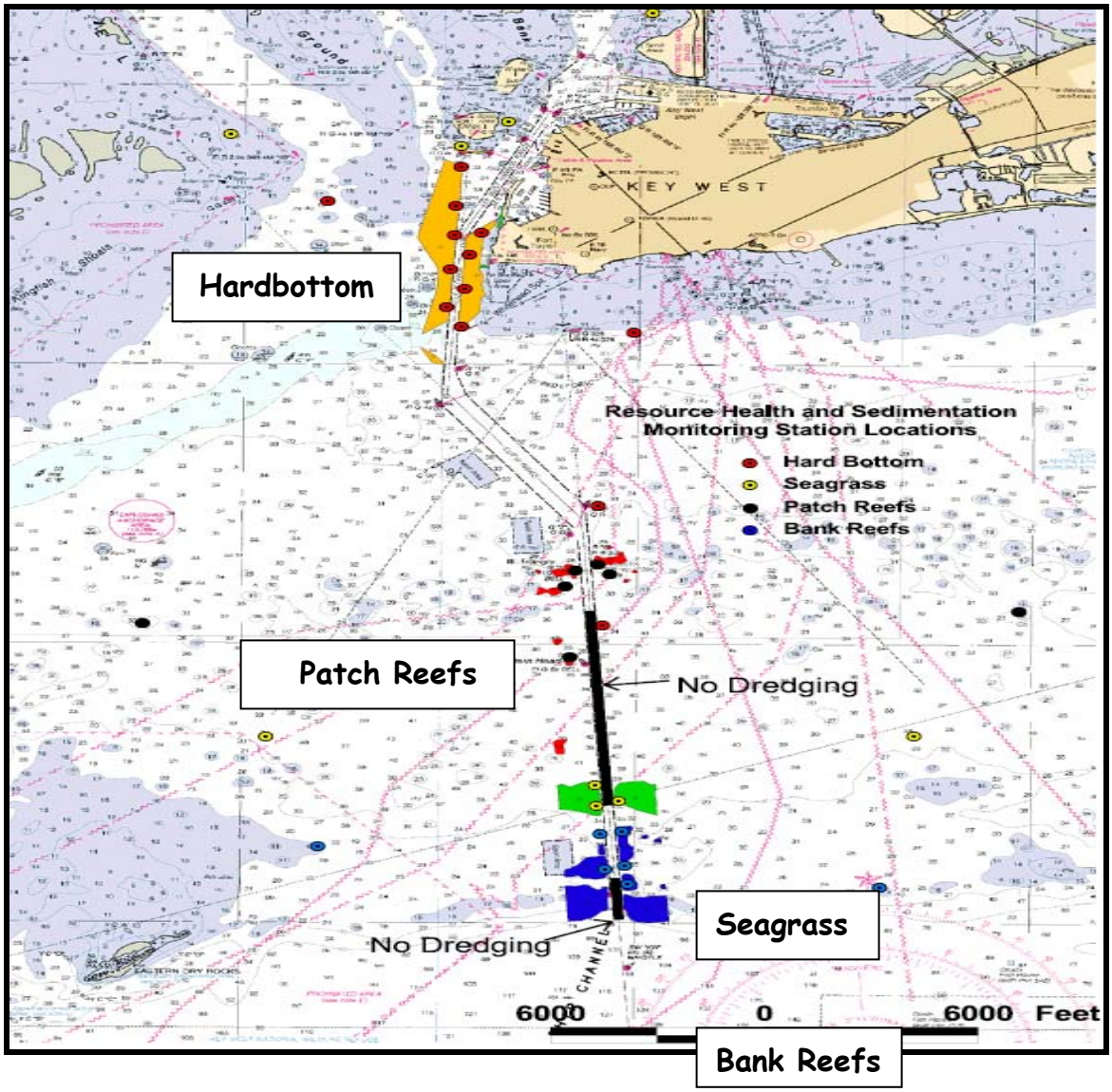
- Seagrass loss has a direct, long-term economic impact on commercial and recreational interests
- Sediment plumes behind boats are a sign of an inexperienced or careless boater
- Seagrasses are critical for stabilizing sediments and providing habitat for hundreds or thousands of associated plant and animal species. Without seagrasses there would be a seascape of unstable shifting sand and mud.

Hardbottom habitats of the Lower Keys are solid, flat, low relief, exposed oolitic limestone substrate that occur in relatively shallow depths often with a thin veneer or pockets of unconsolidated sediment. These pockets may support seagrass and the area is then more of a mosaic of hard features and seagrass habitat. Hardbottom habitats may be colonized by a high diversity of octocorals, stony corals, and sponges in areas of moderate to high water flow such as in channels or cuts. In sheltered areas adjacent to the north or south sides of landmasses, there may be minimal water movement and higher rates of sedimentation and the hard bottom community may be dominated by various species of algae (Navy 2003).

Areas of unconsolidated sediments cover a large majority of the bottom within the Hawk Channel and the channel and harbor dredged areas. Soft bottom habitats can support diverse infaunal assemblages including, polychaete worms, bivalves, gastropods, and crustaceans. Additionally, these areas may contain many epifaunal echinoderm species such as seastars, sea cucumbers, and echinoids. Calcareous mud bottom may be found in areas of high turbidity or with minimal water circulation. The substrate may have varying amounts of sand intermixed with silt- and clay-sized particles, and seagrass and algae may or may not be present. Sand bottom areas are found in locations with wave activity or high tidal flow. If water movement is not excessive, seagrasses and calcareous green algal communities can be dense (Navy 2003).

The 2003 Navy EA for the dredging project identifies and describes habitats within the dredged area based on diver observation and records. These habitats included hardbottom patches, seagrasses, macroalgae, rock rubble, and highly disturbed bottoms of rubble, sand, silt, and mud. The Navy's contractors also identified and mapped natural habitats alongside the channel and harbor for purposes of monitoring any damage from resuspended sediment, turbidity, dredge accidents during dredging, and for establishing habitat specific monitoring sites (Figure 3.B.6).

FIGURE 3.B.6. NATURAL HABITATS ALONG THE MAIN CHANNEL AND HARBOR AND LOCATION OF MONITORING STATIONS (NAVY 2003).



3.B.3.2 ENVIRONMENTALLY SENSITIVE CONSERVATION AREAS

The Key West National Wildlife Refuge (KWNWR) is one of the oldest National Wildlife Refuges in the U.S., designated in 1908, consists of nearly 200,000 acres of islands (including formal wilderness) and open water with unique, highly diverse marine habitats. The administrative boundaries extend from immediately west of the main channel and harbor at Key West to the Marquesas Keys (Figure 3.B.7). The KWNWR was created ".... as a preserve and breeding ground for native birds and other wildlife" and has "particular value in carrying out the national migratory bird management program (USFWS 1997). Objectives of the KWNWR include to provide protection and suitable habitats for listed species, management of feeding, nesting, and roosting habitats for a wide variety of shorebirds, wading birds, waterfowl, raptors and other migratory birds, and to provide wildlife-

dependent recreation and educational activities where compatible with refuge purposes (USFWS 1997). Incompatible uses in the past by large commercial tours out of Key West, especially related to illegal island use by customers, have been identified and addressed by Refuge Management.[11]

The Great White Heron National Wildlife Refuge is to the north and east of Key West and includes about 175,000 acres of productive shallow water seagrass flats, numerous tidal channels, and mangrove islands (Figure 3.B.7). It was established in 1938 as "....as a refuge and breeding ground for native birds and other wildlife" and is to be managed ".... as an inviolate sanctuary, or for any other management purpose, for migratory birds" with objectives similar to those of the KWNWR (USFWS 1997).

In addition, a number of specially designated Wildlife Management Areas (e.g. no motor, low speed, or no access zones) at Refuge islands near Key West that were originally established by the USFWS Refuge System were incorporated into the FKNMS Management Plan. Near Key West WMAs include various access restrictions around the Bay Keys, Boca Grande, Woman Key, Cayo Aqua Keys, Cottrell Key, Big Mullet Key, and Little Mullet Key (FKNMS 1996).

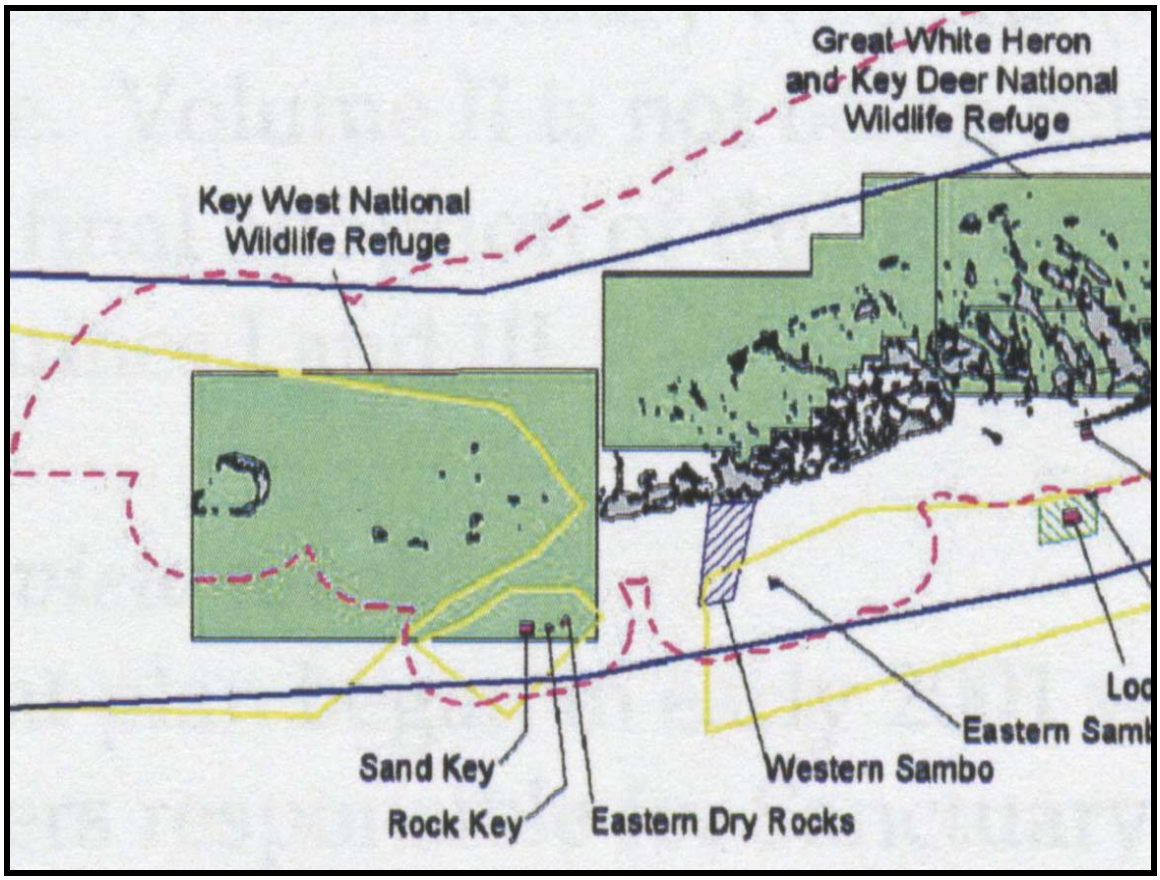
The consideration of temporal and geographic zoning to ensure the protection of Sanctuary resources was mandated under the Florida Keys National Marine Sanctuary and Protection Act of 1990. Three Sanctuary Preservation Areas (SPA) near Key West designated in the 1996 Management Plan are located to the west of the entrance to the main ship channel along the edge of the reef tract. The Sand Key SPA lies about 5 miles west of the entrance channel and comprises about 370 acres of shallow reef. The Rock Key SPA lies about 3.6 acres west of the main channel and consists of about 75 acres of shallow reef and the Eastern Dry Rocks SPA is located just over 2 miles from the entrance channel and consists of about 75 acres of shallow reef (Figure 3.B.7). The Western Sambos Ecological Reserve, about 5 miles east of the entrance channel extends from the south shore of Boca Chica Key to the reef tract (Western Sambo Reef) and includes about 7,600 acres that represent most Keys marine habitats. The Eastern Sambos Research Special Use Area is about 7 miles east of the ship channel and is composed of about 75 acres of shallow reef. Details about these specially protected zoned areas and their biota, and the goals and objectives of the zoning, can be found in 1996 FKNMS Management Plan.

Ft. Zachary Taylor State Historic State Park is a 58 acre facility immediately south of the adjoining Truman Annex and Outer Mole. The site was given to the State of Florida by the Navy in the 1960s. It consists totally of filled land and borders Key West channel on its west side. The south shoreline includes an artificial sand beach protected by rock groins, the west shoreline is stabilized with riprap boulders and it shares a small beach (Truman Beach) here with Truman Annex.

[11] Wilmers, T. Personal Communication, USFWS

FIGURE 3.B.7. LOCATION OF SPECIALLY DESIGNATED CONSERVATION AREAS AROUND KEY WEST.

The east boundary of the Key West NWR lies immediately to the west of Key West Channel and Harbor. Sand Key, Rock Key, and Eastern Dry Rocks are located west of the entrance to the main channel. The solid blue line represents FKNMS boundaries, the dashed red line represents State Waters off Key West, and the solid yellow line represents the Area To Be Avoided designation.



3.B.3.3 THREATENED AND ENDANGERED SPECIES

A detailed review was conducted by federal agencies on the methods proposed to be used for the Navy's dredging project in Key West. As a result, excellent information on the status of marine species found near Key West and listed under the federal Endangered Species Act (ESA) can be found in the Navy's 2003 EA and much of that information is directly excerpted here without reference to the original sources cited in the Navy EA.

Five sea turtle species are known to occur in waters near Key West (Table 3.B.1). In order of abundance, they are loggerhead, green, and hawksbill turtles, and occasionally Kemp's ridley and leatherback. Historic survey data suggest that shallow seagrass beds and hard bottom areas in the Florida Keys, including the project area, are important year-round habitats for loggerhead, green, and hawksbill turtles, and sightings of these species within these habitats are common (Navy 2003).

TABLE 3.B.1. EXCERPTED FROM THE 2003 NAVY EA AS INFORMATION ON SEA TURTLES FOUND IN THE KEY WEST AREA.

Common and Scientific Names	Status[a]	Life Stages Present	Seasonal Presence	Nesting Season
Loggerhead turtle (*Caretta caretta*)	T	Adults, subadults, juveniles, and hatchlings	Year-round (most abundant during spring and fall migrations)	April - August
Green turtle (*Chelonia mydas*)	T/E[b]	Adults, subadults, juveniles, and hatchlings	Year-round	June-August
Hawksbill turtle (*Eretmochelys imbricata*)	E	Adults, subadults, juveniles, and hatchlings	Year-round	Variable[c]
Kemp's ridley turtle (*Lepidochelys kempii*)	E	Juveniles and subadults	Year-round (most abundant during spring and fall migrations)	(no nesting in area)
Leatherback turtle (*Dermochelys coriacea*)	E	Adults, subadults, juveniles, hatchlings	March-October	(no nesting in area)

[a] Status: E = endangered, T = threatened under the ESA of 1973.
[b] Green turtles are listed as threatened except in Florida, where breeding populations are listed as endangered. Due to inability to distinguish between the two populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.
[c] Hawksbill turtle nesting in the Keys has been reported within the months of November, December, March, June, and July (Wilmers and Wilmers, 1999).

All marine turtles are protected under the ESA and under laws of the State of Florida. Hawksbill turtles, Kemp's ridleys and leatherbacks are listed as endangered and loggerheads as threatened. Atlantic green turtles also are threatened, except for the Florida breeding population, which is endangered. Due to inability to distinguish between the latter two populations away from the nesting beach, Atlantic green turtles are considered endangered wherever they occur in U.S. waters. Loggerhead, green, and hawksbill turtles are known to nest on beaches or dunes within the Keys, including the Marquesas and surrounding islands, and the Dry Tortugas (Navy 2003).

Loggerhead turtles are found throughout tropical, subtropical, and temperate waters of the Atlantic, Pacific, and Indian Oceans In the western Atlantic, it is found in estuarine, coastal, and shelf waters from South America to Newfoundland. Adult and subadult loggerhead turtles are generalist carnivores, feeding primarily on benthic crustaceans and mollusks. Loggerheads are present year-round in Florida waters, with peak abundance during spring and fall migrations. They are the most common marine turtle observed in the Keys, including both adult and subadult individuals. The loggerhead turtle is the only marine turtle species regularly utilizing local sandy beaches for nesting. Nesting activities have been reported along the Keys as far as the Dry Tortugas, including sandy beaches around Key West. Nesting activity in the area has been recorded between April and August, with peak activity from May through July. Two successful loggerhead turtle nests were recorded on beaches within Fort Taylor in 2002, and two on other Key West beaches in 2001. Hatchling loggerheads swim offshore and begin a pelagic existence within *Sargassum* rafts, drifting in current gyres for several years. At approximately 40 to 60 cm carapace length, juveniles and

subadults move into nearshore and estuarine areas, where they become benthic feeders for a decade or more prior to maturing and making reproductive migrations (Navy 2003).

The green turtle occurs worldwide in tropical and subtropical waters. The species is made up of several distinct populations. In the U.S., green turtles (part of the Atlantic green turtle population) occur in Caribbean waters around the U.S. Virgin Islands and Puerto Rico and along the mainland coast from Texas to Massachusetts. Green turtles occur throughout the Keys. Nearshore and inner shelf waters of the Keys provide crucial developmental foraging habitats for juvenile and subadult green turtles. Most commonly, these foraging habitats are seagrass and algae beds, though small green turtles also may be found over coral reefs, worm reefs, and exposed hardbottom.. Data suggest that some foraging habitats may only support certain size classes of green turtles and that the turtles apparently move among various foraging habitats as they grow. Subadult green turtles are commonly observed on seagrass beds inside of the reef tract, including those adjacent to Key West channel and harbor. Primary nesting sites in U.S. Atlantic waters are high-energy beaches along the east coast of Florida, primarily during July and August, with additional sites in the U.S. Virgin Islands and Puerto Rico. A few nesting sites have been identified within the Keys. These include Boca Grande Key, Sawyer Key, the Marquesas, and the Dry Tortugas. Nesting activity has been recorded from June through August, with peak activity between June and July (Navy 2003).

The hawksbill turtle occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. In the western Atlantic, hawksbills are generally found in clear tropical waters near coral reefs, including the southeast Florida coast, Florida Keys, Bahamas, Caribbean, and southwestern Gulf of Mexico. Within the Keys, hawksbills are relatively common and are probably year-round residents, including adult, subadult, and juvenile life stages. Subadult hawksbills are found mostly year-round on shallow, offshore reef formations of the Lower Keys, including those in proximity to Key West, and especially the Eastern Dry Rocks area. Within the continental U.S., nesting beaches are considered rare and restricted to the southern coasts of Florida from Palm Beach to the Keys. Nesting near Key West has been recorded on Woman Key and the Marquesas Keys, west of Key West. Hawksbill nesting along the east Florida coast occurs between June and September. However, hawksbill nesting in the Keys appears to be not restricted to summer months only, with nests reported in November, December, March, June, and July. Adult hawksbills typically are associated with coral reefs and exposed hardbottom, where they forage on invertebrates, primarily sponges. Hatchlings are pelagic, drifting with *Sargassum* rafts. Juveniles shift to a benthic foraging existence in shallow waters, progressively moving to deep waters as they grow (Navy 2003).

In 2003, the FKNMS reported to the Navy's consultant, CZR, Inc., that there is a significant transient sea turtle population in the Lower Keys, such that collisions between boats and turtles and injured turtles are a regular occurrence. They noted that the prevalence of hawksbills along the local reef tract seemed underplayed in the Navy's draft EA (FKNMS 2003b).

The West Indian manatee is one of the most endangered marine mammals in coastal waters of the U.S. It is federally and state listed as endangered and is further protected as a depleted stock under the U.S. Marine Mammal Protection Act. Florida manatees of the Atlantic Region range along the entire Florida coast through the Florida Keys, including to Key West. Usually the manatee is a cold-intolerant species and requires warm water temperatures

generally above 20°C. Nearly all manatees winter in peninsular Florida and during warmer months expand their range north along the eastern U.S. and Gulf of Mexico coasts. Manatees inhabit both saltwater and freshwater of sufficient depth throughout their range. They are frequently found in fresh or brackish waters of canals, rivers, and estuarine habitats, but also frequent saltwater bays and other marine environments. On occasion, manatees have been observed as much as 7 miles off the Florida coast. In the lower Keys, including Key West, sightings of manatees are generally uncommon and usually consist of single to few individuals. Manatees prefer to feed on submerged and emergent vegetation. Therefore, movements of manatees often may be correlated with the distribution and availability of seagrasses. Under the ESA, there are no listings of critical habitat for manatees in the Keys (Navy 2003). Manatee "Caution" signs have been placed on the outside of Mallory Dock by the City, and presumably at the Outer Mole.

Although watercraft collisions account for about 25% of all manatee deaths and represent the single greatest threat to manatees (FWC 2002,) there appears to be no direct evidence of naval or other large vessel collisions with these mammals in waters near Key West. Low speeds typical of large commercial and naval vessels transiting the inner harbor at Key West are unlikely to result in collisions with both sea turtles and manatees. The Army Corps of Engineers and Florida DEP included a number of conditions regarding manatee protection and education in permits issued for the Outer Mole and Pier B reconstruction and the Navy's dredging. Displacement of sea turtles and manatees from preferred habitat by vessel traffic is possible, and chronic disturbance of manatees by vessels may alter and important activities such as feeding, suckling, or resting (FWC 2002).

On April 1, 2003, the National Marine Fisheries Service (NOAA Fisheries) announced its final determination to list smalltooth sawfish (*Pristis pectinata)* as an endangered species under the ESA. Sawfish are known to occur in waters around Key West and use a variety of habitats. Sawfish are extremely vulnerable to overexploitation because of their propensity for entanglement in nets, their restricted habitat, and low rate of population growth. The decline in smalltooth sawfish abundance has been caused primarily by bycatch in various fisheries, likely compounded by habitat degradation. Smalltooth sawfish has been reported in both the Pacific and Atlantic Oceans, but the U.S. population is found only in the Atlantic. Historically, the U.S. population was common throughout the Gulf of Mexico from Texas to Florida, and along the east coast from Florida to Cape Hatteras. The current range of this species has contracted to peninsular Florida, and smalltooth sawfish are relatively common only in the Everglades region at the southern tip of the state. Over the past century the population has been reduced by fishing and habitat alteration and degradation, and currently smalltooth sawfish are primarily found in southern Florida in the Everglades and Florida Keys (NOAA 2003).

The Florida Fish and Wildlife Commission (FWC) consolidates the official state and federal lists of endangered species, threatened species, and other species designated in some way by the respective jurisdictional agencies as meriting special protection or consideration (FWC 2004). The FWC maintains the state list of animals designated as endangered, threatened, or species of special concern, in accordance with Rules 68A-27.003, 68A-27.004, and 68A-27.005 FAC.

In addition to the sea turtles and Florida manatee noted above, other species listed by the State as warranting protection that may use the channel and harbor or immediately adjacent marine area, and that may be affected by cruise ship activity are (along with listing status):

Brown pelican (*Pelecanus occidentalis)* - Species of Special Concern

Black skimmer (*Rynchops niger)* - Species of Special Concern

Least tern (*Sterna antillarum)* - Threatened

Roseate tern (*Sterna dougalli)* - Threatened

Osprey (*Pandion haliaetus)* - Species of Special Concern

Pillar coral (*Dendrogyra cylindrus)* - Endangered

Pillar coral is rare in the Florida Keys and is currently the only local stony coral currently listed by state or federal agencies, although as noted above, NOAA has announced a review of *Acropora* spp. for possible listing under the ESA. NOAA is also involved in the protection of deep water *Occulina* coral beds elsewhere. Pillar coral is found only in limited offshore areas, including Hawk Channel and the lower Keys reef tract. This endangered coral is unusual in that its polyps are usually extended for feeding during the day while most hard corals feed at night. Pillar coral forms numerous heavy cylindrical spires that grow upward from an encrusting base.

In addition, and especially important to waters of the Keys, the State of Florida has a Marine Life Rule wherein the taking, destruction, and sale of many marine life species (including stony corals, soft corals, sea fans, reef fish, macroinvertebrates, and even live rock) are either prohibited or restricted (Chapter 46-42 FAC). The purpose and intent of these restrictions is to protect and conserve Florida's tropical marine life resources and assure the continuing health and abundance of these species. Further these rules are to assure that harvesters use methods for the maximum possible conservation and economic benefits.

Although many do not typically occur in waters near Key West, the 2003 Navy EA includes a review of other marine mammals (whales, bottlenose and other dolphin, etc.) that may potentially occur here and interact somehow with large vessel traffic in the area.

3.B.3.4 RECREATIONAL AND COMMERCIAL SPECIES

The high quality of recreational and commercial fishing in the Key West area is world renowned with a seemingly unlimited variety of species available for sport or harvest. These historic Keys and Key West industries significantly generate thousands of jobs in communities and tens of millions of dollars in income.

Important recreational species in the channel and harbor (and immediately offshore) that could be affected by local habitat or water quality degradation include snapper, grouper, dolphin, tunas, marlin, sailfish, mackerel, barracuda, jacks, sharks, bonefish, tarpon, permit, cobia, and spiny lobster. Important commercially harvested species include snapper, grouper, grunts, dolphin, mackerel, jacks, spiny lobster, stone crab, pink shrimp, and marine life for the aquarium industry. Food chain disruptions or changes that affect these species could occur if the abundance of prey items is altered by water quality or habitat modifications. Disruptions or degradation of benthic habitats that these important species depend on at various life stages and could directly affect targeted adult stages.

3.B.3.5 ESSENTIAL FISH HABITAT

Required by federal agencies reviewing their dredging permit application, the Navy provided an extensive and detailed review of Essential Fish Habitat (EFH) in the Key West area as part of the 2003 EA. A portion of that review is excerpted here:

"The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801-1882) established regional Fishery Management Councils and mandated that Fishery Management Plans (FMPs) be developed to responsibly manage exploited fish and invertebrate species in Federal waters of the United States. When Congress reauthorized this act in 1996 as the Sustainable Fisheries Act, several reforms and changes were made. One change was to charge the National Marine Fisheries Service (NMFS) with designating and conserving Essential Fish Habitat (EFH) for species managed under existing FMPs. This was intended to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or non-fishing activities, and to identify other actions that encourage conservation and enhancement of such habitat. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" [16 U.S.C. § 1801(10)]. The EFH Final Rule summarizing EFH regulations 50 CFR Part 600) outlines additional interpretation of the EFH definition. "Waters", as used previously, include "aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate." "Substrate" includes "sediment, hard bottom, structures underlying the waters, and associated biological communities." "Necessary" is defined as "the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem." "Fish" includes "finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds," while "spawning, breeding, feeding or growth to maturity" cover the complete life cycle of those species of interest."

The South Atlantic Fishery Management Council (SAFMC) is the management council with jurisdiction over fisheries in federal waters near Key West. The SAFMC has produced several FMPs for single and mixed species groups. All of these FMPs, including those for shrimps, spiny lobster, and corals, coral reefs and live/hard bottom, reef fishes, and coastal migratory pelagics, were recently amended to further address EFH.

For example, seagrasses provide many biological, chemical, and physical functions for marine communities. They provide habitat for a myriad of fishes, shrimps, crabs, and other species, and therefore have been designated as Essential Fish Habitat (EFH) by the South Atlantic Fisheries Management Council. EFH has been also designated along the Keys reef tract for reef building stony corals. This area extends from nearshore areas to about 100 foot depth in areas where salinity is consistently above 30 ppt and water temperatures range from 15 to 35º C - both true near Key West . Much of the area adjacent to the Key West channel and harbor, and particularly in Hawk Channel, includes patch reefs and hardbottom. Designated also for some species or species groups within EFH are Habitat Areas of Particular Concern (HAPC). HAPCs either play critical roles in the life history (e.g., spawning, feeding) of federally managed species or are those areas vulnerable to degradation from fishing or other human activities. In many cases HAPCs are habitats where detailed information is available. HAPCs for coral, coral reefs, and hard bottom habitats of the Keys include the reef tract and Hawk Channel (Navy 2003).

Queen conch primarily inhabit back-reef zones, shallow hard bottom, seagrass, and coarse habitats in the lower Keys. Several spawning populations exist, and a large concentration of spawning adults is known for the back reef and hard bottom areas from Eastern Dry Rocks (offshore from Key West) east to Looe Key. Conch occur in two major zones - inshore and offshore. The inshore group rarely reproduces, whereas the offshore group is reproductively active. Spawning occurs from March through October with peak activity from April to July (Glazer 2001). HAPCs for queen conch exist in two areas near Key West, the hard bottom adjacent to the main channel, and off Fort Taylor and Boca Chica. Of the estimated 28,000 conch in the spawning stock from Eastern Dry Rocks to Looe Key during 2001, about 18,000 were found in the region extending from Eastern Dry Rocks to Eastern Sambo. This region, by far, represents the greatest reproductive output of Florida's queen conch population, and any impacts, particularly elevated turbidity, could impact planktonic larvae and newly settled individuals The southern portion of the channel intersects this area. In addition, juvenile and non-reproducing adult conch are common in hardbottom along the oceanside of Key West and on the west side of harbor (Navy 2003).

Spiny lobster (*Panulirus argus*) is a very important species near Key West and both commercial and recreational interests benefit from healthy spiny lobster populations. EFH for lobster as well as other valuable invertebrates has been defined (Table 3.B.2). Spiny lobster EFH for adults, subadults, and juveniles consists of hard bottom, coral reefs, seagrasses, macroalgae and mangroves. HAPCs for spiny lobster include coral and hardbottom habitats from Jupiter Inlet to the Dry Tortugas.

All life stages of the stone crab (*Menippe mercenaria*) occur near Key West, including commercial quantifies of adults. Highest local densities of adult stone crab exist to the north in Florida Bay. EFH for adults includes seagrasses, hardbottom, ledges, channel edges, and coral heads. Adults construct burrows and prefer areas with hard packed sand with scattered hard bottom covered with algae, soft corals, and sponges. Juveniles do not burrow but are found in seagrass, shell hash, sponges, and other structurally complex benthic habitats (Navy 2003).

The SAFMC also manages a "Snapper-Grouper Management Unit" that consists of 73 species from 10 families. Members of this management unit inhabit reefs and hard bottom areas as adults and are very important components of commercial and recreational fisheries of the Key West area. Because of their affinity for hardbottom and reefs, members this Unit are collectively referred to as reef fishes. HAPCs described for this Unit include high-relief offshore areas where spawning occurs and localities of known spawning aggregations. In addition, nearshore mangrove habitat, seagrass habitat, coral, coral reef, and hardbottom habitats, and artificial reefs compose HAPC for reef fishes. EFH has also been identified for a wide variety of coastal pelagic species - many of which are of commercial and recreational importance in the Key West area (Navy 2003).

Most importantly, it is maintenance of important and critical habitats and ambient water quality that is critical to the survival and maximum productivity of these species. Table 3.B.3 was provided in the Navy EA and summarizes effects from bottom disturbance and dredging on important habitats and species in the Key West area and their EFH.

TABLE 3.B.2. IMPORTANT COMMERCIAL INVERTEBRATES IN THE KEY WEST AREA FOR WHICH EFH HAS BEEN IDENTIFIED. BY LIFE STAGE AND HABITAT (NAVY 2003).

Invertebrate Species for Which EFH has been Identified in the Ship Channel, Turning basin, Truman Harbor, and Dead End Canals Near Key West, Florida (SAFMC 1998a).

Species	Life Stages	Habitat
Queen conch (*Strombus gigas*)	Adults; Juveniles; Larvae	Back-Reef Zones; Rubble-Sand; Coarse Sand; Pelagic
Pink shrimp (*Penaeus dourarum*)	Adults; Juveniles; Larvae	Soft Bottom; Seagrass; Pelagic
Rock shrimp (*Sicyonia brevirostris*)	Adults; Juveniles; Larvae	Soft Bottom (18 to 180 m); Pelagic
Stone crab (*Menippe mercenaria*)	Adults; Juveniles; Larvae	Hard Bottom; Seagrass; Mangrove; Sponges; Macroalgae; Pelagic
Spiny lobster (*Panulirus argus*)	Adults; Juveniles; Larvae	Hard Bottom; Seagrass; Mangrove; Sponges; Macroalgae; Pelagic

3.B.4 Cruise Ship Discharges

This section discusses the federal regulations, state regulations and cruise ship industry's policies regarding waste management practices in port and underway in the waters around Key West. Also discussed is research on cruise ship discharges and their impacts on natural resources resulting from the application of these practices in Key West. Recommendations to maintain and improve current waste management practices are proposed to further increase the protection of the Key West natural environment.

The main waste discharges generated by cruise ships are sewage/blackwater, graywater, oily bilge water, hazardous and solid waste and air emissions. Ballast water discharges are not considered a waste but improper discharges of ballast water can be a threat to the local marine environment.

TABLE 3.B.3. EXCERPTED INFORMATION ON POTENTIAL IMPACTS TO ESSENTIAL FISH HABITATS OF IMPORTANT MARINE SPECIES NEAR KEY WEST FROM SEAFLOOR DISTURBANCE AND TURBIDITY (NAVY 2003).

Species Group	Seafloor Disturbance	Turbidity	Entrainment
Sargassum Algae[1]	None expected	Potential mortality/ feeding impairment of associated juvenile fishes	None expected
Coral, Coral Reefs, and Hard/Live Bottom[2]	Detachment of individual colonies; direct physical damage	Suffocation of polyps and tissue	None expected
Queen Conch[5]	Adult habitat loss	Potential mortality of early lfe stages	Juveniles and adults susceptible
Penaeid and Rock Shrimps	None expected	Potential mortality of early life stages	All life stages susceptible
Spiny Lobster[2]	Adult and juvenile habitat loss	Potential mortality of early life stages	All life stages susceptible
Stone Crab[3]	None expected	Potential mortality of early life stages	All life stages susceptible
Coastal Sharks[4]	Adult and juvenile habitat loss (nurse sharks)	None expected	None expected
Highly Migratory Species[4]	None expected	Potential mortality/ feeding impairment of early life stages	Larvae and eggs susceptible
Reef Fishes (Snapper-Grouper Management Unit)[2]	Adult and juvenile habitat loss	Potential mortality/ feeding impairment of early life stages	Larvae and eggs susceptible
Coastal Migratory Pelagic Fishes[2]	None expected	Potential mortality/ feeding impairment of early life stages	Larvae and eggs susceptible

[1]-South Atlantic Fishery Management Council 1998b
[2]-South Atlantic Fishery Management Council 1998a
[3]-Gulf of Mexico Fishery Management Council 1998
[4]-NMFS 1999a
[5]-Robert Glazer (Florida Fish and Wildlife Conservation Commission pers. comm. 2003)

From 1993 through 1998 - the most recent year for which data are available - cargo ships, tankers, cruise ships, and other commercial vessels registered, or "flagged," in foreign countries have been involved in nearly 2,400 cases of illegally discharging oil, garbage, and other harmful substances into U.S. coastal waters. Cruise ships, nearly all of which are flagged in foreign countries, accounted for about 4% of all confirmed illegal discharges during this period. Although the more than 100 cruise ships operating in U.S. waters have been involved in a relatively small number of these pollution cases, several cruise ship cases have been widely publicized. In addition to Coast Guard, civil and administrative penalties against illegal discharges by cruise ships the Department of Justice prosecuted 10 criminal cases against cruise ship companies and levied penalties ranging from $75,000 to $18 million (GAO 2000). Officials from various government agencies acknowledge that cruise ship companies were making progress towards changing a maritime culture that once ignored discharges of oil and garbage at sea (GAO 2000). The existence of more and larger cruise ships accessing coastal communities warrants close attention to the issue of discharges.

In addition to cruise ships being subject to international and federal laws and regulations, the industry and the State of Florida entered into a specific waste management agreement for state waters. The State of Florida Department of Environmental Protection (FDEP), the Florida-Caribbean Cruise Association (FCCA) and the International Council of Cruise Lines (ICCL), as representatives for the cruise industry in Florida, signed a Memorandum of Understanding (MOU) in 2001. In the MOU, FDEP accepted the ICCL Industry Standards E-01-01, entitled Cruise Industry Waste Management Practices and Procedures (ICCL 2001). The MOU also states that the FCCA and ICCL members agree to discharge wastewater only outside of Florida territorial waters. The FDEP acknowledges that the waste management practices and procedures meet or exceed the standards set forth in Florida laws and applicable Florida regulations. Effective January 2004, the ICCL implemented a revision of the Cruise Industry Waste Management Practices and Procedures (ICCL 2003). The U.S. Coast Guard, who has federal jurisdiction over environmental matters in navigable waterways in the United States, is responsible for the monitoring and compliance of the ICCL Industry Standards in the MOU.

Within the cruise line industry, the major companies have implemented Safety Management System (SMS) Plans for: (1) developing enhanced waste management systems to implement the companies' environmental policies and highlight proper waste-handling procedures; (2) increasing internal and third-party audit oversight of environmental procedures to prevent illegal discharges; and (3) improving waste management and equipment to reduce or better treat waste. These plans are certified in accordance with the International Marine Organization's (IMO) International Safety Management (ISM) Code. (USEPA 2000)

Cruise lines that visit Key West practice self-imposed waste management policies that are more stringent than the standards in the MOU[12]. But even with implementation of more stringent industry standards there are waste discharge issues that need to be addressed for the cruise ships and all other vessels transiting the waters of Key West.

3.B.4.1 SEWAGE - BLACKWATER

The thousands of passengers on cruise ships can generate up to 30,000 gallons of sewage per day. However, the cruise ships are not subject to the same wastewater regulations that govern land-based facilities. The EPA does not require a National Pollutant Discharge Elimination System permit for cruise ships as mandated for land-based facilities.

This decision by EPA is based on studies that investigated the composition, dispersion and impacts of graywater and blackwater discharged from cruise ships. The findings concluded that the ICCL Cruise Industry Waste Management Practices and Procedures for blackwater resulted in high dispersion levels with minimal negative impacts on the environment (Sweeting and Wayne 2003).

In Florida, the FDEP incorporated the Cruise Industry Waste Management Practices and Procedures in the MOU between the State and the ICCL. The MOU states ICCL members will process blackwater through a certified Marine Sanitation Device (MSD) and discharge treated blackwater only when the ship is more than 4 miles from shore and at a speed of not less than 6 knots (ICCL 2003).

[12] Pruitt, Rich. Personal Communication. Royal Caribbean Cruises Lines

In June 2002, state waters within the Florida Keys National Marine Sanctuary (FKNMS) were designated as a No Discharge Zone (NDZ) by EPA, under Section 321 of the Clean Water Act, making it illegal for any vessel to discharge sewage. Offshore from Key West this NDZ extends about 2 miles beyond the reef tract, and a total distance of about 7 miles offshore. Directly south of Key West, state waters include most of the reef tract and as well as all of Key West channel (Figures 3.B.1 and 3.B.7). The FKNMS is proposing to initiate regulatory changes to expand the existing no-discharge zone in state waters in the Keys to include the entire FKNMS. NOAA will pursue a no-discharge zone regulation for the federal waters of the Sanctuary in 2005.[13]

Of the three cruise ship berths on Key West Harbor, pumpout facilities exist at Mallory Square and the Outer Mole. The City of Key West Environment Best Management Practices Committee is currently researching the feasibility of mandatory pumpout by cruise ships while in port at Key West as a means of reducing discharges offshore. The committee's recommendations to the City Council are due in Spring 2005. However, discussions with the city and cruise ship representatives indicate mandatory pumpout does not seem feasible due to as yet unresolved engineering, waste treatment, and cost issues.[14]

Royal Caribbean Cruises Ltd. (RCCL) and Carnival Corporation (CCL) represent the largest number of cruise lines that visit Key West. Each cruise line under RCCL and CCL, such as Celebrity Cruises, are members of the ICCL and the Florida-Caribbean Association. Over 90% of ships that visit Key West are from these two cruise ship companies.

In the Keys, RCCL vessels discharge only treated and screened black water 12 nautical miles from nearest land with ship's speed greater than 6 knots. If the treatment system is not operational, untreated black water is held for land disposal. A RCCL goal is to have its fleet retrofitted with Advance Wastewater Treatment Systems (AWT) within five years.[15] CCL has similar company discharge policies and AWT goals for all their cruise lines.[16]

AWT systems do not remove all nutrients from the discharge effluent. The dilution of wastewater from a single vessel transiting the Keys may be great. However, if discharges did occur the cumulative impact from many transiting vessels and vessels repeatedly using the same navigational route offshore from Key West could be cause for concern and assessment. Potential impacts are increased if the transiting vessels discharge in close proximity to coral reef, seagrass, or other colonized benthic habitats. Water current direction, speed, and variability near Key West are very complex and are just beginning to be understood in the Keys. Nutrients and other pollutants derived from other geographical areas undoubtedly reach waters surrounding the Florida Keys. (USEPA 2002)

Coral reef monitoring in the Keys indicates the presence of human waste on the reef tract in some areas of the Keys. The Executive Summary for the EPA/NOAA Coral Reef Evaluation and Monitoring Project states: "Beginning in 2002, a series of mid-water and

[13] Causey, Billy. Personal Interview, NOAA.

[14] Fernandez, David. Personal Communication. City of Key West.

Pruitt, Rich. Personal Communication. Royal Caribbean Cruises Lines.

[15] Pruitt, Rich. Personal Communication. Royal Caribbean Cruise Line.

[16] Mujwit, Joe. Telephone Interview. Carnival Corporation.

coral mucus samples were examined for presence of human enteroviruses commonly found in sewage. Human enteroviruses were detected in coral mucus from two Upper Keys sites (El Radabob and Conch Reef), one Lower Keys site (Jaap Reef), and surprisingly, one Tortugas site (Black Coral Rock). In addition, enteroviruses were detected in the mid-water samples from Black Coral Rock and Western Head off Key West and near the Key West Channel. It is unknown if the source of these pollutants is local or is the result of remote transport." (Beaver, et al. 2003). Additional analysis was planned for 2004 and may help define the source of this pollution.

3.B.4.2 GRAYWATER

Cruise ship graywater is defined in 33 CFR 1515.05 as drainage from dishwashers, showers, laundry, washbasins and galleys (ADEC 2000). Up to 1,000,000 gallons a week can be generated by a typical cruise ship (USEPA 2000). Except in the Great Lakes and waters of Alaska, there are no federal regulations prohibiting the discharge of graywater in state or U.S. waters. Based on EPA testing of graywater, the State of Alaska requires graywater be treated before being discharged due to the presence of fecal coliform and total suspended solids (ADEC 2000).

The current FKNMS State waters NDZ does not restrict graywater discharges. However, the State/ICCL MOU states graywater will not be discharged in port or within 4 nautical miles of shore and at a speed of 6 knots or greater (ICCL 2001, ICCL 2003).

Cruise ships do not discharge graywater while berthed or anchored in Key West.[17] The Royal Caribbean Cruise Line's graywater discharge policy is no discharge within 12 miles from any shore. Cruise ships retrofitted with AWT systems will treat graywater before discharging it.[18] However, AWT does not remove all nutrients and, as with blackwater, potential impacts may exist depending on where the discharges occur, and the frequency at which they occur.

3.B.4.3 SOLID WASTE

Cruise ships generate large volumes of solid waste while at sea. Problems associated with improper disposal of this waste includes, ingestion and entanglement by sea birds and many other marine species. The disposal of plastics and garbage is governed through the Marine Plastic Pollution and Control Act pursuant to ANNEX V of The International Convention for the Prevention of Pollution from Ships (MARPOL). Under these regulations the disposal of plastics is prohibited in any water. U.S. law prohibits the disposal of all garbage within three miles of shore and enforces MARPOL Annex V, which prohibits the dumping of garbage from three to 25 offshore unless it is ground to pieces smaller than one inch (Ocean Conservancy 2002). MARPOL Annex V also requires waste reduction through recycling, reuse, land disposal and onboard incineration. Onboard incineration is used for food waste, contaminated cardboard, some plastics, trash and wood (Monterey Bay 2003)

In State waters, the State of Florida/ICCL MOU that governs solid waste disposal follows MARPOL Annex V standards. Solid waste is not off loaded while cruise ships are berthed

[17] Pruitt, Rich. Personal Communication. Royal Caribbean Cruise Line.

Mujwit, Joe. Telephone Interview. Carnival Corporation.

[18] Pruitt, Rich. Personal Communication. Royal Caribbean Cruise Line.

in Key West and in accordance with an agreement between the City of Key West and ICCL members, incinerators are not used in port.[19] Any solid waste discharged at sea must be properly processed and discharged in accordance with MARPOL Annex V (ICCL Standards 9).

Solid waste generated by passengers while onshore in Key West and the Lower Keys is ultimately collected at a transfer station on Stock Island and then trucked to the mainland for disposal. The tonnage of solid waste collected is within the FDEP permit limit. The City of Key West and FDEP did not report any solid waste issues caused by cruise ships.[20]

3.B.4.4 HAZARDOUS WASTE

Hazardous waste produced on cruise ships include by-products of dry cleaning and photo processing operations, paints and solvents, batteries, fluorescent light bulbs containing mercury, waste pharmaceuticals, and waste from print shops.

The U. S. Resource Conservation and Recovery Act (RCRA) imposes management requirements on cruise ships and other vessels that generate or transport hazardous waste and requires that hazardous materials be offloaded to land based treatment or disposal facilities (Monterey Bay 2003).

The ICCL Industry Standards states hazardous waste and other waste streams will not be mixed (ICCL 2001). The Alaska Department of Environmental Conservation sampled various cruise ship waste streams and concluded there was no evidence of hazardous waste being mixed with other overboard discharges (ADEC 2000).

The State MOU includes the RCRA requirements and the ICCL Standards. Hazardous waste is currently not offloaded in Key West. However if there was a need to offload hazardous wastes in Key West, the FDEP would be the lead agency to ensure proper handling and disposal. [21]

3.B.4.5 OILY BILGE WATER

Bilge water contains oily residue from the operation of the ship's engines and machinery. A typical cruise ship can produce over 2,000 gallons of bilge water per 24 hours of operation (Sweeting and Wayne 2003). Before discharging oily bilge water, the effluent must meet international and federal regulation standards set by MARPOL. These regulations require that ships be underway at least 12 nautical miles from shore and that the oil content of the discharge effluent be less than 15 parts per million (ppm) and not leave a visible sheen on the surface of the water. Under U.S. law, oily bilge water with oil content greater that 100 ppm is prohibited between 12 and 200 miles - the limits of the U.S. Exclusive Economic Zone. MARPOL Annex 1 requires the maintenance of Oil Record Book that the US Coast Guard examines periodically (Ocean Conservancy 2002).

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[19] Archer, Raymond, Personal Communication. City of Key West

Collins, Steve, Personal Communication. Royal Caribbean Cruise Lines

[20] Rios, Gus, Personal Communication. Florida DEP

Fernandez, David, Personal Communication. City of Key West

[21] Rios, Gus, Personal Communication. Florida DEP

The MOU between the State and the ICCL adopted the discharge standards set forth in the international and federal regulations. In the Keys, the ICCL members comply with the MOU standards. The U.S. Coast Guard does not routinely inspect Oil Record Books in Key West. In addition, the U.S. Coast Guard has not received any complaints on cruise ship discharges in the Key West area.[22]

3.B.4.6 AIR EMISSIONS

Cruise ship engines produce the same chemical constituents of petroleum combustion emissions as from automobiles and buses. In addition to the engines, incinerators on cruise ships also produce air emissions. Cruise ship emissions contribute a very small percentage of air pollution that is emitted by commercial vessels (Sweeting and Wayne 2003).

In Alaska, the Northwest Cruise Ship Association and Alaska Department of Environmental Conservation Air Quality and Meteorological Monitoring Study concluded the highest recorded pollutant levels were far below the state and federal health based standards as listed in 18 AAC 50.010 (ADEC 2000). This study was not a cruise ship emissions specific monitoring study, but included cruise ships and all other land-based sources of air pollution in Juneau. Based on air monitoring studies in Alaska, the U. S. EPA determined air emissions from cruise ships were too insignificant to regulate.

In Florida, neither the State MOU nor state air quality standards address air emissions from cruise ships. According to the FDEP in Marathon, the state air regulatory agency, no complaints have been received related to cruise ships air emissions.[23] Also in accordance with an agreement between the cruise ship industry and the City of Key West, incinerators are not used in port.[24]

The major cruise ship engine manufacturers are reducing air emissions through the development of advanced technology. For instance, one cruise ship engine manufacturer has developed a smokeless gas turbine engine that greatly reduces nitrogen oxide and sulfur dioxide emissions (Sweeting and Wayne 2003).

3.B.4.7 BALLAST WATER

Ships use ballast water for stability. Ballast water often contains numerous marine organisms that can become invasive when discharged in non-native areas (Aquatic Nuisance Species 2000). Introduction of invasive species through the transport and release of ballast water is well documented in the United States and problem invasive species in Florida that apparently could have been introduced in ballast water include the Asian green mussel, Australian spotted jellyfish, and a non-native *Caulerpa* green algae (Santaniello 2003).

In August 2004, the U.S. Coast Guard (USCG) implemented a mandatory ballast water management regulation for all vessels entering the U.S. waters. The regulation mandates vessels to conduct ballast water exchange outside 200 nautical miles and requires ballast water management reporting to the USCG (USCG 2004). According to NOAA and the

[22] Hyil, Captain, Personal Communication , U.S. Coast Guard

[23] Rios, Gus Personal Communication. Florida DEP.

[24] Archer, Raymond Personal Communication, City of Key West

Collins, Steve. Personal Communication, Royal Caribbean Cruise Lines

Florida Invasive Species Working Group, introduction of invasive species in the Key West area has not yet been an issue except for a few aquaria raised exotic fish captured on the reef.[25]

The cruise industry and environmental regulators are testing a number of technologies for ballast water management. These technologies include ozone, ultraviolet, filtration, heat, chemical biocides and deoxygenation. Testing has not identified the most effective technology (Sweeting and Wayne 2003).

When asked by the FKNMS what were the ballast practices of large vessels using Key West Harbor Carnival Cruise Lines (CCL) responded that CCL ships take on ballast water more than 200 nautical miles from Key West and later discharge ballast in Miami which is allowable. CCL advises that although there are no federal regulations regarding the management of ballast water CCL ships do not discharge ballast in Key West or any other location in Monroe County (Spicer 2003).

The current practices of the cruise ship industry in Key West in regard to potential discharges are summarized in Table 3.B.4. The environment around Key West, and waters routinely traveled by local commercial and pleasure vessels appear to still be at some degree of risk from discharges.

3.B.5 Recreational Values

Recreational values associated with marine resources around Key West can be divided into two broad categories: consumptive users and non-consumptive users. Consumptive users or stakeholders are comprised of fishing interests, including charter boats, head boats, and flats guides. These operations often rely on extractive activities (harvest), but they may also exercise catch and release - or a mixture of the two. Moreover, their income is generated less from the product extracted, and more from the clients they take out fishing. "Non-consumptive" users are comprised of an array of environmentally-friendly (ecotourist) operations, including dive and snorkel charters, and kayak, canoe, bird watching, and nature excursion guides, among others. Small craft and personal watercraft rentals are usually not as environmentally friendly. All of these activities take place to some degree in the Key West area, some by cruise ship passenger, and interactions with the natural resources of the area are typically up close and direct. Some argue that diving and other waterborne activities in the Keys should not be considered non-consumptive and be immune from management and possible regulation, since some amount of impact is associated with many of these forms of recreation[26] Harbor tours, sunset trips, and sightseeing are additional types of waterborne activities that occur in the harbor, and appear to occur more all the time. Crowding at some diving and fishing sites near Key West are indications that levels of activity are high.

These recreational uses are promoted directly to cruise ship passengers that arrive in Key West and are also promoted on the internet and via other commercial advertising. A 2005 Royal Caribbean promotional brochure obtained in Montana for a cruise on *Majesty of the Seas* includes as a suggestion for a Day 7 stop in Key West a glass bottom boat eco-tour of

[25] Heck, Cheva. Personal Communication, FKNMS

Schmitz, Don. Personal Communication.. FDEP

[26] Davidson, Capt. Ed, Personal Communication

the "only living coral reef in the continental U.S.", with an underwater photo of a SCUBA diver on a reef.

Web sites linked to Key West cruise promotion suggest fishing, snorkeling, diving (including on shipwrecks), watersports and ecotours as popular activities in Key West. A Key West link on a *Cruisemates* website promotes affordable private charters to reefs and islands of the FKNMS, another promotes sailing charters in shallow draft vessels to visit areas that other boats cannot. Another suggests snorkeling on coral reefs and kayaking in mangrove islands to encounter many species of fish and wildlife with an experienced naturalist as your personal guide.

The Key West diving and ecotours industry promotes themselves directly to cruise ship passengers although as with other tours and resource based activities the relatively short stays by cruise ships limits the amount of time that a passenger can spend away from the ship or island. Charts of the reef tract west and east of the main channel are used online to show popular dive locations and distances from Key West .

TABLE 3.B.4. SUMMARY OF MANAGEMENT OF DISCHARGES IN AND NEAR KEY WEST.

POTENTIAL DISCHARGES FROM CRUISE SHIPS IN KEY WEST	REQUIREMENT (INCL MOUs AND AGREEMENTS)	VOLUNTARY	VULNERABLE AREAS AT KEY WEST
BLACKWATER/SEWAGE	NDZ IN STATE WATERS	RCCL AND CCL LIMIT DISCHARGES TO >13.8 MILES (12 NM) OUT	OUTSIDE OF STATE WATERS FROM DISCHARGES OF SOME LINES
GRAYWATER	NDZ WITHIN 4.6 MILES (4 NM)	RCCL LIMITS DISCHARGES TO > 13.8 MILES OUT	OUTSIDE OF 4.6 MILES FROM DISCHARGES OF SOME LINES
SOLID WASTE	NO OFFLOAD FROM SHIP NO INCINERATION IN PORT NO PLASTICS DUMPED ANYWHERE		WASTE FROM PASSENGERS IN CITY INCINERATION OUTSIDE OF PORT
	NO DISCHARGE WITH 3 MILES <1" PIECES DISCHARGED OUTSIDE OF 3 MILES		DISCHARGES OF SMALL GARBAGE PIECES OUTSIDE OF 3 MILES
HAZARDOUS WASTE	NO OFFLOAD IN KEY WEST NO DISPOSAL EXCEPT IN A PORT		
OILY BILGE WATER	NO DISCHARGE WITHIN 13.8 MILES OUTSIDE 13.8 MILES < 15 PPM WITH NO SHEEN		OUTSIDE OF 13.8 MILES AT LOW LEVELS
AIR EMISSIONS	NONE	NO INCINERATORS IN PORT	ENGINE EMISSIONS IN PORT INCINERATION OUTSIDE OF PORT
BALLAST WATER	USCG MANDATES NO DISCHARGE WITHIN 200 MILES		

3.B.6 Harbor Navigation and Vessel Traffic

Waters around Key West, especially the harbor and inner portion of the main channel, are at times extremely active with a wide variety of craft, from small sailboat dinghies traveling from anchored out vessels to cruise ships nearly 1,000 feet long turning in the harbor. Vessels are a mix of pleasure and commercial power boats, pleasure (local and transient)and charter sailboats, military and research vessels, cruise ships and ferries, and live-aboards. Vessels anchored out on the west and north sides of Key West have increased dramatically in the last 2 decades, and consist mainland of transient vessels and permanent live-aboards.

As of 2003 there were 4 state and federally licensed Bar Pilots in Key West and also a Navy pilot who handles government owned vessels. The deepest draft vessel the Pilots will bring into Key West carries 28.5 feet and they have refused pilotage to vessels considered too large for the channel as it is their obligation to protect the resources of the harbor (Bar Pilots 2003).

Three tug boats (65 feet to 110 feet long with drafts of 8 to 12 feet) operate in the Port on a regular basis as do two pilot boats (26 and 40 feet long with drafts of 5 and 4 feet). Those involved in the business of cruise ships and pilotage in Key West state that using tug boats to control and maneuver cruise ships in the harbor while berthing and turning is not practical, would not necessarily minimize turbidity and would possibly be unsafe. Even large tugboats cannot take the place of a ship's main engine (Bar Pilots 2003, Bar Pilots 2005, Crusoe 1997).

The U.S. Coast Guard presence in Key West includes patrolling Keys water for immigration, boating safety, and drug interdiction. They also maintain clear and safe zones in formally marked navigational channels, maintain safe zones around cruise ships, and enforce cruise ship operation regulations. At the October, 2002 meeting of the LVWG the Coast Guard identified four major agency concerns in Key West:

- shipboard regulatory and enforcement requirements, ranging from material requirements to equipment requirements
- navigation, from aids to navigation to regulations for mariners
- security
- qualifications for all personnel involved including mariners, port authorities, and agencies

The current formal safety/operating guidelines of the Key West Bar Pilots Association on file with the Florida Board of Pilot Commissioners are based on pre-dredging conditions and will be re-evaluated following dredging after an accurate bathymetric survey is completed. The guidelines used by the Bar Pilots are based on local knowledge and experience, Corps of Engineers surveys, NOAA soundings, periodic local surveys, and the fact that the channel and harbor are in the FKNMS (Bar Pilots 2003).

Those guidelines confirm that cruise ships comprise the bulk of large vessel traffic into the Port of Key West, and due to existing limiting harbor and channel depths, that conditions and limits must be placed on large vessels using the Port. The maximum draft of large vessels presently using the main ship channel to access Pier B, the Outer Mole, and the outer anchorages is 28.5 feet. In the past, due to shoaling off Pier A vessels bound for Pier B

greater than 750 feet in length and 24 feet draft would only dock starboard side in. Due to shoaling reported in 2003, they state that the maximum draft of vessels accessing Mallory Dock should be 26.5 feet for vessels greater than 550 feet in length. The area off of Mallory Dock has recently been maintenance dredged but less material than desired was removed and a bathymetric survey is to be conducted[27] According to the Bar Pilots, the Corps' 2001 depth data provide for a minimum under-keel clearance of 3.2 feet at mean lower low water while a vessel is navigating within the 300 to 800 foot wide main channel, from the channel entrance on the reef tract to the north end of the harbor (Bar Pilots 2003).

The Bar Pilots note that transits into the harbor may be restricted or limited due to wind, weather, tides, current conditions, dock assignment, vessels already moored, maneuvering characteristics, vessel deficiencies, vessel size and draft, navigational hazards, other vessel including small boat traffic, and tug and pilot availability. There are no set wind thresholds in effect for the Key West Channel. In high wind conditions the Bar Pilots take a very close look at all the parameters before committing to any ship movements (Bar Pilots 2005).

They note also that passing situations usually require one of the two vessels to "exit the channel" but as a routine operational procedure passing in the channel should not be scheduled due to the fact that planning and timing safe passing between inbound and outbound vessels is often difficult for a variety of reasons (Bar Pilots 2003). The International Rules of the Road apply on the waters of Key West.

Future large vessel traffic in Key West may increase following channel and harbor deepening and pier modifications at the Outer Mole. These projects may possibly result in up to a 15% increase in the annual naval traffic (Navy 2003). A reduction in use of Roosevelt Roads Naval Station in Puerto Rico may result in more Navy activity in the Gulf of Mexico and Key West. The level of future activity by large cruise ships in a Key West is a matter of discussion but the Bar Pilots believe "One thing the dredging will not do is allow larger cruise ships to enter the harbor. We are limited to the size of vessels that can enter the port by the width of the ship channel, not the depth. There are no plans to widen the channel." (Bar Pilots 2004).

3.B.7 Actual Impacts

Data and other available information indicate that impacts from cruise ship and other large deep draft vessels are occurring to water quality and benthic habitats in the area of the main channel and harbor in Key West. Bottom scouring, severe sediment resuspension and redistribution, plume turbidity far above background levels, interference with historic diving and fishing activities, and bottom excavation in the cruise ship anchorage are resulting from the passage of these vessels. State and federal laws and regulations related to the maintenance of water quality, protection of bottom habitats in the area, and protection of publicly owned submerged lands may be violated when these severe events occur.[28]

The fact that cruise ships and other large vessels resuspend bottom sediment in Key West channel and harbor and in the offshore anchorage and elevate turbidity levels in the water column is undisputed. What the consequences of that resuspended sediment and turbidity

[27] Jones, J. Personal Communication, City of Key West

[28] Burnaman, R., PA, Personal Communication

are in the area has been debated in public forums at length, as have realistic means of reducing it, and what conditions will be once the Navy's channel and harbor deepening project is complete (LVWG 2002-2004).

Measuring turbidity is in this case a surrogate for measuring sediment (silt, sand, rubble, organic matter, etc.) scoured off the bottom by vessel propeller generated turbulence and evidently by displacement pressure waves moving along the bottom. Simply, in waters 30+ feet deep, the level of turbidity measured in the upper water column is a function of what is happening to the bottom when a large vessel close to the bottom moves along or is turning. Measuring turbidity usually can confirm what can be seen visually from the waters surface by an observer. In clear water the resuspended sediment can be observed much deeper in the water column. Larger and heavier particles of resuspended sediment (especially inorganic particles) settle out first, with strength direction of currents and the amount of turbulence created by the ship being major controllers of where. In these situations, larger particle sizes when redistributed in heavy loads can result in the greatest consequence for colonized or vegetated benthic habitats. Sediment resuspension apparently occurs in two ways - directly from propeller and thruster wash and turbulence, the other is the little addressed phenomena of surge waves moving laterally away from a large displacement vessel that resuspend sediment closer to the bottom[29]

The Port of Key West was projected to receive 541 port calls (including the anchorage) by cruise ships in FY 2004/2005. That averages about 1.5 ships each day, or an average of 3 passages by cruise ships in and out of the channel each day. There have been times in recent years when 4 or 5 cruise ships visited in a day, resulting in 8 or 10 passages through the channel and harbor.

3.B.7.1 TURBIDITY AND SEDIMENT RESUSPENSION

The use of a cruise ship's main engines is by far the largest generator of turbidity. Use of main engines to slow and stop upon entering the Harbor and to turn in the Harbor along with vessel speed needed to handle cross currents and cross winds while in the narrow main channel result in most of the turbidity generated (Bar Pilots 2003). At the Outer Mole turbidity from use of side thrusters is minimal due to the vertical face of the seawall there. At Pier B and Mallory Dock, the sloping walls result in more turbidity from use of the thrusters until the vessels has moved out from the berth. By 2003 due to "shoaling" at the north end of Mallory Dock the Pilots had to change the draft restrictions for vessels berthing there from a 28.5 foot draft allowance to 26 feet. (Bar Pilots 2003). They noted in 2005 note that the more a dock is used by cruise ships the less sediment accumulates.

In April, 1999, due to complaints about high levels of turbidity in harbor water created by increasing numbers of large cruise ships, the City of Key West formally requested federal study and action regarding vessel-generated turbidity in the Key West Harbor Federal Project. The Corps advised that an updated survey of harbor conditions was planned and turbidity monitoring would be addressed. Later in 1999, the Florida Department of Community Affairs (DCA) reported that the Florida DEP had recently documented substantial turbidity caused by cruise ships in the area. On March, 1, 1999, the DEP and the FKNMS measured turbidity in the wake of a cruise ship at the Outer Mole at nearly 20 times

[29] Jaap, W. Personal Communication, FWCC

above background. The same day in the anchorage just west of Marker "9" (see Section 3.B.9) they measured turbidity at 7 locations within a plume from the *Enchantment of the Seas* that averaged 30 times the background average values of 3.7 NTU(FDEP 1999a). On March 3, 1999, FDEP monitoring of plumes created by cruise ship movement at the Outer Mole showed levels on average 11 times over background with many samples more than 29 NTUs (Class III standards) above background. Measurements in plumes offshore the same day showed levels as high as 193 NTUs while background levels were near 3 NTU (FDEP 1999b). On March 11, 1999 numerous measurements at the Outer Mole by FDEP (in plumes from cruise ships and tugboats) showed background levels averaging about 3 NTU and plume levels averaging nearly 50 NTU (FDEP 1999c).

Cruise ship traffic has been documented to create turbidity plumes during transit between the outer sea buoy and the docks in the harbor, a passage that is typically an hour long (Figure 3.B.8). In 2000 the FKNMS reported that there is evidence of a turbidity problem relative to movements of large vessels in the Key West area. Evidence included measurements of turbidity created by ship main engines and thrusters during docking maneuvers, visual observations of cruise ship-generated turbidity plumes and visual observations of seagrass and bottom damage from anchoring. The FKNMS also reports that measurements of ship-generated turbidity are orders of magnitude greater than measurements of background turbidity, and that these turbidity events last from one to several hours. FKNMS personnel in 2000 observed a cruise ship "generating a considerable amount of turbidity in its wake" in the offshore portion of Key West channel and then observed stony corals at Western Head Patch Reef adjacent to the channel that had been covered by resuspended silt (FKNMS 2000).

Divers performing the State's coral reef monitoring in recent years at these patch reefs about 1/4 mile from the main ship channel report both resuspended sediments from underwater surge associated with passage of cruise ships in the channel and siltation and redeposited sediments from drift of the turbid plumes created by the ships in the channel. As the dominant current direction in Hawk Channel is to the west, those patch reefs west of the channel are subject to the most siltation[30]

"Turbidity levels have heavily impacted corals adjacent to the harbor and ship channel, especially to the west. Ship generated turbidity is clearly differentiated and distinguished from natural background turbidity." (FKNMS 2003b). In 2002, the FKNMS reported to the LVWG that "large plumes of resuspended sediment are observed with each pass of a cruise ship or other large deep draft vessel in and out of the channel, particularly on low tide. Turbidity levels observed with docking cruise ships greatly exceed state water quality standards and local fishermen observe and report the direct effect of turbidity plumes on the fish they are targeting." (FKNMS 2002).

In 2003, the Corps photographed and measured turbidity plumes associated with the prop wash of cruise ship bow and stern thrusters (USACE 2003). They noted that turbid water masses resulting from vessel passage appeared to have higher maximum values than turbid water generated by high winds but were much shorter in duration. Elevated turbidity readings were observed to last for approximately 15 to 30 minutes after cruise ships passed

[30] Jaap, W. Personal Communication, FWCC

by monitoring stations on their way to or from the docking area. Since high winds are known to resuspend fine sediments from the bottom surface in shallow water, and considering that winds typically persist for extended periods, it is logical that finer sediments from storms would stay in suspension longer than heavier particles scoured off the bottom by strong vessel turbulence.

Resuspension of sediment that elevates turbidity levels occurs with the use of bow and stern thrusters during docking, undocking, and turning the ships during departures. As might be expected, stations near or at the docking areas recorded the greatest changes in turbidity over background levels (USACE 2003)(Figure 3.B.9 and Figure 3.B.10).

FIGURE 3.B.8. TIME SERIES OF A CRUISE SHIP TRAVELING THROUGH KEY WEST CHANNEL TOWARDS KEY WEST IN 2003 (D. KINCAID).

--While two others are docked at the Outer Mole and Pier B. In the bottom photo the vessel has turned into Cut A.

FIGURE 3.B.9. CRUISE SHIP ASSISTED BY TUG DOCKING AT MALLORY DOCK IN 2002 (KEY WEST CITIZEN)

A distinct turbidity plume associated with a cruise ship passing through the ship channel heading towards Key West was observed during a survey conducted by Continental Shelf Associates, Inc. on 15 September 2002 (Table 3.B.5). PPB (2002) showed that there is some correlation of elevated turbidity levels at the Outer Mole and adjacent to Tank Island with ship arrivals and departures.

Pier B obtained permits from DEP in 1999 to renovate and reconfigure the commercial cruise ship docking pier at the Hilton (FDEP 1999). Special conditions to that permit required turbidity monitoring during each coming and going of a cruise ship to that berth, no matter the time of day. It was hoped that the reconstruction and new configuration would change where vessel turbulence was directed (towards deeper water) thereby reducing turbidity levels in the harbor. Some of the data suggested this was the case and in 2002 DEP allowed Pier B to reduce the scope of the monitoring. However, although the dataset is extensive it not believed to be meaningful as all monitoring occurred at the waters surface instead of mid-depth or near the bottom and fixed stations apparently came to be used in lieu of actually tracking the plumes created by the vessels. And since at least 2002 or before there have been no quality assurance or quality control reviews of the monitoring methods as required of DEP[31]. Surface and bottom turbidity monitoring from 1995-1999 in the Key West channel area by the FKNMS WQPP monitoring program showed that at the 3 stations near Key West bottom measurements of turbidity on average ranged from 33% to 47% higher than measurements made at the surface.

[31] McMillan, T. Personal Communication, FDEP

TABLE_3.B.5 A PORTION OF A TABLE EXCERPTED FROM THE 2003 NAVY EA (NAVY 2003).

Turbidity monitoring was in Key West channel and harbor during water column profiling conducted by Continental Shelf Associates, Inc. on 15 September 2002.

Station	Depth (m)	Depth (ft)	Turbidity (NTU)
KW02-10	0.3	1	64.8*
	4.9	16	65.2*
	9.8	32	64.6*
KW02-11	0.3	1	2.6
	4.9	16	1.6
	9.8	32	2.9
KW02-12	0.3	1	57.0*
	4.9	16	49.6*
	9.8	32	49.0*
KW02-13	0.3	1	2.1
	4.9	16	1.6
	10.1	33	2.6
KW02-14	0.3	1	0.8
	4.9	16	0.5
	10.1	33	1.5

* Turbidity plume associated with passage of cruise ship through the Main Ship Channel.

FIGURE 3.B.10. AN UNDATED PHOTO OF CRUISE SHIP LEAVING THE OUTER MOLE AREA (KEY WEST CITIZEN).

In an April, 2003 letter to CZR, Inc., the consulting firm representing the Navy during the dredging permit review, the FKNMS advised - "Turbidity levels have heavily impacted corals adjacent to the harbor and ship channel, especially to the west. Ship generated turbidity is clearly differentiated and distinguished from natural background turbidity." and "Ship generated turbidity is an added stressor to natural systems above and beyond the background and storm event turbidity impacts."

Addressing its dredging project and the risks of elevated turbidity during dredging, the Navy reported in their 2003 EA that although increased turbidity was expected to be temporary and localized, several detrimental effects of turbidity on fish and invertebrates have been documented by prior research. Queen conch was one invertebrate they believed may be susceptible to elevated turbidity. Increases in suspended silt near the southern end of the Ship Channel could affect larval and newly settled stages during the March to October spawning season.

Examples of effects on fishes and a summary of impacts to corals and other benthic assemblages were provided in the 2003 Navy EA. They provided references for information demonstrating that fishes are primarily visual feeders, and when turbidity reduces light penetration, the individual's reactive distance decreases and that light scattering caused by suspended sediment also can affect a visual predator's ability to perceive and capture prey. Some species will actively avoid while others may be attracted to turbid water. Gill cavities can be clogged by suspended sediment preventing normal respiration and mechanically affecting food gathering in planktivorous species -high suspended sediment levels generated by storms have contributed to the death of nearshore and offshore fishes by clogging gill cavities and eroding gill lamellae. High concentrations of fine sediments can coat the gill respiratory surfaces and prevent gas exchange (Wilber and Clarke 2001). Consequences of such impacts to fishes depend on age or life stage of the fish and early life stages are less resilient to direct effects of turbidity than adults. Ultimately, effects on young individuals can be reflected in later life stages as reduced fecundity, low growth rates, and year class depression. Understanding and predicting effects of suspended sediments on fishes require some information on the range and variation of turbidity levels found at a project site prior to dredging - what background levels native species in an area are adapted to (Wilber and Clarke 2001). The Navy believed their activities "may adversely affect but are not likely to have a substantial adverse effect on EFH in the dredging area" (Navy 2003).

3.B.7.2 PROP WASH BOTTOM DISTURBANCE

Issues related to cruise ship and other large vessels activity at and near the Outer Mole and in the Harbor include more than only turbidity and degraded water quality. The type of turbidity addressed here is the result of displacement of large amounts of resuspended unconsolidated bottom sediments from excavation and scour of the bottom. Prop wash is defined here as the turbulent action of water ejected from a vessel's propeller and prop scour as the resultant condition of bottom sediments subject to intense prop wash turbulence. Dredging or excavation is the significant displacement of bottom sediments so as to create a discernable depression or hole. Filling of submerged lands results when displaced sediments from prop wash and prop scour settle on adjacent bottoms.

Displaced sediments in the channel and harbor have been described as mud, sand, and rubble of all sizes. The heavier displaced sediment particles from prop scour settle out the

quickest and, depending on water depth and the amount of turbulence and tidal current velocities, may settle out some distance from the site of excavation. The finer sediment particles resuspended by prop washing may stay suspended in the water column for a longer period, up to several hours (Walters 1999), and are typically what is measured in the type of turbidity monitoring conducted near Key West. Intermittent turbidity can often be tolerated by benthic communities, whereas chronic turbidity can smother marine life (Walters 1999). Excellent reviews of the state of knowledge about the biological effect of redistributed sediment and turbidity were provided to the LVWG by the EPA (LVWG 2002-2004).

Recent diver observations, reports, and sonar mapping reveal that the bottom of the harbor out from the Outer Mole and Pier B, in depths of up to -36 to -37 feet, have been severely impacted and the bottom sediments are continually being rearranged by prop wash and prop scour (Figures 3.B.11 and 3.B.12). The bottom of the turning basin in the harbor has been described as a "blasted moonscape" (FKNMS 2003). The bottom area that appears to be routinely impacted by prop wash scour covers roughly 150-175 acres.

The Navy EA reports "The central area of the turning basin, adjacent to the Mole Pier and extending north of the entrance to Truman Harbor and nearly to the western edge of the turning basin, was composed of mixtures of large rubble and gravel-sized rock fragments. There was minimal biofouling of the substrate material and only a very thin layer of fine sediments visible. Depressions several feet deep were observed along with waves and piles of rubble. The bottom appeared to be heavily impacted by ship propeller and thruster wash during ship docking procedures" (Navy 2003).

A diver benthic survey of the harbor in 1999 noted diverse benthic communities in areas of the channel and harbor not subject to routine physical disruption by turbulence from cruise ships and other deep draft vessels. But at stations (#s 152, 163, and 252; 38 to 40 feet deep) in the vessel turning area out from the Outer Mole and Pier B the bottom is variously described as rolling topography with muddy sand on rocks, mud, and drifts of rubble with some submerged vegetation in rocky areas, but otherwise very little flora and fauna (Fourqueran 1999).

A Navy contractor surveyed this area of the harbor in 2002 and reported on the condition of the bottom "It seemed somewhat unusual for relatively steep sand ripples to occur only in the center of the channel, as the normal tidal currents and recent wave activity could not support their height and wavelength. It also did not seem likely that under natural conditions they should only occur in the center of the channel, as sandy sediments also were present along the channel edges. One potential cause of both this shoaling and the maintenance of the steep sand ripples may be the somewhat regular usage of the ship channel by cruise ships and other large vessels. It is postulated that their deeper draft and thus closer proximity to the bottom is creating a higher current velocity along the channel bottom during their passage. The deeper draft also brings their propellers closer to the bottom, with the propeller wash suspending and removing fine sediments from along the channel centerline, while leaving finer sediments intact along the channel edges. This combination may be creating and maintaining these steep sand ripples. Divers also collected video data and coordinates from along an underwater cable route across Key West Harbor. The line extended from the southeast corner of Tank Island toward the southeast and made landfall at Key West in the vicinity of the cruise ship dock. The lines were covered by a flexible concrete mat, which rose from approximately 1 to 3 ft above the surrounding bottom. In many locations along

the line, the concrete mat was distorted or "wrinkled," and at several sites it was folded back over on itself. These areas of disturbed mat surface were more prevalent closer to the cruise ship dock and could be due to high water flow rates from ship thrusters during docking procedures" (CSA 2002). Similar diver surveys in the main channel offshore indicate that similar disturbance of the bottom is occurring but in a linear fashion instead of the circular signatures resulting from deep draft vessels turning using main engines.

FIGURE 3.B.11. AN ENLARGED VIEW OF THE 2001 MULTI-BEAM SONAR IMAGE OF KEY WEST CHANNEL AND TURNING BASIN OUT FROM THE OUTER MOLE AND PIER B. (NOAA).

Note the heavily disturbed bottom and arcs of ridges of bottom sediment where large vessels routinely turn. The Image is derived from work of the NOAA Vessel Whiting. Blue corresponds to the previously dredged portion of Key West Channel and Truman Harbor.

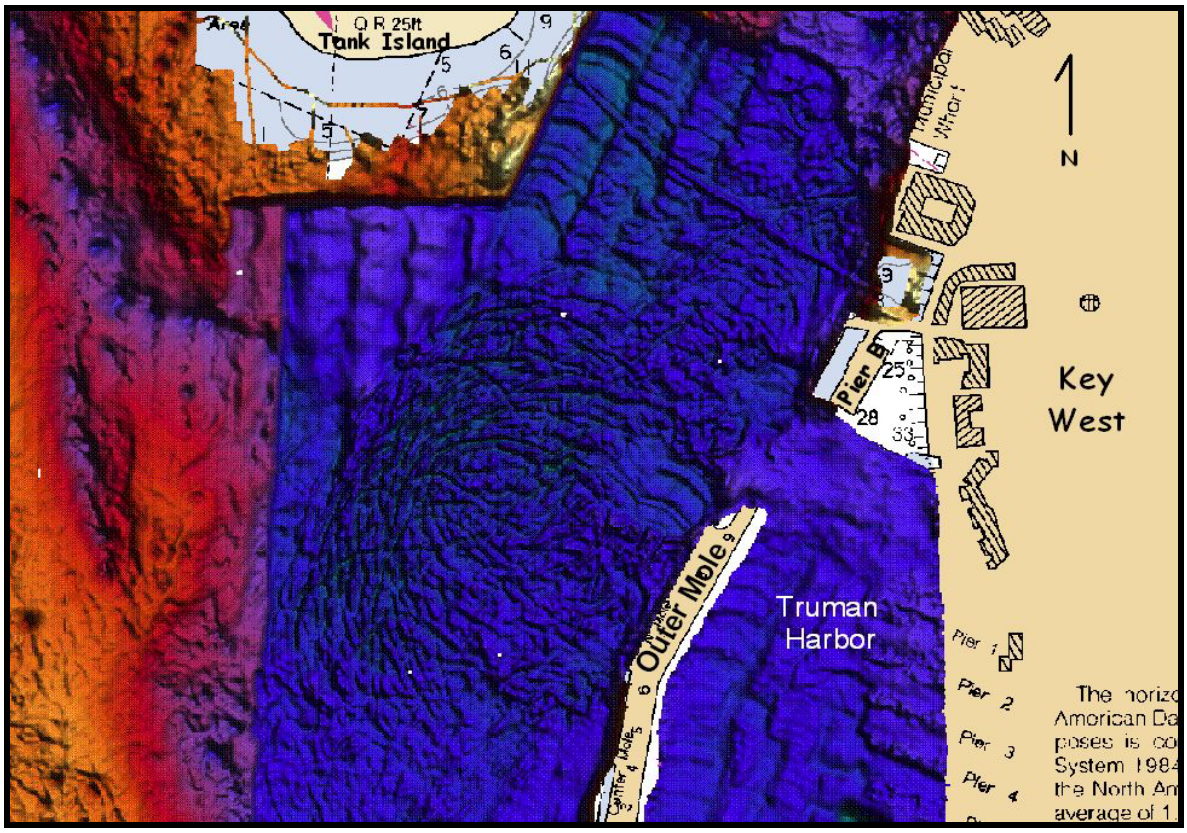
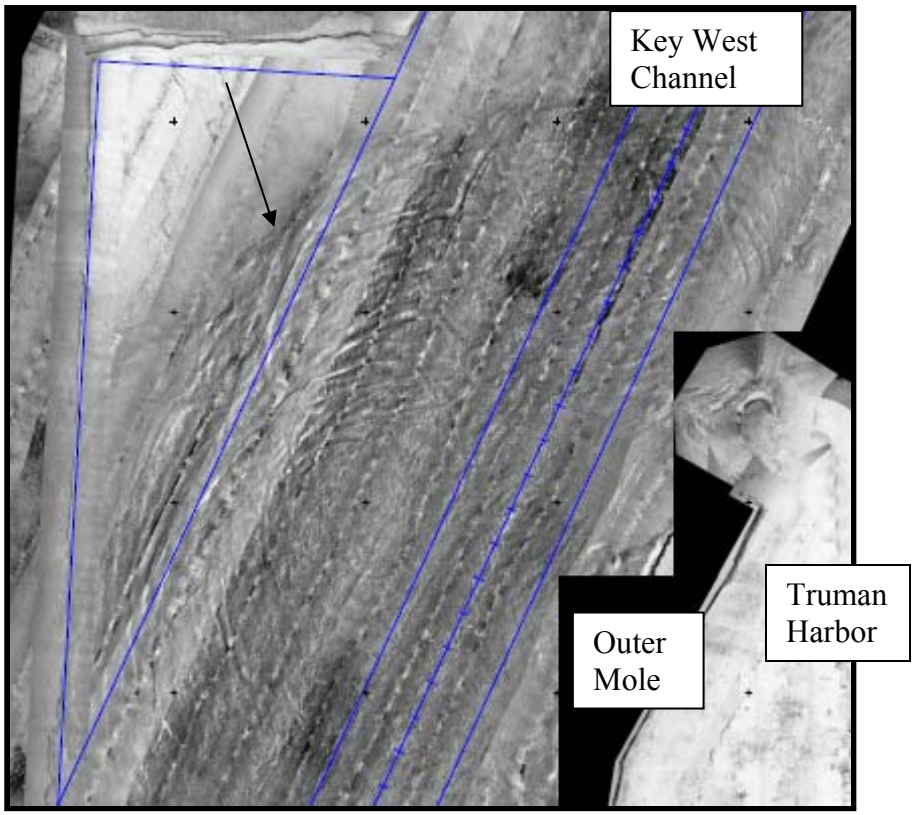


FIGURE 3.B.12. SIDE-SCAN SONAR IMAGE OF KEY WEST HARBOR AND TURNING BASIN AREA OUT FROM THE OUTER MOLE (SEA SYSTEMS CORP. 2003).

Arrow points to area of disturbance.



The displacement of bottom sediments via contact with propellers and the deposition of the sediment on adjacent sea grass beds may create liability under the Clean Water Act. The knowing or willful creation of a propeller-dredged channel creates liability under the River and Harbor Act and if large vessels in Key West harbor and channel create significant trenches or displace sediments onto adjacent habitat, an Army Corps of Engineers permit may be required.[32] FKNMS regulations arising from the National Marines Sanctuaries Act specifically describe as "prohibited activities" those related to the alteration of the seabed and the operation of vessels, and suggest that NOAA authorization is also required for cruise ship operation that causes dredging or turbidity within the FKNMS. In 1997, the use of prop wash deflectors (mailboxes) to blow holes in sand bottom and seagrass beds, and mound sediment as part of treasure salvage work, was found to have violated FKNMS laws and was stopped through a federal lawsuit.

State rules and regulations also address illegal dredging and pollution (fill) discharges related to some vessel operation. The channel and harbor bottom in Key West is state owned submerged land owned by the people of the State of Florida. The Board of Trustees of the Internal Improvement Trust Fund (and DEP) administer the state lands program and have

[32] Burnaman, R., PA, Personal Communication.

granted various leases and easements there - but ownership and requirements for proper management rest with the State.

During their review of the Chapter 288 Base-Reuse Plan, the FKNMS advised that the regulatory action plan of the FKNMS management plan pursuant to the National Marine Sanctuary Act prohibits adverse effects to Sanctuary resources, including alteration of the seabed and engaging in prop dredging and the operation of a vessel in such a manner as to injure corals or seagrasses, including damages by boat propellers (FKNMS 1999).

3.B.7.3 IMPACTS TO FISHERIES AND RECREATION

In addition to physical disturbance of benthic resources in the area by the movements of cruise ships there are substantiated reports of the "collapse" of a sizeable charter and recreational tarpon fishery that existed in the 1980s and early 1990s on the west side of the harbor and turning basin south of Tank Island. As many as 20 to 30 boats at a time would anchor or drift along the channel edge and fish for tarpon, permit, cobia, snapper, barracuda, jacks, and other species, especially later in the day. With the increase in size of cruise ships and the frequency of visits in the early 1990s this charter fishery "collapsed" due to displacement of the target fish from the area when a cruise ship would arrive and turn in the area[33] Fishermen believe that the presence of these very large vessels, the noise created, and the turbid plumes all acted to move fish out of the area. Many fewer charters now use the area and fishermen mostly fish a distance to the north requiring longer trips away from Key West, additional costs, and less production of desired fish.[34]

Public testimony by a number of commercial and recreational divers at meetings of the LVWG related that recreational diving along the edges of Key West channel and harbor has been greatly reduced in the last decade due to the chronic bottom disturbance created by cruise ships, the lack of target species due to the disturbance, and the increased levels of turbidity when large vessels are present (LVWG 2002-2004). Reports were also made that turbidity drifting from the main channel onto patch reefs near the main channel can be a chronic problem and as such discourages recreational divers and marine life collectors from using those reefs.

3.B.7.4 ANCHORAGE

The Bar Pilots take vessels to anchor in the area west of the channel and turning basin from the vicinity of buoy #9 to buoy #17 (Figure 3.B.13). Deeper draft vessels are usually anchored to the west of buoy #9 in this mostly undefined area. This area west of the channel and turning basin has historically been used as an anchorage for large vessels (Bar Pilots 2005). As part of the mitigative efforts required for the Corps dredging permit issued to the Navy, the FKNMS required general no anchor or no impact areas due to the presence of patch reefs along the edges of the dredge footprint of the main ship channel and Key West Harbor Turning Basin (FKNMS 2003b).

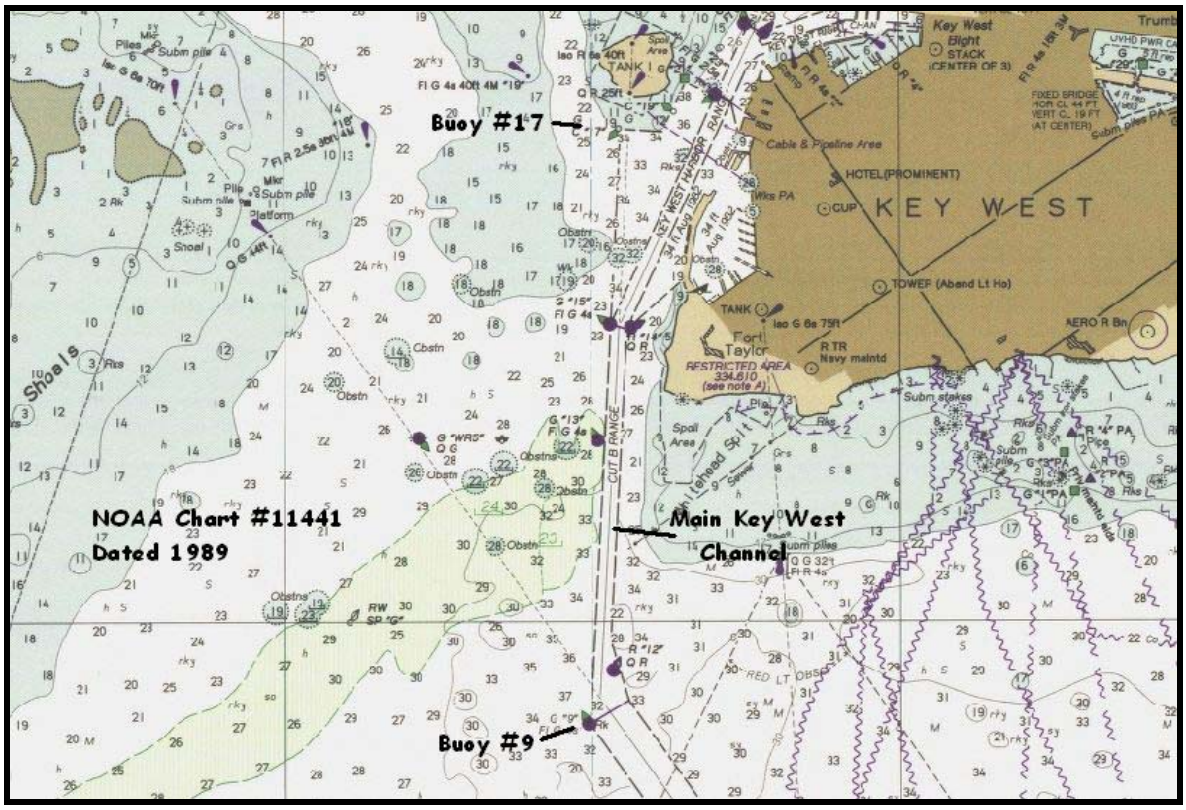
[33] Trossett, Capt. R.. Personal Communication

[34] Trossett, Capt. R. Personal Communication

Harris, Capt. K. Personal Communication

FIGURE 3.B.13. GENERAL LOCATION OF VESSEL ANCHORAGE USED FOR CRUISE SHIPS BY THE KEY WEST BAR PILOTS BETWEEN BUOYS #9 AND #17 WEST OF THE MAIN SHIP CHANNEL AND HARBOR.

Depths in feet at mean lower low water (NOAA).



Use of the offshore anchorage is by cruise ships that cannot or those that choose not to utilize the harbor piers for offloading passengers. Very large anchors and heavy chains are needed to anchor large cruise ships in open water. In March, 1999, the FDEP and the FKNMS documented movement of the 915 foot long, 26 foot draft *Enchantment of the Seas* that was anchored just west of channel buoy #9. GPS coordinates (24 31.88N, 81 49.29W) from the FKNMS vessel placed the *Enchantment* about 1/3 mile NW of Buoy #9 in a charted depth of about -33 feet MLW. Turbidity monitoring as it moved away showed gross violations of DEP turbidity standards with turbidity as much as 140 NTUs above background (Figure 3.B.14)(DEP 1999a). Upon pulling its anchor and moving off, freshly cut turtle grass blades were observed floating in the turbid plume behind the vessel[35]

The City tracks use of the anchorage by cruise ships. From FY 2001/2002 through FY 2003/2004 an average of 21 ships per year used the anchorage. Although the FKNMS is aware of the environmental issues related to the use of this anchorage by cruise ships including high levels of vessel generated turbidity and bottom disturbance, no review or

[35] Barbera, P. Personal Communication, FWCC

assessment has been conducted to date by the FKNMS.[36] Although the channel and harbor are being deepened to accommodate larger vessels, no plans exist to deepen the anchorage.

FIGURE 3.B.14. THE *ENCHANTMENT OF THE SEAS* UNDERWAY LEAVING THE ANCHORAGE WEST OF OFFSHORE CHANNEL BUOY #9 IN MARCH, 1999 (FDEP).

In 2004, in Ft. Lauderdale, a plan was developed by the U.S. Coast Guard and the Corps of Engineers to limit the size and number of large vessels, especially cargo ships that could anchor off the coast while awaiting access to the port there. Considered also to protect coral reefs in the area was total elimination of the anchorage zone.

Some reef ecologists believe, based on experience, that anchoring of large cruise ships close to reefs is always a problem. Reef damage has been documented in Ft. Lauderdale, Grand Cayman, St. John in the Virgin Islands, and at the Tortugas Banks. Issues include physical reef destruction by anchors and chains and groundings, as well as shading and discharge of cooling water. Cruise ship anchoring and a related grounding at Grand Cayman destroyed acres of a very spectacular reef habitat. The anchorage was over utilized and the ships could not maneuver which led to a grounding incident.[37]

A 2002 incident involved a freighter anchoring in a protected area and damaging coral in the Dry Tortugas about 70 miles from Key West. The owner agreed to pay more than $500,000 in fines. The anchor and its chain caused damage to about 0.3 acres of coral. The company reimbursed the federal government for the costs of damage assessment and response and for recovery efforts. The FKNMS estimated that the reattached corals could recover to their previous functional state in approximately five years, provided environmental conditions are good (NOAA 2005). Rogers and Garrison (2001) surveyed natural recovery of a cruise ship

[36] Kamphaus, R. Personal Communication, FKNMS

[37] Jaap. W. Personal Communication, FWCC

anchor scar in St. John, USVI, but found no significant increase in coral cover 10 years after the damage occurred. Allen (1992) addressed issues of anchor and other damage to reefs from increased tourism in the wider Caribbean.

3.B.8 Perceived Impacts

As expressed mostly through the LVWG, perceived impacts from cruise ship and cruise ship passenger activity include additional pressure on local resources from increased offsite nature tours, increased shallow water boating and fishing activity, increased pressure and diver damage to local reefs, contaminated sediments in the harbor, displacement of historic uses in the harbor area, and risks to Ft. Taylor State Park.

The local dive boat *Fury* reportedly carries up to 150 cruise ship passengers at a time to reef on half day snorkel trips. Recreational diving out of Key West has increased dramatically in the last few decades and passengers from cruise ships have undoubtedly contributed to that increase. Educational efforts by the industry to visiting snorkelers and divers may help to mitigate the impacts.

The perception that cruise ship passengers are participating in eco-tours in new areas around Key West may result from a well publicized effort by a kayak tour group in the late 1990s to gain commercial use permits from the City to conduct tours with cruise ship passengers into the Salt Ponds, taking as many as 20 or more kayakers at a time into this protected area. That request was turned down but kayak tours to other quiet locations in the lower Keys are currently offered to passengers. Staff of the U.S. Fish and Wildlife relate that they have never encountered cruise ship passengers at educational and visitor sites on Big Pine in the National Key Deer Refuge, nor in the Key West National Wildlife Refuge west of Key West where inappropriate visitation by boats to out islands has been a problem for years.[38] In an effort to address the activities of cruise ship passengers near coral reefs some cruise lines and conservation groups have initiated programs to educate passengers on means of protecting coral reefs and other areas of high biodiversity during their recreation (Sweeting and Wayne 2003).

Due to the long history of maritime activity in Key West harbor and Truman Harbor, concerns were expressed in the late 1990s about possible contamination of sediments being routinely resuspended by large vessels, and later proposed to be dredged by the Navy. Investigation by the Navy and others found the quality of the sediments near the Outer Mole and elsewhere in the harbor to be good, with no indication of pollutants levels creating a concern. Results indicated that resuspension of sediments during dredging operations in the channel, turning basin, and Truman Harbor will not have a significant impact on the water quality parameters measured (Navy 2003). The Navy EA concluded that the only impact to marine water quality from the dredging would be temporary and insignificant increases in turbidity from dredging operations.

As part of the Truman Annex base reuse review in the late 1990s concerns were expressed by agencies about erosion of the west shoreline of Ft. Taylor State Park, the disturbance of turtle use of Truman Beach and seagrass habitats just south of the Outer Mole, and possible

[38] Wilmers, T. Personal Communication, USFWS

Bell, J. Personal Communication, USFWS

negative impacts on Ft. Taylor from over visitation. None of these have proven to be a concern for the Park[39]

The City is working toward implementing solutions to address the community concern for increased vessel discharges due to the recent growth in the cruise ship industry that has made Key West now the most visited destination port in the U.S. Concerns for declining water quality demonstrated by the increased occurrence of beach closures, fish and coral diseases, and a reduction in visibility in the water column has led to beliefs that cruise ship discharges might be contributing[40] There appears to be no evidence that cruise ship discharges are either occurring or, other than through turbidity and resuspended sediment, contributing to water quality declines in the area. Belief by some that cruise ship turbidity in the channel and harbor was affecting the entire lower Keys region, or was responsible for the widespread reduction in visibility in waters around Hawk Channel and Key West, or in the Lakes region west of Key West, appear unfounded. Many other influences contribute to the water quality of the region, and the turbidity levels found.

Also difficult to address (or even study) was a perception that patch reefs miles away from Key West channel with recent high mortality of stony corals had suffered as a result of cruise ship turbidity.

3.B.9 Potential Impacts, Accidents, and Groundings

Accidental discharges of large volumes of contaminated or hazardous materials (See Section 3.B.4) from cruise ships could potentially occur in Key West and have occurred in waters elsewhere even where such discharges are prohibited by law and agreement (Sweeting and Wayne 2003). As recently as March, 2005, Norwegian Cruise Line's 853 foot long *Pride of Aloha* accidentally discharged about 18,000 gallons of treated effluent into Honolulu Harbor violating a voluntary agreement with the State of Hawaii (Cruise Junkie 2005). The well flushed nature of Key West channel could help ameliorate any such isolated accidental discharge, but also could make cleanup of some spills much more difficult.

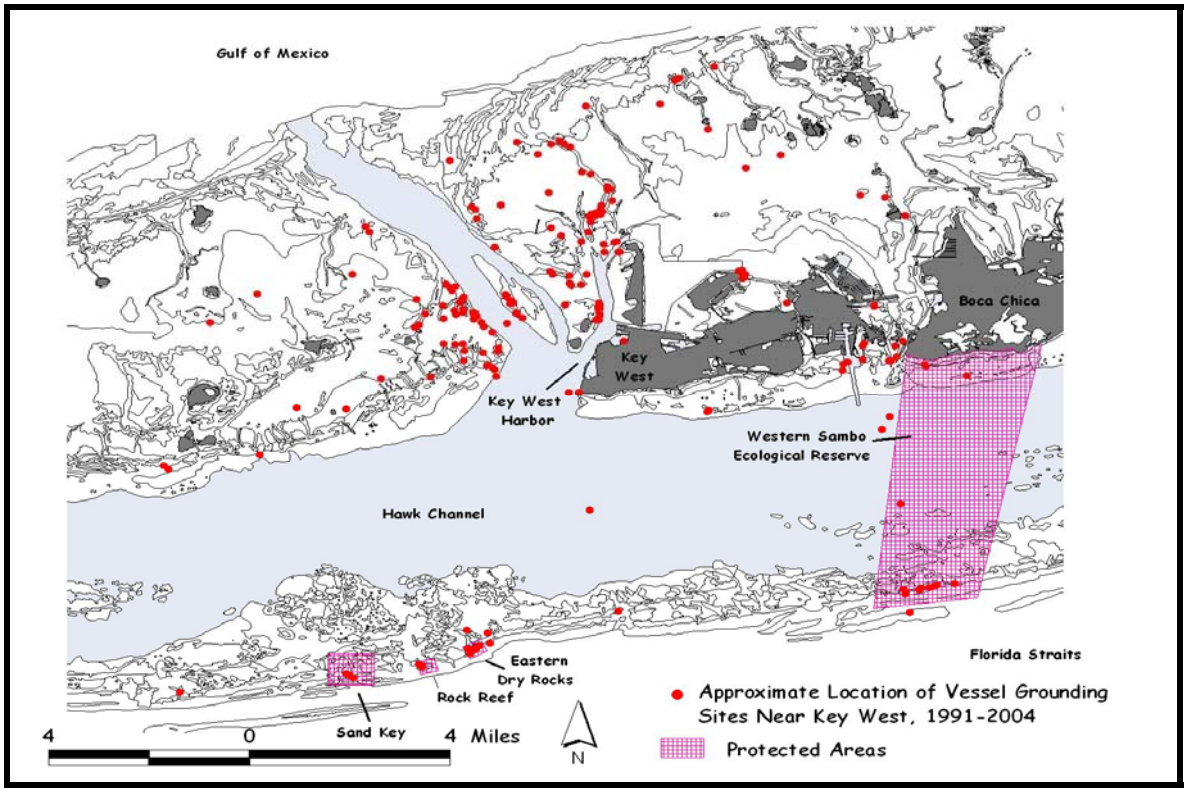
Accidents involving vessels can and do happen, especially in highly congested harbors or where navigation can be difficult or complicated - as it is in Key West channel and harbor. Possible accidents, groundings, and spills are all risks associated with a heavily traveled harbor such as the Port of Key West. Well developed accident and spill contingency plans involving the FKNMS, the Coast Guard and the Navy exist for dealing with the aftermath of accidents and groundings anywhere in the area. The risks appear to be real based on groundings and accidents that have occurred in the past in the FKNMS, and in other reef areas of the region. Figure 3.B.15 is created from GIS point data provided by the FKNMS. *Vessel Groundings in the Lower Keys and near Key West in the FKNMS* is used to map approximate locations of about 194 documented vessel groundings on hardbottom, coral, and seagrass habitats that have occurred near Key West since 1991, including along the edge of Key West channel (FKNMS 2005). Groundings likely occur in the area that are not documented by law enforcement agencies.

[39] Knapke, M. Personal Communication, Ft. Taylor State Park

[40] Quirolo, D. Personal Communication, Reef Relief

When vessels enter the main channel and head towards Key West the direction of travel is directly at Ft. Taylor State Park. Mechanical failure on a cruise ship or other large vessel resulting in a grounding or collision affecting Ft. Taylor is one of the biggest concerns of the Park.[41] An out of control, deep draft large vessel traveling from the south would ground out about 1/2 mile offshore of the south side of Key West depending on its draft, and on the leading edge of Kingfish Shoals southwest of Key West across the channel. The harbor turning basin is a small, irregularly shaped, heavily traveled area less than 2,000 feet across at its widest point (Figures 3.A.11 and 3.A.12). Even with highly trained commercial Bar Pilots and Navy pilots, as well as Coast Guard personnel available to assist large vessels traversing the area, realistically, potential exists for groundings or accidents there.

FIGURE 3.B.15. APPROXIMATE LOCATION OF VESSEL GROUNDING SITES IN SEAGRASS, HARDBOTTOM, AND REEF HABITATS NEAR KEY WEST FROM 1991-2004 (NOAA).



In its internet site titled *Vessel Groundings on Coral Reefs: Response and Prevention Strategies* NOAA notes that numerous vessel-related activities result in coral reef damage, with some of the worst damage resulting from vessel groundings. Groundings can cause serious harm to reefs as a result of the reef structure being dislodged, fractured or destroyed (NOAA 2004). The FKNMS reported over 4,000 boat and vessel groundings in Keys coral and seagrass habitats from 1997 to 2003 and initiated over 300 coral enforcement actions. There are between 500 and 600 reported vessel groundings within the FKNMS each year, plus many groundings that damage Sanctuary resources but are never reported (FKNMS 2004). Risks are increased

[41] Knapke, M. Personal Communication, Ft. Taylor State Park

by slow reef recovery following groundings that have been documented at some grounding sites, including the 1986 grounding site of the *M/V Wellwood* on Molasses Reef off Key Largo where reef recovery was low after 16 years (NOAA 2002).

Over 30,000 acres of seagrass flats in the Keys have been scarred by boat propellers (Sargent et al. 1995). No up to date assessment of this serious boating problem in the Keys has been conducted but boating activity has historically correlated with Florida's human population growth, expected to double within 25-50 years. As population increases, the pressure of boating activity on the marine environment - including groundings and bottom disturbance - is also expected to increase (FKNMS 2005). In 2004, there were over 32,300 registered vessels longer than 26 feet in length (over 6,000 greater than 40 feet long) from Palm Beach County south through the Keys[42] . The proposed Waterway Management Action Plan of the FKNMS includes the following goals designed to initiate actions to address the consequences of problems such as severe large vessel generated turbidity and resuspended sediment (FKNMS 2005):

- minimize resource damage from boating activities
- protect shallow-water resources
- provide reasonable and appropriate access while minimizing resource damage
- educate the public about safe and responsible boating practices

Other examples highlighting local risks exist. In the late 1990s the nuclear submarine *USS Memphis* grounded on a reef in southeast Florida off Ft. Lauderdale. In 2004, in Alaska, the 338 foot long cruise ship *Clipper Odyssey* carrying 126 passengers grounded on an uncharted rock and leaked fuel and gray from tanks that were damaged. Also in 2004, the Navy contractor's hopper dredge strayed outside the dredge zone in the offshore portion of Key West channel and caused impact to coral resources at several locations along the edge of the channel (FKNMS 2004). In Mexico in early 2005 the U.S. research ship *Maurice Ewing* ran aground on and damaged a coral reef about 30 miles off the Yucatan peninsula, after apparently relying on flawed or misleading navigational charts. In its online database entitled "Events at Sea - All the Things that Can Go Wrong On A Cruise" the Cruise Junkie documented 16 cruise ship groundings, 17 ship collisions with other vessels or piers and docks, and 2 cruise ship collisions with marine mammals from 2002-2005 worldwide (Cruise Junkie 2005).

In November, 2004, a tug towing a barge collided with the cruise ship *Enchantment of the Seas* while it was berthed at Pier B. The collision tore an 8 foot hole and left a 50 foot long mark on the ship above the waterline (Figure 3.B.16). On December 19, 2004 complaints and photos by locals were filed with the FKNMS and the Florida Wildlife Commission stating that the cruise ship *Sea Eagle* (about 700 feet long with a 23 foot draft) had traveled unusually far north in Key West channel. An investigation determined that although the ship used a portion of the harbor not commonly used by large cruise ships, it was being operated in a proper and correct manner (Roudebush 2004).

[42] Harvey, Kent. Personal Communication, FWCC

FIGURE 3.B.16. RESULTS OF A NOVEMBER, 2004 COLLISION IN KEY WEST HARBOR (KEY WEST CITIZEN).

A tug towing a barge collided with the cruise ship Enchantment of the Seas while it was berthed at Pier B.

From a historical perspective, undoubtedly there have been accidents, spills and collisions in the channel and harbor, especially when the military was at its most active in wartime. As an example, Figure 3.B.17 is an interesting 1914 photograph of a Navy vessel at Pier B after a collision with the pier. Other vessels of the period appear in the image as well. Two Navy PC boats ran aground near Mule Key west of Key West during World War II and had to be dredged out (Artman 1995). Steps have been taken by the FKNMS and other agencies to minimize the potential for groundings in the Keys and around Key West, especially on the reef. The FKNMS now has dual designations as an "Area to be Avoided" (ATBA) and a "Particularly Sensitive Sea Area" (Figure 3.B.18). The ATBA has resulted in a significant reduction of large vessel (>160 feet) groundings in the FKNMS since its designation in 1990 (Figure 3.B.19). The Sensitive Sea Areas designation ensures that the ATBA boundaries appear on international as well as U.S. nautical charts (FKNMS 2005). And, in a cooperative effort with other groups, radar transponder beacons have been placed along the reef tract as a means of electronically accurately locating the reef on radar screens of passing vessels.

FIGURE 3.B.17. 1914 PHOTO OF ACCIDENT INVOLVING PIER B AND NAVY VESSEL *TONAPAH* (STATE ARCHIVES OF FLORIDA).

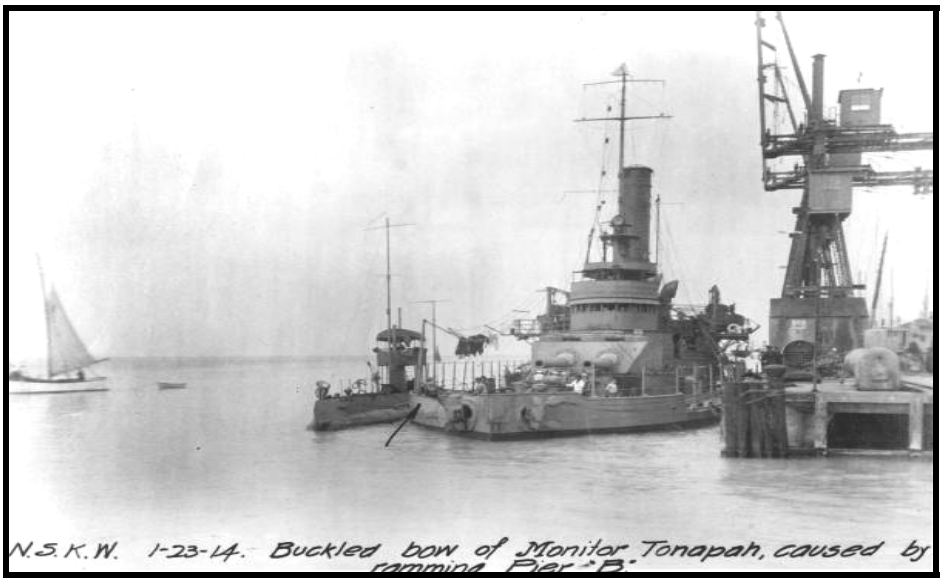
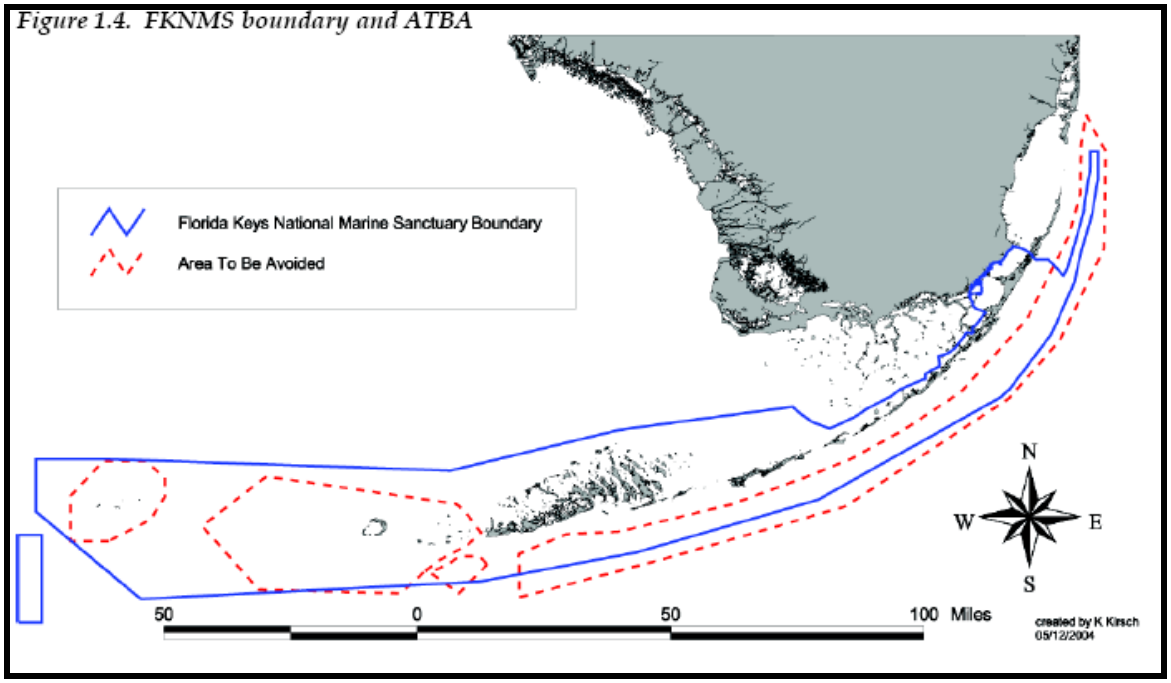


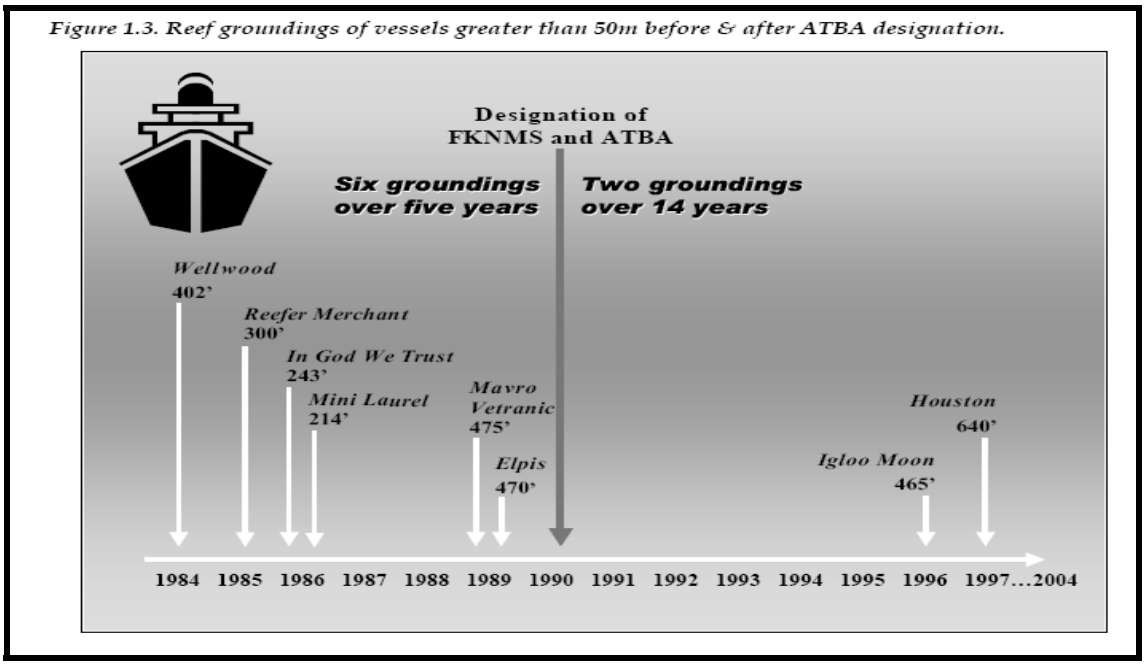
FIGURE 3.B.18. BOUNDARIES OF THE FKNMS AND THE AREA TO BE AVOIDED (ATBA). NOTE AREA EXCLUDED OFFSHORE FROM KEY WEST (FKNMS 2005)



Potential impacts from large vessel activity to biological resources of the channel and harbor area are reviewed in the Navy's 2003 EA and in FKNMS comment letters to the Navy's consultants during the dredging permit review (FKNMS 2003). Based on diver surveys by FKNMS staff and consultants, the FKNMS notes that important protected resources at risk include stony corals, octocorals, sponges, and seagrasses along the harbor and channel edges in a number of locations (especially along Cut B) and patch reefs, hardbottom and seagrass habitats immediately adjacent to the channel in a number of locations.

The vessel generated turbidity and resuspended sediment reflected in Figures 3.B.8 and 3.B.9 in the main channel offshore does not always remain in the channel but drifts away, and based on current patterns in this area typically drifts to the west. Figure 3.B.6 (produced for the 2003 Navy EA) shows sizeable patch reefs and hardbottom both to the west and east of the channel, as well as the stations currently being monitored. This detailed resource health monitoring required of the Navy before, during and following dredging (see Section 3.B.12.3) should prove to be important in assessment of the impact of vessel generated turbidity and resuspended sediment on these resources. Concerns of heavy sedimentation to stony corals include less species diversity, less cover, slower growth, reduced recruitment, decreased calcification and reef accretion, decreased net productivity, and alteration of complex relationships between reef animals (Rogers 1990). Sarkis (1999) reported that high levels of short pulse sedimentation during periods of high temperature may have a different effect on coral reefs than longer pulses of a lesser level during periods of colder temperatures- as for winter storms. As Rogers (1990) and Sarkis (1999) and others have suggested, coral coverage may not be the most sensitive method for assessing health of stony corals as the growth of a coral skeleton is very slow, and can be altered by other environmental conditions over time. Growth can vary greatly between colonies of the same species under similar environmental conditions and even within a single colony.

FIGURE 3.B.19. REDUCTION IN LARGE SHIP GROUNDINGS IN THE FKNMS ATTRIBUTED TO THE ATBA DESIGNATION IN 1990 (FKNMS 2005).



Another potential problem from increased large vessel activity in the Key West area relates to human noise in the marine environment. The issue is relatively little studied compared to other marine stressors but NOAA, the National Marine Fisheries Service and scientists from various academic institutions initiated a lecture series in 2004 with an objective of presenting current scientific information about human sources and uses of sound in marine environments, the physics of sound and hearing, and biological and behavioral factors that relate to noise impacts and especially affect marine mammals. NOAA provides "While we continue to work toward understanding some of these complex issues, much has been learned recently about the impact of noise on marine life. Our ultimate goal is to use a balanced approach to share the ocean with marine life, and to conserve and protect these incredible creatures for many years to come." (NOAA September 2004 press release - Lectures on Noise & Marine Mammals). In a review of the Navy dredging proposal the Florida DEP stated that unavoidable underwater noise, light, and visual disturbances during dredging and Outer Mole reconstruction would adversely affect fish, sea turtles, marine mammals and colonial seabird movements. They believed such affects as well as collision risks should decrease with project completion but might continue as secondary impacts from large vessel activity (FDEP 2003).

3.B.10 Cumulative Impacts

Cumulative impacts on the environment and on biological resources from human activity are very difficult to assess, under the best of circumstances. The diverse resources, diverse people and activities, and multitude of existing stressors on the resources of the Key West result in many confounding influences virtually impossible to sort out, or to determine when important cumulative thresholds have been reached. What is known is that many important habitats in the Key West area as well as water quality have seen changes and declines in "health" in recent years. Health is defined here as resilience, diversity, functions driven by natural processes, and lack of physical impact by humans. The cause of negative changes in the nearby reef ecosystem is generally believed to be a result of the multitude of damaging or degrading human activities and the long history of these activities, in combination with possible natural changes.

Involving 6 years of effort and expenditure of $6 million the Florida Keys Carrying Capacity Study was intended to view cumulative impacts from what has gone before and assess the ability of the Keys to absorb additional development. The Study reported in 2002 that the carrying capacity of certain aspects of the Keys terrestrial environment had been exceeded. An original intent was to "determine the ability of the ecosystem infrastructure to withstand all impact of additional land development activities.....". An original purpose was to perform ".....an analysis of consequences that may be used by local planners to determine the level of land development activities that will avoid adverse impacts to the Florida Keys ecosystem." (USACE 2002). Land development and other improvements associated with improving the 3 cruise ship berths in Key West, and a dramatic increase in cruise ship movements was occurring at the time, yet was not considered in the study.

The Study, led by the Army Corps of Engineers and the Florida Department of Community Affairs, ultimately did not address cumulative impacts affecting the Keys marine environment. Shortcomings in data for the Keys marine environment led the National

Research Council (2002) to recommend limitations in the use of the results from the Study and express opinions that the task was perhaps too ambitious an undertaking.

An effort was made in the 2003 Navy EA to address cumulative impacts related to their dredging and infrastructure improvements at the Outer Mole. In commenting on this effort the FKNMS suggested that in regard to benthic habitats (especially coral communities) in the area the cumulative impacts section could be enhanced by addressing the potential for overall cumulative effects with reference to turbidity, direct disturbance, and generally increasing stressors to an already stressed ecosystem. The FKNMS noted that benthic communities "are already dealing with induced stress from poor water quality (sewage, nutrient loading or toxins), storm water run off, coral disease, coral bleaching, vessel groundings and anchoring in addition to existing levels of large vessel generated turbidity. It must be emphasized that every effort to avoid or minimize additional stressors must be employed to reduce the cumulative impacts." (FKNMS 2003). This suggests that cumulative impacts in the area are a very real issue, but there is no easy answer or ready solution as to how to best establish thresholds that would allow agencies or groups to know when cumulative impacts have exceeded a natural systems or natural habitats (such as local hardbottom, patch reef, or seagrass bed) ability to tolerate additional impact.

The 2003 Navy EA noted that military vessel activity into Key West was expected to increase as a result of their work as was commercial and recreational vessel traffic. Statewide, vessel registrations continue to increase at about 2% per year. Even without navigational improvements in and around ports like Key West, navigation will likely continue to increase. The National Marine Fisheries Service, concerned about dredging as well as secondary impacts, advised the Navy during review of the draft EA that a more detailed discussion of the potential cumulative impacts of the project on EFH was needed. With few exceptions degrading impacts to natural habitats are cumulative - it's the degree of degradation (if any) that humans are willing to accept and our ability to measure the degradation that are difficult to establish. Again, the resource health and turbidity monitoring currently being conducted by the Navy may be the only opportunity to relate chronic turbidity and resuspended sediment from passing cruise ships and other large vessels to habitat quality of adjacent areas.

In regard to cumulative issues of the land based component of increased cruise ship and passenger activity at the Outer Mole, the Navy notes in the 2003 EA that the stormwater collection system at the Truman Annex dates back to World War II, and includes five drainage basins, four of which flow into the harbor basin. The fifth drainage basin flows southwest towards Fort Taylor. The Truman Annex discharges runoff to two outfalls along the east quay and five outfalls near the mouth of the harbor. There are no water retention or detention facilities at Truman Annex. Key West averages nearly 40 inches of rain per year.

Increased vehicular traffic to and from the Outer Mole during cruise ship visits may be cause for concern in regard to stormwater runoff. Ft. Taylor State Park reports no detrimental impacts to date from increased vehicular and pedestrian traffic [43]

[43] Knapke, M. Personal Communication, Ft. Taylor State Park

3.B.11 Existing Minimization and Mitigation Efforts for Cruise Ship Impacts

Known efforts include the $38 million ongoing Navy dredging and monitoring project, the reconfiguration of Pier B several years ago in an effort to reduce turbidity, limits on the size and draft of vessels brought into the harbor by the Key West Bar Pilots, managed use of the main engines of cruise ships by the Bar Pilots, and educational efforts of agencies and NGOs in the Key West area. The City's decision several years ago to preclude commercial kayak tours with cruise ship passengers in the Salt Ponds is a minimization effort to be acknowledged.

3.B.11.1 VALUE OF NAVY DREDGING IN ALLEVIATING CRUISE SHIP TURBIDITY

Permits issued to the Navy (and later modified in January 2005) authorize dredging of about 456 acres of submerged bottom in the main channel offshore (5+ miles long), the main channel inshore through the harbor north to Mallory Dock, the turning basin, and Truman Harbor.

The permits from the mid 1960s Navy dredging project in the channel and harbor authorized depths of -34 feet MLW and these depths were obtained in much of the area although some areas of hardbottom remained slightly shallower. The current dredging permits authorize depths of -37 feet MLW throughout the previously dredged portions of the channel and harbor, and -36 feet MLW in Truman Harbor. The permits included maintenance and additional dredging and the removal of about a dozen hardbottom patches left over from the 1960s dredging. Modified permits issued by the Florida DEP and the Army Corps of Engineers in January, 2005 (at the City's request) authorized an additional 7,500 cubic yards of maintenance dredging by the Navy's contractor (but paid for by the City) within the City's submerged lands lease in front of Mallory Dock to a maximum depth of -32 feet MLW. According to the City, dredging at Mallory was done at the request of the Key West Bar Pilots and the Navy to allow certain size frigates to dock at Mallory Dock on City leased bay bottom, and to remove accumulated silt and debris there[44]

In their January 11, 2005 permit modification, the Florida DEP stated "The Mallory Dock area is relatively shallow in comparison to the ship traffic in the area, which results in generation of turbidity plumes during ship movement in the area. Potential for impacts generated from ship traffic turbidity plumes is likely to exceed any potential impacts associated with dredging the area to depths more suitable for vessel traffic. It is not expected that elevated turbidity resulting from dredging will have any greater impacts on coral communities in the area than that which occurs during vessel ingress and egress. Once the maintenance dredging at Mallory Dock is complete, turbidity resulting from vessel activity should be greatly reduced."

On February 2, 2005, the dredging contractor advised the City and the Navy that dredging at Mallory was complete and that considerably less unconsolidated "maintenance" material and more solid rock bottom than expected had been encountered. They noted that much less material was removed than anticipated (only about 1,000 cy) and although the dredge being used was not suitable for the type of hardbottom encountered, multiple attempts were made to remove the hardest material, with minor success. The contractor advised that the dredge removed material until hard bottom refusal or the final authorized grade of -32 feet MLW

[44] Jones, J. Personal Communication, City of Key West

had been achieved. An official after dredge survey was to be performed by the contractor (Van Hoogstraten 2005).

A major determinant of the value of the Navy's channel and harbor deepening in alleviating large vessel turbidity will be the amount of unconsolidated material remaining in the dredged area when dredging is completed. The dredge used (Figure 3.B.20) for most of the dredging is designed to remove unconsolidated bottom sediments but limits exist on the size fractions that can be handled (finer sediments are more difficult to remove mechanically) and the dredge's ability to remove all loose material. And it is anticipated that natural processes of bedload movement due to tidal and wind generated currents along with storms will begin to deposit new unconsolidated material into the channel.

FIGURE 3.B.20. ACTIVE DREDGING BY THE NAVY CONTRACTOR OFFSHORE IN KEY WEST CHANNEL IN AUGUST 2004 (KRUER PHOTO).

Figure 3.B.2 reflects pre-dredged depths of -36 feet to -37 feet MLW in the area of the turning basin subject to prop wash scour by large vessels maneuvering (Figure 3.B.11). With dredging authorized to a maximum depth of -37 feet MLW little additional depth will be gained in this area, and a relatively small amount of unconsolidated material will be removed here.

Opinions vary in regard to what will be accomplished by the current Navy and City dredging. The Navy believes a beneficial impact to local benthic resources and a reduction in turbidity may occur as a result of less resuspension and redeposition of sediments during vessel movement resulting from the removal of fine sediments that are ".....now resuspended each time large vessels enter and leave port." (Navy 2003).

The Bar Pilots report in 2005 that they believe dredging will help reduce vessel generated turbidity but also believe that sediments will be re-deposited and regular maintenance dredging will be needed over time to keep turbidity levels at a minimum. To reduce turbidity in the main channel they recommend placement of out bound range markers in Cut B to allow large vessels to safely depart at slower speeds (Bar Pilots 2005). They also believe

widening the 300 foot wide channel entering Key West (north of buoy # 5) would allow large vessels to travel at slower speeds and help minimize turbidity levels generated by vessels stopping or accelerating. Earlier the Bar Pilots stated - "While the Pilots would not oppose maintenance dredging, they do not believe it is necessary, as depths in the harbor are still fully adequate for safe navigation of vessels. There are also several factors which lead us to believe that dredging would be of dubious value." (Walters 1999). In 2003, the Bar Pilots believed increasing the depths of the Harbor would make a noticeable difference in turbidity levels and that maintenance dredging around Mallory Dock would help greatly (Bar Pilots 2003). In 2004, they believed turbidity levels in the harbor should be reduced significantly after the dredging (Bar Pilots 2004).

An industry representative also suggested that by allowing ships to pass through the main channel at a higher rate of speed there would be a corresponding decrease in the amount of sediment displaced. He understood that the Navy's dredging would enhance the ability of the Bar Pilots to bring a vessel in more swiftly providing the relief (reduced turbidity) he expected[45]

In Tampa Bay, the channel passage of cruise ships heading to the Port of Tampa, along with other large vessel traffic, routinely increases turbidity and resuspends bottom sediments to the detriment of water quality and the adjacent benthic communities. There, maintenance dredging is not believed to mitigate the problem as it is too long between dredging events due to economic reasons. Maintenance dredging in Tampa Bay is believed driven by navigation and not water quality needs[46]

Prior to the initiation of the dredging a concern was expressed by the LVWG that dredging to a greater depth may simply encourage the use of still larger vessels than those using the area now thereby defeating a desired result of the dredging (LVWG 2002-2004). Little information was readily available on the type and size of large Navy vessels that might use Key West Harbor in the future but the Florida DEP has stated that waterway and Outer Mole improvements will allow access for more and larger Navy vessels, including cruisers and frigates (FDEP 2003). The National Marine Fisheries Service noted in a March 2003 dredging coordination letter to the Corps of Engineers that "draft requirements of cruiser and destroyer class vessels preclude their entry into Truman Harbor under the current channel conditions."

When dredging is completed new full bathymetric surveys will be conducted by the Navy. Depths achieved will be critical to future problems of prop wash scour, resuspended sediment, and turbidity from future use of the channel and harbors by large vessels. Turbidity monitoring in the channel and harbor is to continue for 3 months following completion of dredging.

3.B.11.2 LOCAL BASE REUSE AND LOCAL CONSERVATION INITIATIVES

The City's Land Development Regulations as they related to port improvements and expansion at Truman Annex required new activities and structures be assessed in terms of their impacts to wetlands, open water, wildlife habitat, and other environmentally sensitive

[45] Collins, S. Personal Communication, RCCL

[46] Lewis, R. Personal Communication, Lewis Environmental Services, Inc.

areas (Bermello et al 1999). A number of environmental issues were identified and assessed to some degree in the Key West Base Reuse Plan - these included water quality and vessel generated turbidity, natural habitats in the area, sea turtles and use of natural habitats in the area for feeding, possible use of a small beach just south of the Outer Mole by sea turtles for nesting, manatees, and management of sewage and graywater from cruise ships. In 1999, the Florida DCA noted a change in use of the Outer Mole that never underwent the required development review required by the Department and stated that the City should fully evaluate the impacts of using the Outer Mole for regular cruise ship visits. They also expressed concern at the time that a substantial increase of turbidity in the channel created by cruise ships could adversely affect water quality in and near the area (FDCA 1999).

Initiatives by the City in recent years to protect and improve water quality and marine resources in and near the City include advanced wastewater treatment for the island with deep well injection, upgrading the sewer system, no motor zones in important nearshore areas, management of some liveaboards through managed anchorages and pump out facilities, protection of the Key West Salt Ponds, and improved tidal flushing in interior wetlands of the City. The Port of Key West through the Key West Port Authority recommends the use of best management practices for environmental and water quality at City port and marine facilities around Key West including Key West Harbor. The City describes the mission of the Port of Key West as "A public benefit City department providing maritime, real estate services, and management of infrastructure to enhance the local economy, providing recreational opportunities for its citizens, and at the same time protecting both our heritage and the marine environment for future generations." (*http://www.keywestcity.com/depts/port)/cruiseships/cruiseships.asp*). The City and community groups help educate residents and visitors on ways to recreate, dive, fish, and boat in the Key West area while protecting and minimizing disturbance to marine resources.

In conjunction with the U.S. Coast Guard and the FKNMS, the Key West Propeller Club placed 8 radar transponder beacons along the Keys reef tract from the Dry Tortugas to the north end of Biscayne National Park. These beacons transmit a signal that is displayed on the radar screens of passing ships, warning them of the location of the reef tract (FKNMS 2005).

3.B.12.3 MONITORING PROGRAMS

Relative to issues of large vessel activity in the channel and harbor, the most important new monitoring is that being required of the Navy by state and federal agencies as conditions to the issued dredging permit. An extensive and detailed 99 page water quality and resource health monitoring plan titled *Key West Harbor Dredging Monitoring and Mitigation Plan* was developed in 2003 for the Army Corps of Engineers by the Navy, the Navy's consultants, and the regulatory agencies. In general, the monitoring during the dredging and for a limited period post-dredging include high frequency turbidity monitoring at surface and mid-depth while dredging is underway and during select vessel passages, benthic habitat assessment that includes monitoring of sedimentation near the dredge area and at control stations, and monitoring for injury to benthic resources during dredging. Although mostly designed to monitor and document any impacts resulting from the Navy's dredging, the data and results should prove valuable in assessing environmental issues related to cruise ship activity in the channel and harbor post-dredging. Specifically, the monitoring plan has various components designed to use best available technology and methods to protect and monitor resource

health in the area before, during, and after dredging, to provide a baseline for future comparisons. It includes, but is not limited to, the following elements.

The objective of the Resource Health and Sedimentation Monitoring Plan (RHSMP) is to use coral and seagrass health and sedimentation measurements at selected locations adjacent to the project area as indicators of potential impacts to benthic resources from dredging. This monitoring program was developed to respond to the following concerns from the Corps of Engineers and Florida DEP and other resource agencies:

- coral health adjacent to dredging;
- seagrass health adjacent to dredging;
- sediment characteristics in the dredging footprint and in areas downstream of turbidity plume, and at monitoring stations;
- background sedimentation in and adjacent to dredging footprint and at monitoring stations;
- during-dredging water quality for sedimentation from Key West Harbor and approaches from the outer coral reef tract;
- sedimentation on nearby seagrass and coral communities; and
- monitoring of sediment traps weekly at pre-arranged stations.

The RHSMP consists of the following efforts:

- monitoring of coral health at sites adjacent to the project area and at reference sites by repetitive diver observations of selected coral colonies for signs of bleaching, excess mucus production, coral polyp extension, and disease;
- monitoring of seagrass health within seagrass beds adjacent to the project area and at reference sites by diver observation of sediment buildup on blades and increased epiphytes or biofouling;
- monitoring of sedimentation adjacent to the dredging footprint within sensitive resources and at appropriate reference locations. The sedimentation monitoring will be conducted at permanent stations, and measurements will be made during dredging activities by using sediment accumulation blocks (weekly) and sediment traps (monthly); and
- monitoring of impacts to resources immediately adjacent to dredging activities using diver observations made during weekly drift dives along the channel edges.

The objectives of the Navy's Net Environmental Effects Monitoring Plan are to 1) show the effects of dredging Truman Harbor, the Truman Harbor turning basin, and the Key West ship channel on turbidity generated by ship traffic and 2) document sedimentation rates before and after dredging activities at stations along the Truman Harbor turning basin and Key West ship channel. This will be accomplished by the before and after monitoring of turbidity directly associated with ship activity along with sedimentation rates throughout the project area. The Net Environmental Effects Monitoring Plan consists of:

- sampling turbidity plumes associated with ship traffic using turbidimeters deployedfrom a small vessel following ships the length of the channel.
- placement of a remote drogue with attached turbidimeters in ship turbidity plumes and recording of data within the plumes as they dissipate.
- collection of sedimentation data before and after dredging from selected net sediment accumulation monitoring sites and sediment traps established as a component of the RHSMP.

The Large Vessel Turbidity Monitoring Plan is intended to monitor levels of turbidity associated with large vessel traffic within the Truman Harbor turning basin and ship channel. Monitoring was to occur before the initiation of dredging, during dredging, and after the completion of dredging for a period of 3 months. Measurements of turbidity will be made at surface and mid-water depths behind large vessels as they transit within the ship channel and turning basin. Ships will include military vessels, cruise ships, and large commercial freighters or tankers. The survey vessel will follow the ships at a fixed distance and record near-surface and mid-depth turbidity using two towed turbidimeters. Information recorded during each sampling will include vessel name and type, date, time interval, distance of turbidimeters from vessel, depth of instruments, continuous survey vessel position and speed, and turbidity levels. Either before or after each monitored vessel's passage down the channel, background turbidity readings will be collected along the channel for comparisons. Measurements will be made of ship passages during two separate 3-day periods prior to dredging and at least two 3-day periods after the completion of dredging. Turbidity data will be stratified by specific segments of the channel and vessel type and size to assess the net environmental effect of the dredging on ship-generated turbidity levels within various sections of the project area. By agreement, monitoring of post-dredge turbidity from vessels will continue for at least 3 months.

The FKNMS 1996 Final Management Plan required the FKNMS to have a Water Quality Protection Plan (WQPP) developed by EPA and the State of Florida. The Water Quality Protection Program continues to fund three long-term monitoring projects - overall water quality, coral reef and hardbottom community health, and seagrass community health. These three projects represent a long term commitment by the EPA to assess the health of coral reef, hardbottom, and seagrass communities within the FKNMS with a focus on resource and health issues and concerns related to water quality. There is also a research/special studies component which consists of a multitude of smaller, more focused studies looking at specific cause and effect relationships and the impacts of specific environmental perturbations (NOAA 2005)

The contract for the ongoing water quality monitoring component of the WQPP was awarded to the Southeast Environmental Research Program at FIU and the field sampling program began in March 1995. Research and monitoring activities were intended to focus on fundamental processes and specific management-driven topics. Information generated from such activities will be used to:

- provide the public with a means to evaluate the effectiveness of the Sanctuary;
- provide a means to distinguish between the effects of human activities and natural variability;

- develop hypotheses about causal relationships which can then be investigated; evaluate management actions; and verify and validate quantitative predictive models used to evaluate and select management actions.

Ongoing long-term monitoring within the FKNMS occurs at two scales. Comprehensive, long-term monitoring critical to achieving the FKNMS' primary goal of resource protection. is conducted through the WQPP. The purpose of the research and monitoring is to establish a baseline of information on the resource and the various components of the ecosystem, and how they interact. Two laws require that a research and monitoring program be implemented within the Sanctuary. Section 309 of the NMSA mandates that the "Secretary of Commerce shall take such action as is necessary and reasonable to promote and coordinate the use of national marine sanctuaries for research, monitoring, and education purposes. The 1992 amendments to the FKNMSPA (Section 7(a)(4)) are much more specific, calling on the Secretary of Commerce to:

- identify priority needs for research and amounts needed to improve management of the Sanctuary, and in particular, the coral reef ecosystem within the Sanctuary;
- identify clearly the cause-and-effect relationships between factors threatening the health of the coral reef ecosystem in the Sanctuary; and
- establish a long-term ecological monitoring program and database, including methods to disseminate information on the management of the coral reef ecosystem.

The Coral Reef and Hardbottom Evaluation and Monitoring Project began in the Keys in 1996 and is being led by the Florida Fish and Wildlife Conservation Commission (FWC) and the University of Georgia, Institute of Ecology. Initiated in 1996, this project examines coral and hardbottom communities at 41 fixed sites annually, including some next to the main channel at Western Head and Cliff Green Patch Reefs. The goal is to monitor the status and trends of coral reef and hardbottom communities in the FKNMS using repetitive underwater observations and video transects to provide estimates of biodiversity, distribution and coverage of stony reef coral, soft coral, sponge, algae, substrate and the incidence of selected coral diseases (Beaver 2003, FKNMS 2003a). The Project noted keyswide a 38% decline of stony corals between 1996 and 1999. However, coral cover has not significantly changed since 1999.

The Zone Monitoring Program is part of the Sanctuary wide status and trends monitoring. The primary object of this program is to annually sample permanently marked sites ranging from the northern Florida Keys to the Dry Tortugas, including outer reefs, patch reefs, and hardbottom communities. Site locations were chosen using a random stratified technique based on EPA survey procedures. Underwater Station Species Inventories survey coral biodiversity while image analysis of video transects provides estimates of planar coverage. The sampling design and broad coverage is intended to provide statistically sound estimates of the temporal stability of coverage and coral species richness. These observations are intended to be used to generate hypotheses to distinguish between local, regional, and larger-scale factors that may influence the health of the coral reef ecosystem (e.g., sewage, land use, visitation, Florida Bay water, global climate change). It is believed to be the most statistically rigorous and precise large-scale coral monitoring project in the world (FKNMS 2003).

Seagrass sites within the Sanctuary are monitoring quarterly for coverage, biomass, and productivity also by FIU. Seagrass habitats around Key West are known to be part of the largest continuous seagrass bed in the world. The most current general results of seagrass, coral, and water quality monitoring in the FKNMS is summarized in the 2003-2004 FKNMS Annual Report.

The Fisheries-Independent Monitoring Program of the Florida Fish and Wildlife Research Institute is a long-term project designed to evaluate fishery resources in Florida. Visual surveys are used to estimate relative abundance and to monitor the size class distribution of economically important fish species in coral reef areas of the FKNMS. Sites near Key West are included. The program uses stratified random sampling, a statistical means of resolving the complications caused by variations in habitat, to provide valuable information to fisheries managers on relative abundance, size structure, distribution, habitat use, and recruitment.

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4. ADVERSE ECONOMIC IMPACTS

4.A Resource-Based User Characterization and Perceptions on Cruise Tourism Impacts

Resource-based users[47], or those stakeholders who rely upon and/or utilize natural resources for their livelihoods, often serve as indicators on the state of the environment in which they operate (Bergmann et al., 2004; Mackinson, 2000). Within the fluid medium of the coastal and marine environment, where changes to ecosystems, biota, and services are more difficult to monitor, resource-based users can (and should) play a central role in monitoring resource conditions, thereby assisting in the identification of stressors and other harmful activities (Pomeroy et al., 2004; Mackinson and Nottestad, 2001; Bunce et al., 2000). Both a characterization of user types and of stakeholder perceptions on existing conditions can serve to create a baseline against which future changes can be measured (see, for instance, Suman et al., 1999, for a description of baseline conditions of stakeholder groups in the Florida Keys National Marine Sanctuary).

The rise of the cruise ship industry in Key West has resulted in increased cruise vessel traffic entering and departing the city's harbor, coupled with a corresponding increase in the number of cruise vessel passengers using the city's resources. While some studies suggest that cruise ship visitation has negative impacts on a destination's environment (Klein, 2002; McKee, 1998; Allen, 1992), there exists little empirical knowledge on the environmental and economic impacts resulting from the cruise ship industry on the Key West resource-based users and hence a need for a resource-based user study.

As called for under Task 4 of the Key West Quality of Life Study, the present project was developed to identify adverse economic impacts sustained by environmental sensitive businesses (or resource-based users) resulting from cruise ship-related environmental degradation, including the impact on the marine environment, including an assessment of impacts on sediment and water quality, the re-suspension of sediments, turbidity, seagrass beds and all living marine resources. The project addressed the overall goal of understanding the direct linkage between environmental degradation and adverse economic impacts, as resulting from the cruise ship industry and as affecting the various stakeholder groups, by adopting a comprehensive, step-wise approach to identify and characterize the resource-based user community. The project methodology, results, and recommendations and conclusions are presented in the following sections.

4.B Methodology

As part of the overall goal of understanding environmental and (socio)economic linkages within the resource-based user groups, the project identified three objectives that were then enacted as step-wise methodologies. The objectives were to:

1. Identify *all* resource-based user, or stakeholder, groups that may be impacted by the cruise ship industry;

[47] The terms 'resource-based user groups' and 'stakeholders' are used interchangeably in this report.

2. Determine the types of impacts (economic, social, or other);

3. Quantify each impact category and to characterize the current (baseline) conditions and perceptions of the resource-based user groups

1. Identification of resource-based user, or stakeholder, groups

This objective sought to identify *all* resource-based user, or stakeholder, groups that may be impacted by the action. Stakeholder groups are generally defined as those users that directly interact with the affected resources and are a subset of a larger, affected population. Previous and ongoing research by the authors in the region has led to the identification of several stakeholder groups that rely directly on the marine resources (Suman et al., 1999; Shivlani et al, 2003). These groups can be divided into two broad categories: Consumptive users and nonconsumptive users. Consumptive users are comprised of all fishing interests, including commercial fishers, charterboat operations, headboats, and flats guides. The commercial fishers rely directly on the products (ex. fish and shellfish, among others) extracted from the coastal and marine environment. The charterboat, headboat, and guides operations may also rely on extractive activities, but they may also exercise catch-and-release guidelines. Moreover, their income is generated less from the product extracted, and more from the clients they take out fishing. Nonconsumptive users are comprised of an array of environmentally-friendly (or 'ecotourist') operations, including diver and snorkel charters, kayak and other light craft rentals, and birdwatching and other nature excursion guides, among others. These stakeholders also rely directly on the marine resources, but in a non-extractive manner. Their views on marine resources tend to be more preservation-based than those of their consumptive counterparts. However, as the Key West Quality of Life Study emphasized, both sets of stakeholders rely on a healthy ecosystem and would be impacted by environmental degradation.

The methodology adopted for resource-based user group identification and inventory was multi-pronged and inclusive. Research personnel consulted a variety of sources, including published and gray literature, government lists, commercial sources, organizational rosters, key contacts, and word of mouth, to compile resource-based user group inventories. These included the review of recent studies on stakeholder groups (such as the Shivlani et al., 2003 study on dive operators in the Lower Florida Keys), perusal of organization lists, interviews with group representatives on local panels, including the Florida Keys National Marine Sanctuary (FKNMS) advisory council, and a comprehensive inventory of all listed and advertised groups (dive and snorkel operators, small vessel, personal watercraft, and kayak operators, eco-tourism operators, mixed charter operators, flat fishing guides, charterboat operators, sunset and related pleasure boat tours, among others). Once all available sources had been consulted, research personnel generated resource-based user lists that were later utilized for interviews.

The lists generated focused on three main groups: commercial fishers and fish houses; charterboat operators and fishing guides; and non-consumptive, commercial operators. Commercial fishers and fish houses were primarily identified using previous research conducted by research personnel in the region (Shivlani et al., 2003; Milon et al., 1997), as well as by visiting each of eight fish houses in the Key West/Stock Island region and requesting that they provide a list of all known commercial fishers who fish in the area of

concern[48]. Fish houses were included as part of the commercial fisher group as they receive fishery product from individual fishers and thus have a direct stake in the resource conditions. The charterboat operator and fishing guide list was generated first by including all those operations that advertised trips out of the Key West area, and second by visiting all Key West marinas. Finally, research personnel contacted each charterboat operator and fishing guide to determine whether the business operated in the area of concern, thereby further refining the list. Non-consumptive, commercial operators were identified in the same way as were charterboat and fishing guide operators, except that the research team did not exclude any non-consumptive operations[49].

2. Determination of impacts

The research team selected semi-formal, open-ended interviews (Babbie, 1990) as the preferred method by which to gather cruise ship impact and other related information from the resource-based user groups. Interviews, which were to be conducted in the field and in-person, were chosen over other, more formal methods (i.e. surveys) because the population of users was relatively small and thus afforded itself to the more exhaustive approach, and also because interviews allowed for the discovery of issues not uncovered in the pilot session (described below). However, the research team did develop a series of thematic questions that were utilized to drive the interview process. The themes comprised demographic and economic information, perceptions and outlook on resources and other biological indicators as impacted directly or indirectly to the cruise ship industry, views on the economic impacts of tourism and cruise ship tourism, condition of quality of life indicators, and preferred alternatives on future cruise ship tourism. Additionally, respondents could elaborate on any of the themes or other matters they considered important to the study.

Interview results were entered as narratives, divided up into various sections according to the aforementioned themes. Once data collection was complete, parts of the narratives were transformed from qualitative into quantitative results, to facilitate inter-group comparisons, and all other information was summarized by user group.

3. Quantification of impacts and characterization of the current (baseline) conditions and perceptions of the resource-based user groups

Once results had been summarized for each resource-based user group, intra-group and inter-group analyses were conducted to compare the impacts resulting from environmental degradation, as reported by the respondents. Finally, these analyses led to the overall characterization of each resource-based user group, which consisted of each group's views on the biological and ecological impacts of the cruise ship industry on coastal and marine resources in the region, the importance of tourism and cruise ship tourism to the local economy, the changes in quality of life indicators in Key West, a comparison of resource, economic, and tourism indicators from prior to 1990 to the present day, and whether cruise ship visitation should be controlled and, if so, then what strategies should be employed.

[48] Initially, research personnel used the Main Ship Channel as the area of concern but following pilot work conducted in June 2004, it was decided that a larger area – encompassing a 25-mile radius around Key West – be identified as the area of concern. However, only those operations were interviewed who use parts of this larger area around (or through) which there is cruise ship traffic. Thus, those who only utilized areas beyond the 25-mile radius but who may travel through the area of concern were not considered eligible.

[49] Only two non-consumptive businesses were identified that operated beyond the area of concern, and these were not included in the non-consumptive resource-based user list.

4.C Results

Altogether, the research team completed 70 resource-based interviews over eight months (July 2004 – January 2005), and the results are representative of 30 commercial fishing industry members, 20 charterboat operators and fishing guides, and 20 water-based operators. The results are presented for each of the three resource-user group, and pertinent inter-group comparisons are provided within each group section.

4.C.1 Commercial Fishing Industry

The research team completed a total of 30 commercial fishing industry interviews, consisting of 21 commercial fisher interviews and nine fish house and processor interviews. As stated previously, the decision to interview fish house and processor operators was made to ensure that the views of the industry segment that relies on the fishery product landed from the area of concern be included in the project; commercial fishing is the second largest industry in the region, and fish houses and processors represent a direct vertical link to commercial fishers. Moreover, the research team determined that by interviewing fish house and processor operators, it could better determine the macroeconomic, or fishery-wide, impacts (as opposed to fisher, or microlevel, effects) of the cruise ship industry.

The respondents represented a long tenure in the fishery, having fished or purchased fish products from the region for an average of over 30 years. One fisher reported that he had been fishing the harbor and environs for over 70 years, and several others had used the area for 50 or more years. Therefore, the sample contained a long time series from which to determine changes that may have occurred in the regional environment and its resources.

Almost half of the fishers interviewed (47%) were affiliated with a single fish house and were affiliated with a commercial fishing organization (43% were affiliated with Monroe County Commercial Fishermen, Inc.). None of the fishers or fish house operators interviewed had affiliations with other, Key West organizations, such as the local chamber of commerce or other business guilds, tourist organizations, or civic groups. The lack of horizontal connections suggested that the commercial fishing industry, though largely physically adjacent to the tourism areas of Key West and using the same resources and areas as those used by other resource-based users, is mostly separate from the larger, tourism-based economy.

In terms of economic investments and operating costs, the expenditures varied considerably within the fishery. The average investment in a fishing operation (including fish houses) was $1.7 million, with an average, annual operating cost reaching $155,000. However, when only fish houses were considered, the average investment was almost $5.7 million, and the average, annual operating cost was $405,000. Within the commercial fisher sample, the investment and operating costs were more modest, averaging $126,000 and $45,000 respectively. Generally, fish houses reported land values, which greatly increased investment costs; additionally, operating costs for fish houses, which consist of payroll, maintenance, and related activities, were high. The most expensive investments for individual fishers were their vessels and gear (especially for those fishers in the sample who owned spiny lobster and/or stone crab traps).

Fish houses employed an average of 3.7 persons, which was over twice as many mates (1.75) that fishers hired for fishing trips. Fish houses also maintained a fleet of commercial boats,

ranging from as few as nine boats to as many as 35 boats that sold exclusively to the fish houses. On average, almost 21 commercial boats were affiliated with each fish house. Almost all of the respondents and their employees lived in the Key West/Stock Island area. Of the 2.4 persons employed on average in the commercial fishery as fish house personnel and mates, 2.3 persons lived in the local area. However, many of the respondents did complain that housing is an issue (see below), and that the lack of affordable housing has shrunk the pool of reliable mates, many of whom have migrated to the Middle and Upper Florida Keys. Other fishers argued that this migration is the first step in the inevitable extinction of commercial fishing in the Key West/Stock Island region.

Fish houses in the Key West/Stock Island area purchase most of the local fishery product landed in the region (see Shivlani et al., in preparation, for a description of spiny lobster catch totals purchased by fish houses in the Florida Keys), but most of the catch is exported out of the area and the county. For the eight fish houses interviewed, the average amount of finfish and crustaceans sold locally was only 4.6% (most of which was sold either in retail directly from fish houses or to the region's only processor, which reported selling 80% of the processed product to the local restaurants and other markets). The rest, or over 95% of the region's catch, was sold either via Marathon or Miami to the rest of the US and elsewhere. When asked why the industry would not try to take greater advantage of the local market and thus promote more tourism-based consumption of local seafood (and thereby improve linkages between the commercial fishing and tourist industries), fish house operators provided several explanations. The first was that fish houses cannot compete with local fishers in supplying fishery products to local restaurants, as the latter often sell at cheaper prices. The second was that local markets and consumers do not purchase enough fishery products on a consistent basis to make local sales profitable. Finally, the third reason was that most restaurants and other local markets purchase imported fishery products over local ones, based solely on price. One fish house operator reported that imported pelagic species often sell for less as fillets per pound then what he can offer his fishers for the whole fish per pound, thereby making competition based on price completely infeasible. The operator added that while some restaurants will pay a higher amount for freshly caught, local fish, that there are very few such restaurants.

While most fish houses list one or more of the aforementioned reasons for not linking more closely with local markets, others stated that they had commenced selling more to Key West restaurants and fish markets, and that they intended to increase their market share in the future. Several fish houses operate retail sections from which they sell smaller quantities to local residents and tourists. However, whether these linkages shall lead to closer connections between the region's two main economies remains unclear.

Commercial fishers reported fishing from areas east of Key West (as far east as American Shoal) to No Man's Land, a region west of the Marquesas. The areas fished depended primarily on the species targeted. Respondents targeted spiny lobster in both the Gulf of Mexico and South Atlantic around Key West up to the areas described above, whereas they fished mainly for stone crab north and northwest of Key West. Finfish were targeted mainly on the southern side of Key West, with the reef tract from American Shoal to areas west serving as the prime location for snappers and groupers. Other, pelagic species were caught in the deeper waters on either side of the island, and the main species harvest was king mackerel. Over three quarters (77%) of the sample did not fish the same areas each trip, and

all fishers stated that they change location depending on the species that they were targeting that trip.

Almost two-thirds of the commercial fishing industry sample (63%) stated that there had been changes in local conditions, which many of the fishers identified as increased pollution[50]. Fewer respondents (30%) had noticed a change in the condition of local species, and fewer yet (16%) reported similar changes in local habitats and/or ecosystems. Instead, most fishers believed that upstream pollution, either resulting from Key West or mainland Florida (especially the Everglades and southwest Florida) has been responsible for the changes in local conditions, which they identified most often as sedimentation, increased algal cover, and a general decline in water quality. Moreover, most of the sample did not blame the cruise ship industry for these changes. Less than 16% believed that the cruise ship industry caused impacts to the benthos or marine biodiversity, while 35% felt that the passage of cruise ships affected water quality (most often stated as an increase in turbidity). However, many fishers also qualified their answers, arguing that while the passage of cruise ships in and around the harbor and main ship channel does cause increased turbidity, that the effects are temporary and, most importantly, do not result in chronic, environmental damage. Other fishers stated that natural events, such as strong northerly winds and tropical storms, often create the same effect as cruise ships. Finally, some fishers reported that while they do not fish the area through which cruise ships pass, it is not because of any physical damage caused by the ships on the environment or decreased catch rates; rather, it is because of the potential loss of trap gear that would inevitably get tangled in and cut by cruise ships.

Almost half (46%) of the sample reported that the presence of user conflicts in the region, and 35% complained of crowding. However, as with other questions, most fishers clarified their answers by adding that such conflicts are not related to cruise ships or cruise ship passengers, most of whom they believed do not participate in activities associated with user conflicts. Rather, most user conflicts identified referred to intra-fishery and recreational fishery conflicts resulting from losses in fishing grounds that have generated crowding. Fishers most commonly pointed to the two ecological reserves (no-fishing zones) that the Florida Keys National Marine Sanctuary (FKNMS) implemented in the Lower Florida Keys (NOAA, 2000; NOAA, 1996), and argued that these zones have pushed uses closer together.

The commercial fishing industry was in general agreement that both general and cruise tourism are either essential or important to the region's economy presently and in the future. In fact, as previously stated, several fishers believed that the future rise in tourism will lead to the eventual decline of their occupation. One problem that almost all respondents blamed on tourism was affordable housing, as over 71% believed that tourists are pushing up property and rental prices in Key West. Others added that there are not enough local, high-paying jobs that make housing affordable. When asked about the future of affordable housing, all fishers had a negative opinion. Many felt that there was no hope for commercial fishing in the region, and that fish houses would be converted into recreational marinas and condominiums soon. They pointed to recent developments in the Stock Island area, where such gentrification had occurred. Other fishers believed that the long-term solution would involve busing in service workers from the Upper Florida Keys and southern Miami-Dade

[50] These findings are consistent with those reported in a study conducted by DeMaria (1996) with residents of the Florida Keys, where fishers and others reported a decline in water quality in near-shore areas and the coral reefs.

County. The attitude towards affordable housing was summarized by one of the respondents who, when asked about affordable housing, replied, "This (Key West) is a place for the rich…(where) billionaires are buying out the millionaires".

Commercial fishers and fish house operators, like respondents from the other two resource-user groups, provided their opinions on the status of various quality of life indicators in Key West. The results are presented in ranked order in the table below.

TABLE 4.1: COMMERCIAL FISHING INDUSTRY VIEWS ON QUALITY OF LIFE INDICATORS

Indicator	Unfavorable rating (in percentage, n = 30)
1. Congestion	97%
2. Cost of living	90%
3. Amount of public areas (green spaces)	78%
4. Taxes	63%
5. Attractions	60%
6. Raising a family	37%
7. Crime	24%
8. Growth management	30%
9. Sustainability	30%
10. Quality of tourists	7%

As is clear from the results, a large majority of the commercial fishing industry sample listed congestion and cost of living as issues negatively affecting their quality of life. Many fishers stated that they no longer visit Key West, as trips there result in traffic jams, near collisions, and inconsiderate tourists. Other fishers felt that while Key West has always been expensive, that the past three years have ushered in even greater hikes in the cost of living (a fact that some fishers blamed on increased tourism). Almost 80% of the sample believed that the city had not been successful in generating or protecting common or public areas, and 60% argued that the number of attractions (especially for locals) had declined; some pointed to the re-development of local attractions as tourist destinations, such as restaurants, while others remarked that most recent developments had been undertaken with tourism, rather than local, interests.

Most respondents still believed that Key West is a good place to raise a family, but as stated by one fisher and echoed by several others, they could no longer afford to raise their children here. As a result, many fishers revealed that they were planning to re-locate, especially those who reported owning property in Key West; many locals already had re-located, and several respondents felt that the so-called 'conch exodus' was partly driven by higher property prices but also by declining quality of life indicators.

In comparing the pre-cruise ship era (defined loosely as pre-1990) to current conditions, most respondents (77%) believed that resource conditions remained the same, 80% stated that the economy was better, and 53% reported a decline in overall quality of life conditions. Of those suggesting that the economy was better now than in the pre-cruse ship era, 27% qualified their answer by adding that the economy had improved mainly for those who benefit from cruise ships (and not the general population). Importantly, commercial fishers and fish house operators did not report any declines in resource conditions which, when compared with similar information they provided on local biological and resource conditions, suggests that the commercial fishing industry does not believe that the cruise

ship industry impacts its activities. This view is further supported by the fact that 50% of those interviewed did not believe that cruise ships impact the marine environment (43% felt that they did), and 60% did not want to place limits on cruise ship tourism in Key West. While it may be speculated that their views may be economically motivated, it must be recalled that less than 5% of the regional catch is sold locally; moreover, fish house operators reported that if cruise ship visitation were to decline, they would lose only 2.8% of their total market. Commercial fishers did not believe that a decrease in cruise tourism would affect them at all.

Thus, the interview data suggests that the commercial fishing industry believes that the cruise ship industry, as a tourism sector, presents economic and social challenges, particularly by increasing property and rental rates, contributing to the increasing cost of living, and generating congestion. While these impacts do degrade the region's quality of life, the respondents do not agree that the cruise ship industry has similar impacts on the region's marine resources and conditions.

4.C.2 Charterboat Operators and Flats Fishing Guides

As described in the methodology section, the charterboat and flats fishing guide resource-user group was selected because it both functions as a (mainly) consumptive user group and has strong ties with the tourism industry (as it is exclusively a for-hire industry). By using a combination of published material, such as the telephone white and yellow page, advertisements, and brochures, and taking trips to all Key West and Stock Island marinas, the research team identified 123 charter fishing and guide operations in the region. The team then contacted each operation for which it had contact information to determine whether the operation qualified under the tenure criterion (of having an operation since 1990 or earlier) and to ascertain whether the operator would be interested in participating in the study; a total of 16 operations had been fishing only after 1990 and therefore did not qualify. Among the others, interviews were set up with those operators who were interested and available during the survey period, and by February 2005, the research team completed the required 20 interviews.

The interviews completed consisted of 30% flats guides and 70% charterboat operations. The average tenure in the fishery extended to 1983 (or a mean of 21.7 years), and 20% of the operations had over three decades of fishing experience in the region. Thus, much like the commercial fishing industry group, the charterboat and flats fishing guide group represented a sample with long-standing use and knowledge of the natural environments and resources around Key West. Rates of affiliation among the group were low and diverse. Only 10% of the sample reported belonging to the Key West Chamber of Commerce, the Key West Charterboat Association, or the International Game Fish Association (IGFA). Altogether, only 50% of those interviewed were affiliated with any organization.

The average investment in an operation was almost $183,000, with annual expenses reaching over $53,000. However, as with the commercial fishing and water operator samples, there was considerable variation between respondents. The main investment costs were those related to the vessels that the operators owned, whereas expenses were dominated by maintenance costs and docking fees, the latter of which can reach upwards of $20,000 per year in several locations. Less important were employees, who averaged less than 1.5 per operation; most respondents reported having at least one employee, and two reported hiring

extra, part-time help as well. However, as employees are mainly paid based on the number of trips taken, most operators did not report fixed incomes for their employees.

Overall, all respondents earned 100% of their income from fishing trips. Price structures varied among operations, depending mainly on the length of the trip but also on whether the clients were local or not. The average cost per trip was $550, and most trips taken were full-day trips. The operations were quite busy, averaging 4.5 trips per week, but most reported a peak season (winter months) and an off-peak season (summer months). Out-of-town clients accounted for a majority of the business (89.6%), but local residents also contributed to fishing trips (9.2%); by contrast, only 1.2% of the clients were cruse passengers. Many respondents stated that they do not cater to cruise passengers, as the group tends to spend too little time in Key West (this was confirmed in the visitor study, where it was determined that cruise passengers spent an average of just over three hours off the cruise vessel, and less than 1% took a charterboat trip).

Trips taken around Key West varied considerably, depending mainly on the species targeted for that trip. Generally, however, those fishing reef fish (70%) or pelagic species (70%) fished from the reef in the South Atlantic on either side of Key West and further southwards into deeper water; by contrast, the fishers targeting inshore species (55%) tended to fish further in towards Key West, in both the Gulf of Mexico to the north and the South Atlantic to the south. Also, almost all respondents (90%) fished different areas, stating that they 'follow' the fish or adjust to weather conditions. But, no operator in the sample fished further than a 25 mile radius around Key West. Finally, no fishing guides reported selling their catch; in fact, most stated that they practice catch-and-release guidelines. Out of the charterboat captains, only 21% sell their catch, and the catch is sold only to fish houses.

Unlike among the commercial fishing industry sample where most respondents reported no changes in local conditions, 75% of the charterboat operators and guides felt otherwise. These persons believed that changes had occurred over time, most pointing to fewer fish and increased sedimentation as key indicators of local change. Additionally, 65% reported changes in the number and abundance of marine species, 70% believed that local conditions (especially sea grass meadows) had degraded, and 70% complained about the condition of local ecosystems. Overall, a majority of charterboat operators and flats guides agreed that there have been shifts in flora (70%), fauna (70%), and ecosystems (65%) around Key West during their tenure.

Importantly, a majority of the respondents blamed many of the changes they reported on the cruise ship industry. Most operators (65%) stated that cruise ship activities are responsible for impacts on marine biodiversity, and 85% believed that cruise ships negatively affect the local marine benthos and degrade water quality. The most common complaint among respondents was that cruise ship activity increases turbidity by suspending sediments. They often pointed out that the waters off Key West were once as clear as anywhere in the Florida Keys, but that cruise ship traffic had lowered water visibility. A few operators even believed that the re-suspension of sediments was partly responsible for algal blooms that they argued have increased since the advent of cruise ship tourism in Key West.

Asked whether cruise ship tourism leads to socioeconomic impacts, such as crowding and user conflicts, most in the sample agreed that cruise ship passengers burden the island and its resources (65%), promote user conflicts (55%), and lead to over-crowded conditions in Key

West. One of the respondents likened it to "scorched earth tourism", where profit maximization leads to short-term gains and long-term ecological damage. Others were less critical but felt nevertheless that the crowding that cruise ship tourism generates is detrimental to the clientele to which they cater. Several believed that tourism promotion had tilted towards shorter-term visitors, and that this strategy had negatively affected resource-based users both by increasing impacts on the marine environment (via increased and highly dense use) and on their occupations (via increased crowding and user conflicts). Interestingly, charterboat operators and flats guides did not point to other management impacts that may affect crowding and user conflicts (i.e. the FKNMS no-fishing zones); instead, most placed the blame directly on cruise ship tourism.

Almost all respondents agreed that tourism is vital to the region's economy, in both the present and long-term. But, less than half agreed that cruise ship tourism is important to the region's economy, arguing that unlike other tourists, cruise ship passengers only contribute to a limited portion of Key West' economy – namely downtown establishments such as clothing and souvenir stores, nearby eating and drinking establishments, and the trolley tours and affiliated franchises. When asked whether cruise ship head-tax revenues also contribute to the economy, several respondents disagreed, arguing that more visitors require greater infrastructure, services, and enforcement, all of which absorb any additional revenues.

Tourism, according to the sample, has strong impacts on affordable housing. Of the average 1.5 employees that work with each operator (29 in total), less than one (18) of these lives in Key West. While 25% of the respondents could offer no explanation for the lack of affordable housing in the region, most (55%) believed that tourism was responsible for pushing up prices for properties and rentals. Others believed that tourists are responsible but not as tenants or property owners, but rather as the reason for driving the development of more hotels and resorts. Asked for their views on affordable housing over the long-term in Key West, most were pessimistic. Only 10% felt that current solutions would create sufficient affordable housing, but most believed that there is no hope, and that housing will only get more expensive in the long-term. Some of those interviewed argued that there never has been affordable housing in the region, in that Key West has always been expensive relative to the State of Florida, and that increasing property prices are simply a reflection of what is occurring all over the nation.

TABLE 4.2: CHARTERBOAT OPERATOR AND FLATS FISHING GUIDE VIEWS ON QUALITY OF LIFE INDICATORS

Indicator	Unfavorable rating (in percentage, n =20)
1. Cost of living	90%
2. Growth management	80%
3t. Amount of public areas (green spaces)	70%
3t. Congestion	70%
3t. Taxes	70%
6. Raising a family	65%
7t. Quality of tourists	45%
7t. Sustainability	45%
9. Attractions	40%
10. Crime	5%

As shown in the table above, charterboat operators and flats fishing guides had very different opinions on quality of life indicators than did the other consumptive resource-based user group, the commercial fishing industry. While almost all of those who were interviewed complained about the cost of living and congestion, the operators felt that growth management was an issue that the city had not addressed. Several respondents pointed to developments in downtown Key West and Stock Island as evidence that the city government was allowing construction that was affecting the residents' quality of life. These developments, in the view of many operators, would only worsen congestion conditions, further reduce available public (green) space, and increase the cost of living. Many respondents also complained about local taxes, stating that cruise ship tourism has not reduced or maintained taxes (especially property taxes). Also, while most operators did not report much crime in the region, they nevertheless believed that present conditions were not conducive to raising a family in Key West; some felt that children would not have access to many public spaces or family attractions, but most of those who argued against raising a family (30%) identified the prohibitively high costs of having children in Key West as the main reason. Overall, as is clear among the indicators from the table, charterboat operators and flats fishing guides were generally dissatisfied with quality of life conditions in the region. Of the ten indicators, only four did not have majority negative opinions, and of these, respondents only expressed a majority positive view about crime conditions (which most believed were very low).

The sample's assessment of present conditions, compared to pre-cruise ship era conditions, was not very positive either. A majority (90%) believed that the region's natural resources were in a worse condition, 70% had not observed any changes in the city's economy (25% considered the economy to have weakened with the advent of cruise ships), 70% reported a decline in the quality of life, and 60% felt that the quality of tourists had declined. Even those who reported positive opinions often qualified their answers. For example, the respondents who believed that the economy was better now than in the pre-cruise ship era all added that it is better *only* for a select few and not for the entire region.

When asked how their operations would be impacted with an increase or decrease in cruise ship tourism, most (60%) believed that there would be no effects. However, 25% believed that an increase would negatively affect their operations, and 15% felt that a decrease would actually improve their business. Others added that the damage had already been done, in terms of resource damage and clientele loss, and that changes now would not usher in the previous era. Nevertheless, 80% agreed that cruise ship tourism should be limited, mainly by limiting the number of cruise ships that can visit Key West per year. Some operators suggested that this may be accomplished by raising the disembarkation fee, arguing that by doing so, the city and its businesses would still generate similar revenues from a smaller base of more affluent visitors.

Almost all respondents (95%) agreed that cruise ships have an impact on the marine environment. The impacts that most needed attention, in their views, are channelization (75%) that would reduce turbidity, better controls on dumping (60%), and improved enforcement on sewage emanating from cruise ships in the region (50%). While many in the sample had previously complained about visitor loads causing crowding and user conflicts, only 20% identified capacity loading on cruise ships as a solution.

Overall, the charterboat operator and flats fishing guide group harbored mainly negative views on cruise ship tourism and its impacts on the marine environment and the local economy. It could be argued that part of this view is driven by the group's economic detachment from the cruise ship economic sector. After all, as shown earlier in this section, almost 90% of this user group's income is generated from non-cruise ship passengers, compared to less than 1.5% from cruise ship passengers. But, more detailed analysis shows that it is not this discrepancy that drives the group's largely negative views towards cruise ship tourism, as might be otherwise interpreted. If that were the case, then it would be expected that charterboat operators and fishing guides would be against tourism in general, as their clientele is generally not part of the mainstream tourism industry[51]. Instead, there are two perceptions shared among a majority of the respondents that drive the views towards cruise ship tourism: First, most of those interviewed believe that cruise ships have a negative, chronic impact on the region's marine environment, which affects their livelihood; and second, there is a shared belief that tourism is being "mass produced" in Key West to a level where the crowding impacts are driving away the charterboat and flats fishing clients.

4.C. 3 Water-Based Operators

Water-based operators, or those operations that take out tourists on non-consumptive, water excursions, comprised the last third of resource-bases user groups characterized for this study. While combined into a single group as a result of sharing non-consumption as a key characteristic, water operators included diverse businesses, such as dive and snorkel operators, kayak tour operators, eco-tour guides, sunset and other pleasure excursions, and marine mammal charters, among others. Using a process similar to that used to identify charterboat operators and flats fishing guides (see section 4.3.1), the research team developed a list of 70 water operators that it then contacted to determine whether operations qualified to participate in the study and if they would be willing to complete an interview. Almost 30% of those contacted were eliminated from the list, due to eligibility restrictions[52], inability to be reached, or unwillingness to participate. The research team worked with the remainder of the operators and conducted a total of 20 interviews from July 2004 to February 2005.

Like their counterparts in the other two groups, the water operators interviewed had a long history of working in the local environment. The average amount of time that an operation had been in existence was almost 20 years, and 25% of the sample had been working for 30 or more years. Also, as previously stated, water operators consisted of a variety of different operations and within the sample, including 70% that offered snorkeling trips or tours, 45% that took out visitors for mixed tours (water excursions, sunset trips, etc.), 40% that did a combination of kayak and nature tours, 30% that offered dive trips, and 25% that arranged pleasure boat, parasailing, and sailing trips. As is clear from the percentages listed, several operations provided more than one type of water activity.

[51] Many of the captains interviewed as part of this project preferred that their customers be referred to as clients. They argued that many of the persons they take out on fishing trips travel to Key West almost exclusively for that activity and thus should not be classified as general tourists.

[52] The research team found that there was considerably more turnover in the water operator industry than in the other two groups, a fact that has been reported for the region and across the Florida Keys from a previous study (Suman and Shivlani, 1998).

Almost two-thirds (65%) of the sample reported being affiliated with an organization or group. The most popular organization was Reef Relief[53], which represented 41% of all memberships, followed by the Key West Chamber of Commerce (18%) and other Key West organizations (18%). Altogether, the sample was part of 10 organizations, and the average was 1.1 organizations per operator, an average that was considerably higher than those for the other two resource-user groups. This suggests that not only are water operators in Key West more closely tied to the local tourism economy (as shown by local group affiliations) but also that there may exist more linkages between operators than do between members of the other two groups.

Costs provided for average investments ($1.27 million) and operating expenses ($486,000) were higher than those for the other resource-based user groups (and most comparable to those reported by fish houses). This is to be expected, as water operators use larger vessels to carry passengers, invest in considerable gear and ancillary equipment (such as dive gear, kayaks, etc.), and many own or rent property in premium locations. Operating expenses were also high due to docking fees, insurance costs, and employee payroll. Water operators hired a higher number of employees than did the other two groups, and the full-time employees averaged to 10.3 per operation, as well as 1.4 part-time employees, and 1.1 seasonal employees.

Water operators reported making 90% of their income from water-based activities, which attracted an average of 82.7% tourists, 12% locals, and 5.3% cruise ship passengers. While 45% of the sample did not cater to cruise ship passengers, the water operators who did attracted 10% of their total clientele from cruise ship passengers. However, as shown for the other resource-based user groups and in the visitor study, cruise passengers were generally less likely than other tourists to participate in most water-based activities, primarily because of the short amount of time they are off their vessels.

The price structure for trips varied considerably between operations and also based on the type of trip taken (ex. dive trips taken from the same operation were considerably more expensive than snorkel trips), but the average rate reported for a trip was $67.20, considerably cheaper than charterboat or flat fishing trips. Moreover, water operators reported taking many more trips per week, compared to their charter counterparts. On average, water operators took out tourists 20.8 times per week, as many operated more than one trip per day (some reported taking three or more trips per day) and several had more than one vessel. Sites selected ranged from the national wildlife refuges around and near Key West, the southern reefs in the FKNMS no-take zones, the Gulf of Mexico backcountry area, and shipwrecks around Key West, among others. Visitors were taken to these site based primarily on the type of activity that the trip targeted and secondarily on weather conditions. Some operators stated that they avoided crowded conditions, changing sites based on the number of users present. Altogether, 35% of the sample visited the same sites on each trip, and the remainder changed sites based on the aforementioned conditions.

The sample was mainly split in terms of its views on existing resource conditions. A majority (55%) believed that that there have been changes in the condition of local species,

[53] Reef Relief is a Key West-based non-profit organization that seeks to protect coral reefs in the region and elsewhere thorough encouraging scientific research and conservation, building awareness, and promoting sustainable activities. It is supported mainly by memberships. Please refer to the organization's website for more information: www.reefrelief.org.

habitats, and ecosystems, but there was no consensus on whether these changes signify a species or ecosystem shift. Some operators believed that the changes that had occurred had actually improved the local conditions, including the reef health and coral cover. Others argued that there are more algal blooms and that sedimentation has increased, smothering coral and reducing visibility.

As with the views on resource conditions, the water operators were split in their opinions on the impact of cruise ships on the marine environment. Half of the sample believed that cruise ships have an impact on local, marine biodiversity and the benthos; but, 65% did agree that cruise ships negatively affect water quality. Some respondents added that the problem is limited to the harbor and surrounding areas, but others argued that the problem is more pervasive and chronic, and that the resulting turbidity affects both benthic habitat and fish populations. Similarly, a majority of the sample (80%) that cruise ship tourism results in population pressure on Key West, but the operators were again split on the impacts of that pressure; that is, they did not reach consensus on whether it leads to crowding, although 70% did state that the increased visitation does not cause user conflicts.

All respondents agreed that tourism is vital to the region's economy and to their present and long-term interests, but fewer operators believed that cruise ship tourism is of equal importance. In fact, half the sample felt that cruise ship tourism is not as important as the other tourism sectors, and 15% argued that cruise ship tourism is not important at all. As discussed earlier, most water operators rely on cruise ship passengers for only a small percentage of their total customer base, and their opinions here may be reflective of that situation. However, some operators interviewed also added that cruise ship tourism is problematic as it emphasizes "quantity over quality". Also, while the City of Key West does generate revenues from additional visitors, tourism at its increasing rate is not sustainable.

In terms of affordable housing, 70% of those interviewed blamed increasing tourism as the engine behind higher property values and rental rates. A few also blamed short-term rentals for the increased rates, and others argued that affordable housing no longer exists in Key West. While some respondents offered solutions like tax incentives to lower rental rates and a system of busing to bring in service personnel, most operators were pessimistic about affordable housing over the long-term in Key West. Like most members of the other two groups, they believed that due to the island's location and lack of space, property rates will not stabilize to a point where Key West will become "affordable".

TABLE 4.3: WATER-BASED OPERATOR VIEWS ON QUALITY OF LIFE INDICATORS

Indicator	Unfavorable rating (in percentage, n =20)
1. Cost of living	95%
2t. Growth management	70%
2t. Amount of public areas (green spaces)	70%
4. Congestion	60%
5t. Taxes	50%
5. Raising a family	50%
5t. Quality of tourists	50%
8. Sustainability	30%
9. Attractions	40%
10. Crime	20%

As shown in the table above, water operators were most concerned about the cost of living, which most believed is getting out of control. Growth management was another concern, and the group complained mainly that the city was either abetting development or had not done enough to prevent or at least slow down growth. Concurrently, they argued that residents are losing public areas and encountering more congestion. Fewer water operators listed taxes as an issue, and among these, several believed that cruise ship tourism is responsible for maintaining a reasonable tax structure. Also, while not totally satisfied as a group, water operators were generally supportive of other indicators, including the type and number of attractions, the direction in which the city is headed (in terms of sustainability), and crime.

In comparing the pre-cruise ship era with present conditions, most water operators (70%) agreed that the economy has improved, but 40% qualified their answer, adding that the economy has improved for a select few that benefit from cruise ship tourism. Conversely, 65% of the respondents believed that resource conditions had declined, and 55% cited a degraded quality of life. Thus, as did the other resource-based user groups, water operators reported declining natural and socioeconomic indicators in the region.

Most respondents did not believe that they would be affected if cruise ship tourism were to increase or decrease, as only 25% believed that their operations would benefit from reduced tourism and 20% believed the opposite, and vice versa. Almost two thirds (65%) of the sample was in favor of limiting cruise ship tourism in Key West, and the most common approach suggested was limiting the number of cruise ships per year. A fifth of the respondents believed that the city should consider raising the disembarkation fee (to as high as $50 per passenger) to reduce visitor loads, and several operators suggested having cruise-free days.

Finally, 95% of the water operators interviewed believed that cruise ships do affect the marine environment. The best methods by which impacts can be controlled, according to the sample, would be via channelization (75%) to reduce turbidity, monitoring illegal dumping (55%), and enforcing sewage discharge from cruise ships (45%). A smaller percentage, or 30%, believed that visitor loads (or the total cruise ship passengers) should be controlled.

4. D Conclusions

The findings from this study suggest very different outlooks on cruise ship tourism in particular and on tourism in general among resource-based user groups. These outlooks are not mutually exclusive, in that they do not necessarily reflect conflicting views; instead, when taken together, the mosaic of stakeholder opinions often help to reveal the complexity of the environment, the many ways in which user groups interact with the different parts of the same environment, and how the interactions may shape their perceptions.

Although the commercial fishing industry group reported very limited, direct contact with the tourism economy in general and the cruise ship tourism economy in particular, that is not to say that tourism does not affect the commercial fishing industry. As observed by many of the respondents, tourism leads to more disposable income among residents, who often purchase freshly caught seafood. Similarly, tourism exposes visitors to Key West's fishery resources, indirectly increasing exports. Finally, the commercial fishing industry does

supply the local markets, even though it does so in small quantities (in comparison with what it exports out of the region) and in competition with imported fishery products. So, there are economic linkages between commercial fishing and tourism industries.

Added to these economic linkages are the indirect effects of tourism on the commercial fishing industry. As reported by the commercial fishing sample and shown by other sources, the property and rental price explosion in Key West has led to the flight of many natives, or "Conchs", and among them, commercial fishers (Ball, 2005). The overall percentage of commercial fishers in the region has declined incrementally over the past decade (Thomas J. Murray and Associates, Inc., 2003). As property values have reached upwards of $500,000 with the consolidation of commercial fishing docks, many fishers have considered leaving or exited the industry and the region. However, it is clear that these effects have been a result of economic, rather than environmental impacts — precipitated by tourism in general, rather than by cruise tourism. Respondents from the commercial fishing industry sample often pointed out that difference, from indicating that changes in local conditions are most likely a result of land-based pollution to describing the socioeconomic challenges posed by tourism as a competing regional economy.

The charterboat operators and the flats fishing guides were the most polarized critics of the cruise ship industry among the three resource-based user groups characterized as part of the study. Their objection to the advent of cruise ship tourism was driven by both environmental and socioeconomic concerns. Many operators believed that cruise ships have been responsible for destroying nearshore habitats, particularly sea grass meadows, and increasing turbidity. This was of special concern for those operators who fish in shallow water. Unlike their commercial fishing counterparts, charterboat operators and flats fishing guides argued that floral, faunal, and ecosystem shifts had occurred in the areas around Key West; commercial fishers were more likely to point to natural cycles. The difference may be partly explained by the species targeted by the two groups. Over 90% of the commercial fishers interviewed targeted spiny lobster, a species whose populations tend to fluctuate normally (for example, see FWRI, 2004, for trends in commercial landings from 1982-2001). Charterboat operators and flats fishing guides (in particular) target species that are caught in nearshore habitats and which are sensitive to water clarity and quality (ex. bonefish, tarpon, etc.). Thus, what the two groups reported is not mutually exclusive; rather, it is conditional based on the species in question. Moreover, the user conflicts described by charterboat operators and flats fishing guides may not be as important a problem for commercial fishers as most tend to use fixed gear (i.e. traps) that they place away from high vessel traffic area and especially away from cruise ship transit areas.

The other issue that affects the for-hire fishing industry is the proliferation of what many respondents referred to as "Disneyworld" visitors, both in the cruise ship and general tourism sectors. According to the sample, these tourists tend to spend less time and money in the region, and they are perceived to have a negative impact on charterboat and flats fishing clients. In the group's view, these tourists have transformed Key West into "Middle America" and from a quiet town into "Disneyworld".

The water-based operators provided among the most balanced perspectives on cruise ship tourism. Almost all operators acknowledged that cruise ships have impacts on the physical environment and that increased tourism does affect residents' quality of life, but the group also believed that tourism is essential to the region's economic security, both in the present

and into the future. Because the group is closely associated with general tourists (more so than charterboat operators and flats fishing guides who, by their own admission, tend to cater to a specialized clientele), its views are congruent with a pro-tourism development position. However, as many water-based operators pointed out, their views are also tempered in favor of "quality" tourism, and that increasing tourism must have upper limits.

When comparing all three groups, there are a few areas in which there exist common perceptions. When considered as a single sample, a majority of the resource-based users are in agreement over changes that have occurred in the local environment and while only a majority of the charterboat operators and flats fishing guides would argue that the impacts, manifested as increased turbidity and decreased benthic resources, are a result of cruise ships, the other groups (and the sample as a whole) do not agree. Within the commercial fishing sample, the most common view held is that changes are a result of all anthropogenic inputs and especially land-based pollution; the water-based operators tend to be divided on their views concerning the impacts of cruise ships on marine biodiversity and benthic habitats, but a majority of the group agrees that cruise ship activities degrade water quality. Also, many respondents from all three groups believed that while unregulated cruise ship tourism may very well lead to greater environmental problems – especially those related to dumping and sewage – that current regulations prevent many of those violations. Thus, as a regulated industry, most respondents agreed that cruise ships may pose limited environmental impacts.

The three groups were also in agreement over the socioeconomic impacts of cruise ship tourism, and it was within this context that a majority of respondents raised the most serious challenges to the cruise ship sector. First, most respondents agreed that tourism in general (but increased tourism, as evidenced by general tourist and cruise passenger totals) affects affordable housing by making properties and rents prohibitively expensive. As stated by one of the commercial fishing industry interviewees, the greatest tragedy of the property price explosion, coupled with the rise in the cost of living, has been the "Conch migration". Second, tourism (and cruise ship tourism) was perceived to negatively affect most quality of life indicators used in the study. The indicator that all groups agreed was most affected is the cost of living, which according to most, is increasing and may force even more migration. Third and most important, most group members believed that important indicators had declined in the cruise ship tourism era, including resource abundance and their overall quality of life.

Thus, whereas it could be argued that many of the natural resource indicators remain stable and therefore suggest that cruise ship tourism does not affect resource-based users, it must be understood that it may be the human, as opposed to the natural, environment that is largely affected by the tourism industry. Therefore, while it may appear that natural conditions remain unchanged, the associated socioeconomic conditions could be deteriorating; the resource-user groups characterized in this study have demonstrated that unless their socioeconomic concerns are addressed, their quality of life may very well continue its present decline.

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5. AFFORDABLE HOUSING

5.A. Introduction

The availability of affordable housing has become a primary concern in isolated tourism destination communities around the country. This situation is particularly problematic in the city of Key West and throughout the Florida Keys given issues of isolation, land availability and mandated growth management constraints. These physical and institutional constraints coexist with rising demand tied to retirement and relocation activity driven by the city's high quality of life and to substantial growth and employment in Key West's tourism industry, including significant increases in cruise ship traffic over the past decade. This increasing demand and severe housing constraints at all price points has led to briskly increasing housing prices that are quickly outpacing increases in income. Challenges related to providing a sufficient supply of affordable housing are associated with significant limits on new construction, Not in My Backyard (NIMBY) challenges, and environmental concerns.

The gap between income and housing cost has obvious effects on those at the lowest income levels, including those working in the service industry. Even those working in sectors where wages are typically higher, such as teachers and government employees, face challenges in finding quality affordable housing. Employers, who often have a difficult time recruiting and retaining employees due to the relatively high cost of living, also feel the impacts of this situation.

This section elaborates on these issues, identifying both the supply and demand elements that contribute to Key West's affordable housing shortage. A discussion of affordable housing conditions and solutions undertaken by similar island communities is included. Recommendations are proposed to assist Key West in addressing its affordable housing challenges.

5.B Housing Conditions

As a preface to the discussion of housing affordability, it is necessary to discuss housing conditions in the city of Key West. Comparing Key West to Monroe County, Florida, and the U.S. provides context and illustrates the unique characteristics of housing in Key West and the Florida Keys region.

5.B.1 Number of Units

Table 5.1 below shows the number of housing units in each of these jurisdictions, as well as the change between 1990 and 2000. Overall, housing development in Key West and Monroe County did not keep pace with state and national trends between 1990 and 2000. The Rate of Growth Ordinance (ROGO), which allocates housing units on an annual basis for the purposes of maintaining hurricane evacuation, is an obvious explanation for the much slower growth at the local and county levels. A notable finding in Table 5.1 relative to the affordability of housing, is that the number of renter-occupied units in Key West decreased by about 1% between 1990 and 2000, while the number of owner-occupied units increased by nearly 15%. This finding suggests a shift of previously rental housing to owner-occupied status, as well as a concentration of new units in the owner-occupied market. Since

lower income residents often rely on rental housing, these trends clearly point to a decrease in access to affordable housing.

TABLE 5.1: NUMBER OF HOUSING UNITS BY TYPE BY JURISDICTION, 1990-2000

	City of Key West	Monroe County	State of Florida	United States
Total Housing				
1990	10,424	33,583	5,134,919	**91,947,410**
2000	11,017	35,086	6,337,929	**105,500,101**
%Change	**5.69%**	**4.48%**	**23.43%**	**14.74%**
Owner-Occupied				
1990	4,384	20,854	3,452,160	**59,031,378**
2000	5,024	21,900	4,441,711	**69,816,513**
%Change	**14.60%**	**5.02%**	**28.66%**	**18.27%**
Renter-Occupied				
1990	6,040	12,729	1,682,759	**32,916,032**
2000	5,993	13,186	1,896,218	**35,683,588**
% Change	**-0.78%**	**3.59%**	**12.69%**	**8.41%**

Source: U.S. Census

5.B.2 Housing Values and Costs

While the supply of housing in Key West has increased by a relatively small number of units, housing values have increased dramatically. Table 5.2 below shows the increase in median value of owner-occupied units between 1990 and 2000. The table suggests that housing values are much higher in Key West and Monroe County than comparable figures at the state and national levels. However, the table also suggests that there may be unique conditions in Key West, as compared to Monroe County. The increase in value between 1990 and 2000 for Key West was 17 percentage points higher than that seen for Monroe County. Key West's preferred location status, higher level of isolation and continued growth in tourism including substantial growth in cruise ship tourism along with restricted supply has resulted in the concentration of higher housing values in Key West.

TABLE 5.2: MEDIAN VALUE OF OWNER-OCCUPIED HOUSING UNITS BY TYPE BY JURISDICTION, 1990-2000

	1990	1990 (adjusted)[1]	2000	%Change[2]
City of Key West	$143,600	$189,265	$265,800	**40.44%**
Monroe County	$147,800	$194,800	$241,200	**23.82%**
State of Florida	$76,500	$100,827	$105,500	**4.63%**
United States	**$78,500**	**$103,463**	**$119,600**	**15.60%**

[1]Adjustment to 2000 dollars based on Consumer Price Index (source: U.S. Department of Labor)
[2]Change in 1990 median value (adjusted to 2000 dollars) and 2000 median value
Source: U.S. Census

Sales data also provide insights into issues of housing value and cost. Table 5.3 summarizes changes in median sales prices for various types of units in Monroe County and Key West. Overall, Key West has seen larger increases in sales prices than Monroe County, though both increased significantly between 1990 and 2003. The table also suggests that in the past three years, condominium prices are increasing at a much faster rate than prices for single family homes. In Key West between 2000 and 2003, condo prices increased at nearly twenty

times the annualized rate of increase seen between 1990 and 2000. One explanation for this finding is that single family homes are now becoming out of reach for a larger portion of the population, increasing the demand for a limited supply of condominium units. This trend may be having the effect of reducing the affordability of a housing type that has typically been accessible to a larger portion of the population.

TABLE 5.3: MEDIAN SALES PRICES BY TYPE BY JURISDICTION, 1990-2003

	MONROE COUNTY			CITY OF KEY WEST[1]	
	Single Family	**Condominiums**	**Mobile Homes**	**Single Family**	**Condominiums**
1990	$150,000	$125,000	$69,950	$130,000	$110,332
1990 *(Adjusted)*[2]	$211,800	$176,500	$98,769	$183,560	$155,789
2000	$255,000	$145,500	$100,000	$269,950	$167,750
2000 *(Adjusted)*[3]	$273,360	$155,976	$107,200	$289,386	$179,828
2003	$420,000	$300,000	$163,000	$435,000	$340,000
%Change 1990-2000[4]	+29.07%	-11.63%	+8.54%	+57.65%	+15.43%
%Change 2000-2003[5]	+53.64%	+93.34%	+52.05%	+50.32%	+89.07%

[1]There are no mobile homes located in the city of Key West. Mobile homes located on Stock Island are included in the Monroe County data.
[2]Adjustment to 2003 dollars based on Consumer Price Index (source: U.S. Department of Labor)
[3]Adjustment to 2003 dollars based on Consumer Price Index (source: U.S. Department of Labor)
[4]Based on 1990 and 2000 median sales prices adjusted to 2003 dollars
[5]Based on 2000 and 2003 median sales prices adjusted to 2003 dollars
Source: Monroe County Property Appraiser

Additional sales figures for Key West and Monroe County in Table 5.4 provide further evidence of quickly decreasing housing affordability. The table suggests two key trends. First, both Key West and Monroe County are seeing an increasing percentage of sales in the upper price categories and decreasing percentages in lower price categories. For example, in 2003 in Key West there were only four sales of single family homes valued at less than $200,000 (less than 1% of total sales), compared to a total of 108 in 2001-2002 (12% of total sales). In Key West, condominium sales below $200,000 also have decreased from 202 in 2001-2002 to 56 in 2003. At higher price levels, 2003 saw 53 single family sales (12.62% of total sales) valued at over $750,000 compared to a total of just 40 (4.51% of total sales) for 2001 and 2002 combined. The second trend is that Key West has had a slightly higher percentage of sales in the upper categories for single family homes compared to Monroe County, suggesting that affordability is an even greater issue in Key West than in other areas of the Florida Keys.

TABLE 5.4: PERCENTAGE OF SALES BY PRICE BY TYPE IN KEY WEST AND MONROE COUNTY, 2000-2003

	Single Family			Condominium		
	2001-2002 # (%)	2003 # (%)	%Change	2001-2002 # (%)	2003 # (%)	%Change
Key West						
<$50,000	0 (0.00%)	0 (0.00%)	-	0 (0.00%)	0 (0.00%)	**-**
$50,001-$100,000	4 (0.45%)	0 (0.00%)	-0.45%	21 (3.72%)	16 (5.06%)	**+1.34%**
$100,001-$150,000	17 (1.92%)	1 (0.24%)	-1.68%	63 (11.15%)	11 (3.48%)	**-7.67%**
$150,001-$200,000	87 (9.81%)	3 (0.71%)	-9.10%	118 (20.88%)	29 (9.18%)	**-11.7%**
$200,001-$250,000	147 (16.57%)	15 (3.57%)	-13.00%	97 (17.17%)	35 (11.08%)	**-6.09%**
$250,001-$500,000	495 (55.81%)	241 (57.38%)	+1.57%	218 (38.58%)	183 (57.91%)	**+19.33**
$500,001-$750,000	97 (10.94%)	107 (25.48%)	+14.54%	35 (6.19%)	30 (9.49%)	**+3.3%**
$750,001-$1,000,000	22 (2.48%)	30 (7.14%)	+4.66%	10 (1.77%)	5 (1.58%)	**-0.19%**
>$1,000,001	18 (2.03%)	23 (5.48%)	+3.45%	3 (0.53%)	7 (2.22%)	**+1.69%**
Total Sales	887	420		565	316	
Monroe County						
<$50,000	52 (1.12%)	4 (0.17%)	-0.95%	137 (7.91%)	10 (1.12%)	**-6.79%**
$50,001-$100,000	396 (8.55%)	87 (3.65%)	-4.90%	181 (10.45%)	83 (9.32%)	**-1.13%**
$100,001-$150,000	491 (10.60%)	160 (6.71%)	-3.89%	247 (14.26%)	53 (5.95%)	**-8.31%**
$150,001-$200,000	668 (14.42%)	154 (6.45%)	-7.97%	273 (15.76%)	70 (7.86%)	**-7.90%**
$200,001-$250,000	642 (13.86%)	221 (9.26%)	-4.60%	230 (13.28%)	115 (12.91%)	**-0.37%**
$250,001-$500,000	1760 (38.00%)	1076 (45.10%)	+7.10%	517 (29.85%)	409 (45.90%)	**+16.05%**
$500,001-$750,000	402 (8.68%)	415 (17.39%)	+8.71%	83 (4.79%)	94 (10.55%)	**+5.76%**
$750,001-$1,000,000	121 (2.61%)	140 (5.87%)	+3.26%	39 (2.25%)	28 (3.14%)	**+0.89%**
>$1,000,001	100 (2.16%)	129 (5.41%)	+3.25%	25 (1.44%)	29 (3.25%)	**+1.81%**
Total Sales	**4632**	**2386**		**1732**	**891**	

Source: Monroe County Property Appraiser

The affordability of rental housing also is important to consider. Table 5.5 illustrates that even though the percentage increase in median monthly gross rent in Key West was only 12% between 1990 and 2000, rental rates remain higher than other jurisdictions at $899. One possible explanation for the larger percentage increase in rental rates in Monroe County between 1990 and 2000 is that unmet demand from Key West may be spilling over into the county, resulting in a tighter rental market and thus higher costs.

TABLE 5.5: MEDIAN MONTHLY GROSS RENT[1] BY JURISDICTION, 1990-2000

	1990	1990 (adjusted)[2]	2000	%Change[3]
City of Key West	$608	$801	$899	12.19%
Monroe County	$523	$689	$820	18.96%
State of Florida	$402	$530	$641	20.98%
United States	$447	$589	$602	2.18%

[1]U.S. Census Bureau defines gross rent as including utility costs.
[2]Adjustment based on Consumer Price Index (source: U.S. Department of Labor).
[3]Change in 1990 median value (adjusted to 2000 dollars) and 2000 median value.

Source: U.S. Census

5.C Housing Affordability

Insights into affordability are provided by considering income relative to housing costs. Table 5.6 suggests that both owner and renter households in Key West are paying a larger portion of their income toward housing costs than in other jurisdictions – up to 29.5% in the 2000 Census for owners with a mortgage. That compares with state and national figures of 22.8 and 21.7%, respectively. Further, the percentage of income paid toward monthly owner costs and rent has increased more quickly in Key West than in other areas. For owners with a mortgage, housing as a share of income rose by 2.8 percentage points, four times the national average. Key West was the only jurisdiction of the four that had a positive increase in housing to income ratios for renters over the past decade.

TABLE 5.6: MEDIAN MONTHLY OWNER COSTS[1] AND GROSS RENT[2] AS A PERCENTAGE OF HOUSEHOLD INCOME BY JURISDICTION, 1990-2000

	Key West	Monroe County	State of Florida	United States
Median Monthly Owner Costs				
1990 with a Mortgage	26.70%	26.10%	22.30%	**21.00%**
1990 All Owners	19.75%	19.30%	17.25%	**16.95%**
2000 with a Mortgage	29.50%	28.00%	22.80%	**21.70%**
2000 All Owners	22.10%	20.70%	16.70%	**16.10%**
% Change (with a Mortgage)	+2.80%	+1.90%	+0.50%	**+0.70%**
% Change (All Owners)	+2.35%	+1.40%	-0.60%	**-0.85%**
Median Monthly Gross Rent				
1990	30.90%	29.50%	28.00%	**26.40%**
2000	31.40%	29.00%	27.50%	**25.50%**
% Change	**+0.50%**	**-0.50%**	**-0.50%**	**-0.90%**

[1]U.S. Census Bureau defines monthly owner costs as including mortgages, real estate taxes, insurance, utilities, and association fees.
[2]U.S. Census Bureau defines gross rent as including utility costs.
Source: U.S. Census

Table 5.7 elaborates on the issue of the affordability by specifying the percentage of renters and owners paying more than 30% of their income toward housing costs. The U.S. Department of Housing and Urban Development (HUD) specifies that families paying more than 30% of their income for housing are cost burdened, and may have difficulty paying for other household necessities such as food, clothing, transportation, and medical care.

Among owners, Key West and Monroe County have far higher percentages of owner households exceeding the 30% standard and saw greater increases in this category between 1990 and 2000, compared to Florida and the U.S. Another notable finding in the table relative to owner households is that in Key West, the percentage of households with a mortgage exceeding this affordability standard was 48.7% in 2000, a nearly 10 percentage point increase since 1990. Monroe County saw only a 4.5 percentage point increase during this period for households with a mortgage. The 48.7% of owners with mortgages paying more than 30% of income on housing is now nearly twice the national average.

Key West and Monroe County, compared to Florida and the U.S., also have higher percentages of renter households paying 30% or more of their income for housing. While Monroe County had a higher percentage of renters exceeding the 30% standard than Key

West in 1990, Key West had 3 percentage points more cost burdened renters than the county in 2000.

TABLE 5.7: PERCENTAGE OF HOUSEHOLDS PAYING MORE THAN 30 PERCENT OF HOUSEHOLD INCOME ON HOUSING COSTS BY JURISDICTION, 1990-2000

	Key West	Monroe County	State of Florida	United States
Monthly Owner Costs[1]				
1990 with a Mortgage	39.29%	40.94%	27.98%	**24.00%**
1990 All Owners	26.82%	26.76%	18.73%	**18.16%**
2000 with a Mortgage	48.70%	45.40%	30.60%	**26.60%**
2000 All Owners	32.40%	31.20%	20.50%	**18.60%**
% Change (with a Mortgage)	+9.41%	+4.46%	+2.62%	**+2.82%**
% Change (All Owners)	+5.53%	+4.40%	+1.73%	**+0.40%**
Monthly Gross Rent[2]				
1990	41.90%	43.81%	36.63%	**38.63%**
2000	45.23%	42.00%	40.87%	**36.84%**
% Change	**+3.30%**	**-1.81%**	**+4.24%**	**-1.79%**

[1]U.S. Census Bureau defines monthly owner costs as including mortgages, real estate taxes, insurance, utilities, and association fees.
[2]U.S. Census Bureau defines gross rent as including utility costs.
Source: U.S. Census

The preceding two tables clearly illustrate that housing affordability is a significant issue for both Key West and Monroe County. However, the tables also point to a more rapid decline in affordability in Key West in the 1990s, compared to Monroe County. Again, these findings point to tight market conditions created by high demand and supply constraints. Additional information about affordability is determined by considering income relative to housing values and sales prices. Table 5.8 assesses affordability by considering the ratio of median value of owner-occupied units to household income. A ratio of less than 3.00 represents relative affordability. Key West's ratio was two times higher than this standard at 6.18 in 2000, up from 5.11 in 1990. The ratio is more than twice the state and national averages and is increasing at a substantially higher rate than those entities.

TABLE 5.8: RATIO OF MEDIAN VALUE OF OWNER-OCCUPIED UNITS TO MEDIAN HOUSEHOLD INCOME BY JURISDICTION, 1990-2000

	Key West	Monroe	State of	United
1990				
Median Household Income	$28,121	$29,351	$27,483	**$30,056**
Median Value of Owner-Occupied Units	$143,600	$147,800	$76,500	**$78,500**
Ratio of Median Household Income to Median	5.11	5.04	2.78	**2.61**
2000				
Median Household Income	$43,021	$42,283	$38,819	**$41,994**
Median Value of Owner-Occupied Units	$265,800	$241,200	$105,500	**$119,600**
Ratio of Median Household Income to Median	6.18	5.70	2.72	**2.85**
Change in Ratio of Income to Value (1990-2000)	**+1.07**	**+0.67**	**-0.07**	**+0.24**

[1]Ratio less than or equal to 3.00 suggests relative affordability
Source: U.S. Census

An even more detailed look at affordability in Key West and Monroe County is provided in Table 5.9. The data compare household income to prices for housing units sold between

2000 and 2003 and show very quickly decreasing affordability in both Key West and Monroe County. The sales price to income ratios in the table show sales prices significantly outpacing increases in income. For new home sales the median sales price to median income ratio rose from 6.3 in 2000 to 9.5 in 2003 in Key West and from 6.0 to 9.3 in Monroe County. The data also show that condominiums and mobile homes, previously more affordable to those in the low and middle income ranges, are becoming increasingly unaffordable. In Key West and Monroe County, the median condominium sales price more than doubled between 2000 and 2003. Overall, most recent sales are exceeding prices affordable to the average household in the region. For example, the affordable home price in Key West in 2003, based on three times the median household income, is estimated at $137,968. According to the Monroe County Assessor, only one single family home and 27 condominium units sold at below $150,000 in Key West during that year. In Monroe County, 251 single family units and 146 condominium units sold for less than $150,000.[54]

[54] In Key West in 2003, there were a total of 420 single family homes and 316 condominiums sold. In the same year in Monroe County, there were a total of 2,386 single family homes and 891 condominiums sold.

TABLE 5.9: MEDIAN HOUSEHOLD INCOME COMPARED TO HOUSING SALES PRICES FOR KEY WEST AND MONROE COUNTY, 2000-2003

	2000	2001	2002	2003
Key West1				
Median Household Income2	$43,021	$44,226	$44,957	**$45,989**
Estimated Affordable Home Price3	$129,063	$132,677	$134,871	**$137,968**
Median Single Family Sales Price	$269,950	$299,000	$332,500	**$435,000**
Median Condominium Sales Price	$167,750	$220,000	$264,250	**$340,000**
Difference in Affordable Home Price and Median Single Family Sales Price	-$140,887	-$166,323	-$197,629	**-$297,032**
Difference in Affordable Home Price and Median Condominium Sales Price	-$38,687	-$87,323	-$129,379	**-$202,032**
Ratio of Median Single Family Sales Price4 to Median Household Income	6.27	6.76	7.40	**9.46**
Ratio of Median Condominium Sales Price4 to Median Household Income	3.90	4.97	5.88	**7.39**
Monroe County				
Median Household Income	$42,283	$43,467	$44,186	**$45,201**
Estimated Affordable Home Price3	$126,849	$130,401	$132,557	**$135,602**
Median Single Family Sales Price	$255,000	$280,000	$321,750	**$420,000**
Median Condominium Sales Price	$145,500	$179,000	$231,750	**$300,000**
Median Mobile Home Sales Price	$100,000	$114,000	$123,000	**$163,000**
Difference in Affordable Home Price and Median Single Family Sales Price	-$128,151	-$149,599	-$189,193	**-$284,398**
Difference in Affordable Home Price and Median Condominium Sales Price	-$18,651	-$48,599	-$99,193	**-$164,398**
Difference in Affordable Home Price and Median Mobile Home Sales Price	+$26,849	+$16,401	+$9,557	-$27,398
Ratio of Median Single Family Sales Price4 to Median Household Income	6.03	6.44	7.28	**9.29**
Ratio of Median Condominium Sales Price4 to Median Household Income	3.44	4.12	5.24	**6.64**
Ratio of Median Mobile Home Sales Price4 to Median Household Income	**2.37**	**2.62**	**2.78**	**3.61**

[1]There are no mobile homes located in the city of Key West. Mobile homes located on Stock Island are included in the Monroe County data.
[2]Median household income for 2001-2003 estimated based on the Consumer Price Index (source: U.S. Department of Labor)
[3]Based on 300% of median household income
[4]Ratio less than or equal to 3.00 suggests relative affordability

Source: U.S. Census (2000 median income data), Monroe County Appraiser (sales data)

Overall, the data clearly suggest that Key West's affordable housing situation is becoming quite dire, with dramatically rising housing costs and only slowly increasing incomes. The data presented here, coupled with the recognition that there is very limited potential for significant increases in housing supply, suggests the need to look to new alternatives in order to address the problems facing Key West, and the entire Florida Keys region.

5.D Existing Housing Policies

Key West currently has a number of affordable housing policies and programs in place. Local efforts to promote the construction of affordable housing take place within the context of ROGO, as discussed previously, which allocates building permits on an annual basis for Key West and Monroe County. Table 5.10 provides information related to the number of remaining units available under ROGO.

TABLE 5.10: STATUS OF HOUSING UNITS UNDER ROGO, JANUARY 1990 – APRIL 2004

	Built	Obligated/ Pending1	Available to be Built2	Total
Houses & Large Apartments	216	304	94	**614**
Small Apartments3	203	78	418	**699**
Transient Units4	888	0	0	**888**
Vested Projects5	1,604	50	0	**1,654**
Total	**2,911**	**432**	**512**	**3,855**

[1]Under construction, permitted, vested project, or applying for permits
[2]This figure represents the remaining number of new units able to be built. However, it is possible that some existing units may be removed and new units be built elsewhere in the City.
[3]ROGO allows for one bedroom apartments of 600 s.f. or less to be counted as 0.55 equivalent units. If this factor is applied then a total of 418 small apartments could be built.
[4]Rooms in hotels, motels, and guesthouses.
[5]These may be houses, motels, apartments, apartments, or any other type of unit.
Source: Ty Symroski, Planning Director, City of Key West.

ROGO necessarily limits the potential for affordable housing construction, but several other efforts are in place to increase the supply of affordable housing and maintain the existing stock. Local efforts are summarized below:

Construction of Affordable Housing Units under ROGO. Of the 512 units available to be built in Key West, approximately 300 are reserved for affordable housing.55

Requirements for Affordable Multifamily Residential Units. This policy requires that at least 10% of all new multifamily units constructed each year shall be designated as "low income affordable housing" and that an additional 20% be designated as "affordable housing." If approved by the City Commission, developers also can contribute a fee in lieu of construction to the Affordable Housing Trust Fund.

Accessory Unit Infill Ordinance. This ordinance allows for the addition of affordable housing on the second story of commercial buildings and institutions to promote employee housing. Accessory units are allowed as permitted uses in several non-residential districts.

Restrictive Covenants for Affordable Housing. The City of Key West restricts rental and sales prices of affordable housing and establishes income limitations for tenants and ownership. Covenants remain in place for a minimum of 30 years.

Community Land Trust. A recent bond issue provided $2.5 million to fund land purchases in Bahama Village. Land held by the trust can be leased, but cannot be sold, and thus allows for greater price control.

[55] Source: Ty Symroski, Planning Director, City of Key West.

Affordable Housing Trust Fund. The City has established a trust fund for monies earmarked for affordable housing. The trust currently contains approximately $70,000 which can be used to assist residents in need of affordable housing and to promote the development of affordable housing through financing assistance and other incentives.

5.E Affordable Housing Issues Facing Other Island Communities

Key West is clearly unique in terms of its geographically isolated location, as well as its reliance on tourism. However, there are a number of other communities that might be looked to as examples for addressing affordable housing issues. Similar island communities, facing increasing housing costs and shortage of affordable housing, have implemented varying policies, which are highlighted below. In addition, affordable policies enacted by Monroe County are summarized.

- Monroe County, Florida

Monroe County provides additional points for development applications for affordable housing under its ROGO ordinance. In addition, a minimum of 20% of new units allowed under ROGO each year must be affordable housing.

The county recently established a requirement that new affordable and employee housing incur a deed restriction requiring affordable status for at least 50 years.

Affordable housing units are exempt from the payment of impact fees required by the county for new development, such as fees for libraries and police service.

New commercial, multifamily, institutional, and industrial development is required to contribute to the Affordable and Employee Housing Fair Share Impact Fee Trust Fund.

- Cape Cod, Massachusetts

The Cape Cod Commission, the regional planning and land use authority for Barnstable County, has established a Model Inclusionary Housing Ordinance, adopted by communities in Barnstable County. The ordinance requires that 10% of all units in a land subdivision or multi-unit development be designated as affordable housing. Developers can get approval for fees in lieu of construction or for the development of the units on a separate site.

Barnstable County also has adopted an Accessory Unit Amnesty Ordinance, which brings existing unpermitted accessory units into compliance and allows for the conversion of existing units to affordable housing.

Cape Cod also benefits from the Massachusetts State Comprehensive Permit Law which allows developers to seek density bonuses from local planning boards in communities that have less than 10% of their housing stock as affordable housing. The law requires that 25% of units proposed by developers who seeking the bonuses be affordable.

Another state provision that facilitates affordable housing development in the Cape Cod region is the State Community Preservation Act. This law allows communities to approve an up to 3% surcharge on property tax bills to fund affordable housing, open space, and historic preservation.

- Town of Hilton Head Island, South Carolina

The Family Housing Program Ordinance allows for a 100% density bonus (8 units per acre rather than 4 units per acre) for affordable housing. Staff level approval, rather than a public hearing, is required for development under this ordinance, thus decreasing the potential for public opposition.

Hilton Head also has established a Family Housing Overlay District that allows higher densities up to 12 units per acre. Under this provision and the Family Housing Program Ordinance, at least 50% of the units must be designated as affordable and tenants or owners must meet income guidelines.

One additional effort that helps to minimize Hilton Head's affordable housing shortage is the establishment of the Lowcountry Regional Transportation Authority (LRTA) which provides transportation to approximately 600 workers per day from the mainland.

- Outer Banks, North Carolina

Dare County has completed an Affordable Housing Study.

The Outer Banks region benefits from a tax credit program administered by the North Carolina Housing Finance Agency. The program provides tax credits to private sector developers who build low and moderate income housing units. Developers are allowed to re-sell the tax credits, often for more than they were worth originally.

Dare County is considering additional provisions related to affordable housing including density bonuses and fee waivers for affordable housing development. The county also is considering implementing linkage requirements that would make commercial development approvals contingent on the provision of a certain number of housing units.

The county is considering allowing schools to construct housing for teachers on land owned by the Board of Education. Police, fire, and rescue services also have expressed an interest in this type of arrangement.

- Victoria, British Columbia

The Capital Region Housing Corporation, part of the Capital Region District regional government, has completed a Regional Housing Affordability Strategy.

The strategy calls for the establishment of a regional housing fund, supported by increased property taxes, development fees, and federal and provincial assistance. The fund would provide capital for construction, gap financing, and grants for affordable housing development.

The Strategy also calls for the establishment of a Housing Resource Center and Facilitator to implement the Strategy and provide expertise to local governments, stakeholders, and the community.

Local governments in the Capital Region District are in the process of adopting a consistent set of development regulations and procedures. These changes are intended to remedy market failures that are perceived as negatively impacting the supply of new housing.

5.F List of References

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6. THE IMPACT TO THE CHARACTER AND QUALITY OF LIFE IN KEY WEST

6.A Public Participation

One of the primary objectives of this study was to assess the public perception of tourism in general and cruise ship tourism in particular in the city of Key West. Input was solicited from several stakeholder groups including cruise ship and non-cruise ship tourists and resource dependent business establishments. The following section deals specifically with input from the resident population and the larger business community in Key West. Input was derived from:

- two public meetings,
- a survey of residents,
- a survey of business establishments, and
- a survey of employees.

6.A.1 Public Meetings

Two public meetings were held in August 2004 to introduce the project team, to describe the scope of the project and to receive public comment on issues relating to cruise ship tourism. Meetings were scheduled for August 10th at Key West High School and August 11th at the Old City Hall. The second meeting was postponed until August 26th as Hurricane Charley moved in and an evacuation order was announced. Both programs were well attended--with 110 participants in the first meeting and 57 in the second--and contentious indicating the strong sentiments in the community relating to cruise ship activity. In general, public meetings pull in individuals with strong feelings on issues. Those individuals with middle of the road sentiments are more likely to stay home.

6.A.1.1 GENERAL COMMENTS

No transcripts were taken at the meetings, but questionnaires were distributed to participants addressing quality of life issues and the direction that the city should take. Critical issues relating to tourism in general and cruise ship tourism in particular were addressed, each of which are discussed below. In the first meeting, a fair amount of skepticism was expressed about the study, whether the information would be representative, and ultimately how the information would be used. The concerns included: 1) the credibility of the consulting team, 2) the validity of the survey results given sample size, and 3) the inclusion of employees who work but do not live in the city. The first issue may not have been addressed adequately in the introduction of the project team. At the second meeting, a brief discussion of credentials of the consultants seemed to allay concerns in that regard. The next two issues were addressed following the first meeting with discussions between city officials and the consulting team. It was agreed that the sample size for residents would be increased to 4000 households (36% of total households). That figure represented a higher number than necessary to achieve a representative sample, but it was felt that for reasons of public perception the larger sample size was important. In terms of including non-residents in the

sample, the determination was made to develop a separate employee survey to solicit input from those individuals working in the city who may not otherwise be given input.

The three issues of concern relating to the project team and project design raised at the first meeting were addressed at the beginning of the second public meeting. Unfortunately, because of the hurricane, there was a lapse of two weeks in getting information to the public. Still, those concerns seemed to be addressed, and the second meeting as well as the rest of the first meeting focused on the issues and trade-offs associated with cruise ship tourism. The focus of the discussion centered on the importance of cruise tourism to the local economy and to the impacts of cruise ship activity on the quality of life of residents. In tourism destinations where the city itself as opposed to a theme park is the attraction, it is not unusual to have conflicts between those with economic interests tied to tourism and residents that have a less direct tie to tourism but who feel that their quality of life is being affected by encroachment from tourist activity. In Key West, that divide appears to be particularly wide.

Both sides of the debate were represented at the two public meetings. No counts were taken, but it seemed particularly at the first meeting that a larger number of pro-cruise ship sentiments were represented by individuals working for businesses with direct economic interest in cruise ship based tourism. The divergence of opinion on this matter was borne out in the questionnaires that participants were asked to fill out at the meetings. A total of 88 responses were received. The most often cited issues fell under the heading jobs, economy, tourism (22.7%) followed by quality of life issues: lifestyle (19.1%), population growth (10.2%), and natural amenities (8.7%) (Table 6.1). Overall, the first meeting at the high school tended to put greater emphasis on economic issues, while the second meeting in Old Town gave a little more emphasis to quality of life issues.

6.A.1.2 SPECIFIC ISSUES

The brief survey form administered at the public meetings asked six specific questions followed by an open-ended question for general comments.

Why did you move to Key West, or if you were raised in Key West what made you stay? The first question addressed why people came or stayed in Key West (Table 6.2). The most often cited reasons were weather/climate (10%) followed by job opportunity and small town feel (7% apiece). Other frequently indicated responses were "I like it/good quality of life", environmental cleanliness and beauty, atmosphere, diversity of population, charm – vibrant/funky, and family. Collectively, lifestyle/cultural amenities (37%) and natural amenities (23%) seem to be particularly important in attracting and retaining population. Economic issues and friends and family are also important considerations.

TABLE 6.1: PUBLIC MEETING SUMMARY TABLE

CONCERN	Why did you move to Key West?	Positive contributors to Key West's quality of life	What should Key West look like in 20 years?	What do you not want Key West to look like in 20 years?	What are critical tourism issues?	What are critical cruise ship issues?	What should the city do to enhance quality of life?	What should the city do about cruise ships?	General Comments	Total	Percent of 1st Public Meeting	Percent of 2nd Public Meeting	Percentage
Jobs/Economy/Tourism										349	**24.4%**	**20.3%**	**22.7%**
▪ health of tourism industry	3	20	16	4	34	8	11			96	7.0%	4.5%	6.3%
▪ health of job market	36	18	11	9	2	3				79	5.8%	3.7%	5.1%
▪ health of cruise ship industry						27	5	18	19	69	4.4%	4.7%	4.5%
▪ affordability of Key West for working class			11	25	8				3	47	2.9%	4.9%	3.1%
▪ ill will between those who benefit from tourism and those who do not					7	5			10	22	1.5%	1.2%	1.4%
▪ short stays of tourists					3	11		2		16	1.2%	0.6%	1.0%
▪ ill will between part-time and full-time residents					6	2			2	10	0.8%	0.4%	0.7%
▪ affordability of Key West for tourists					5	2		3		10	0.8%	0.4%	0.7%
Lifestyle										294	**17.7%**	**22.0%**	**19.1%**
▪ charm--community character	16	26	17	22	4					85	4.5%	7.7%	5.5%
▪ small town feel	18	28	5	27						78	5.3%	4.5%	5.1%
▪ easy-going atmosphere or present atmosphere in general	24	21	6	3						54	3.4%	3.7%	3.5%
▪ diversity of population--tolerance, open-mindedness	14	22	4	2						42	2.3%	3.7%	2.7%
▪ impact of tourism on residents/residential areas					7	3	6		4	20	1.0%	1.8%	1.3%
▪ crime level	4	6	5							15	1.1%	0.6%	1.0%
Population Growth										157	**11.0%**	**8.3%**	**10.2%**
▪ amount of traffic, availability of parking, alternative transportation	4	8	10	4	11	4	10			51	3.6%	2.6%	3.3%
▪ amount of people			9	16	21					46	3.5%	1.8%	3.0%
▪ amount of cruise ship passengers			3			20	4	14	3	44	2.9%	2.8%	2.9%
▪ density--especially along Duval St.						7	2	5	2	16	1.0%	1.0%	1.0%
Natural Amenities										133	**8.1%**	**9.8%**	**8.7%**
▪ environmental purity	15	21	8	6	7	13	3	4		77	4.7%	5.7%	5.0%
▪ health of ocean, other waters	19	9	7		7	9	3		2	56	3.4%	4.1%	3.6%
City Services										82	**4.8%**	**6.3%**	**5.3%**
▪ cleanliness of streets			19	5	5		5			34	2.0%	2.6%	2.2%
▪ appearance and capacity of infrastructure and public spaces			8	4	8	2	9			31	2.2%	1.6%	2.0%
▪ miscellaneous governmental obligations			8		3		6			17	0.7%	2.0%	1.1%
Commerce										41	**2.7%**	**2.6%**	**2.7%**
▪ chain stores			5	7	4	8				24	1.2%	2.2%	1.6%
▪ bad quality shops/restaurants			8	3		6				17	1.4%	0.4%	1.1%
Other	88	81	84	70	35	37	24	31	30	480	**31.3%**	**30.7%**	**31.3%**
							Grand Total			**1,536**	**100.0%**	**100.0%**	**100.0%**

TABLE 6.2: WHY DID YOU MOVE TO KEY WEST, OR IF YOU WERE RAISED IN KEY WEST WHAT MADE YOU STAY?

	1st Public Meeting	2nd Public Meeting	Total	Percentage
JOBS/ECONOMY/TOURISM	**29**	**10**	**39**	**15%**
▪ job opportunity	12	6	18	7%
• job that relies on tourism	5	2	7	3%
• military job opportunity	6	0	6	2%
▪ job market	4	1	5	2%
▪ tourism--appeal to tourism in general; not because of a job	2	1	3	1%
NATURAL AMENITIES	**43**	**16**	**59**	**23%**
▪ weather--climate	20	5	25	10%
▪ environmental cleanliness or beauty	9	6	15	6%
▪ water	11	2	13	5%
▪ island	3	0	3	1%
▪ water sports	0	3	3	1%
LIFESTYLE/CULTURAL AMENITIES	**61**	**35**	**96**	**37%**
▪ small town feel	10	8	18	7%
▪ general--"I like it"/"good quality of life"	13	3	16	6%
▪ atmosphere in general excluding comments about being easy-going or funky	7	7	14	5%
▪ diversity of population--tolerance, open-mindedness	9	5	14	5%
▪ charm--community character--unique, vibrant, funky, fun	8	5	13	5%
▪ easy-going atmosphere	8	2	10	4%
▪ culture--the arts	6	2	8	3%
▪ man-made charm--architecture, landscaping, history	0	3	3	1%
FRIENDS AND FAMILY	**28**	**8**	**36**	**14%**
▪ family	9	4	13	5%
▪ people--Key Westerners respondent sees from time to time	7	2	9	3%
▪ friends	4	2	6	2%
▪ family history--for Conchs mostly	5	0	5	2%
▪ family values Key Westerners have--social environment	3	0	3	1%
GENERAL	**19**	**9**	**28**	**11%**
▪ commute--enjoyable, short, can get around without using a car	4	1	5	2%
▪ safety--absence of crime	3	1	4	2%
▪ quiet	2	0	2	1%
▪ other	10	7	17	7%
grand total=	**180**	**78**	**258**	**100%**

Identify and rank three characteristics that contribute in a positive way to Key West's quality of life. The responses to this question identify and rank order positive attributes with those items identified weighted according to rank (3 for 1st, 2 for 2nd, etc.). These responses generally reinforce those from the first question. Lifestyle issues (33%) and natural amenities (22%) were rated as the most important characteristics followed by economic issues (16%) and cultural amenities (14%) (Table 6.3). Among lifestyle issues diversity of population and small town feel again were important. Environmental cleanliness/beauty and jobs and tourism were also cited.

What do you want Key West to look like in 20 years? Some of the same issues come out, but the highest single response was "like it is now" (14%) (Table 6.4). "Like it did in the past" had another 3% of responses. Economic issues including tourism, good job market and affordable housing collectively accounted for 17% of responses, while, as a group, eight% of replies indicated such comments as fewer bad quality shops, no chain stores, fewer cruise ships, etc. Again, lifestyle and cultural and natural amenities showed up collectively 25% of the time. City services as a whole were mentioned on 15% of replies with clean streets accounting for over half of those comments followed by well kept properties. Other votes were for less cars/more alternative transportation with a few votes for "paradise."

What do you not want Key West to look like in 20 years? Here the most often cited replies were the collective "not _____" referring to some other place that Key West might begin to replicate (Table 6.5). Miami and Disneyworld were named most often followed by Duval Street, Boca Raton, and St. Thomas. Also listed were a number of other places with several referencing "every other town USA." The most often listed single not reply was "only for rich people." Overcrowded and lost small town feel were together represented 8% of responses. On economic issues, concerns over lack of business opportunity – empty with no business and no tourists outnumbered by a 3 to 2 margin concerns over chain stores and bad quality shops.

What are the critical issues relating to tourism? This question drew a variety of responses divided among economic issues, general pro-tourism comments, crowdedness, and lifestyle as indicated in Table 6.6. The realism that tourism is the primary economic base for the city was weighed against issues of too many people and cars and unsavory characters/crime. Mentioned along with economic issues were issues of affordable housing and rich people driving out locals. Impacts on the environment and infrastructure were also identified.

What are the critical issues relating to cruise ship tourism? Here as might be expected a split exists between – maintain the current level of activity (13%), limit the number of ships/people (12%), and more cruise ships (4%) (Table 6.7). A variety of economic issues are mentioned ranging from concerns over short stays of cruise ship

TABLE 6.3: IDENTIFY AND RANK THREE CHARACTERISTICS THAT MOST CONTRIBUTE IN A POSITIVE WAY TO KEY WEST'S QUALITY OF LIFE.

	1st Public Meeting*	2nd Public Meeting*	Total*	Percentage
JOBS/ECONOMY/TOURISM	**73**	**34**	**107**	**16%**
▪ jobs/economy	39	15	54	8%
▪ tourists/cruise ship passengers	34	19	53	8%
NATURAL AMENITIES	**109**	**39**	**148**	**22%**
▪ environmental cleanliness or beauty	54	12	66	10%
▪ weather	40	12	52	8%
▪ water	15	15	30	4%
CULTURAL AMENITIES	**56**	**40**	**96**	**14%**
▪ culture--the arts	29	7	36	5%
▪ man-made charm--architecture, landscaping, elements of history or historic preservation	15	15	30	4%
▪ sports	8	9	17	2%
▪ fun activities to do--places to eat, nightlife	4	9	13	2%
LIFESTYLE	**144**	**80**	**224**	**33%**
▪ diversity of population--tolerance, open-mindedness	31	26	57	8%
▪ small town feel	29	20	49	7%
▪ easy-going atmosphere	20	9	29	4%
▪ charm--community character--unique, vibrant, fun	12	15	27	4%
▪ atmosphere in general--any reference to atmosphere that is not about being easy-going or funky	19	4	23	3%
▪ sense of community	15	5	20	3%
▪ general--"I like it"	10	1	11	2%
▪ community service	8	0	8	1%
FRIENDS AND FAMILY	**34**	**16**	**50**	**7%**
▪ people--Key Westerners respondent sees from time to time	24	8	32	5%
▪ family values Key Westerners have--social environment	8	4	12	2%
▪ family history--for Conchs mostly	2	4	6	1%
GENERAL	**45**	**12**	**57**	**8%**
▪ commute--enjoyable, short, can get around without using a car	16	1	17	2%
▪ safety--absence of crime	11	2	13	2%
▪ other	18	9	27	4%
grand total=	**461**	**221**	**682**	**100%**

*Weighted scores

TABLE 6.4: WHAT DO YOU WANT KEY WEST TO LOOK LIKE IN 20 YEARS?

	1st Public Meeting	2nd Public Meeting	Total	Percentage
LIKE IT DOES NOW	**23**	**10**	**33**	**14%**
LIKE IT DID IN THE PAST	**3**	**3**	**6**	**3%**
JOBS/ECONOMY/TOURISM	**32**	**12**	**44**	**19%**
▪ tourists	14	2	16	7%
▪ good job market/economy	8	3	11	5%
▪ affordable housing	7	4	11	5%
▪ no more hotels, time shares, condominiums	1	2	3	1%
▪ less cruise ships/no cruise ships	2	1	3	1%
NATURAL AMENITIES	**12**	**3**	**15**	**6%**
▪ clean and green environment	6	2	8	3%
▪ clean ocean, reef--all waters	6	1	7	3%
CULTURAL AMENITIES	**18**	**4**	**22**	**9%**
▪ charm--community character--unique, vibrant, fun	8	2	10	4%
▪ man-made charm--historic sites preserved	6	1	7	3%
▪ culture--the arts	4	1	5	2%
LIFESTYLE	**20**	**4**	**24**	**10%**
▪ not overcrowded	7	2	9	4%
▪ current atmosphere	4	2	6	3%
▪ small town feel	5	0	5	2%
▪ diversity of population--tolerance, open-mindedness	4	0	4	2%
COMMERCE	**11**	**2**	**13**	**6%**
▪ fewer bad quality shops, restaurants	5	1	6	3%
▪ no chain stores	4	1	5	2%
▪ fewer T-shirt shops	2	0	2	1%
CITY SERVICES	**20**	**15**	**35**	**15%**
▪ clean streets	13	6	19	8%
▪ generally renovated and rehabilitated--well-kept properties	6	2	8	3%
▪ better medical facilities	0	3	3	1%
▪ better government	1	2	3	1%
▪ better schools	0	2	2	1%
GENERAL	**27**	**15**	**42**	**18%**
▪ less cars, more alternative transportation	7	3	10	4%
▪ general--"paradise"	3	0	3	1%
▪ other	17	12	29	12%
grand total=	**166**	**68**	**234**	**100%**

TABLE 6.5: WHAT DO YOU NOT WANT IT TO LOOK LIKE IN 20 YEARS?

	1st Public Meeting	2nd Public Meeting	Total	Percentage
NAMES OF OTHER PLACES	**44**	**10**	**54**	**26%**
▪ Miami	8	1	9	4%
▪ Disneyworld	7	0	7	3%
▪ Duval St	3	2	5	2%
▪ Boca Raton	2	2	4	2%
▪ New York	3	0	3	1%
▪ St Thomas	2	1	3	1%
▪ other places	19	4	23	11%
JOBS/ECONOMY/TOURISM	**27**	**11**	**38**	**18%**
▪ only rich people	15	10	25	12%
▪ empty--no business	9	0	9	4%
▪ no tourists	3	1	4	2%
NATURAL AMENITIES	**8**	**2**	**10**	**5%**
▪ environment degraded	4	2	6	3%
▪ overdeveloped	4	0	4	2%
CULTURAL AMENITIES	**11**	**8**	**19**	**9%**
▪ "every other town" in America	7	2	9	4%
▪ misplaced architecture--high-rise buildings, planned communities, etc.	3	4	7	3%
▪ "every other cruise port"	1	2	3	1%
LIFESTYLE	**20**	**4**	**24**	**12%**
▪ overcrowded	11	1	12	6%
▪ lost small town feel	3	1	4	2%
▪ carnival atmosphere	3	0	3	1%
▪ loss of community character--not unique, vibrant, fun	2	1	3	1%
▪ loss of diversity	1	1	2	1%
COMMERCE	**6**	**4**	**10**	**5%**
▪ chain stores	3	4	7	3%
▪ bad quality shops, restaurants	3	0	3	1%
CITY SERVICES	**8**	**1**	**9**	**4%**
▪ dirty	4	1	5	2%
▪ run-down	4	0	4	2%
GENERAL	**32**	**11**	**43**	**21%**
▪ more cars, too many parking lots	2	2	4	2%
▪ wrong answer--question mistaken for #3	7	0	7	3%
▪ other	23	9	32	15%
grand total=	**156**	**51**	**207**	**100%**

TABLE 6.6: WHAT ARE THE CRITICAL ISSUES RELATING TO TOURISM?

	1st Public Meeting	2nd Public Meeting	Total	Percentage
GENERAL PRO-TOURISM COMMENT	**26**	**5**	**31**	**17%**
CROWDEDNESS	**22**	**10**	**32**	**17%**
▪ too many people	15	6	21	11%
▪ cars, traffic, parking, buggies	7	4	11	6%
JOBS/ECONOMY/TOURISM	**24**	**15**	**39**	**21%**
▪ affordable housing, cost of living	4	4	8	4%
▪ rich people driving out locals--people who do not benefit from tourism vs. those who do	4	3	7	4%
▪ part-time residents vs. full-time residents	4	2	6	3%
▪ the need for economic diversification	1	4	5	3%
▪ reasonable prices for tourists	4	1	5	3%
▪ short stays of cruise ship passengers	2	1	3	2%
▪ attracting return visitors	3	0	3	2%
▪ competition between Key West and other tourist destinations	2	0	2	1%
NATURAL AMENITIES	**10**	**4**	**14**	**8%**
▪ impact on environment	5	2	7	4%
▪ impact on ocean, other waters	5	2	7	4%
LIFESTYLE	**24**	**5**	**29**	**16%**
▪ unsavory characters	9	1	10	5%
▪ impact on residential areas, quality of life of residents	6	1	7	4%
▪ crime	4	1	5	3%
▪ loss of community character	2	2	4	2%
▪ noise	3	0	3	2%
CITY SERVICES	**9**	**7**	**16**	**9%**
▪ impact on city maintenance and infrastructure, services	4	4	8	4%
▪ unclean streets, litter	4	1	5	3%
▪ criticism of government	1	2	3	2%
GENERAL	**16**	**8**	**24**	**13%**
▪ chain stores	2	2	4	2%
▪ other	14	6	20	11%
grand total=	**131**	**54**	**185**	**100%**

TABLE 6.7: WHAT ARE THE CRITICAL ISSUES RELATING TO CRUISE SHIP TOURISM?

	1st Public Meeting	2nd Public Meeting	Total	Percentage
MAINTAIN THE CURRENT NUMBER OF CRUISE SHIPS/GENERAL PRO-CRUISE SHIP COMMENT	**13**	**8**	**21**	**13%**
LIMIT THE NUMBER OF CRUISE SHIPS OR PEOPLE	**16**	**4**	**20**	**12%**
MORE CRUISE SHIPS	**5**	**1**	**6**	**4%**
DENSITY	**9**	**2**	**11**	**7%**
▪ too dense downtown	5	2	7	4%
▪ cars, traffic, parking, buggies	4	0	4	2%
JOBS/ECONOMY/TOURISM	**25**	**6**	**31**	**19%**
▪ short stays of cruise ship passengers	9	2	11	7%
▪ rich people driving out locals--people who do not benefit from tourism vs. those who do	5	0	5	3%
▪ attracting the return visitor	2	2	4	2%
▪ government revenue comes from tourists	4	0	4	2%
▪ competition between Key West and other tourist destinations	3	0	3	2%
▪ fear of increased taxes or disembarkation fees for tourists	2	0	2	1%
▪ need to diversify sources of government revenue	0	2	2	1%
NATURAL AMENITIES	**14**	**8**	**22**	**13%**
▪ impact on environment	7	3	10	6%
▪ impact on water quality, bow thrusters, turtle grass beds	6	3	9	5%
▪ disposal of solid waste	1	2	3	2%
LIFESTYLE	**7**	**4**	**11**	**7%**
▪ unsavory characters	5	1	6	4%
▪ impact on quality of life of residents	0	3	3	2%
▪ part-time residents vs. full-time residents	2	0	2	1%
COMMERCE	**9**	**5**	**14**	**8%**
▪ chain stores	4	4	8	5%
▪ bad quality shops, restaurants	5	1	6	4%
GENERAL	**23**	**6**	**29**	**18%**
▪ impact on city maintenance and infrastructure, services	2	0	2	1%
▪ other	21	6	27	16%
grand total=	**121**	**44**	**165**	**100%**

passengers (7%) to the chain stores/bad quality shops response (combined 9%). Issues of natural amenities, density, and lifestyle were also identified.

What can and should the city of Key West do to protect and enhance the quality of life of residents and visitors? Some suggested limiting, maintaining or expanding cruise ship activity in that order (Table 6.8). The most frequent response related to the reliance of the economy on tourism (13%). Collectively, transportation issues including traffic reduction and pedestrian issues were mentioned 14% of the time. City services including street cleaning, infrastructure and code enforcement were identified (12%). Quality of life for residents and natural amenities were deemed important as well (7% apiece). Affordable housing and protecting the middle/working classes as well as addressing noise and the homelessness issue also each represented at least 5% of responses.

TABLE 6.8: WHAT CAN AND SHOULD THE CITY OF KEY WEST DO TO PROTECT AND ENHANCE THE QUALITY OF LIFE FOR RESIDENTS AND VISITORS?

	1st Public Meeting	2nd Public Meeting	Total	Percentage
LIMIT THE NUMBER OF CRUISE SHIPS OR PEOPLE	**3**	**1**	**4**	**5%**
MAINTAIN THE CURRENT NUMBER OF CRUISE SHIPS/GENERAL PRO-CRUISE SHIP COMMENT	**2**	**1**	**3**	**3%**
MORE CRUISE SHIPS	**1**	**1**	**2**	**2%**
JOBS/ECONOMY/TOURISM	**11**	**8**	**19**	**22%**
▪ economy should rely on tourists	7	4	11	13%
▪ provide affordable housing	3	1	4	5%
▪ protect middle and working classes	1	3	4	5%
NATURAL AMENITIES	**2**	**4**	**6**	**7%**
▪ reduce pollution	0	3	3	3%
▪ clean beaches	2	1	3	3%
TRANSPORTATION	**9**	**3**	**12**	**14%**
▪ reduce traffic	4	2	6	7%
▪ increase walking and biking paths	3	1	4	5%
▪ make Duval St. pedestrian only	2	0	4	5%
CITY SERVICES	**12**	**8**	**10**	**12%**
▪ clean streets	0	5	5	6%
▪ improve city maintenance and infrastructure, services	3	2	5	6%
▪ enforce codes	3	1	4	5%
▪ improve Old Town--storm water system, appearance	2	0	2	2%
▪ improve government	2	0	2	2%
▪ add parks	2	0	2	2%
GENERAL	**18**	**12**	**30**	**35%**
▪ improve quality of life for residents and in residential areas	3	3	6	7%
▪ lessen noise	1	3	4	5%
▪ solve homelessness	3	1	4	5%
▪ other	11	5	16	19%
grand total=	**58**	**38**	**86**	**100%**

6.A.2 Resident Survey

Surveys were mailed to 4000 households in the city of Key West. Addresses were drawn randomly from the mailing list of the electric company, Keys Energy. **(For a copy of the Resident Survey see *Appendix 5*).** Individuals were asked to return the survey by November 12th, scheduled to be two weeks from when they received the survey. Because of delays in getting the city's business reply permit operational, a follow-up card was required to apologize for the confusion and to assure recipients that the due date had not passed. In the end, 1150 responses were received, a 29.0% response rate. Statistically, the results reported below fall within a +/- 3% confidence interval at a 95% confidence level.

Of the responses, 79.8% were from full-time residents, while 20.2% were from part-time residents (Table 6.9). On average, full-time residents lived in the city for 17 years. Part-time residents averaged 5.0 months per year residency. Geographically, responses were evenly divided between Old Town and New Town sections of the city – 52% from Old Town and 48% from New Town. A total of 10 residential districts were identified (Table 6.10 and Figure 6.1).

TABLE 6.9: RESIDENCY STATUS

	Number	Percentage
Full Time	911	79.8%
Part Time	230	20.2%

TABLE 6.10: PLACE OF RESIDENCY BY RESIDENTIAL DISTRICT

Residential District	Number	Percentage
1	45	4.2%
2	49	4.5%
3	145	13.4%
4	324	29.9%
5	136	12.6%
6	90	8.3%
7	90	8.3%
8	171	15.8%
9	27	2.5%
10	5	0.5%
Old Town	563	52.0%
New Town	519	48.0%

NOTE: Old Town for the purposes of this study comprises Residential Districts 1-4. New Town includes Residential Districts 5-10.

FIGURE 6.1: RESIDENTIAL DISTRICTS

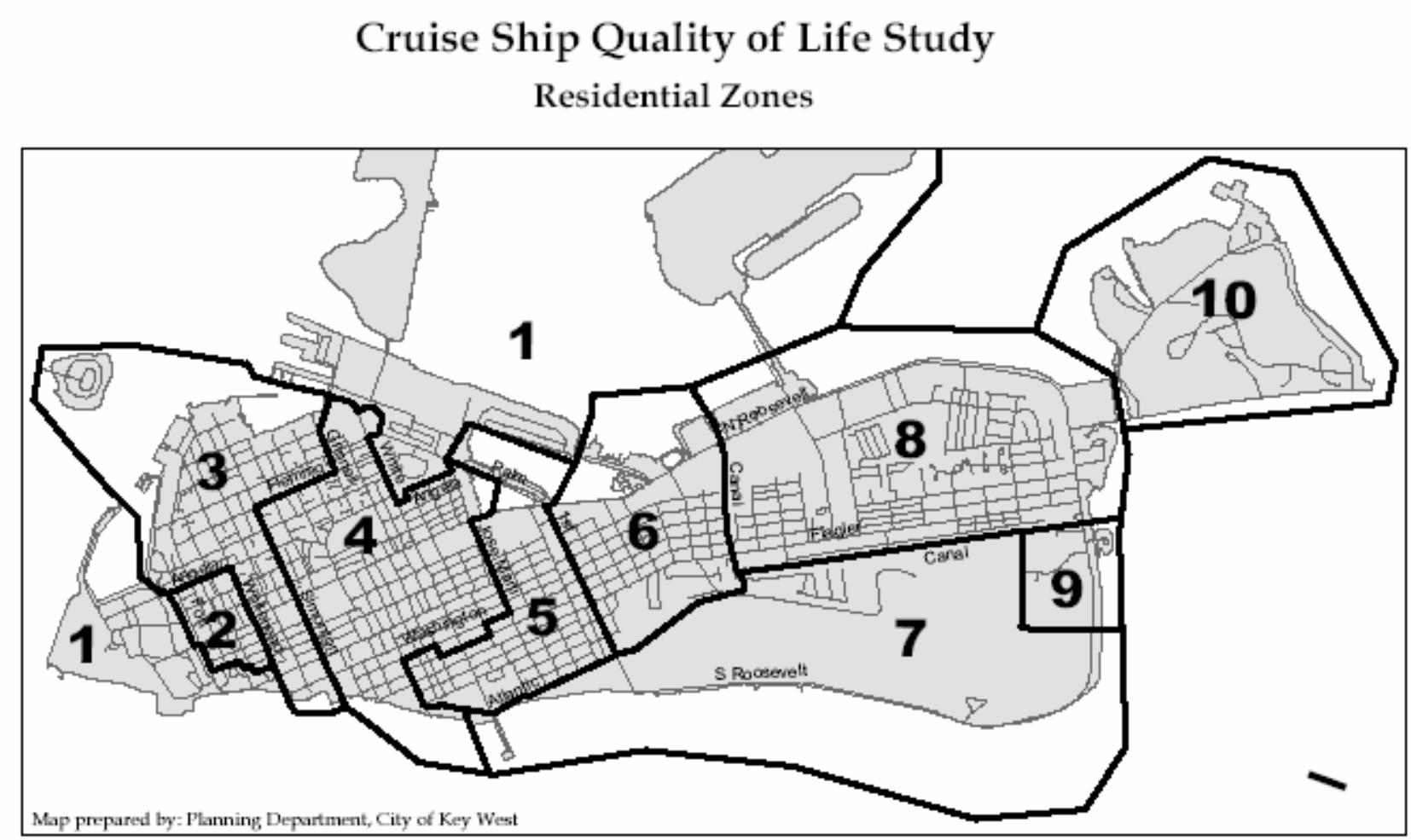
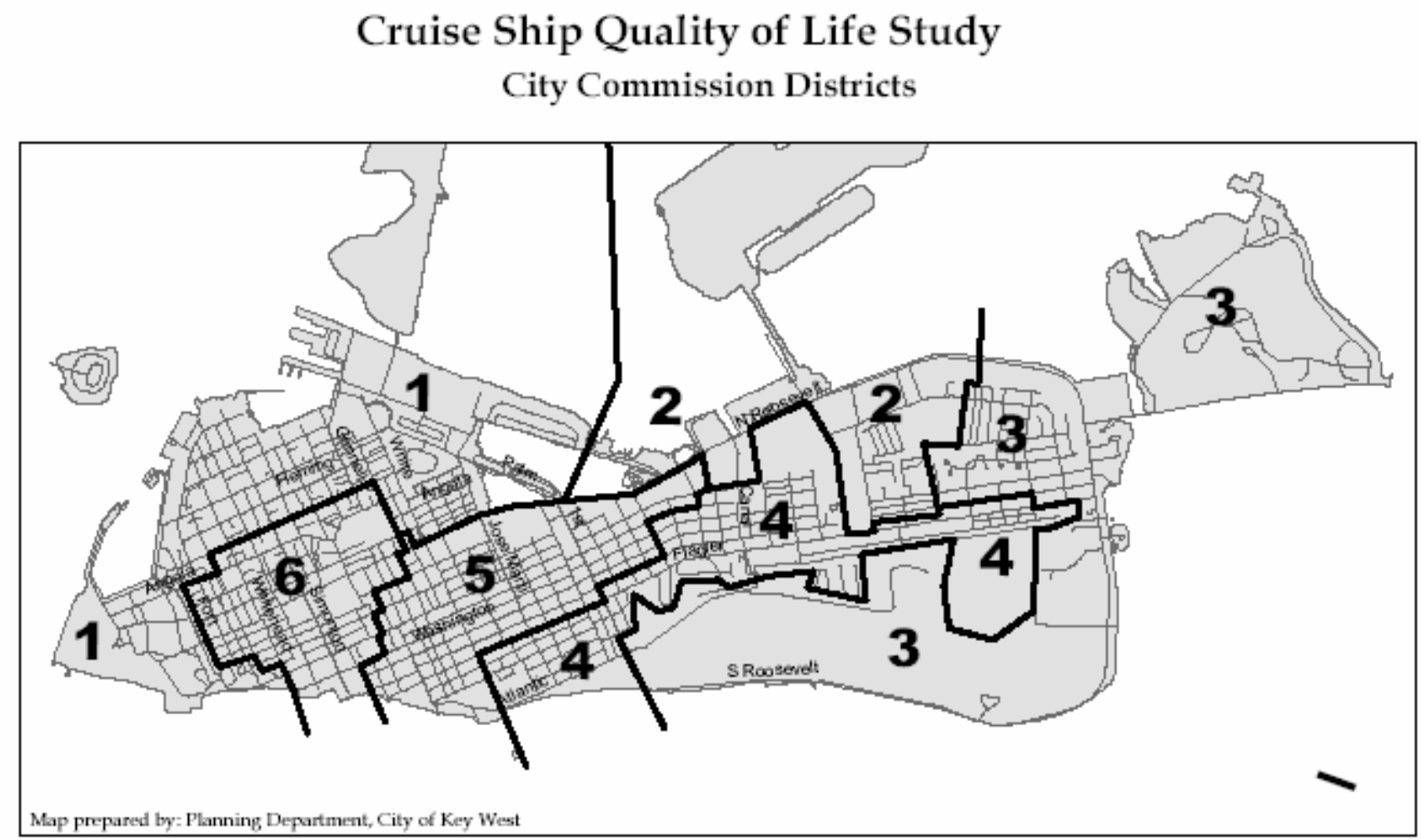


FIGURE 6.2: COMMISSION DISTRICTS



Of those districts, the largest share of responses came from Districts 4 and 3 in Old Town and Districts 8 and 5. District 5 is a transitional zone between Old and New Town. Responses were also entered by Commission District (Figure 6.2). District 1 (geographically the most impacted area) and District 3 (the most removed area from cruise ship docking areas) had the highest numbers of responses (Table 6.11). Only District 2 appears to be substantially under represented.

TABLE 6.11: PLACE OF RESIDENCY BY COMMISSION DISTRICT

Commission District	Number	Percentage
1	249	22.7%
2	56	5.1%
3	144	13.1%
4	243	22.1%
5	193	17.6%
6	198	18.0%
Other	15	1.4%

The most often cited work affiliations were services (31.4%), retail trade (10.4%), and finance and real estate (9.1%). Retired individuals accounted for 22.4% of responses. Of those responding, 11.3% indicated that they rented property to tourists.

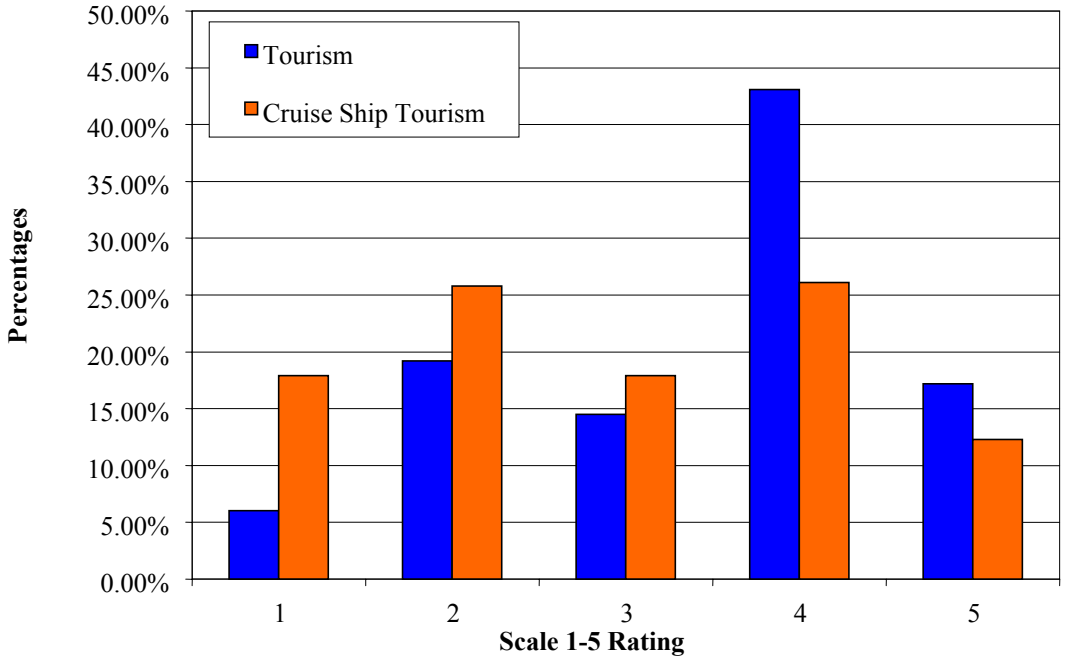
When asked the effect of tourism and cruise ship tourism on quality of life, the responses differed by type as shown in Table 6.12 and Figure 6.3. Using a five point scale (1= strongly negative, 2=generally negative, 3=neutral, 4=generally positive, and 5=strongly positive), 60.3% had a favorable response (4s or 5s) for tourism in general, 25.2% had an unfavorable response (1s and 2s). The mean score of 3.46 places tourism above the mid-point of response options. For cruise ship tourism, the numbers dropped to 38.4% favorable responses and 43.7% unfavorable responses with a mean response of 2.89.

TABLE 6.12: OVERALL EFFECT ON QUALITY OF LIFE OF TOURISM AND CRUISE SHIP TOURISM

SCLAR RATING	1	2	3	4	5	Mean
Tourism						
Number	68	218	165	491	196	3.46
Percentage	6.0%	19.2%	14.5%	43.1%	17.2%	
Cruise Ship Tourism						
Number	203	292	203	296	139	2.89
Percentage	17.9%	25.8%	17.9%	26.1%	12.3%	

(1= strongly negative, 2=generally negative, 3=neutral, 4=generally positive, and 5=strongly positive)

FIGURE 6.3: OVERALL EFFECT ON QUALITY OF LIFE OF TOURISM AND CRUISE SHIP TOURISM



(1= strongly negative, 2=generally negative, 3=neutral, 4=generally positive, and 5=strongly positive)

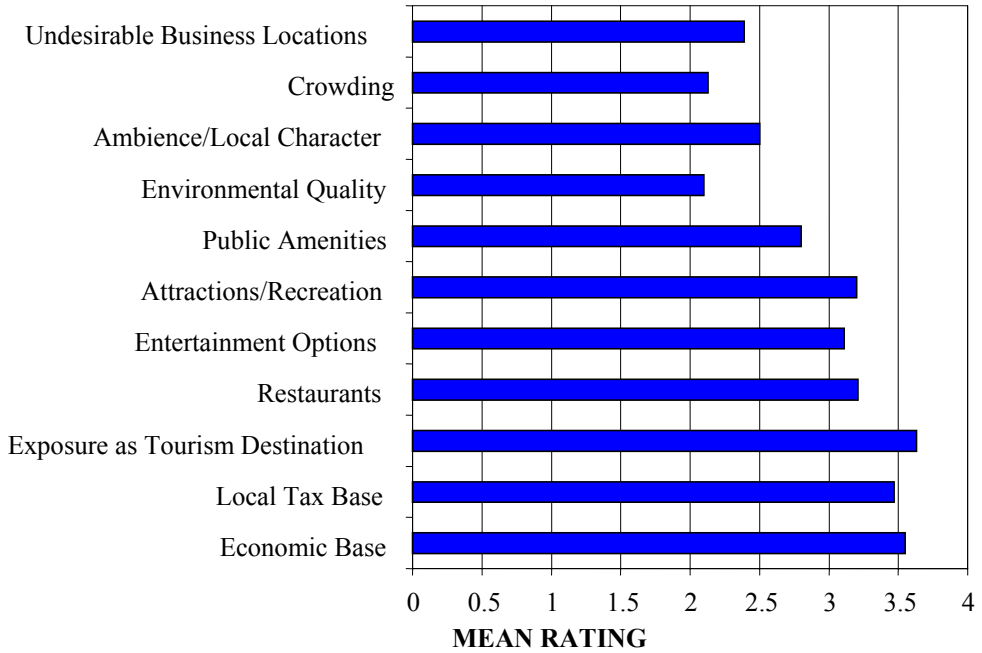
Focusing specifically on cruise ships, individuals were asked to comment on the impact of cruise ship activity on quality of life on a range of issues (Table 6.13, Figure 6.4). In general, the economic and fiscal impact of cruise ships were seen as positive with high favorable responses for exposure as a tourism destination (65.7%), economic base (60.5%), and local tax base (54.8%). Means for those three categories ranged from 3.47 to 3.63. Tourism amenities including restaurants, entertainment options, and attractions were rated slightly lower but were on balance positive with favorable ratings still in the 37.5 to 43.4% range and means ranging from 3.11 to 3.21. Less than desirable ratings were given for public amenities, ambiance/local character, and undesirable business locations. The lowest ratings given were for impacts on environmental quality and crowding with unfavorable ratings of 76.6 and 64.0%, respectively.

TABLE 6.13: IMPACT OF CRUISE SHIP ACTIVITY ON QUALITY OF LIFE BY ISSUE (PERCENTAGE RATING)

SCALE RATING	1	2	3	4	5	Mean
Economic Base	6.9	14.5	18.1	37.7	22.8	3.55
Local Tax Base	7.3	12.0	26.0	36.2	18.6	3.47
Exposure as a Tourism Destination	7.9	12.6	13.8	39.6	26.1	3.63
Restaurants	8.0	18.8	31.0	28.3	13.8	3.21
Entertainment Options	9.4	18.0	35.2	27.5	10.0	3.11
Attractions/Recreation	8.9	16.3	31.3	32.7	10.7	3.20
Public Amenities	15.5	24.8	32.4	19.7	7.8	2.80
Environmental Quality	41.6	25.0	19.0	10.4	4.1	2.10
Ambience/Local Character	31.0	23.0	18.7	19.8	7.5	2.50
Crowding	42.7	21.3	20.6	11.0	4.4	2.13
Undesirable Business Locations	27.1	20.3	42.5	6.6	3.4	2.39

(1= strongly negative, 2=generally negative, 3=neutral, 4=generally positive, and 5=strongly positive)

FIGURE 6.4: IMPACT OF CRUISE SHIP ACTIVITY ON QUALITY OF LIFE BY ISSUE (MEAN RESPONSE)



(1= strongly negative, 2=generally negative, 3=neutral, 4=generally positive, and 5=strongly positive)

In discussion on quality of life issues, reference is often made to the expansion of undesirable business locations in recent years. To determine what an undesirable business location is, residents were asked to fill in the blank. By far the most often mentioned type of establishment was t-shirt shops that are prevalent on Duval and Front Streets, 37.2% of responses (Table 6.14). Adult clubs and adult entertainment shops collectively accounted for 20.5% of responses with tacky, cheap stores and chain stores mentioned on 8.9 and 5.9% of survey returns, respectively. Conch trains, trolleys, scooters and bars, panhandlers, and stores that rip people off were the next most often mentioned business operations.

TABLE 6.14: UNDESIRABLE BUSINESSES IN KEY WEST

Undesirable Business Type	Total	Percentage
T-shirt shops	367	37.2%
Adult entertainment clubs	138	14.0%
Tacky, cheap stores	88	8.9%
Adult entertainment shops	64	6.5%
Chain stores	58	5.9%
Conch trains, trolleys, scooters	36	3.7%
Bars	33	3.3%
Panhandlers	32	3.2%
Stores that rip customers off	30	3.0%
Businesses catering to tourism	23	2.3%
Old Town shops	14	1.4%
Head shops, drug sellers	14	1.4%
Shops catering to cruise ship passengers	7	0.7%
Other	82	8.3%
Total	986	100.0%

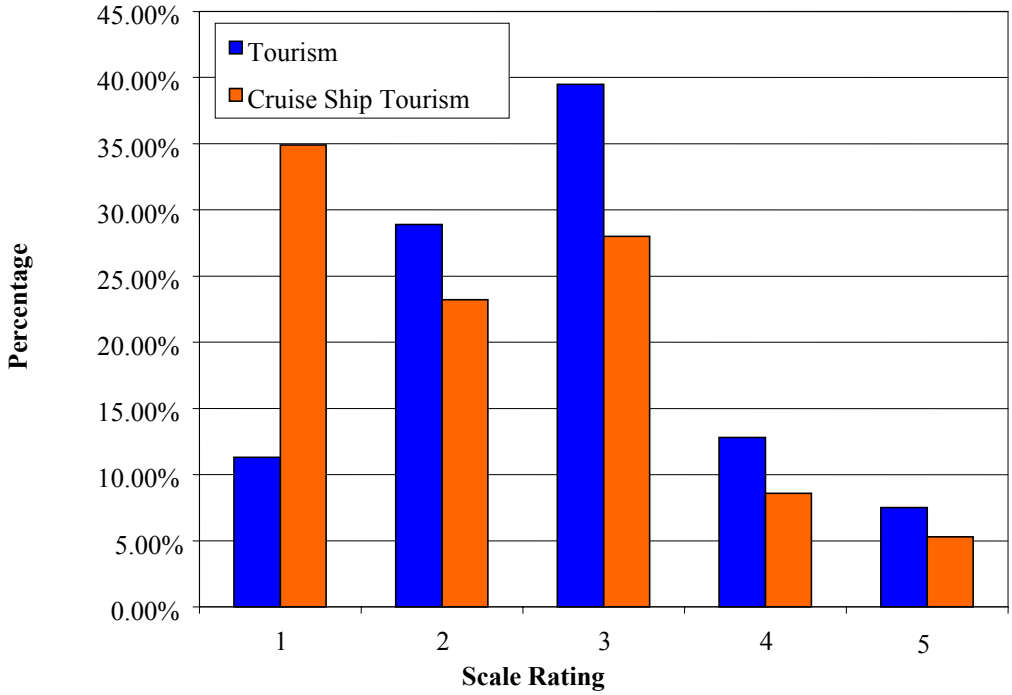
When asked the proper level of tourism activity, 20.3% of respondents indicated that they wanted more tourism, 40.2% indicated that they wanted less tourism, and 39.5% said they wanted the current level (Table 6.15 and Figure 6.5). For cruise ships, the numbers were less favorable. Less cruise ship activity was preferred by 58.1%. 28% wanted the current level to continue, while 13.9% wanted more cruise ship tourism.

TABLE 6.15: PROPER LEVEL OF TOURISM AND CRUISE SHIP TOURISM

SCALE RATING	1	2	3	4	5	Mean
Tourism						
Number	128	328	447	145	85	2.76
Percentage	11.3%	28.9%	39.5%	12.8%	7.5%	
Cruise Ship Tourism						
Number	395	263	317	97	60	2.26
Percentage	34.9%	23.2%	28.0%	8.6%	5.3%	

(1= much less, 2=a little less, 3=at the current level, 4=a little more, and 5=much more)

FIGURE 6.5: PROPER LEVEL OF TOURISM AND CRUISE SHIP TOURISM



(1= much less, 2=a little less, 3=at the current level, 4=a little more, and 5=much more)

When replies were sorted by Commission District, the highest favorable responses for tourism came from Districts 2, 3, 4, the districts furthest removed from tourist activity, as well as District 6, centered on Duval Street (Table 6.16). For cruise ships, all six districts had more than half of responses favoring less activity with the highest calls for less activity from Districts 1, 5, and 6 where because of proximity the spillover impacts are greatest. When broken down into an Old Town/New Town split, similar numbers are found. For tourism, 42.8% of Old Town residents favor less tourism, while 38.8% of New Town residents favor less (Table 6.17). For cruise ships, both sections of the city favored less cruise ship activity, but the numbers were slightly higher for Old Town residents at 62.7% compared to 55.0% for New Town residents.

TABLE 6.16: PROPER LEVEL OF TOURISM AND CRUISE SHIP TOURISM ACTIVITY BY COMMISSION DISTRICT

SCALE RATING	1	2	3	4	5	6
Tourism						
Favorable	16.6%	20.4%	20.9%	23.4%	17.9%	20.4%
Unfavorable	42.9%	48.1%	30.9%	40.0%	45.7%	47.1%
Mean	1.28	1.30	1.40	1.37	1.28	1.30
Cruise Ship Tourism						
Favorable	12.6%	20.4%	17.3%	13.6%	9.2%	13.6%
Unfavorable	63.2%	55.6%	52.5%	57.0%	63.6%	66.5%
Mean	1.17	1.27	1.25	1.19	1.13	1.17

(1= much less, 2=a little less, 3=at the current level, 4=a little more, and 5=much more)

TABLE 6.17: PROPER LEVEL OF TOURISM AND CRUISE SHIP TOURISM ACTIVITY BY RESIDENTIAL AREA

	Old Town		New Town		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Tourism						
Favorable	114	20.1%	109	21.2%	223	20.6%
Unfavorable	242	42.8%	200	38.8%	442	40.9%
Mean	1.32		1.35		1.34	
Cruise Ship Tourism						
Favorable	74	13.1%	79	15.3%	153	14.2%
Unfavorable	355	62.7%	283	55.0%	638	59.0%
Mean	1.17		1.22		1.19	

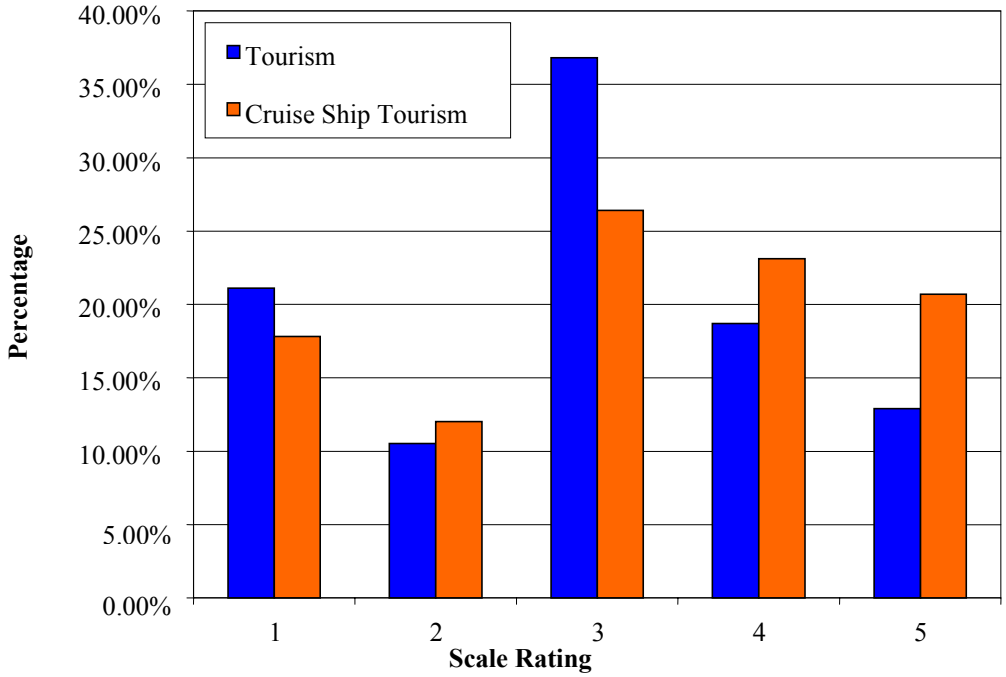
Next, residents were asked the extent to which the city should be involved in regulating tourism and cruise ship tourism activity. For tourism, 46.7% indicted that the city should exercise more regulatory controls, while 16.9% said the city should exercise less control (Table 6.18 and Figure 6.6). For cruise ships, the number went up to 59.0% favoring more control with 12.3% favoring less control.

TABLE 6.18: TO WHAT EXTENT SHOULD CITY BE INVOLVED IN REGULATING TOURISM AND CRUISE SHIP TOURISM

SCALE RATING	1	2	3	4	5	Mean
Tourism						
Number	81	108	408	351	171	3.38
Percentage	7.2%	9.7%	36.5%	31.4%	15.3%	
Cruise Ship Tourism						
Number	50	87	322	335	326	3.71
Percentage	4.5%	7.8%	28.8%	29.9%	29.1%	

(1= none, 2=less than current level, 3=savme as current levels, 4=more than current levels, and 5=much more than current levels)

FIGURE 6.6: TO WHAT EXTENT SHOULD CITY BE INVOLVED IN REGULATING TOURISM AND CRUISE SHIP TOURISM



(1= none, 2=less than current level, 3=savme as current levels, 4=more than current levels, and 5=much more than current levels)

Given anticipated concerns regarding both tourism and cruise ship tourism, residents were asked whether they would be willing to pay higher taxes or fees to offset a loss in tax base from curtailed activity. For tourism as a whole, 74.9% of respondents indicated that they would not be willing to pay higher taxes or fees, while 25.1% said that they would (Table 6.19). For cruise ships, a slightly higher percentage of residents would be willing to make up a revenue shortfall from a cutback in cruise ship activity – 63.6% would not and 36.4% would. Although not rational, those responses are not unusual when the public is asked such questions.

TABLE 6.19: WOULD YOU BE WILLING TO PAY HIGHER TAXES OR FEES TO OFFSET LOST CRUISE SHIP REVENUES

	Yes	No
Tourism		
Number	264	789
Percentage	25.1%	74.9%
Cruise Ship Tourism		
Number	382	668
Percentage	36.4%	63.6%

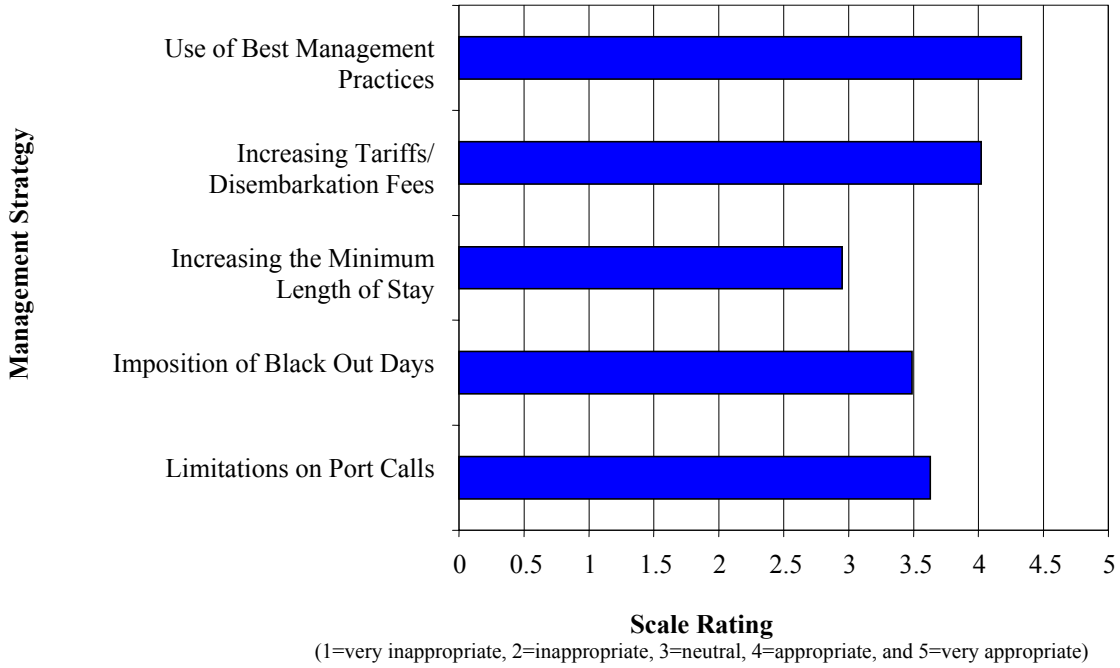
Of the five management strategies identified in the earlier settlement agreement on cruise ship activity, four of the five strategies had strong support (Table 6.20 and Figure 6.7). The strongest support (87.1%) was for tighter controls to assure that best management practices are being performed, followed by a 76.8% favorable rating for increasing tariffs including disembarkation fees. Mean responses for those two strategies were high at 4.33 and 4.02. Limitations on port calls and the imposition of black out days at 64.0 and 58.2% favorable ratings, respectively, also had public support. A mixed response was given to increasing the minimum length of stay of cruise ships.

TABLE 6.20: RATING TO MANAGEMENT STRATEGIES

SCALE RATING*	1	2	3	4	5	Mean
Limitations/ Quotas on the Number of Port Calls/Passengers						
Number	133	111	163	354	370	3.63
Percentage	11.8%	9.8%	14.4%	31.3%	32.7%	
The Imposition of Black Out Days During Periods of Peak Tourism						
Number	139	154	175	319	333	3.49
Percentage	12.4%	13.8%	15.6%	28.5%	29.7%	
Increasing the Minimum Length of Stay of Cruise Ships						
Number	242	201	226	304	163	2.95
Percentage	21.3%	17.7%	19.9%	26.8%	14.3%	
Increasing Tariffs (Including Dockside and Disembarkation Fees)						
Number	84	52	127	370	500	4.02
Percentage	7.4%	4.6%	11.2%	32.7%	44.1%	
Tighter Controls to Assure that Best Management Practices are Performed						
Number	68	15	64	317	672	4.33
Percentage	6.0%	1.3%	5.6%	27.9%	59.2%	

**SCALE RATING: (1=very inappropriate, 2=inappropriate, 3=neutral, 4=appropriate, and 5=very appropriate)*

FIGURE 6.7: RATING TO MANAGEMENT STRATEGIES



In open-ended comments on tourism/cruise ship tourism issues and options to be considered, comments not in favor and in favor of cruise ship activity were evenly divided at 9.6 and 9.5% of comments (Table 6.21). The largest collection of comments were suggestions for managing tourism/cruise ship activity including: 1) raise disembarkation fees, 2) limit chain stores/t-shirt shops, 3) attract higher quality tourist, 4) attract tourists who will stay overnight, and 5) limit the number of ships per day. Other issues frequently mentioned included environmental, transportation, and quality of life issues and city image as well as suggestions for running city government.

TABLE 6.21: ARE THERE ANY OTHER STRATEGIES TO ELIMINATE OR REDUCE IMPACTS ASSOCIATED WITH TOURISM IN GENERAL OR CRUISE SHIPS IN PARTICULAR?

	Total	Percentage
COMMENTS IN FAVOR OF CRUISE SHIPS/TOURISM	**168**	**9.5%**
▪ Key West survives on cruise ships	43	2.4%
▪ cruise ships are good for the economy	34	1.9%
▪ increase cruise ships/tourism	24	1.4%
▪ do not restrict/regulate cruise ships	17	1.0%
▪ we are not adversely impacted by tourism	15	0.8%
▪ cruise ships create return visitors	15	0.8%
▪ those who do not benefit from tourism have "I've got mine" attitude, can leave	13	0.7%
▪ cruise ship passengers do not require many city service due to short stays	7	0.4%
COMMENTS NOT IN FAVOR OF CRUISE SHIPS/TOURISM	**170**	**9.6%**
▪ need less cruise ships	94	5.3%
▪ only a few people benefit from tourism while the rest of the city suffers	48	2.7%
▪ killing what made island desirable in first place--charm and environment	16	0.9%
▪ cruise ships should be eliminated	12	0.7%
SUGGESTIONS FOR MANAGING CRUISE SHIP/TOURISM INDUSTRY	**410**	**23.1%**
▪ raise disembarkation fees/other fees or tariffs	72	4.1%
▪ limit chain stores/t-shirt shops	56	3.2%
▪ attract higher quality tourists	52	2.9%
▪ attract tourists who will stay all day or overnight	44	2.5%
▪ limit number of ships per day	40	2.3%
▪ eliminate or decrease Conch trains	40	2.3%
▪ do not let docked cruise ships obstruct views of ocean/sunset	32	1.8%
▪ redirect some cruise ship passengers off of Duval St.	18	1.0%
▪ do not let RVs camp in certain areas	15	0.8%
▪ provide public restrooms, benches for cruise ship passengers	11	0.6%
▪ cruise ships should not stay overnight	10	0.6%
▪ get rid of Fantasy Fest or over events	9	0.5%
▪ less money to TDC, advertising	8	0.5%
▪ restrict number of business licenses	3	0.2%
ENVIRONMENTAL COMMENTS	**141**	**7.9%**
▪ preserve environment, ocean	80	4.5%
▪ place tighter environmental regulations on cruise ships	55	3.1%
▪ market ecotourism	6	0.3%
HOUSING SUGGESTIONS	**44**	**2.5%**
▪ do not allow conversions of hotel rooms into condominiums	15	0.8%
▪ stop illegal transient rentals	14	0.8%
▪ provide affordable housing for low and middle income workers	11	0.6%
▪ allow conversions of hotel rooms into condominiums	4	0.2%

TABLE 6.21: CONTINUED

	Total	Percentage
TRANSPORTATION SUGGESTIONS	**164**	**9.2%**
▪ lessen car traffic	38	2.1%
▪ improve parking--cost, availability, especially for residents	39	2.2%
▪ make Duval St. pedestrian only	22	1.2%
▪ enforce traffic laws	20	1.1%
▪ have tourists ferried or driven downtown	18	1.0%
▪ improve public transportation	14	0.8%
▪ encourage walking and biking	13	0.7%
QUALITY OF LIFE IMPROVEMENTS	**224**	**12.6%**
▪ decrease noise/enforce noise ordinances, especially with motorcycles	52	2.9%
▪ repair/clean sidewalks, streets, maintain infrastructure	48	2.7%
▪ lower cost of living	30	1.7%
▪ tighten controls on homeless	26	1.5%
▪ t-shirt shops guilty of criminal activity	18	1.0%
▪ more places for kids and adolescents to play	16	0.9%
▪ too populated/overbuilt	13	0.7%
▪ more police presence	13	0.7%
▪ improve schools	5	0.3%
▪ support street performers	3	0.2%
IMAGE	**117**	**6.6%**
▪ maintain charm--community character	58	3.3%
▪ complaints about drunkenness or nudity	18	1.0%
▪ teach tourists to treat island respectfully	14	0.8%
▪ clean up Key West's image--stress family values	13	0.7%
▪ market party atmosphere--not family atmosphere	5	0.3%
▪ do not allow open containers	5	0.3%
▪ more gay tourism	2	0.1%
▪ less gay tourism	2	0.1%
SUGGESTIONS FOR RUNNING CITY GOVERNMENT	**154**	**8.7%**
▪ do not raise taxes	37	2.1%
▪ disallow monopolies--especially in transportation; eliminate or decrease Conch trains	22	1.2%
▪ commissioners or city officials corrupt or incompetent	21	1.2%
▪ reduce city expenditures	19	1.1%
▪ specific fiscal policy suggestions	17	1.0%
▪ enforce ordinances of all types	16	0.9%
▪ reduce city government/regulation	11	0.6%
▪ city should communicate with stakeholders	11	0.6%
COMMENTS REGARDING SURVEY	**60**	**3.4%**
▪ thank you for hearing our opinions	18	1.0%
▪ complaints about survey's due date	17	1.0%
▪ improve wording in questionnaire	16	0.9%
▪ waste of time residents feel powerless against government and special interests	9	0.5%
OTHER	**122**	**6.9%**
grand total =	**1774**	**100.0%**

6.A.3 Business Establishments Survey

Business establishments were surveyed as well to gather economic data and a business perspective on tourism and cruise ship tourism. **(For a copy of the Business Suvery see *Appendix 6*).** A stratified sample was drawn from the city business license list containing over 7000 entries. Using business license classification codes the list was reduced to include business establishments from 29 of the individual classification codes having direct contact with tourists (Table 6.22). Of the 2498 establishments meeting that criterion, the sample size was reduced eventually to 700 units after taking out duplicate listings. Within each grouping, a random selection process was used dividing the number of entries by the sample size for that group.

Admittedly, this approach is not representative of the entire business community, but it most efficiently gathers pertinent economic information and does represent a cross section of businesses with direct ties to tourism. Within each group, relative weights were applied based on sales records by industry to help determine the number of establishments to be surveyed in each group.

Of the 700 surveys mailed to business establishments, 219 were returned, a 31% response rate. Of those returns, industry classifications were listed by the respondent. Some blurring between wholesale and retail trade activity seems likely. Restaurants/eating and drinking establishments account for 17.2% of the total. Lodging/accommodations are represented by 14.3% of responses and other trade activities (wholesale and retail) by 32.9% of responses (Table 6.23). On average, the businesses responding have been in business for 15 years. Surveys were returned by owners 74.5% of the time and by managers 24.1% of the time. Employees returned the remaining 1.4% of surveys.

TABLE 6.22: BUSINESS SURVEY SELECTION PROCESS

	Category	Total	Sample 3 (final)	Percentage of Total
01A	**BAR WITH ENTERTAINMENT**	**33**	**28**	**3.9%**
01B	**ENTERTAINMENT ESTABLISHMENT**	**15**	**14**	**2.0%**
01C	**SIGHTSEEING VEHICLES**	**3**	**3**	**0.4%**
01D	**6 PACK CHARTER**	**147**	**34**	**4.8%**
01E	**VESSEL OVER 6 PASSENGERS**	**39**	**20**	**2.8%**
	RESTAURANTS/FOOD SALES TOTAL	**317**	**152**	**21.3%**
04A	take out food	86	34	4.8%
04B	restaurant seating 1-15	28	15	2.1%
04C	restaurant seating 16-40	46	25	3.5%
04D	restaurant seating 41-60	30	17	2.4%
04E	restaurant seating 61-120	40	22	3.1%
04F	restaurant seating 121 +	63	29	4.1%
04G	misc. restaurants	24	10	1.4%
05	**GAS STATION**	**10**	**6**	**0.8%**
	ACCOMMODATION UNITS TOTAL	**502**	**118**	**16.5%**
10C	rental, transient	336	32	4.5%
10D	motel/ timeshare unit	53	49	6.9%
10E	guesthouse unit	113	37	5.2%
10F	**CAMPGROUND SPACE**	**6**	**3**	**0.4%**
10G	**COMMERCIAL PARKING LOT**	**25**	**8**	**1.1%**
10J	**MOTOR DRIVEN RENTAL**	**50**	**19**	**2.7%**
10K	**NONMOTOR DRIVEN RENTAL**	**42**	**15**	**2.1%**
	RETAIL SALES TOTAL	**788**	**240**	**33.6%**
11A	retail, 0-500 s.f.	350	79	11.1%
11B	retail, 501-2,000 s.f.	336	86	12.0%
11C	retail, 2,001-5,000 s.f.	56	38	5.3%
11D	retail, 5,001-10,000 s.f.	23	16	2.2%
11E	retail, 10,001-25,000 s.f.	14	12	1.7%
11F	retail, 25,000 + s.f.	9	9	1.3%
12A	**PERSONAL SERVICES**	**126**	**19**	**2.7%**
12B	**PROFESSIONAL SERVICES**	**376**	**25**	**3.5%**
13B	**VEHICLE TRANSPORTATION**	**19**	**10**	**1.4%**
	ALL CATEGORIES TOTAL	**2498**	**714**	**100.0%**

TABLE 6.23: TYPE OF INDUSTRY

Industry	Frequency	Percentage
Agriculture, Forestry, Fishing	6	2.9%
Restaurants/Eating Establishments	27	12.9%
Drinking Establishments.	9	4.3%
Clothing and Apparel Stores	14	6.7%
Other Retail Trade	14	6.7%
Wholesale Trade	41	19.5%
Transportation Sales & Rentals	12	5.7%
Finance, Insurance, Real Estate	7	3.3%
Professional and Business Services	10	4.8%
Arts, Entertainment, and Recreation	23	11.0%
Lodging/Accommodation	30	14.3%
Other Services	11	5.2%
Other	6	2.9%
Total	210	100.0%

Collectively, the businesses responding employ 4671 workers. That represents 33.9% of the workforce in the city of Key West. Of those workers 80.6% are full-time employees, and 19.4% are part-time employees (Table 6.24).

TABLE 6.24 NUMBER OF EMPLOYEES – FULL-TIME AND PART-TIME

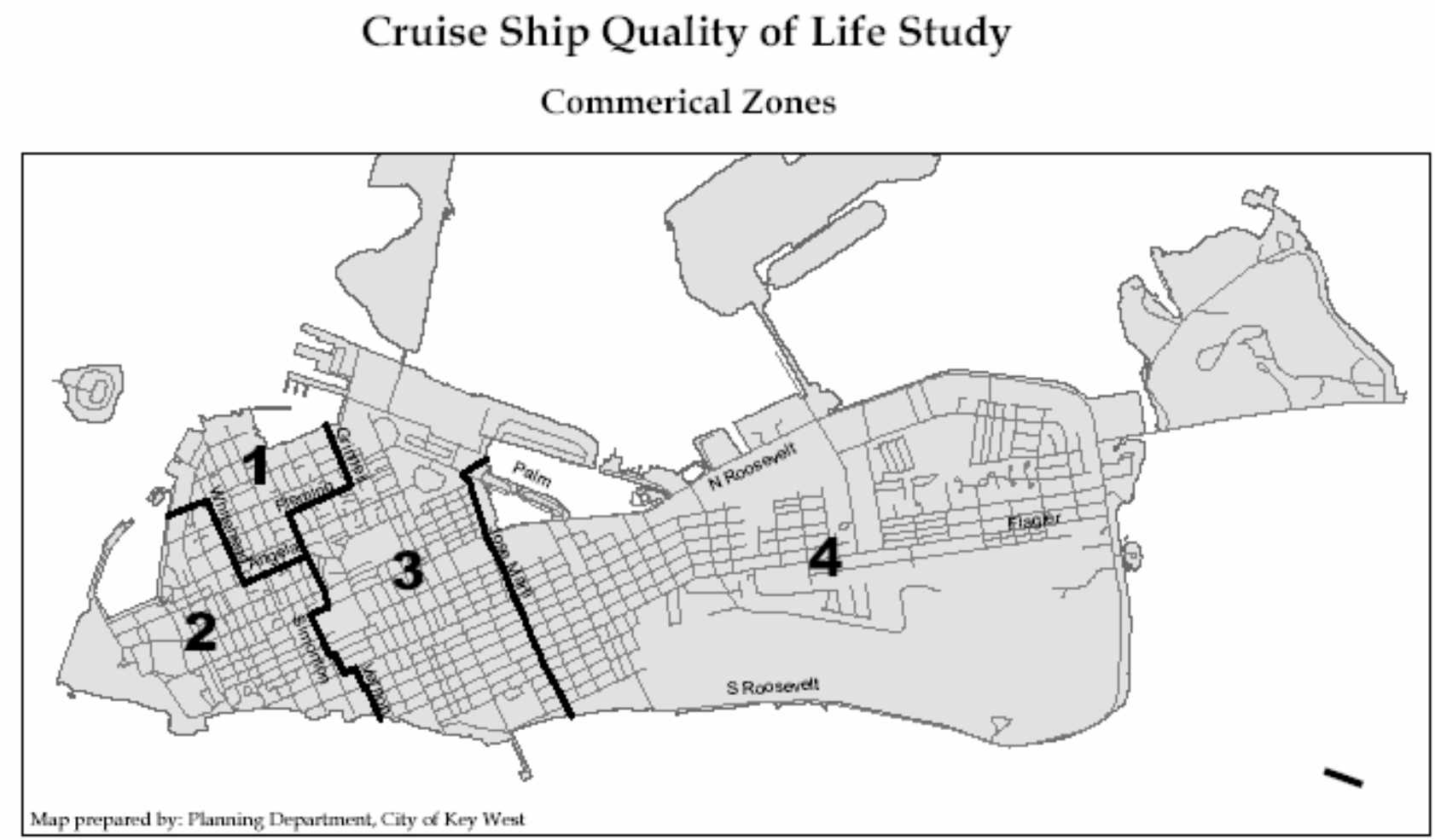
	Frequency	Percentage
Full-time	3765	80.6%
Part-time	906	19.4%
Total	4671	100.0%

The city was divided into four business districts to track responses by geographic area. Among responses, 36.3% of responses were from District 1 that includes the prime tourist areas along upper Duval Street (Table 6.25 and Figure 6.8). District 2, below Angela and west of Whitehead had 30.7% of responses. District 4, east of Jose Marti had 20.3% of responses.

TABLE 6.25: PLACE OF BUSINESS BY COMMERCIAL DISTRICT

Commercial District	Frequency	Percentage
1	77	36.3%
2	65	30.7%
3	27	12.7%
4	43	20.3%

FIGURE 6.8: COMMERICAL ZONES



Of the respondents, nearly half, 44.3%, indicated that they lived in Old Town Key West (Table 6.26). The remainder of the respondents were divided between New Town (36.2%) and areas outside the city (19.5%).

TABLE 6.26: PLACE OF RESIDENCY OF BUSINESS OPERATORS

Place	Frequency	Percentage
Old Town	93	44.3%
New Town	76	36.2%
Outside the City	41	19.5%

Among workers, the respondents indicated that 81.0% of employees lived inside the city (Table 6.27). This number seems high given complaints about the lack of affordable housing in the city. The employee survey in the next section may offer a better basis for this information.

TABLE 6.27: SHARE OF WORKERS LIVING IN KEY WEST

Place	Percentage
In the City	81.0%
Outside the City	19.0%

Not all respondents provided sales information as there is sensitivity to revealing that information. Of responses received, annual sales totaled $206.6 million (Table 6.28). That accounts for 14.7% of sales in the city of Key West (Florida Department of Revenue). Based on survey responses, an estimated 72.1% of sales from these establishments are to tourists. Figures were based on weighted averages within individual industrial sectors and, admittedly, do not fully reflect the larger economic community. Of the responses, high tourism dependence is shown for clothing and apparel stores, accommodations, and arts and entertainment. Drinking establishments and restaurants attributed roughly two-thirds of their sales to tourists. Of tourist expenditures, the largest share, 79.3%, were provided by overnight visitors (Table 6.29 and Figure 6.9). Cruise ship customers account for 12.1% of expenditures, while day trippers account for the last 8.6% of sales.

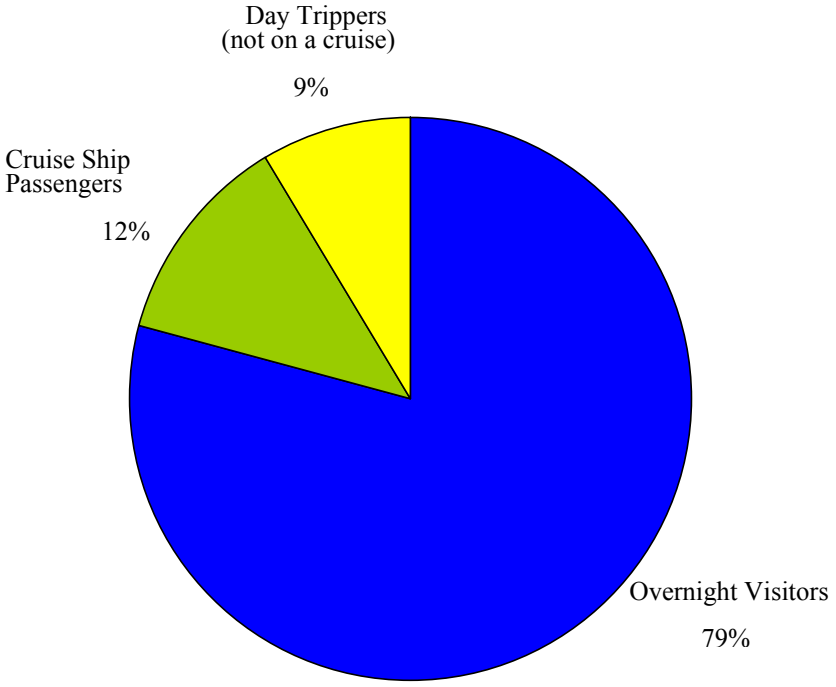
TABLE 6.28: SHARE OF ANNUAL SALES FROM TOURISTS

INDUSTRY	Total Sales	Sales to Tourists	Percentage to Tourist
Agriculture, Forestry, Fishing	1,100,000	500,000	45.5%
Restaurants/Eating Establishments	27,700,000	17,675,000	63.8%
Drinking Establishments.	12,145,000	8,388,250	69.1%
Clothing and Apparel Stores	1,590,500	1,491,450	93.8%
Other Retail Trade	591,000	394,550	66.8%
Wholesale Trade	31,280,000	10,926,000	34.9%
Transportation Sales & Rentals	3,670,000	2,687,000	73.2%
Finance, Insurance, Real Estate	7,200,000	-	0.0%
Professional and Business Services	3,435,000	1,321,250	38.5%
Arts, Entertainment, and Recreation	18,920,000	16,446,000	86.9%
Lodging/Accommodation	85,218,000	78,003,600	91.5%
Other Services	3,520,000	1,663,000	47.2%
Other	10,250,700	9,440,420	92.1%
TOTAL	206,620,200	148,936,520	72.1%

TABLE 6.29: SHARE OF ANNUAL SALES FROM TOURISM BY TYPE OF TOURIST

	Relative Share
Overnight Visitors	79.3%
Cruise Ship Passengers	12.1%
Day Trippers (Not on a cruise)	8.6%

FIGURE 6.9: SHARE OF ANNUAL SALES FROM TOURISM BY TYPE OF TOURIST



These business establishments indicated that slightly over half of their inputs, 51.2%, were purchased from outside of Monroe County (Table 6.30). The remainder of their inputs were purchased from vendors within the city of Key West (31.4%) and elsewhere in Monroe County (17.4%).

TABLE 6.30: SHARE OF INPUTS

	Relative Share
In the city of Key West	31.4%
Elsewhere in Monroe County	17.4%
Outside of Monroe County	51.2%

When asked the effect of tourism and cruise ship tourism on their business operations, 78.4% of respondents said that tourism had a significantly positive influence on their operations (Table 6.31). Another 12.5% indicated that tourism had a moderately positive impact on their operations. With cruise ship tourism, the influence was not as strong with 49.2% of replies indicating a positive impact and 21.7% indicating a negative effect.

TABLE 6.31: EFFECT OF TOURISM/CRUISE SHIP TOURISM ON BUSINESS OPERATIONS

Scale Rating	1	2	3	4	5	Mean
Tourism						
Frequency	3	1	15	26	163	4.66
Percentage	1.4%	0.5%	7.2%	12.5%	78.4%	
Cruise Ship Tourism						
Frequency	28	17	60	27	75	3.50
Percentage	13.5%	8.2%	29.0%	13.0%	36.2%	

(1=significantly negative, 2=moderately negative, 3=neutral, 4=moderately positive, and 5=significantly positive)

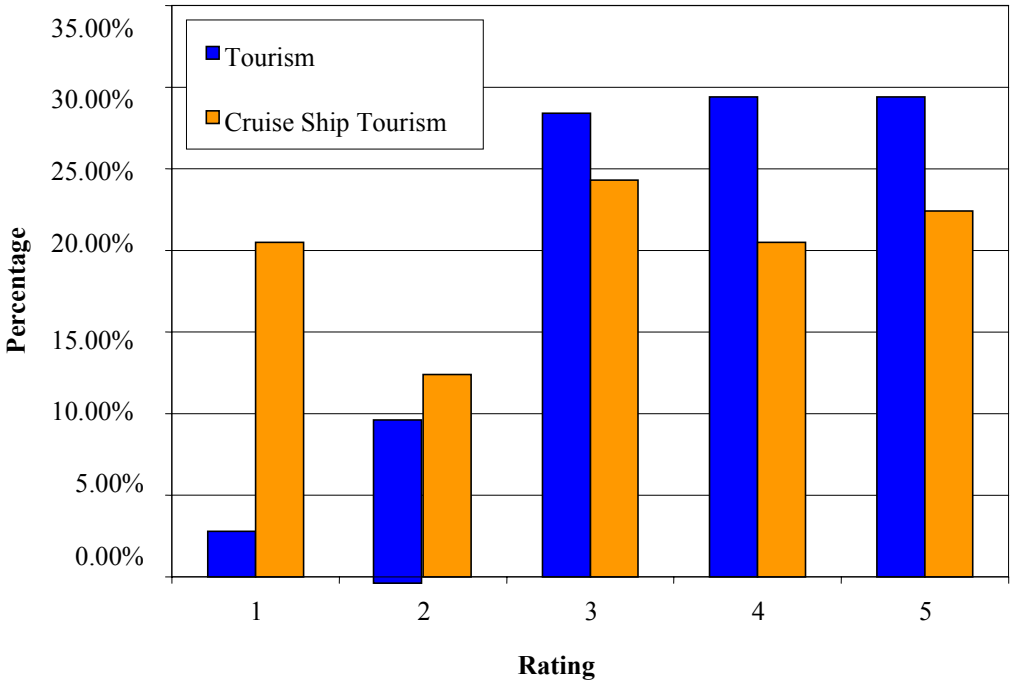
Business establishments were then asked a series of questions similar to those asked of residents. On the proper level of tourism activity, 58.8% of those responding indicated that they would prefer more tourism activity (Table 6.32 and Figure 6.10). With cruise ship tourism, 42.9% suggested that they would rather see more activity compared to 32.9% that would prefer to see less. Overall, mean scores of 3.73 and 3.12 were registered for tourism and cruise ship tourism, respectively. Those scores compared to mean scores of 2.76 and 2.26 from residents.

TABLE 6.32: PROPER LEVEL OF TOURISM/CRUISE SHIP ACTIVITY

Scale Rating	1	2	3	4	5	Mean
Tourism						
Frequency	6	21	60	62	62	3.73
Percentage	2.8%	10.0%	28.4%	29.4%	29.4%	
Cruise Ship Tourism						
Frequency	43	26	51	43	47	3.12
Percentage	20.5%	12.4%	24.3%	20.5%	22.4%	

(1=much less, 2=a little less, 3=at the current level, 4=a little more, and 5=much more)

FIGURE 6.10: PROPER LEVEL OF TOURISM/CRUISE SHIP ACTIVITY



(1=much less, 2=a little less, 3=at the current level, 4=a little more, and 5=much more)

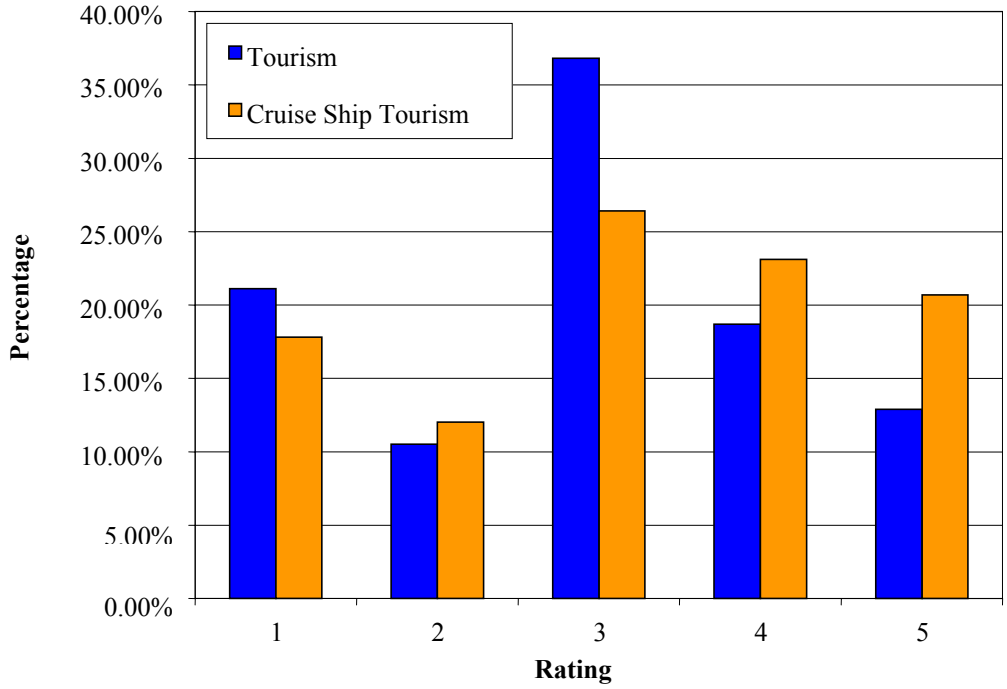
In response to the question of the extent to which the city should be involved in regulating tourism activity, the same number of responses (31.6%) indicated that the city should regulate tourism more than current levels and less than at current levels (Table 6.33 and Figure 6.11). A higher percentage suggested that the city should regulate at current levels (39.5%). With cruise ship tourism, only 13.9% of business responses indicated that the city should regulate activity more than at current levels compared to 43.8% among residents.

TABLE 6.33: TO WHAT EXTENT SHOULD THE CITY BE INVOLVED IN REGULATING TOURISM/CRUISESHIP ACTIVITY?

Scale Rating	1	2	3	4	5	Mean
Tourism						
Frequency	44	22	77	39	27	2.92
Percentage	21.1%	10.5%	36.8%	18.7%	12.9%	
Cruise Ship Tourism						
Frequency	37	25	55	48	43	3.17
Percentage	17.8%	12.0%	26.4%	23.1%	20.7%	

(1=none, 2=less than current levels, 3=same as current levels, 4=more than current levels, and 5=much more than current levels)

FIGURE 6.11: TO WHAT EXTENT SHOULD THE CITY BE INVOLVED IN REGULATING TOURISM/CRUISESHIP ACTIVITY?



(1=none, 2=less than current levels, 3=same as current levels, 4=more than current levels, and 5=much more than current levels)

On the issue of paying higher taxes and/or fees to offset lost tourism revenues, businesses were still less likely than residents to support revenue substitution. For tourism, 83.7% said they did not want to raise taxes or fees to offset revenue loss from decreased tourism (Table 6.34). For cruise ships, 77.5% indicated they were not in favor of having to make up for any revenue shortfall that might occur should cruise ship activity be curtailed.

TABLE 6.34: WOULD YOU BE WILLING TO PAY HIGHER TAXES AND/OR FEES TO OFFSET LOST CRUISE SHIP REVENUES

	Yes	No
Tourism		
Frequency	34	175
Percentage	16.3%	83.7%
Cruise Ship Tourism		
Frequency	47	162
Percentage	22.5%	77.5%

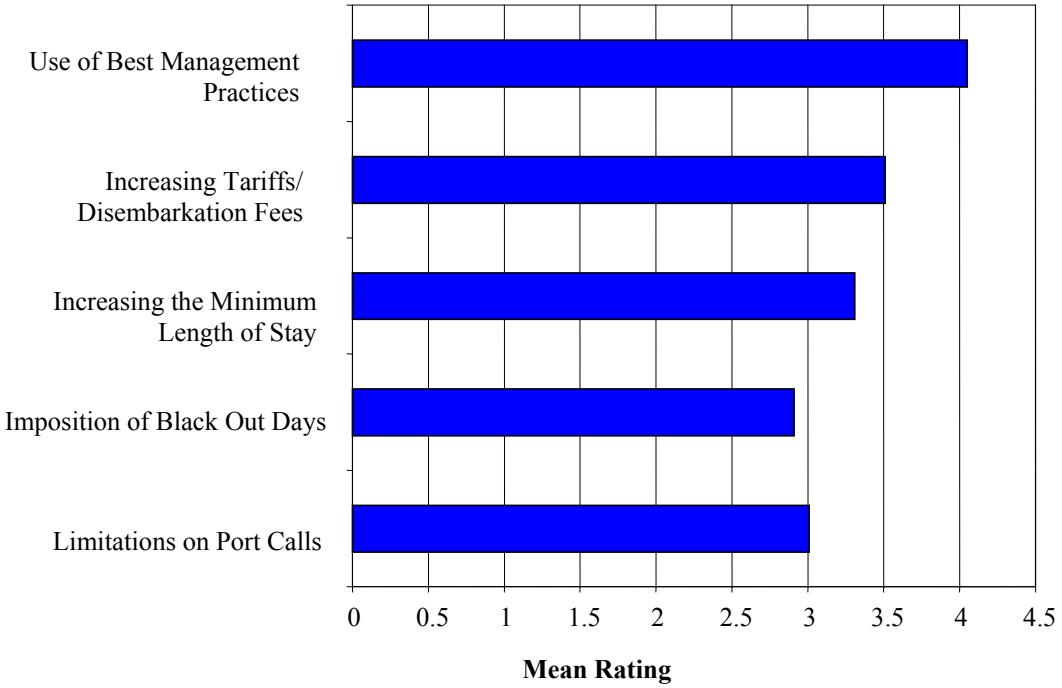
With management strategies, tighter controls requiring best management practices were rated favorably by 76.8% of businesses responding (Table 6.35 and Figure 6.12). Higher tariffs/disembarkation fees were favored by 56.5% of responders followed by increasing the minimum length of stay by 51.9%. Limitations/quotas and blackout days were less popular with the business community with mean responses at 3.01 and 2.91, respectively. On balance the business community is in favor of enforcing tighter controls to assure best management practices and the imposition of higher fees. They have mixed feelings on restricting the number of visitors.

TABLE 6.35: RATINGS ON MANAGEMENT STRATEGIES

SCALE RATING	1	2	3	4	5	Mean
Limitations/ Quotas on the Number of Port Calls/Passengers						
Number	48	44	26	42	50	3.01
Percentage	22.9%	21.0%	12.4%	20.0%	23.8%	
The Imposition of Black Out Days During Periods of Peak Tourism						
Number	43	47	41	40	37	2.91
Percentage	20.7%	22.6%	19.7%	19.2%	17.8%	
Increasing the Minimum Length of Stay of Cruise Ships						
Number	33	23	44	63	45	3.31
Percentage	15.9%	11.1%	21.2%	30.3%	21.6%	
Increasing Tariffs (Including Dockside and Disembarkation Fees)						
Number	25	23	43	57	61	3.51
Percentage	12.0%	11.0%	20.6%	27.3%	29.2%	
Tighter Controls to Assure that Best Management Practices are Performed						
Number	12	8	28	69	90	4.05
Percentage	5.8%	3.9%	13.5%	33.3%	43.5%	

(1=very appropriate, 2=inappropriate, 3=neutral, 4=appropriate, and 5=very appropriate)

FIGURE 6.12: RATINGS ON MANAGEMENT STRATEGIES



(1=very appropriate, 2=inappropriate, 3=neutral, 4=appropriate, and 5=very appropriate)

In open-end responses, comments were more often positive rather than negative by almost a 2 to 1 margin (Table 6.36). Businesses did favor management strategies to make for a higher quality experience for both tourists and residents. The most often suggestions made were: 1) preserve the environment, ocean, 2) attract high-end cruise ship passengers/tourists, 3) raise disembarkation fees, 4) maintain charm – community character, and 5) redirect some cruise ship passengers off of Duval Street. Other suggestions related to attracting overnight/longer stay visitors, improving transportation, and maintaining affordability.

TABLE 6.36: WHAT ARE THE CRITICAL ISSUES RELATING TO TOURISM?

	Total	Percentage
COMMENTS IN FAVOR OF CRUISE SHIPS/TOURISM	**41**	**18.6%**
▪ cruise ships are good for the economy	10	4.5%
▪ Key West survives on cruise ships	6	2.7%
▪ do not restrict/regulate cruise ships	6	2.7%
▪ reference to September 11th and hurricanes	6	2.7%
▪ cruise ships create return visitors	5	2.3%
▪ need more cruise ships	3	1.4%
▪ cruise ship passengers do not require many city service due to short stays	3	1.4%
▪ do not increase disembarkation fees/other fees or tariffs	2	0.9%
COMMENTS NOT IN FAVOR OF CRUISE SHIPS/TOURISM	**21**	**9.5%**
▪ ill will from those who do not benefit from cruise ships towards those who do	9	4.1%
▪ need less cruise ships	7	3.2%
▪ cruise ships should be eliminated	3	1.4%
▪ cruise ships should not stay overnight	2	0.9%
SUGGESTIONS FOR MANAGING CRUISE SHIP/TOURISM INDUSTRY	**158**	**71.8%**
▪ preserve environment, ocean	15	6.8%
▪ attract high-end cruise ship passengers/tourists	12	5.5%
▪ raise disembarkation fees/other fees or tariffs	11	5.0%
▪ maintain charm--community character	11	5.0%
▪ redirect some cruise ship passengers off of Duval St.	8	3.6%
▪ attract tourists who will stay all day or overnight	6	2.7%
▪ improve public transportation	5	2.3%
▪ maintain affordability	5	2.3%
▪ limit chain stores/t-shirt shops	5	2.3%
▪ limit number of ships per day	4	1.8%
▪ disallow monopolies--especially in transportation	4	1.8%
▪ do not raise taxes	4	1.8%
▪ improve parking--cost, availability	4	1.8%
▪ eliminate or decrease Conch trains	4	1.8%
▪ reduce city government/regulation	4	1.8%
▪ reduce city expenditures	4	1.8%
▪ do something about conversions of hotel rooms into condominiums	3	1.4%
▪ provide affordable housing for low and middle income workers	3	1.4%
▪ improve wording in questionnaire	3	1.4%
▪ repair/clean sidewalks	3	1.4%
▪ stop biker noise	2	0.9%
▪ tighten controls on homeless	2	0.9%
▪ support street performers	2	0.9%
▪ provide public restrooms for cruise ship passengers	2	0.9%
▪ change tourist maps	2	0.9%
OTHER	**30**	**13.6%**
grand total=	**220**	**100.0%**

6.A.3.1

EMPLOYEE SURVEY

Employee surveys were distributed through business associations in the city including the Restaurant and Bar Association, Lodging Association, Innkeepers Association, and Attractions Association. Retail establishments were contacted directly with input from the Chamber of Commerce. **(For a copy of the Employee Survey see *Appendix 7*).** A total of 621 surveys were sent to business associations or, in the case of retail establishments, directly to the establishments. A total of 226 surveys were returned, a 36.4% response rate – that response rate may be an understatement as it is likely that not all the surveys were used at all locations (Table 6.37).

TABLE 6.37: EMPLOYEE SURVEY SELECTION PROCESS

Establishment	Contact	Number
Restaurant and Bar Association	Bart Hofford	165
Lodging Association	Peter Ilchick	125
Innkeepers Association	Randy Osipow	50
Attractions Association--museums	Linda Test	100
Attractions Association--water based attractions	Linda Test	50
Retail Establishments		
Key West Aloe	Rich Gorman	15
Tropical Selling Gifts	Lucretia Fadden	40
Fast Buck Freddies	Tony Falcone	45
Margaritaville--retail	Denise DiSalvo	31
Total		621

Of the respondents, 71.2% indicated that they lived in the city, while 28.8% lived outside the city (Table 6.38). The share of workers living in the city is less than the 81% figure given from business responses but still surprisingly high given concerns that employees can't afford to live in the city.

TABLE 6.38: WHERE DO YOU LIVE?

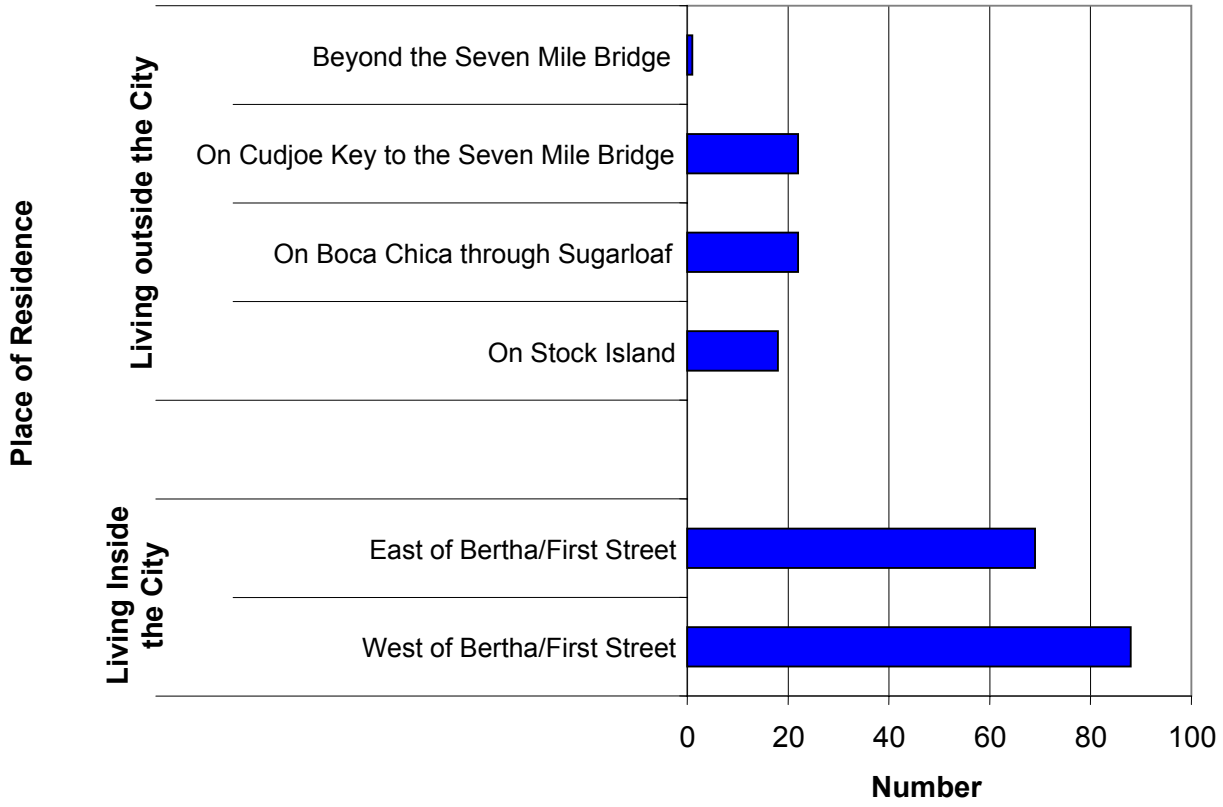
	Number	Percentage
Living Inside the City	161	71.2%
Living Outside the City	65	28.8%
Total	226	100.0%

Of those individuals living in the city, 56.1% live in the older part of town west of Bertha and First Streets, while 43.9% live east of that line. For those individuals living outside the city, 98.4% of workers live south of the Seven Mile Bridge with distributions split fairly evenly between Stock Island (28.6%), Boca Chica through Sugarloaf (34.9%), and Cudjoe Key to the Seven Mile Bridge (34.9%) (Table 6.39 and Figure 6.13).

TABLE 6.39: PLACE OF RESIDENCE OF EMPLOYEES

	Number	Percentage
Living In the City		
West of Bertha/First Street	88	56.1%
East of Bertha/First Street	69	43.9%
TOTAL	157	100.0%
Living Outside the City		
On Stock Island	18	28.6%
On Boca Chica through Sugarloaf	22	34.9%
On Cudjoe Key to the Seven Mile Bridge	22	34.9%
Beyond the Seven Mile Bridge	1	1.6%
TOTAL	63	100.0%

FIGURE 6.13: PLACE OF RESIDENCE OF EMPLOYEES

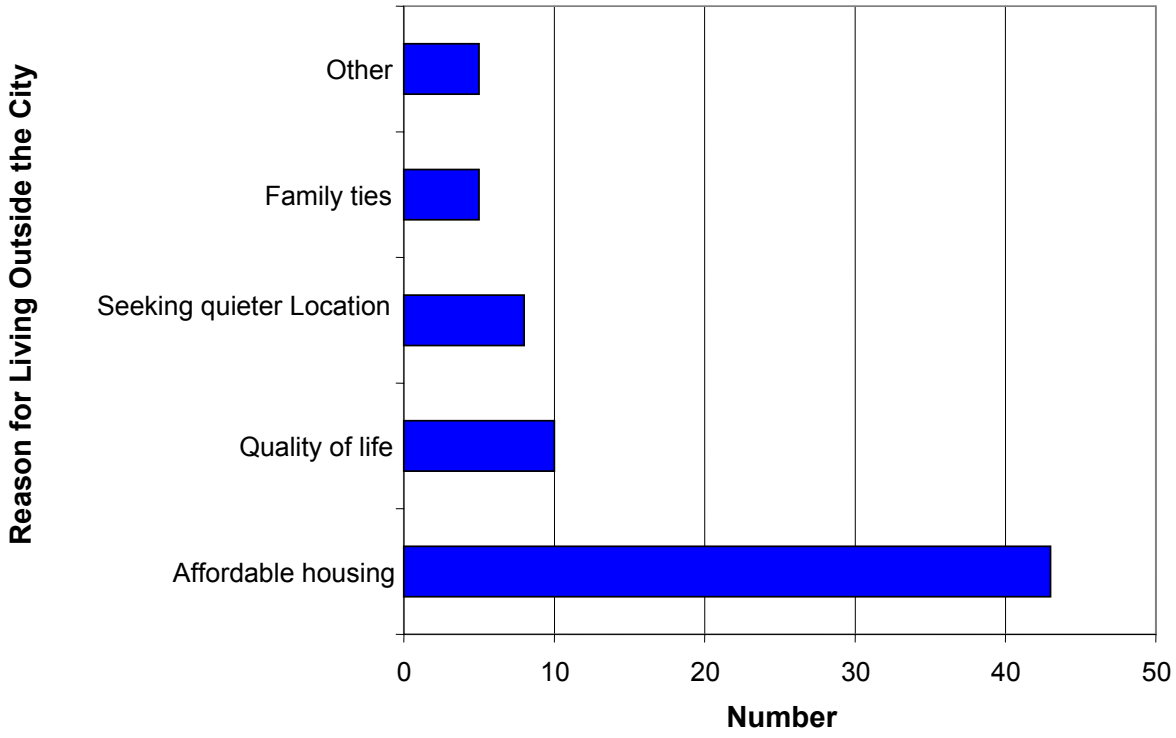


For those workers living outside of Key West, the most often cited reason for doing so was housing affordability – 60.6% of total responses. Quality of life was a distant second followed by seeking a quieter location and family ties (Table 6.40 and Figure 6.14).

TABLE 6-40: REASON FOR LIVING OUTSIDE OF THE CITY

	Number	Percentage
Affordable Housing	43	60.6%
Quality of Life	10	14.1%
Seeking Quieter Location	8	11.3%
Family Ties	5	7.0%
Other	5	7.0%
Total	**71**	**100.0%**

FIGURE 6.14: REASON FOR LIVING OUTSIDE THE CITY

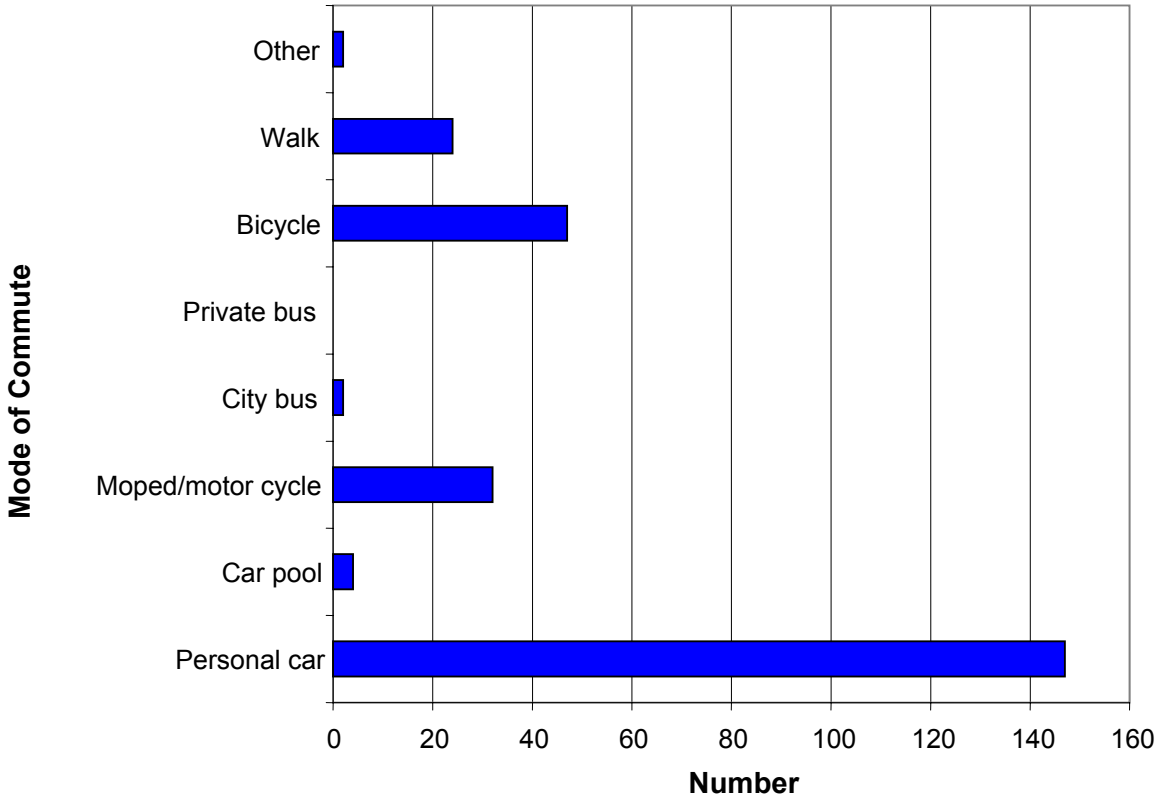


When asked the mode of transportation that they most often take to work, 57.0% indicated that they take a personal car to work (Table 6.41). A comparatively high percentage of workers bike to work (18.2%). Most of the rest of workers either ride a moped/motor cycle or walk to work. The last three options help with congestion and parking but personal car traffic in the downtown area remains a major problem.

TABLE 6.41: MODE OF TRANSPORTATION TO WORK

	Number	Percentage
Personal car	147	57.0%
Car pool	4	1.6%
Moped/Motor cycle	32	12.4%
City bus	2	0.8%
Private bus	0	0.0%
Bicycle	47	18.2%
Walk	24	9.3%
Other	2	0.8%
Total	**258**	**100.0%**

FIGURE 6.15: MODE OF TRAVEL TO WORK

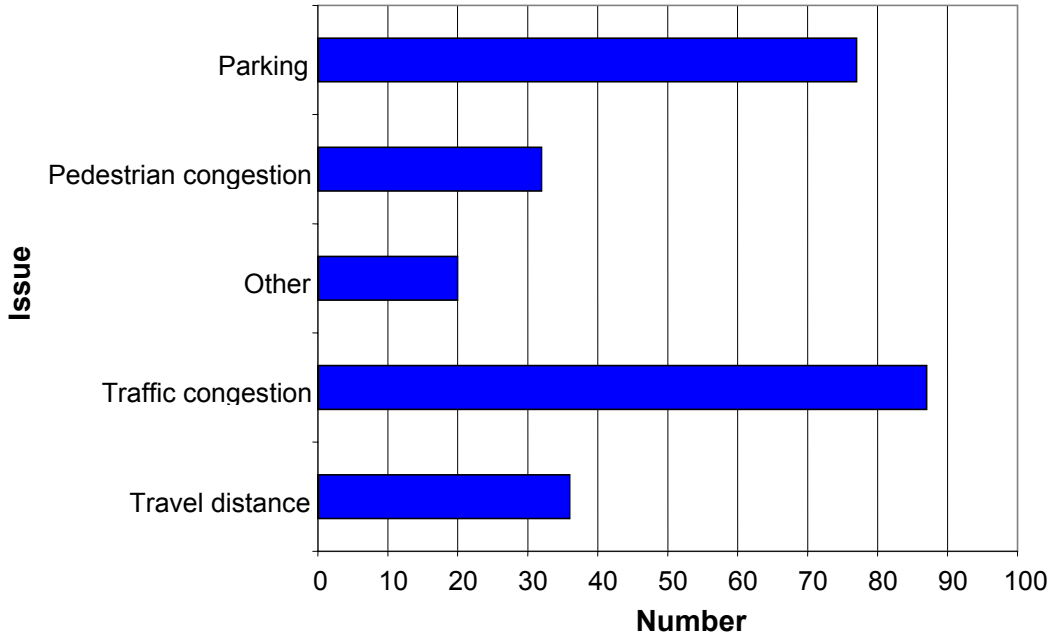


The most common issues in getting to work are traffic congestion (34.5%) and parking (30.6%). For those outside the city, travel distance (14.3%) and for those living in the city pedestrian congestion were identified as a problem in getting to work (Table 6.42).

TABLE 6.42: MOST COMMON ISSUES IN GETTING TO WORK

	Number	Percentage
Travel distance	36	14.3%
Traffic congestion	87	34.5%
Other	20	7.9%
Pedestrian congestion	32	12.7%
Parking	77	30.6%
Total	**252**	**100.0%**

FIGURE 6.16: MOST COMMON ISSUES IN GETTING TO WORK



Among employees that responded, they estimated that on average 68.6% of sales revenues come from tourism and that 42.5% of revenues come from cruise ship tourism (Table 6.43).

TABLE 6.43: SHARE OF REVENUES COMING FROM TOURISM/CRUISE SHIP TOURISM

	Percentage
Tourism	68.6%
Cruise Ship Tourism	42.5%

When asked what factors would make Key West a more attractive place to work, the most frequent response was affordable housing mentioned on 22.5% of responses (Table 6.44). The second most often mentioned factor was parking appearing on 12% of responses. Collectively, transportation issues ranging from parking to reducing cars to road and sidewalk improvements to alternative transportation appeared on a third of all responses. Economic issues ranging from fair wages to cost of living, jobs, and taxes were important issues as were quality of life issues including city beautification, dealing with homelessness and alcohol issues. Although the majority of these workers are employed for tourist dependent businesses as indicated in Table 6.43 above, several of the suggestions were to address the needs of locals and not tourists.

TABLE 6.44: FACTORS THAT WOULD MAKE KEY WEST A MORE ATTRACTIVE PLACE TO WORK

	Total	Percentage
AFFORDABLE HOUSING	**74**	**22.5%**
GENERAL PRO-CRUISE SHIP TOURISM COMMENTS	**10**	**3.0%**
GENERAL ANTI CRUISE SHIP TOURISM COMMENTS	**11**	**3.3%**
JOBS, FAIR WAGES, COST OF LIVING	**34**	**10.3%**
▪ wages	18	5.5%
▪ cost of living	9	2.7%
▪ employment	3	0.9%
▪ lower taxes	4	1.2%
TRANSPORTATION	**107**	**32.5%**
▪ reduce cars	11	3.3%
▪ enforce transportation regulations	11	3.3%
▪ better traffic control	6	1.8%
▪ parking	39	11.9%
▪ alternative transportation	14	4.3%
▪ roads, sidewalks	18	5.5%
▪ close Duval Street	8	2.4%
ADDRESS NEEDS OF LOCALS NOT TOURISTS	**10**	**3.0%**
BETTER SHOPPING OPPORTUNITIES	**6**	**1.8%**
PROMOTE TOURISM	**6**	**1.8%**
QUALITY OF LIFE	**49**	**14.9%**
▪ city beautification	9	2.7%
▪ eliminate t-shirt shops	4	1.2%
▪ street people/panhandlers	7	2.1%
▪ homelessness	12	3.6%
▪ alcohol issues	9	2.7%
▪ noise pollution	4	1.2%
OTHER	**22**	**6.7%**
grand total =	**329**	**100.0%**

6.B Key West Visitor Survey — Cruise Passenger and General Visitor

Tourism is the dominant economic sector in the Florida Keys, including in the City of Key West. It is estimated that over three million visitors in 1995/96 enjoyed the resources offered by the unique Florida Keys region, and a significant number of these tourists spent time in Key West (Leeworthy and Wiley, 1996). Accessible via air, land, and sea, Key West contains a number of tourist amenities, ranging from coastal and marine resources, a rich cultural history, and a variety of dining, lodging, and related tourism destinations. More recently, Key West has become an important cruise ship destination.

Cruise ships started calling in Key West in 1990, and by 1994, over 476,000 passengers had visited the island. In 1999, the number of cruise passengers increased to 631,000, and it reached almost a million passengers in 2003 (Key West Citizen, 2004). While cruise ship visitation may lead to direct benefits, resulting primarily from a head tax and passenger expenditures in the local economy, the long-term costs of increasing visitation remain unclear. Specifically, this study questions whether increasing cruise passenger totals may inhibit visitation from other tourism sectors, namely among those visitors arriving by air and land for longer (and potentially more expensive) visits. Further, it examines how cruise passengers perceive crowding; relative as to whether the conditions may reduce their willingness to return for either a cruise trip and/or a longer vacation.

Conducted as part of the Key West Quality of Life Study, the research project described below addressed these and other issues relevant to the study's objectives (please refer to KWQOL RFP, 2003, for study objectives and further details). Divided into seasonal surveys with cruise passengers and other visitors (See *Appendix 1* for a copy of the Cruise Passenger Survey Instrument and *Appendix 2* for a copy of the General Visitor Survey Instrument), the project determined tourist perceptions on activities and conditions within the city, and it estimated economic contributions from each visitor type. A detailed description of pilot findings, questionnaire content, and survey completion rates is presented below.

6.B.1 Survey Design and Methodology

A standard statistical sampling methodology was developed for the project, one that maximized data collection and controlled for data quality by ensuring the randomness of respondents and extending data collection across seasons (to account for potential summer/winter differences in visitor types, as reported by Leeworthy and Wiley, 2003, and Leeworthy and Wiley, 1996). Consisting of a formal pilot period and seasonal survey sessions, the project's field component consisted of 120, two-hour survey sessions conducted over a period of four months in 2004 and 2005. .

6.B.2 Pilot Survey Session

Following established social science sampling procedures (see Alreck and Settle, 1985 and Babbie, 1990), three sites were selected for pilot survey implementation. The primary reason that different sites were identified was to capture visitors of the three main types: Cruise passengers, visitors arriving by ground transportation (automobiles, commercial buses, and charter buses, mainly), and visitors arriving on airlines. Sites were selected first via discussion among the research team, followed by field reconnaissance, and finally by pilot testing. The sites selected are shown in the following figure.

FIGURE 6.B.1: KEY WEST STUDY AREA

Reference: http://thefloridakeys.com/keywest/keywestmap.htm

A - Mallory Square and Pier B cruise passenger disembarkation areas

B - Mallory Square pier

C - Key West International Airport departure area

Due to the fact that surveyors could not access the disembarkation areas for cruise passengers (due to security restrictions), it was decided that cruise passengers would be intercepted as they walk back to the disembarkation areas. During the pilot session (and throughout the summer sampling period), only the city-owned Mallory dock and private Pier B were accessible; it was not until the winter sampling period that the Outer Mole pier was operational. Mallory Square pier was selected to interview land-based (and air-based) passengers due to the fact that it is heavily frequented by tourists during sunset hours; previously, the research team had expected to use the two parking garages in the Mallory Square vicinity but, following field reconnaissance, it was decided that the garages presented a potential safety threat and moreover could result in high rates of rejections (due to the fact that departing tourists would probably not like to remain behind in a parking lot to answer questions). Finally, Key West International Airport was selected as a location where to intercept departing visitors.

Pilot testing determined that a maximum of three sessions can be undertaken on a daily basis, with the exception being those days when there are no scheduled cruise vessel stops. Thus, it was decided that a total of 20 field days, consisting of three sessions each, could be undertaken in two summer months, and that this methodology would be repeated during two winter months. The summer months selected were July and August 2004, and the winter months selected were January and February 2005.

Also, because the focus of the study is on cruise vessels, it was decided that one half of all sessions (or 30 sessions) shall be undertaken with cruise passengers, and the other half shall be equally divided among land-based and air-based passengers. Thus, the sampling scheme shall be:

a. Cruise vessel passenger survey sessions – 30

b. Land-based passenger survey sessions – 15

c. Air-based passenger survey sessions – 15

Two types of survey instruments were developed — a cruise passenger survey and a general visitor survey **(See Appendices 1 and 2 for copies of the cruise passenger and visitor survey instruments, respectively).** Both instruments were developed comparing previous models used in cruise passenger and other visitor studies (Shivlani et al., 2003, TDC, 2003), and the City of Key West personnel and others assisted in the refinement and elaboration of questions. The questions developed for each instrument were made as similar as was practicable, to compare activity rates and perceptions and to identify variations in expenditure patterns and behaviors among different visitor types. Other questions concerned the quality of visitor experiences, and how that experience may affect future visitation. Finally, visitors were encouraged to provide additional input as a means by which to identify those issues important within and across visitor types and which were not formally a part of the survey instruments.

A total of 14 pilot sessions were undertaken from June 21-26, 2004 at the three, aforementioned locations. The number of sessions was approximately equal by site, due to the fact that the focus of the pilot study was to test the applicability of the questionnaires by site, rather than to maximize data collection by site. Results are provided in the table below.

TABLE 6.B.1: PILOT SESSION SURVEY RESULTS

	June 22	June 23	June 24	June 25	June 26	Average rates
Cruise surveys	21	14	13	14	No cruise vessels	15.5
Cruise survey rejections	4	18	18	13		13.3
Air surveys	20	15	19	18	14	17.2
Air survey rejections	1	2	3	3	3	2.4
Land surveys	7	17	18	7	13	12.4
Land survey rejections	5	5	4	5	3	4.4

6.B.2.1 PILOT SESSION SURVEY RESULTS

From the pilot survey results, it was determined that between 13-15 surveys per session (depending on weather conditions and other factors) could be completed. Based on an average of 14 surveys per session, the research team estimated that it could interview a total of 840 visitors (based on 60 survey sessions) each in the summer and winter sampling periods. Moreover, the pilot survey results also demonstrated that rejection rates, while highest among cruise passengers (due most likely to their limited time on the island, which is discussed in more detail in the report), nevertheless allowed for extensive data collection; that is, all types of visitors participated to the extent that a large number of surveys could be completed (compare, for instance, previous survey efforts in the region, including Leeworthy and Wiley, 1996, and Monroe County Tourism Development Council, 2003).

6.B.3 Summer 2004 and Winter 2005 Survey Rates

The two survey periods yielded a total of 1,822 completed surveys, of which 1,018 were completed in the summer period (or 55.9% of the total) and 804 were completed in the winter period (or 44.1% of the total). The table below shows the breakdown of surveys by period and by type.

TABLE 6.B.2: SUMMER, WINTER, AND TOTAL SURVEY RESULTS

Session	Cruise passengers	Air-based visitors	Other visitors	Total by session
Summer 2004	521	290	207	**1,018**
Winter 2005	398	208	198	**804**
Total	**919**	**498**	**405**	**1,822**

As shown in the table, very similar totals of cruise passengers (919 respondents) and air-based and other visitors (903 respondents) were obtained. Also, while the total number of surveys completed was lower in the winter period, the lower amount was attributable mainly to lower participation rates among cruise passengers rather than among other visitor types. The following two sections describe the sampling rates and results in more detail, by season.

6 B.3.1 SUMMER 2004 SURVEY RATES

The summer sampling period was completed in July and August 2004. A total of ten days were identified for each month during which three sessions would be completed on a daily basis (or 30 sessions per month, for a total of 60 sessions). Additionally, the research team utilized the Key West cruise ship schedule calendar[56] to identify the time period during which to conduct surveys. This scheduling component was especially important, as the methodology adopted called for ten-day field periods, during which time a total of 15 cruise ship survey sessions had to be completed.

While accommodations in the form of buffer days around the 10-day period were included to account for days lost to rain, the research team fell short of its 60 session goal. This was due to a combination of cruise-free days, rain days, and the passage of Hurricane Charley in mid-August over the Lower Florida Keys and the later threat posed by Hurricane Frances in late-August. Although the single session was lost due to climatic conditions, the overall field

[56] Available at the City of Key West's website, via http://www.keywestcity.com/depts/port/cruiseships/cruiseships.asp.

sessions were successful. Return rates for cruise passenger and other visitor surveys exceeded pilot survey session estimates (840 surveys), thereby leading to a higher total (1,018 surveys). The following tables detail each sampling session over the two months.

TABLE 6.B.3: JULY 2004 SAMPLING SESSIONS

Date	Cruise surveys	Air passenger surveys	Other visitor surveys
7/11/04	20	21	16
7/13/04	21	16	
	20		
7/14/04	20	13	
	18		
7/15/04	15	7	
7/16/04	22	22	21
7/18/04	15	4	21
7/19/04		19	15
7/20/04	20	16	
	12		
7/21/04	15	19	
	15		
7/22/04	15	16	16
TOTAL	**228**	**153**	**89**

TABLE 6.B.5: AUGUST 2004 SAMPLING SESSIONS

Date	Cruise surveys	Air passenger surveys	Other visitor surveys
8/6/04	10	16	15
8/7/04		22	18
8/8/04	16	18	14
8/9/04	21	4	
8/10/04	21	14	
8/11/04	14		
8/16/04		12	20
8/17/04	24	12	
	17		
8/18/04	21	17	
	26		
8/19/04			15
8/20/04			17
8/22/04	20	22	19
8/23/04	24		
8/24/04	20		
	24		
8/25/04	17		
8/26/04	18		
TOTAL	**293**	**137**	**118**

As shown in tables above, survey effort concentrated on the cruise passengers, and the rest of the sessions were split unevenly among air passenger and other visitor surveys. As adopted in the survey methodology, an equal number of sessions were spent on cruise surveys and on other visitor surveys. However, logistical issues made that balance difficult at

times. Apart from the aforementioned cruise-free days and delays resulting from Hurricane Frances (which resulted in the August session being extended), other challenges included the weather. Data collection was often hampered by rain, during which visitors could only be surveyed indoors (i.e. the airport). Thus, to maximize field time, sessions were held at the airport when the weather conditions did not permit outdoor interviews.

Also, rejection rates were higher among cruise passengers than within the other two groups. Rejection rates for the cruise passenger group were 1.22 (or 1.22 rejections per completed survey); by contrast, the rejection rates for the air-based visitor group and other visitor group were 0.18 and 0.26, respectively. The research team identified three reasons for high rejection rates specific to the cruise passengers: First, passengers were always interviewed upon their return, and several were hurried to return to the vessel when prompted to participate; second, many days in the summer are very warm, and because the surveys were conducted near the berthing piers (where there is little shade), passengers often did not stop to participate; and third, days which had been affected by rain led to lower rates of participation. The following figures shows participation rates by cruise passenger and other visitor survey sessions.

FIGURE 6.B.2: JULY AND AUGUST 2004 CRUISE PASSENGER SURVEY SESSION PARTICIPATION RATES

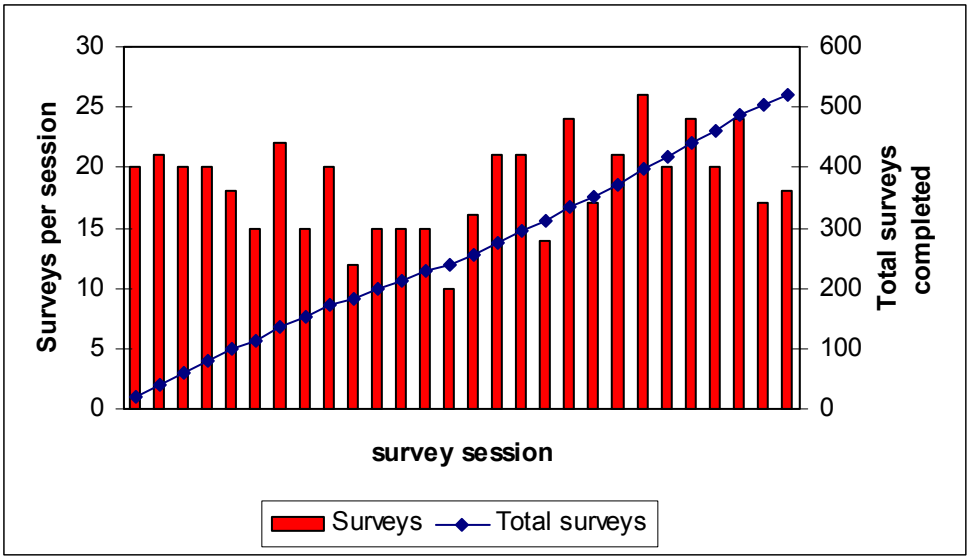


FIGURE 6.B.3: JULY AND AUGUST 2004 AIR-BASED VISITOR SURVEY SESSION PARTICIPATION RATES

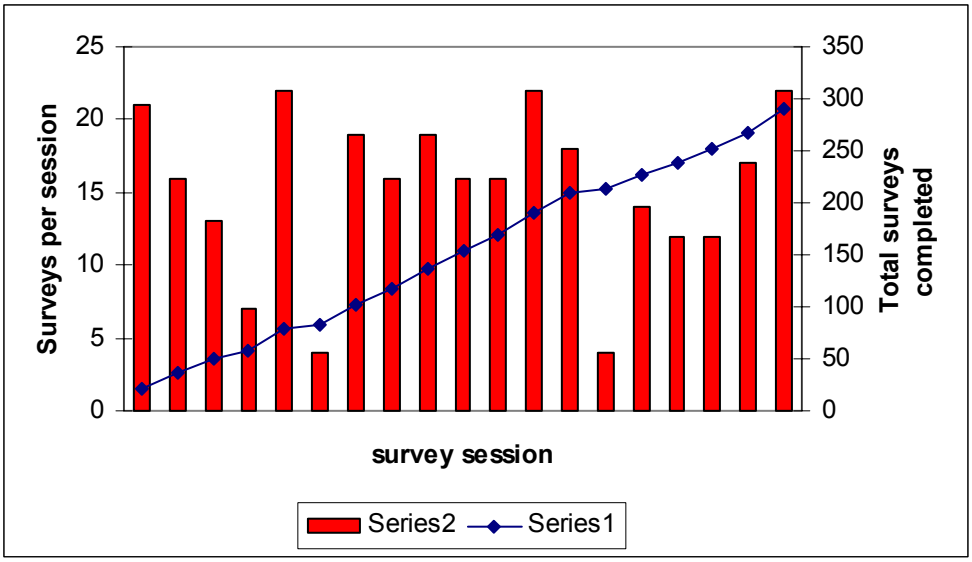
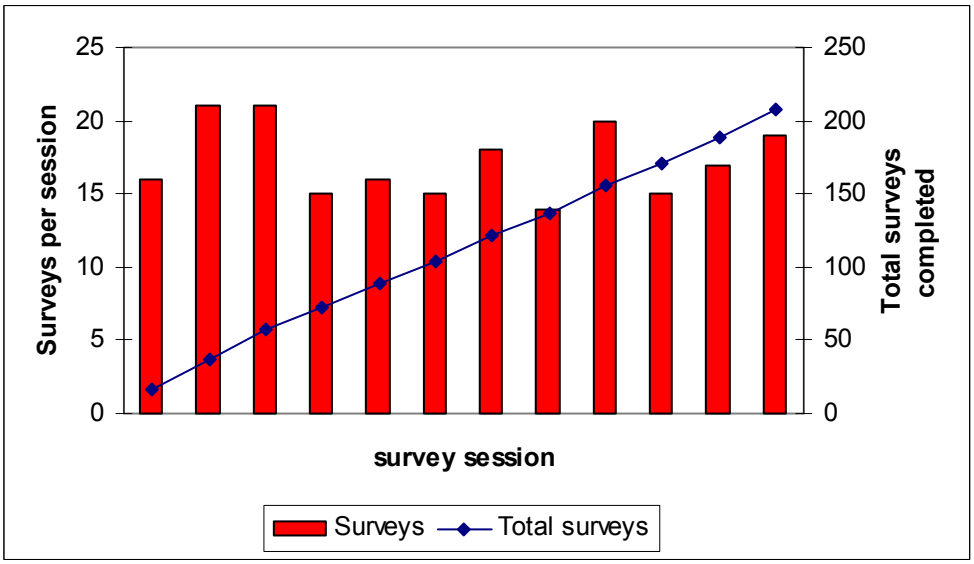


FIGURE 6.B.4: JULY AND AUGUST 2004 OTHER VISITOR SURVEY SESSION PARTICIPATION RATES



The number of cruise passenger surveys ranged from a low of 10 surveys to a high of 26 surveys. The average number of surveys completed per session was 18.6 surveys (SD = 3.87), or a survey every 6.5 minutes. For July, the research team completed a total of 228 surveys in 13 sessions, or 17.5 surveys per session. For August, the research team completed a total of 293 surveys in 15 sessions, or 19.5 surveys per session. Clearly, the retention of a single data collector and familiarity with the survey instrument played key roles in increasing survey rates per session.

The range of air-based visitor surveys completed ranged from a low of 4 surveys (on two occasions) and a high of 22 surveys (again, on two occasions). The number of surveys completed per session averaged to 15.3 surveys (SD = 5.58). On average, the amount of time that it took to complete an air-based visitor survey was approximately 7.25 minutes, or slightly longer than it took to complete a cruise passenger survey. The main reason for the longer time is due to the expanded expenditure section of the air-based and other visitor surveys. This section requests lodging, meals, and other extended-trip related information that takes respondents longer to calculate and thus answer.

The number of other visitor surveys completed with the general visitor population was generally consistent across sessions. Data collection yielded an average of 17.3 surveys per session (SD = 2.49), and the range was from a low of 14 surveys to a high of 21 surveys. Surveys were generally completed within an average of 6.9 minutes, taking longer than the cruise surveys (see the previous paragraph for an explanation on the reasons for differing survey rates).

As stated earlier, one of the major reasons why more sessions could not be held (n = 12) was due to weather conditions. Because the methodology calls for 10-day sampling periods, rain-affected sessions could not be made up easily for two reasons. The first was because cruise surveys take priority and thus affect make-up dates, and the second was because of the total time (as affected by the budget) that could be allocated for each sampling period. As shown in earlier tables, while 10-day samples were achieved for each month, project personnel had to spend 14 days in the field for the July session and 24 days in the field for the August session (mainly to make up for the delays caused by Hurricanes Charley and Frances).

6.B.3.2 WINTER 2005 SURVEY RATES

The winter sampling period was completed over 60 sessions spanning 21 days in January and February 2005. As during the summer sampling period, the research team utilized the Key West cruise ship calendar to identify the time period during which to conduct surveys. Unlike in the summer sampling period, when the Outer Mole Pier was not in operation, the research team conducted several of its cruise passenger survey sessions at this location.

The research team completed a total of 804 surveys, of which 398 surveys were completed by cruise ship passengers, and the remainder (406 surveys) was completed by air-based and other visitors. Compared to the summer sampling period, there was a 21% decline in the number of surveys completed in the winter months. The reasons for this decline are discussed later in this section.

TABLE 6.B.5: JANUARY 2005 SAMPLING SESSIONS

Date	Cruise surveys	Air passenger surveys	Other visitor surveys
1/19		7	
1/20	8		7
	9		
1/21	16	16	14
1/22		11	18
		13	
1/23	8	17	12
1/24	15		
	13		
	13		
1/25	14		
	13		
	12		
1/26	12	14	12
1/27	14		13
	15		
1/28	12		13
	14		
1/29		11	
		13	
TOTAL	**188**	**102**	**89**

TABLE 6.B.6: FEBRUARY 2005 SAMPLING SESSIONS

Date	Cruise surveys	Air passenger surveys	Other visitor surveys
2/1	16	16	14
2/2		16	12
2/3	14	13	13
	16		
2/4	13		14
	14		
2/5		14	14
		15	
2/6	15	15	
	14		
2/7	14		14
	13		
2/8	14		15
	15		
2/9	12		13
2/10	13	17	
	13		
	14		
TOTAL	**210**	**106**	**109**

As shown in tables above, survey effort concentrated on the cruise passengers, and the rest of the sessions were split evenly among air passenger and other visitor surveys. As agreed upon by the survey team, an equal number of sessions (or as close as could be reached) would be spent on cruise surveys and on other visitor surveys. The research team successfully completed a total of 60 sessions over 21 total sampling days, from which a total of 804 surveys were completed. While lower than the summer session total, it still represents a broad survey of the cruise and other visitors.

Rejection rates were higher among cruise passengers than within the other two groups. Rejection rates for the cruise passenger group were 0.88 (or 0.88 rejections per completed survey; however, rejection rates for the other visitors (0.85) and air-based visitors (0.40) were also high, leading to higher overall rejection rates in the winter session than in the summer session. While it remains unclear why this may be the case, it was anecdotally reported that there were more visitors during winter session surveys, leading to more crowding and perhaps a lower willingness to participate. Also, unlike in the summer session where precipitation played a role in reducing participation on given days, two cold fronts that depressed temperatures may have affected participation in the winter session.

FIGURE 6.B.5: JANUARY AND FEBRUARY 2005 CRUISE PASSENGER SURVEY SESSION PARTICIPATION RATES

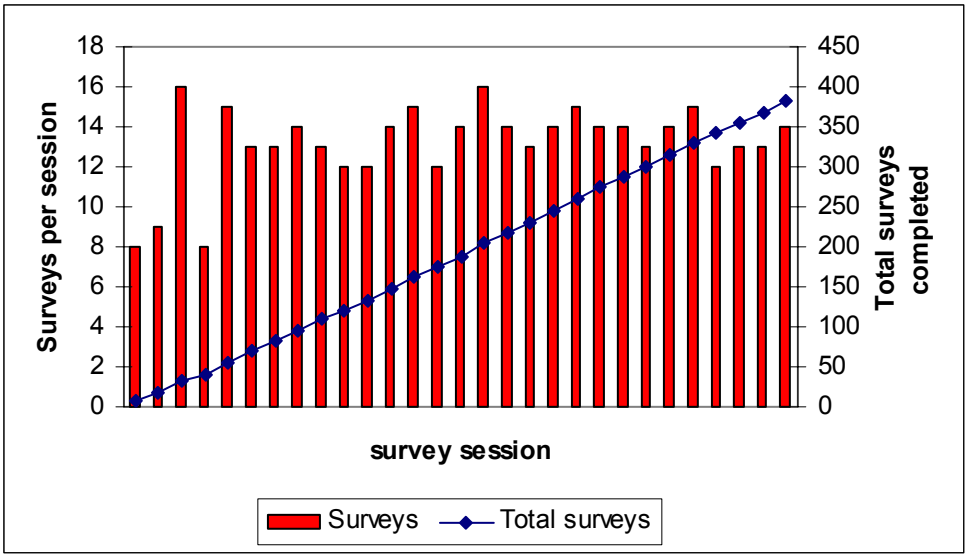


FIGURE 6.B.6: JANUARY AND FEBRUARY 2005 AIR-BASED VISITOR SURVEY SESSION PARTICIPATION RATES

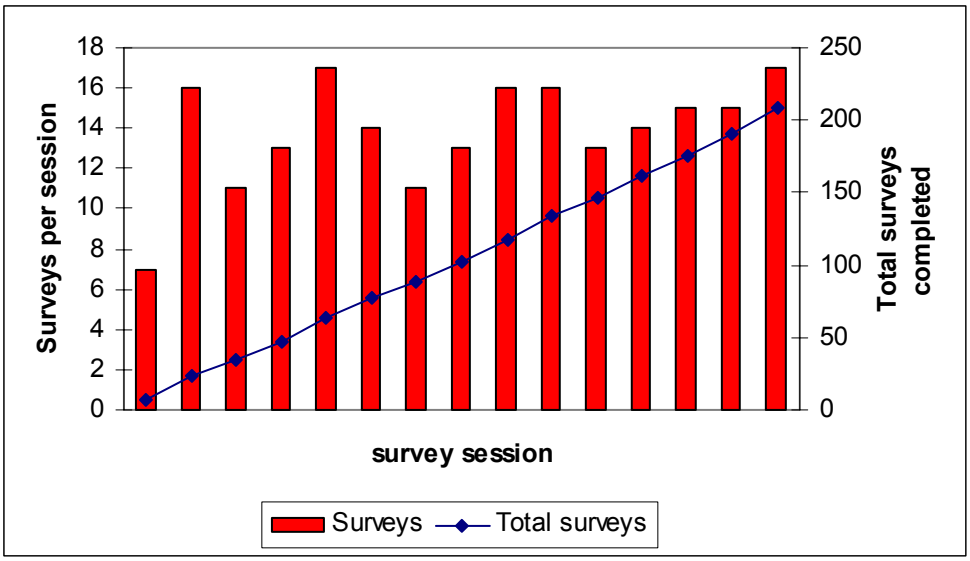
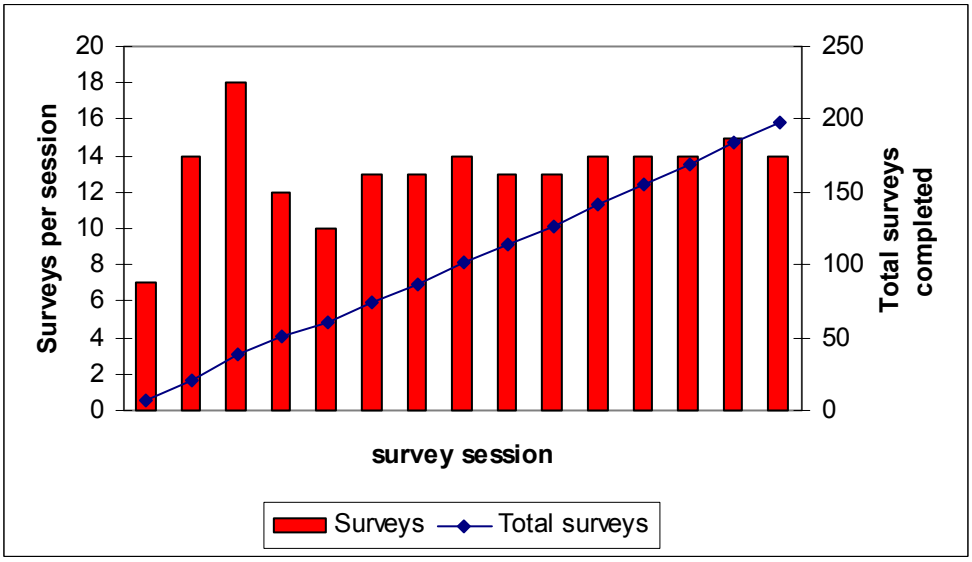


FIGURE 6.B.7: JANUARY AND FEBRUARY 2005 OTHER VISITOR SURVEY SESSION PARTICIPATION RATES



The number of cruise passenger surveys ranged from a low of 8 surveys to a high of 16 surveys. The average number of surveys completed per session was 13.3 surveys (SD = 2.03), or a survey every 9.0 minutes. For January, the research team completed a total of 188 surveys in 15 sessions, or 12.6 surveys per session. For February, the research team completed a total of 210 surveys in 15 sessions, or 14 surveys per session.

The range of air-based visitor surveys completed ranged from a low of 7 surveys and a high of 17 surveys. The number of surveys completed per session averaged to 13.9 surveys (SD

= 2.70), or a survey every 8.6 minutes. This was largely a result of lower rejection rates, which led to more airline passengers being interviewed during each session.

The number of other visitor surveys completed with the general visitor population was generally consistent across sessions. Data collection yielded an average of 13.2 surveys per session (SD = 2.4), and the range was from a low of 7 surveys to a high of 18 surveys. Surveys were generally completed within an average of 9.1 minutes.

Overall, the survey rate per session averaged 13.4 surveys over the 60 session period. While this is lower than the 17.3 survey rate obtained in the summer session, it must be noted that weather conditions (and most likely crowding conditions) played a major role in reducing participation. The average temperature during the January 2005 sampling period was 64 degrees Fahrenheit (range = 56 – 71 degrees Fahrenheit), or five degrees cooler than the averaged observed temperature for January over the past 100 years (NOAA, 2005). February conditions were milder (average temperature was 69 degrees Fahrenheit), but two sampling days had to be re-planned due to precipitation and strong winds resulting from arriving cold fronts (NOAA, 2005). Thus, meteorological conditions strongly affected survey rates.

6.B.4 Visitor Survey Results

The survey results results are presented generally in the form of descriptive statistics, relying mainly on percentages. This type of reporting has been chosen to make the results more accessible. However, in the instances where more scrutiny may provide meaningful recommendations, the appropriate analyses have been performed (and described). The study results are also provided for the two main types of surveys conducted — cruise passenger surveys and general visitor surveys. The general visitor surveys, which consist of air-based and other visitors, have not been stratified, as they represent a single sample whose findings are compared with cruise passenger results. Also, results across sampling periods are combined to provide a more complete description of each visitor type (across seasons); however, **Appendices 3 and 4 contain *seasonal results* by visitor type**. Finally, because either sample (cruise passenger n = 919; general visitor n = 903) contains a large number of observations, inter-sample statistical comparisons are performed where deemed important.

The results are presented in three, broad sections pertaining to information collected from the cruise passenger and general visitor surveys: Socio-demographic information; expenditures; and perceptions on resource quality and amenities.

6.B.4.1 SOCIO-DEMOGRAPHIC INFORMATION

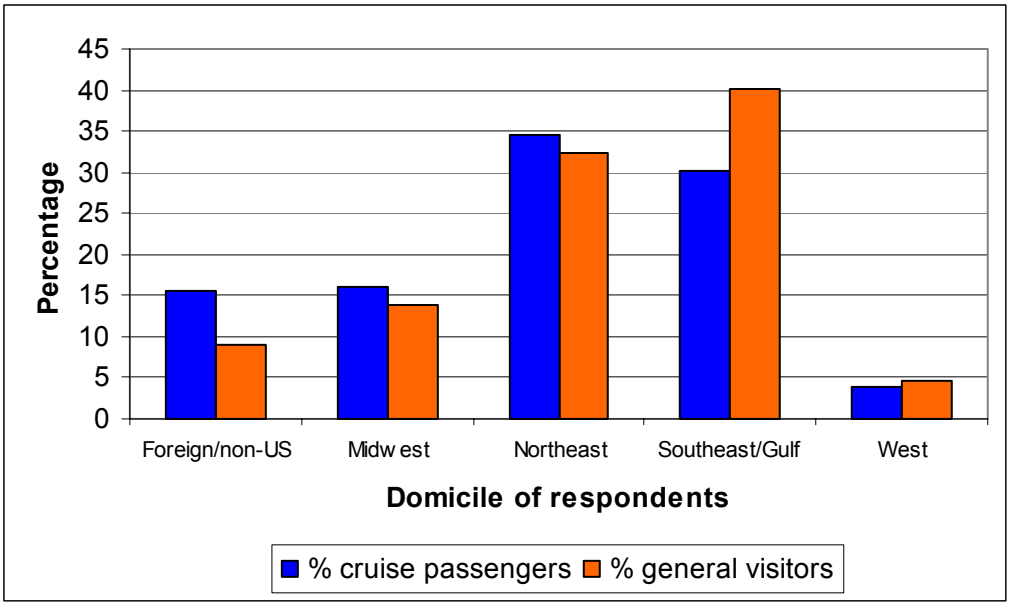
As previously stated, the research team completed a total of 1,822 surveys, of which 919 were conducted with cruise passengers returning to their vessel, and 903 were conducted with a combination of air, land, and sea (those arriving on private vessels) based visitors, hereby identified as general visitors. All respondents in both samples were requested to provide basic socio-demographic information, including their domicile, household income bracket, and number and ages of all members in their group.

6.B.4.2 DOMICILE

Both cruise passengers and general visitors were requested to provide either the zip code of their primary residence (in the case that they were US residents) or their country of residence

(primarily foreign nationals). Based on the information provided, respondents were categorized as originating from four regions in the US (Northeast, Southeast and Gulf, Midwest, and West) and from outside the US. The figure below shows the percentage of respondents from each region.

FIGURE 6.B.8: DOMICILE OF RESPONDENTS BY REGION



Most general visitors interviewed in Key West over the four months were from the Southeast and Gulf region (40%); in fact, Florida visitors headed the list, comprising over 23% of the sample. Other southern states, such as Georgia and North Carolina, also contributed several general visitors. This is most likely due to the fact that Key West is within a reasonable driving distance to many southern residents. Another 32% of general visitors originated from northern or northeastern states, mainly New York (6.4%), Virginia[57] (6.2%), Pennsylvania (4%), and New Jersey (4%). Both the Midwestern states (13.8%) and foreign nations (9.1%) contributed more general visitors than did the West (4.6%). Larger, more populous Midwestern states, such as Ohio (3.4%), dominated the regional sample, and Canada (38%) and the UK (12%) accounted for a majority of the foreign tourists. Altogether, 45 US states and 17 foreign nations comprised the general visitor sample.

A majority of the cruise passengers interviewed were from the northeast (35%), followed by those from the southeast (30%), Midwest (16%), foreign nations (15%), and the west (4%). Unlike as in the general visitor sample, Florida residents did not dominate the cruise passenger sample; while they did represent the highest percentage of cruise passengers (9.2%), their participation rate was considerably lower than the 23% they represented of the general visitor sample. Furthermore, unlike in the general visitor sample, states other than those in the southeast were represented in higher proportions. For example, 6.4% of the cruise passengers were from Pennsylvania, 6% were from Virginia, 5.7% were from New

[57] Due to its driving distance, Virginia (which is otherwise classified as a mid-Atlantic or even southern state) is categorized with all eastern seaboard states from Massachusetts south to Virginia.

York, and 5.3% were from Maryland. Within the foreign cruise passenger sector, which comprised a higher percentage of tourists than in the general visitor sample, a total of 31 countries were represented; however, as observed in the general visitor sample, a majority of the cruise passenger respondents were either from Canada or the UK (28% each). Finally, a smaller percentage of cruise passengers (3.8%) than general visitors (4.6%) were from the west; while the differences are not significant, the lower percentage may be reflective of the fact that western states such as California and Washington offer cruises as well.

Domicile information may be able to provide very useful information with further analyses, including a determination of travel costs by zip code, a better understanding of visitor incomes and other socioeconomic profiles (as determined by zip codes), and analyses of intra-Florida visitation by the visitor types (cruise, air, and land) and season. It is clear from the survey effort that Florida visitors, who comprise 16% of the total sample, are an important contributor to the Key West economy; however, the extent of that contribution can be best determined by further analyses on that segment of the tourist sample.

6.B.4.3 INCOME

All respondents were requested to provide income information, based on six income brackets. While there was initial concern that this may affect participation (and thus the reason for having made this one of the last questions of both survey instruments), almost 85% of all respondents in both samples answered the question. The results are presented below.

FIGURE 6.B.9: GENERAL VISITOR SAMPLE INCOME DISTRIBUTION

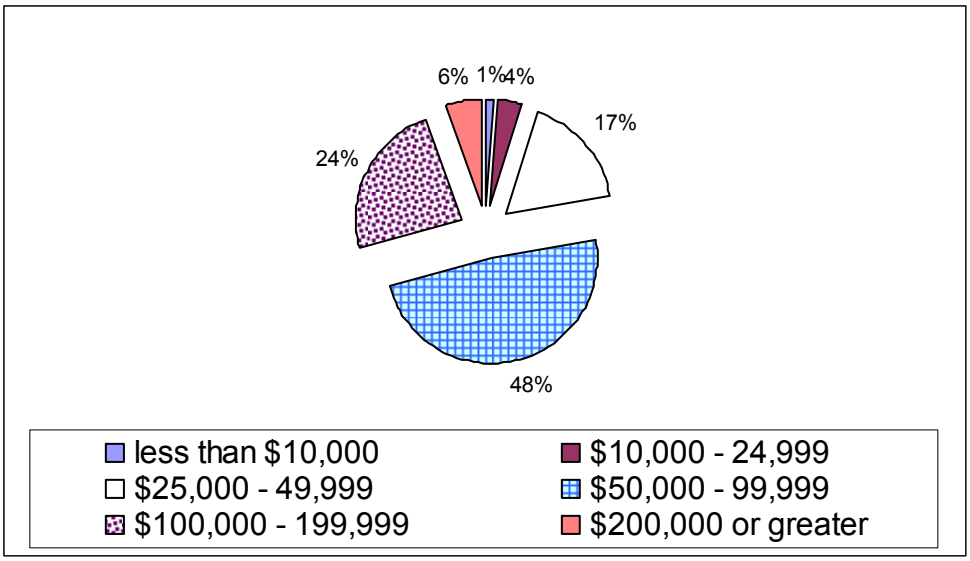
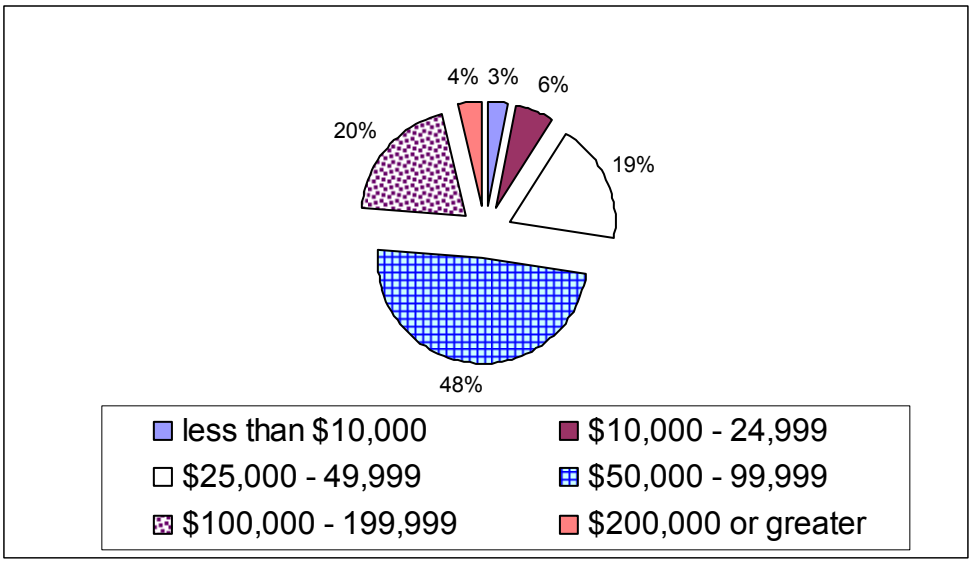


FIGURE 6.B.10: CRUISE PASSENGER SAMPLE INCOME DISTRIBUTION



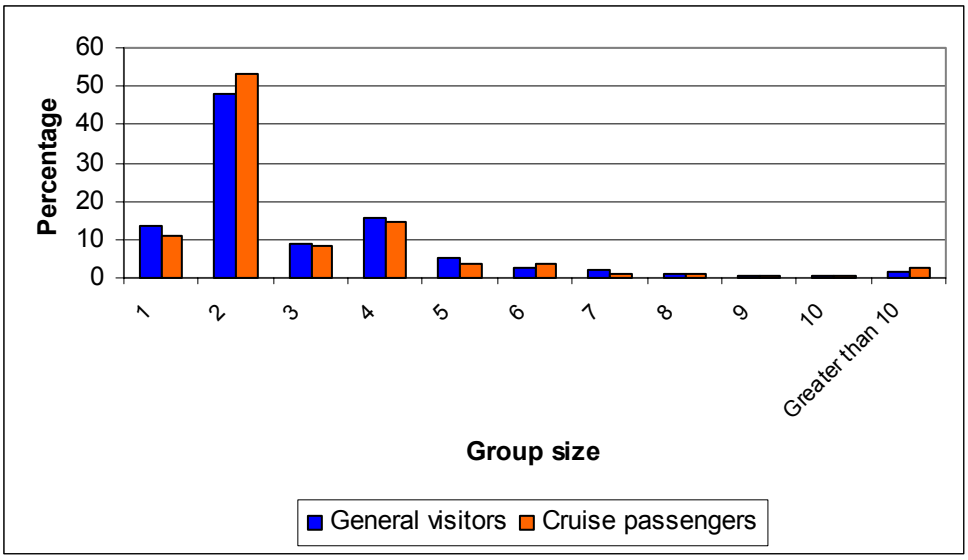
Income distributions among cruise passengers and general visitors differed, as the average income was 4.1 (slightly higher than the $50,000 – 99,999 bracket) for general visitors, which was significantly higher (Mann-Whitney U-Test; $p < 0.001$) than the 3.8 average (lower than the $50,000 – 99,999 bracket) for cruise passengers. The highest income brackets, or those making $100,000 or more, comprised 30% of the general visitor sample, compared to 24% of the cruise passenger sample. Conversely, the cruise passenger sample contained almost twice as many respondents (9%) earning less than $25,000 than the general passenger sample (5%).

Although the statistics demonstrate that general visitors were significantly more affluent than their cruise passenger counterparts, the results do not inform on expenditure patterns or behavior. While a later section does consider differences in spending in Key West, it should be noted that neither those nor these profiles can conclude on which group is *more* important to the city's economic success. Also, the data show that the most dominant income bracket, by frequency, was that of respondents earning between $50,000 – 99,999; it represented almost half, or 48%, of both samples, and its relative dominance suggests that while the higher and lower ends of the income bracket distribution between samples may vary, the majority of visitors (and thus a majority of the persons who will have expenditures) belong to the same income bracket.

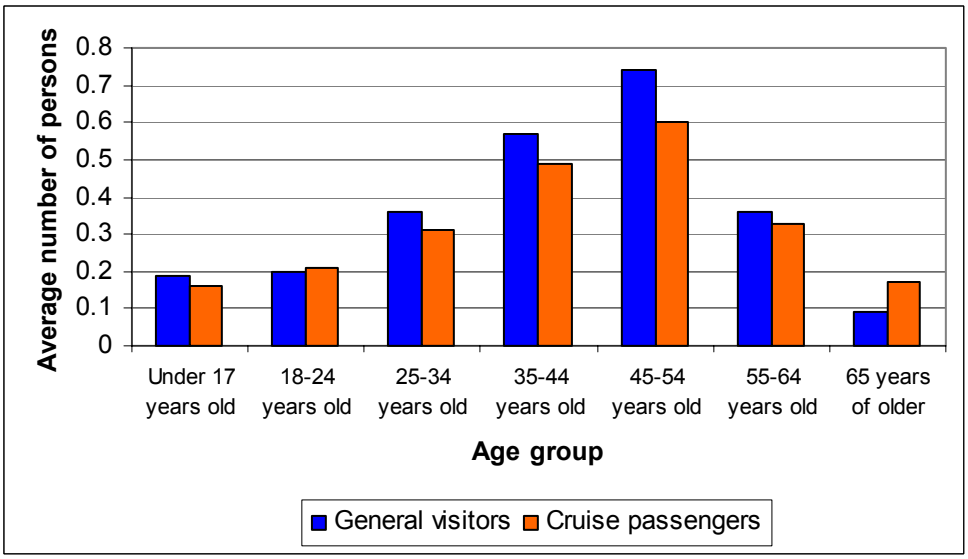
6.B.4.4 SIZE AND AGE GROUPS

Most visitors to Key West, regardless of the mode of arrival, came in groups of two (47.8% for general visitors and 53.2% for cruise passengers). The next most common group size was that of four persons, and it accounted for 15% in both samples. Also, only 14% or fewer in each sample arrived alone. For group sizes over 10 persons, cruise passengers reported a higher percentage of such groups than did general visitors (2.7% vs. 1.7%); however, the overall frequency of such large groups was low. The average group size for general visitors was 3.0 persons, and it was slightly higher for cruise passengers, at 3.1 persons.

FIGURE 6.B.11: GROUP SIZE DISTRIBUTION



FIGGURE 6.B.12: NUMBER OF VISITORS BY AGE GROUP



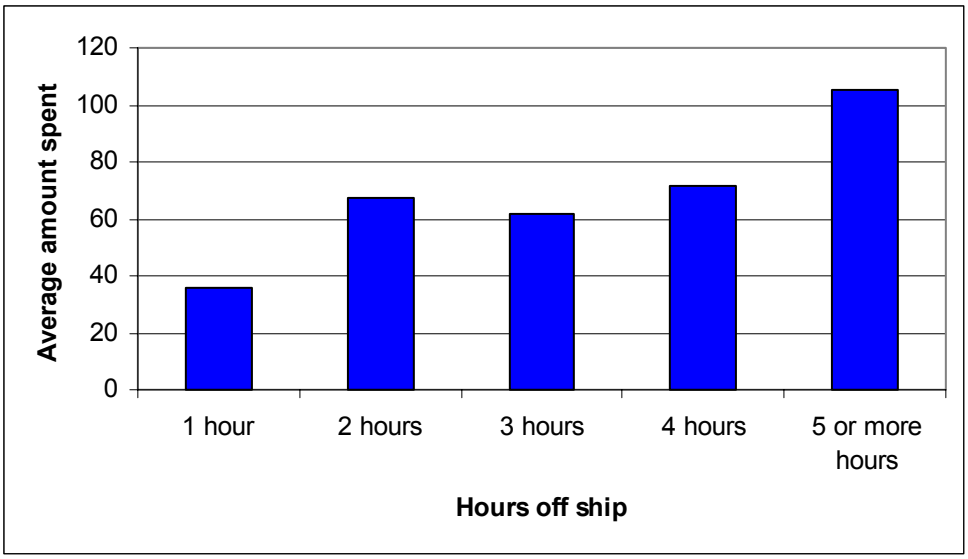
While group sizes were largely consistent across visitor types, the number of visitors by age group was different for general visitors and cruise passengers. The former included higher numbers of persons in almost all age groups except for the oldest (over 65 year old) age group; the cruise passenger sample contained an average of 0.17 persons 65 years or older, compared to an average of 0.09 persons 65 years or older in the general visitor sample. Also, while there were differences between the samples in the average size of representative age groups, both samples followed similar trends. In both samples, for example, the most common age group was the 45-54 year old group, followed by the 34-45 year old and 25-34 year old groups. Finally, the youngest age group (those person 17 years or younger) averaged less than 0.19 persons per sample. This suggests that Key West may not be an attractive destination for families with children (this is further enforced by the fact that the most common group size is that of two persons), even on cruise vessels[58].

6.B.4.5 EXPENDITURES

Expenditures refer to all the items on which visitors expended funds while in Key West, but they do not include travel costs (or what it cost the visitors to get to Key West). Thus, all tickets (airline, cruise, or ground transportation), gas, and other related costs are not included. Moreover, because cruise passengers do not stay overnight in local lodging establishments, their expenditure items are not identical to those of general visitors.

Cruise passengers spent an average of 3.1 hours (SD = 1.27) off their vessel in Key West. The range in the time spent off the vessel was from a minimum of one hour to a maximum of nine hours. The following figure shows the average amount spent as determined by the number of hours off the ship.

FIGURE 6.B.13: CRUISE PASSENGER EXPENDITURES BASED ON TIME OFF VESSEL

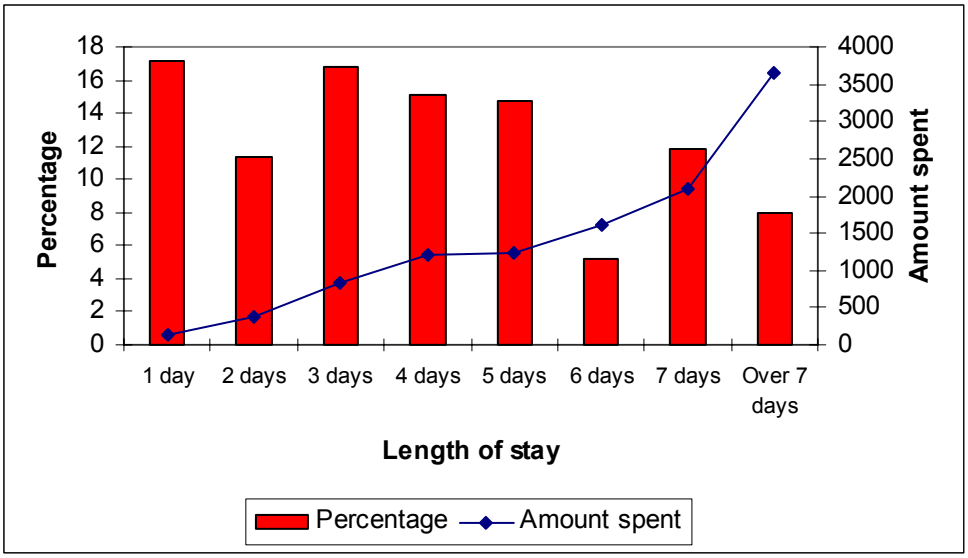


[58] There are some cruise vessel companies that cater to families, such as Disney Cruises, and these do have higher proportions of persons under the age of 17. For example, for the 15 respondents interviewed from a Disney cruise ship, the average number of persons 17 years or younger per group was 1.0; this represented the highest average of any age group from the sample. The example shows the variation within the cruise sample, and the results suggest that management can be shaped to attract different types of visitors, depending on goals.

As shown in Figure 6.B.13, cruise passengers spent more the longer they were off their vessels. On average, a respondent spending an hour off the vessel spent less than $40 ($36.13), compared to the over $100 ($105.04) spent by respondents spending five or more hours in Key West[59].

In terms of general visitors, the average length of stay was 4.3 days (SD = 2.83), and 92% of the sample reported staying for a week or less. As within the cruise passenger sample, an increase in the amount of time general visitors spent in Key West generally led to a corresponding increase in their expenditures.

FIGURE 6.B.14: GENERAL VISITOR LENGTH OF STAY AND AVERAGE EXPENDITURES



Day-trippers, or those visitors who did not stay overnight, comprised the largest percentage of general visitors (17.0%); however, this strata spent the least, averaging $141 per respondent. Among those visitors staying more than one day in Key West, the most common length of stay reported was three days (16.9% of the sample), followed by four days (15.1%), and five days (14.7%). Expenditures increased considerably for each additional day from days 1 to 4. From there, expenditures were stable until the length of stay reached 7 days and beyond. For those persons staying for over a week, the average expenditure was over $3,600 per respondent[60].

[59] As part of the questionnaire, respondents were requested to provide their group size and to identify whether the expenditure information they itemized was related to their group costs or to their own costs. Within the cruise ship sample, 81.6% provided expenditure information for group costs. Based on the number of persons in their group and whether the respondents reported group or self costs, the average number of cruise passengers for whom expenditures are reported is 2.48 (SD = 1.55). Similarly, within the general visitor sample, 79.1% of the respondents provided group expenditure costs. The average number of general visitors for whom expenditures are estimated is 2.62 (SD = 1.64). Thus, for interpretative purposes, the reported expenditures should be divided by 2.5 and 2.6 for the cruise and general visitor samples, respectively, to obtain an average, per-capita expenditure amount.

[60] As could be expected, there was considerable variation in the expenditures among respondents. For example, if one respondent is removed from the 'over 7 days' stratum, the average expenditure for that stratum drops from $3,652 to

Expenditures were also recorded by activities and items on which the funds were spent. These included a few areas in which cruise passengers did not have expenses, such as lodging, but most costs were comparable. The results are presented in the following table.

TABLE 6.B.7: CRUISE PASSENGER AND GENERAL VISITOR EXPENDITURES

Expenditure activity/item	Cruise passengers per respondent	Cruise passengers per capita	General visitors per respondent	General visitors per capita
Lodging	N/A	N/A	$546.99	$208.77
Groceries	N/A	N/A	$31.36	$11.97
Eating establishments	$5.26	$2.13	$291.95	$111.43
Drinking establishments	$3.22	$1.30	$122.99	$46.94
Ground transportation	$0.17	$0.07	$3.68	$1.40
Water excursion	$1.04	$0.42	$33.82	$12.91
Land excursion	$11.41	$4.61	$1.84	$0.70
Attractions	$5.60	$2.27	$15.35	$5.86
Clothing	$15.01	$6.07	$27.04	$10.32
T-shirt shops	$9.55	$3.86	$16.78	$6.40
Health products	$0.45	$0.18	$0.15	$0.06
Jewelry	$9.89	$4.00	$15.71	$6.00
Artwork	$1.61	$0.65	$4.86	$1.85
Souvenirs	$14.58	$5.90	$26.30	$10.04
Business	$0.24	$0.10	$1.71	$0.65
Personal	$0.00	$0.00	$0.02	$0.01
Other	$1.34	$0.54	$39.51	$15.08
Total	**$79.37**	**$32.10**[61]	**$1,169.61**	**$446.42**

Cruise passengers spent an average of $79.37/2.48 =$32.10 per trip, compared to over $1,169.61/2.62=$446.42 spent by general visitor per trip. It should be noted that expenditures varied considerably within groups, as proven by the large standard deviations for both the cruise passenger average costs (SD = $157.77) and the general visitor average costs (SD = $3,248). The large variation in expenditures shows that based on a combination of affluence, group size, and length of stay, among other factors, visitors spent within a large range. However, it is also clear that general visitors spent considerably more in Key West than did their cruise counterparts, even if only the day-trippers are compared with cruise passengers. Those general visitors entering Key West for the day reported spending less than $160 during their trip, which is still twice as much as that which was spent on average by cruise passengers. The main reason for this difference is due to the higher average amounts that day-trippers spend in eating and drinking establishments ($94 per respondent's party). Cruise passengers did not spend much on these items (less than $9 per party), most likely because they have already paid for their meals as part of their cruise vacations.

It should be noted that the $32.10 per capita expenditure total is at the high end of estimates (range $27-$32). In view of questions related to the survey's potential exclusion of expenditures for pre-paid tours purchased aboard the vessel, the $32 expenditure was determined by assigning a value of $22 per respondent who reported an opinion on a land

$2,395. The standard deviation for average expenditures for this stratum is $10,759, demonstrating the variance in the expenditure among respondents.

[61] The average here represents the high end of survey estimates (range $27.40-$32.10 per passenger).

excursion but did not state costs for the excursion. To estimate costs, the first assumption made was that the 164 respondents who reported an opinion on a land excursion, and did not state a cost, had in fact taken and paid an amount equal to the average expenditure of those who did report costs for a land excursion. The second assumption made was that all group members for whom the respondents stated costs had taken the same land excursion (and thus, their costs were included as well). The identical approach was used to determine the costs for 35 respondents who reported an opinion on a museum tour but did not state costs.

This approach likely over estimates expenditures, as not all group members necessarily would have gone on the tour, yet it is assumed that they did. Furthermore, 20.7% of the sample who reported on tour quality but reported no associated expenditures boarded tour buses at the Outer Mole Pier which do not assess fees, and thus these persons may have been providing their opinions on a free, land excursion. Additionally, such land based excursion expenditures, if pre-purchased on the cruise ship, would be discounted by the 30% fee charged for booking through the cruise ship. That adjustment would reduce the cruise ship passenger expenditure amount accruing to Key West businesses to approximately $30 per capita.. With no such adjustments the average expenditure based upon the survey data was $27.40.

The results presented in this section could be perceived as suggesting that one sector of the tourism economy is more 'valuable' (at least in terms of the average per capita contribution) than another. That is not the intent of the reporting, and more importantly, it is not accurate. As shown in the following section, tourism inputs may be better viewed as a dynamic, where positive experiences may lead to return visits, and how that erases the distinction between different visitor types. Another important aspect of the findings is that economically, cruise passengers and general visitors may fill different 'niches', with the former supporting cruise tourism industries (ex. the highest expenditures for the sample were in clothing, t-shirts, and souvenirs), and the latter spending most heavily in traditional sectors (lodging, restaurants and bars, and excursions).

6.B.4.7 PERCEPTIONS

Cruise passengers and general visitors were requested to rank a variety of natural, social, and cultural resource conditions, provide their views on the island's amenities, state their willingness to return to Key West, and to identify other tourism-related issues that should be considered. Using mainly a five-range, Likert scale (limited to two positive, two negative, and one neutral response), average visitor views were calculated and compared[62].

Previous visits and perceptions on resource conditions and amenities

Over 64% of cruise passengers surveyed had not been to Key West previously. Of the 36% who had been to Key West previously, almost half (47%) stated that the city was "better" now than it was when they last visited. Only 5.6% felt that the city was "worse" now than before.

[62] The percentages for the two positive and two negative responses have been consolidated into single positive and single negative responses. For example, in the case where 50% of the respondents reported that conditions were "better", and 15% reported that conditions were "much better", the results are consolidated into 65% of the respondents reporting "better" conditions.

By contrast, over 54% of the general visitors were repeat tourists, and among these, 68% felt that Key West was "better" now than it was when they last visited the city. Under a third, or 29%, argued that the city had not changed, and most importantly, only 2.5% believed that Key West was "worse" now than it was previously. Thus, return visitors from both samples had very positive opinions about the status of the city.

While cruise passengers and general visitors gave opinions on a variety of similar indicators and activities, there were several activities in which only very few cruise ship passengers participated. For instance, only three cruise passenger respondents reported taking a dive or snorkel trip, eight or fewer rented watercraft or went on a pleasure boat, and no cruise passengers took a charter fishing trip. This may be mainly due to the short time that the passengers spend off the cruise ships (three hours), as well as because Key West may be perceived as a shopping and cultural destination. This latter explanation is supported by the fact that 97% of the cruise passengers provided opinions on their shopping experience, almost two thirds (65.5%) commented on local bars or restaurants, over a fifth (21.7%) took a train tour, and 7% took a museum tour. This is to be contrasted with general visitor sample, of which 8.9% reported taking dive or snorkel trips, 5.2% took fishing charters, 6.5% went on a pleasure boat, and 5.5% rented watercraft. See the tables below for percentage responses by cruise passengers and general visitors.

TABLE 6.B.8: CRUISE PASSENGER AND GENERAL VISITOR OPINIONS ON ACTIVITIES AND INDICATORS

Activity/indicator	Excellent/Above average (percentage)	Average (percentage))	Less than average/poor (percentage)	Number of respondents
VISITOR INFORMATION				
1. Cruise passengers	65	18.7	16.3	887
2. General visitors	66	19	15	
TRAFFIC				
1. Cruise passengers	64.2	26.3	9.5	908
2. General visitors	55.2	30.3	14.5	897
SECURITY				
1. Cruise passengers	65.4	23.2	11.4	912
2. General visitors	66.7	27.3	6	892
HOSPITALITY				
1. Cruise passengers	84	13.3	2.7	912
2. General visitors	83.2	15.1	1.7	892
TRAIN TOUR				
1. Cruise passengers	94	4.5	1.5	199
2. General visitors	90.4	7.7	1.9	52
MUSEUM TOUR				
1. Cruise passengers	98.4	0	1.6	61
2. General visitors	90.2	8.6	1.2	82
SHOPPING				
1. Cruise passengers	79.7	15.5	5.3	887
2. General visitors	77.4	19.2	3.1	849
RESTAURANT/BAR				
1. Cruise passengers	86.3	12.6	1.1	602
2. General visitors	86.8	12.3	0.9	873
OVERALL				
1. Cruise passengers	87.3	11.5	1.2	914
2. General visitors	89.7	9.4	0.9	892

TABLE 6.B.9: GENERAL VISITOR OPINIONS ON WATER-BASED ACTIVITIES

Water-based activity	Excellent/Above average (percentage)	Average (percentage))	Less than average/poor (percentage)	Number of respondents
Dive/snorkel trip	81.8	14.3	3.9	80
Fishing charter	84.4	4.4	11.1	47
Pleasure boat	74.1	19	6.9	59
Watercraft rental	100	0	0	50

As shown in the two tables above, opinions on all indicators and activities by both samples were overwhelmingly positive. A majority of the respondents shared positive views on the information available to visitors, the traffic conditions, the level of security, and the hospitality offered. While a larger percentage of general visitors expressed dissatisfaction with the traffic conditions (14.5%) than cruise passengers (9.5%), the majority of the former group (55.4%) believed that the traffic conditions were either "above average" or "excellent".

Within the activities in which both samples participated, the opinions were also very positive. Among the cruise passenger sample, 94% or more endorsed the train and museum tours, and 90% of the general visitors agreed. However, it must be noted that only a small percentage in either sample participated in these types of tours. With the exception of the 21% cruise passenger sample participation in the train tour, all other participation totals in such tours were below 10%. Nevertheless, the high satisfaction ratings suggest that these types of excursions are attractive to both tourist types.

Shopping and visiting restaurants and bars represented the most popular activities among respondents from both samples, and the opinions were very positive. In particular, over 86% of both cruise passengers and general visitors agreed that Key West bars and restaurants were either "above average" or "excellent", compared to only 1% who disagreed.

General visitors who participated in dive or snorkel trips, fishing charters, pleasure boats, or watercraft rentals all reported positive opinions of their experiences; in fact, those who rented watercraft reported 100% satisfaction ratings. These results suggest that general visitors hold very high views on the region's coastal and marine resources and/or the operators. Other studies (Leeworthy and Wiley, 1996; Shivlani et al., 2003) have shown similar results among visitors taking part in water-based activities, and the present results add to the literature that demonstrates the divergence between socioeconomic perceptions and biophysical data on resource conditions.

Overall, the satisfaction ratings for both samples reinforced the findings for individual indicator and activities. Tourists greatly enjoy their experience in Key West, regardless of whether they are cruise passengers spending an average of three hours on the island or longer-term visitors spending an average of four days. The approval ratings, which are close to 90% for both groups, suggest that marketing and management strategies are both highly successful; that is, respondents' opinions show that the marketed, or expected, aspect of Key West is being met by their experiences, on how tourism is being managed. Overall, findings suggest the following:

a. There are no spillover effects from the cruise passenger sector onto the general visitor sector;
b. Major visitor indicators (visitor information, security, congestion, and hospitality) all rank very highly;
c. There are high rates of participation in the traditional economic activities from both tourism sectors, namely shopping at the different vendors; cruise passengers don't use restaurants
d. Visitors to Key West generally experience the type of vacation that they had planned (if not better);
e. Issues such as resource degradation or social crowding are not prevalent in the visitors views[63].

Views on return visits

When asked whether they would return for another cruise ship trip to Key West, 16.8% of the cruise passengers surveyed stated it was unlikely. Another 20.3% stated that it was not likely or unlikely (neutral) that they would return. However, a majority, or almost 63%, stated that they would return to Key West on another cruise ship trip. When the same sample was asked on the likelihood of returning for a longer, non-cruise ship trip, a larger percentage of respondents (68.3%) stated that they would. The mean willingness to return on a cruise ship (3.56) was statistically lower than the mean willingness to return on a longer, non-cruise ship trip (3.66) (Mann-Whitney U-Test; $p < 0.05$), suggesting that cruise passengers now exposed to Key West were more willing to take a longer, non-cruise ship trip for their next visit to the island than returning via a cruise ship. This finding is consistent with another study conducted by the Monroe County Tourism Development Council (TDC, 2003) that found that cruise passengers were willing to return for longer-stay visits to Key West.

Among general visitors, a large percentage (84.7%) stated that they would return for another longer-stay vacation. Only 6.5% would not. Also, the summer general visitor sample was asked whether they would return via a cruise ship vacation, and less than 34% said that they would. The results suggest that those who make longer, non-cruise ship trips to Key West are more likely to return to the island on similar trips, rather than returning as cruise ship passengers. Whether this is a characteristic of the general visitor sample (that is, whether these persons represent a segment of the population least likely to take a cruise trip to Key West) or whether the findings result from the sample's perception that only longer trips are worth taking to Key West cannot be ascertained from the present study.

Most and least appreciated aspects of Key West

Cruise passengers and general tourists were allowed to provide a maximum of two responses on what they liked most and least about their trip to Key West. Their replies were then sorted into larger categories, which are presented in the following graphics.

[63] In fact, it could be argued that the cruise passengers may be the wrong target group from whom to ask questions about spacing or crowding, especially because their visit to an island as small as Key West may still represent an emancipating experience compared to ship conditions.

FIGURE 6.B.15: MOST APPRECIATED ASPECTS OF KEY WEST

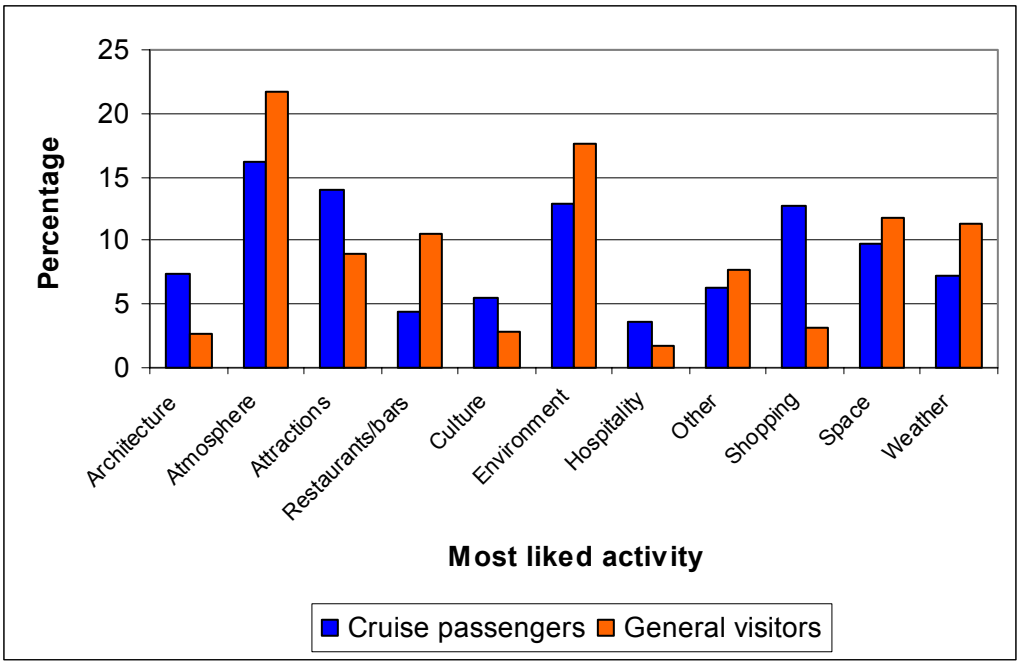
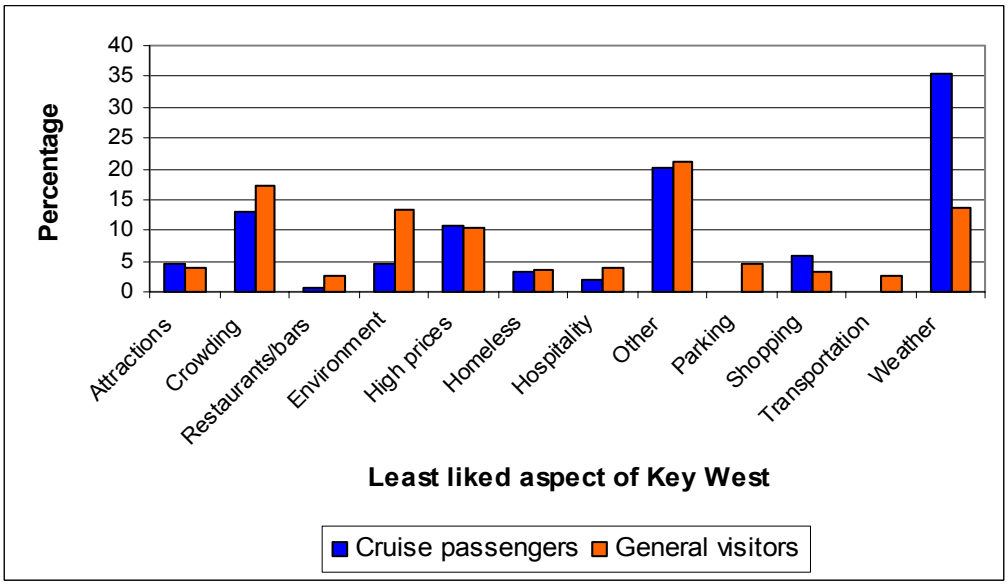


FIGURE 6.B.16: LEAST APPRECIATED ASPECTS OF KEY WEST



As shown in the two graphics above, cruise passengers and general visitors had differing opinions on what they appreciated and did not like about Key West. Cruise passengers, for instance, were more likely to report having enjoyed their shopping experience (13%) than were general visitors (3.1%). Also, cruise passengers appreciated the architecture and attractions more than did their general visitor counterparts, but aspects that were most related to long-term trips – such as the atmosphere on the island, the quality of the eating

and drinking establishments, and the status of the natural environment – were all more often reported by general visitors than by cruise passengers.

Aspects least liked by both groups consisted of the weather, high prices, and congestion. Cruise passengers were almost three times more likely (35.4%) to complain about the weather than general visitors (13%), and this could be partly due to the fact that the weather during the sampling periods did include very warm summer weather with two hurricane threats and a cooler than average winter session punctuated by several cold fronts. While general visitors may have experienced a wider range of weather conditions, cruise passengers tended to report on the weather as they experienced it during their brief stay. Crowded conditions ranked relatively high among both samples, 13% for cruise passengers and 17.3% for general visitors, suggesting that while respondents did not report such issues in their evaluation of Key West as a tourist destination, 13% or more of them were dissatisfied with the crowding conditions, traffic levels, and space offered. Another complaint consistent across samples was the predominance of high prices, or low value, in Key West. One out of each 10 persons who provided an opinion argued that Key West is too expensive. Finally, a larger percentage of general visitors (13.4%) complained about the condition of the environment than did cruise passengers (4.6%); this difference is most likely due to the amount of time that the former sample spent interacting with the environment, as proven by the fact that a much larger percentage of general visitors undertook water-based activities.

Respondents from both samples provided a variety of suggestions on how to improve tourism in Key West. Both groups (34% of general visitors and 31% of cruise ship passengers) agreed that services on the island need attention, which include improvements to visitor information, public transportation, more public restrooms, cleaner streets, etc. Almost 11% of cruise passengers and 15% of general visitors complained that costs were too high, recommending that tourist industry lower prices.

6.B.5 Visitor Survey Summary

Many of the conclusions presented in this section of the report have already been discussed in the earlier sections, but these are repeated here for the sake of completeness. It should be noted that the conclusions are general to the sample level, and that additional analyses could provide stratum-level resolution. Thus, if it were deemed important to compare airline-based visitor information with that of other general visitors and/or cruise passengers, then the data required for that stratified analysis exist within the datasets.

6.B.5.1 COMPARABILITY AND APPLICABILITY OF DATA COLLECTED

The survey design and implementation were both successful in maximizing data collection and maintaining data quality. Compared to other studies conducted in the region with cruise passengers (Leeworthy and Wiley, 2003; TDC, 2003), a larger number (919) of cruise passengers was surveyed in the present study. While the Leeworthy and Wiley study did not focus on cruise passengers (completing only three cruise passenger surveys), the total number of surveys completed by that study (1,210 surveys completed from June 2000 to April 2001) is similar to the number of general visitor surveys completed under the present effort (903 surveys). The TDC study, conducted over August 1-6, 2003, resulted in the completion of 161 surveys from passengers from seven ships. By contrast, the present study obtained information from passengers from 21 ships over 59 sessions spanning two summer (July and August 2004) and two winter (January and February 2005) months.

The TDC results closely tracked the current study's findings. As reported in the earlier results, most respondents rated Key West very highly as a destination, a majority of cruise passengers stated that they would return to Key West for a longer visit, and over half of those surveyed were first-time visitors. Unlike in the TDC study, however, the present study collected more detailed statistics on expenditures, finding that average expenditures (though subject to much variation) totaled almost $70 per respondent (or over $27 per capita). While the current findings are in agreement with the TDC study's results that place souvenirs and gifts as the most commonly reported expenditure, the second most reported activity from the TDC study – land-based activities – was not as popular in this study. The reason for this may be due to the limited nature of the TDC study, which occurred in one of the warmest months (August) in the region, and whose sampling sessions lasted only five days. Thus, the TDC findings, with respect to activities and expenditures, are biased towards summer months and do not necessarily provide an inter-seasonal composite of cruise passengers.

Finally, in terms of data collected, it is acknowledged that while summer and winter months were sampled under the current study, they did not include the so-called 'peak' months. For example, due to contract period limitations the study could not sample visitors during March, which is when winter lodging rates tend to peak in Key West, mainly due to spring break. Also, the types of tourists that visit the city in March may be considerably younger than the study averages, and they may have different opinions and participate in alternate activities. Similarly, the study did not sample visitors in October, the last week of which is very popular due to the October 31st celebration of Fantasy Fest. As in March, lodging rates are amongst their highest, and the visitor types may be different than those encountered during the rest of the year.

Therefore, it is important that the conclusions derived be interpreted with the understanding that they do not (nor are meant to) represent an overall average for the entire year. Instead, the stratified sampling design and its results should be mainly used to inform on the differences in visitor types over the sampling period, which includes both respondents over summer and winter (or off-peak and peak) seasons.

6.B.5.2 DOMICILES, EXPENDITURES AND INCOME

There were several differences in the domiciles of cruise passengers and general visitors. First, cruise passengers were comprised of a more diverse set of US residents and foreign tourists than the general visitors. Second, more Florida and other southeastern and gulf state residents were represented in the general visitor sample than in the cruise passenger sample, suggesting that proximity may play a larger role in attracting those who drive or fly to Key West than those who arrive as part of a larger cruise. Third, the western states did not provide many cruise passengers or general visitors; the findings suggest that there might be sufficient substitutability among western vacation resorts and cruises, coupled with the longer travel distance, which may limit visitation[64].

The study determined that there were significant differences between the amounts spent by cruise passengers and general visitors, and findings also suggested that expenditures tend to increase with the amount of time spent in Key West. Expenditure types revealed that the

[64] However, it is acknowledged that marketing may play a role as well, in that limited advertising of the region in western states may lead to lower exposure and consequently fewer visitors.

two groups spend on different items and activities, with cruise passengers spending mostly on shopping-type expenses, whereas general visitors spent on a variety of items, including lodging, meals, and drinks. However, when lodging, meals, and drinks are removed from the list of general visitor expenditures (as they need to be, in order to be able to compare both groups, since cruise passengers have already paid for these items as part of their cruise fee), it is clear that both types of visitors had very similar expenditures. Cruise passengers spent the most on clothing, followed by souvenirs, jewelry, T-shirt shops, and attractions. General visitors spent the most on water excursions, followed by clothing, souvenirs, T-shirt shops, jewelry, and attractions.

These results suggest that, in terms of expenditures, the main differences between groups are a result of having incurred expenses prior to the trip (as in lodging and meals for cruise passengers) and the amount of time spent in the location, rather than being dictated necessarily by visitor type and their preferences[65].

Income data showed that on average general visitor respondents were more affluent than their cruise passenger counterparts. However, the data also showed that the largest percentage of respondents (i.e. the largest spending block) in both groups, comprising almost half of each sample, was that which earned between $50,000 and $99,999. Thus, even with the difference in higher end income distributions between the samples, a bulk of both groups displayed income parity and would thus have similar, economic impacts (based on spending power, that is).

6.B.5.3 VISITOR PERCEPTIONS

All visitor types, regardless of arrival mode, reported very high satisfaction ratings. These findings were similar to the TDC study results, in which 85% of respondents rated Key West 4.33 out of 5 as a place to visit (TDC, 2003). However, because these perceptions represent a 'snapshot' rather than trends and also because a majority of respondents in the cruise passenger sample were first-time visitors, it is difficult to conclude whether visitor satisfactions are based on complete information. For example, Leeworthy and Wiley (1996) found significant differences among repeat visitors in their views on uncrowded conditions, condition of roads and streets, water clarity, and value for the price in Monroe County; all means declined over a five-year period.

Notwithstanding the lack of trend data, other visitor perceptions reinforced the satisfaction ratings. Among the repeat visitors (36% of cruise passengers and 54% of general visitors), a majority believed that the city is better now than it was during their last visit), and 68.3% of cruise ship passengers and 84.7% of general visitors stated that they would return for a non-cruise ship visit. These results suggest that visitor experiences were generally very positive (further proven by the high indicator and activity ratings), and that as presently managed, there are no spillover impacts from one tourist sector onto another.

[65] It could be argued that the preferences are embedded by the type of visit that the tourist selects, in that a cruise passenger selects for certain activities, based on the person's knowledge of the amount of time that the cruise vessel will dock in a certain location, upon paying for the cruise. Conversely, a tourist making a longer trip may have other preferences. Notwithstanding that basic difference, the data collected from the present study shows that, regardless of travel mode, tourist types show consistent spending patterns. This suggests that a strategy by which to improve spending in what may be considered 'non-cruise' sectors may be increasing the amount of time that passengers spend on the island.

However, tourists did complain about crowding, congestion, and traffic issues when providing information on what they liked and disliked about Key West. But, the important result is that these complaints did not affect their opinions on the important indicators (such as visitor information, security, and overall experience, among others) and on activities in which they participated, as well as their stated willingness to return.

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7: MANAGEMENT STRATEGIES

Currently, it is estimated that 16.4% of the city's general fund revenues are derived from cruise ship passengers. Despite the economic impact of the industry, the more difficult quantification is on the non-tangible quality of life issues that are a concern to residents. All heavily impacted tourism destinations affect the local quality of life. Cruise ship activity — with *an average cruise ship bringing in 2,021 passengers into Key West per call* — can be particularly disruptive given the sudden influx of large numbers of day visitors. In Key West, those impacts are intensified as the city with a million annual cruise passengers (2001-2002 figures) is the most active cruise ship destination in the U.S., and impacts occur on a 4.2 square mile setting with little option for retreat.

The cruise industry can best limit its impacts by either capping the number of passengers visiting a given island at any one time, or by charging a higher passenger head tax with this increased revenue used to mitigate the effects of large numbers of cruise passengers, such as improved infrastructure and habitat restoration projects. While cruise fees are often coordinated at the national level, particularly for countries with only one port, more coordination of head taxes at the regional level (e.g., CARICOM for Caribbean states) has been called for to increase tourist revenue remaining within each island state.

Based upon assessments conducted as part of this Study, and in view of those management strategies outlined for review in the earlier settlement agreement on cruise ship activity, presented in this section are potential cruise ship management measures for consideration by the City of Key West. The issue of whether to encourage or discourage cruise ship activity is a policy issue to be determined by local officials with public input. Additionally, this Study has assimilated and examined cruise ship policies at other heavily impacted ports of entry to examine restrictions on vessels and passenger disembarkations, as well as fees used to recoup both public service requirements and mitigate other local impacts. They are presented herein for consideration also.

Of the five management measures identified in the settlement agreement, and queried on the Resident and Business survey, the **strongest support was for tighter controls to assure that best management practices are being performed** with a supportive rating by residents of 87.1% and 76.8% for businesses.

Support for increasing tariffs including disembarkation fees was high also, with a favorable resident response 76.8% and a business rating of 56.5%.

The mean survey responses for both Residents and Business presented below — on a scale of 1-5 (with 1=very inappropriate, 2=inappropriate, 3=neutral, 4=appropriate, and 5=very appropriate) — indicate **a mixed response for black out days during peak tourism** and **increasing the minimum length of stay of cruise ships**; with **residents supporting the imposition of black out days; and businesses showing support for increasing the minimum length of stay of cruise ships.**

TABLE 7.:1: SURVEY RESPONSES ON MANAGEMENT MEASURES	RESIDENT Mean	BUSINESS Mean
Limitations/ Quotas on the Number of Port Calls/Passengers	3.63	3.01
The Imposition of Black Out Days During Periods of Peak Tourism	3.49	2.91
Increasing the Minimum Length of Stay of Cruise Ships	2.95	3.31
Increasing Tariffs (Including Dockside and Disembarkation Fees)	4.02	3.51
Tighter Controls to Assure that Best Management Practices are Performed	4.33	4.05

When asked the **proper level of tourism activity and cruise ship activity**, **opinions were mixed** as indicated in the chart below. On a scale of 1-5 (1=much less, 2= a little less, 3=at the current level, 4=a little more, and 5=much more), **residents wanted less of both**, with a mean rating of 2.76 for tourism activity and an even less favorable rating for cruise ship activity of 2.26. **Businesses surveyed indicated a more positive rating of both**, with tourism rated at a mean of 3.73 and cruise ship activity rated at 3.12.

TABLE 7.2: SURVEY RESPONSES ON PROPER LEVEL OF TOURISM AND CRUISE SHIP ACTIVITY	RESIDENT Mean	BUSINESS Mean
Tourism Activity	2.76	3.73
Cruise Ship Activity	2.26	3.12

When *businesses* were asked the **effect of tourism and cruise ship tourism on their business operations**, **the mean response for tourism was positive** at 4.66. (1= significantly negative, 2= moderately negative, 3=neutral, 4= moderately positive, and 5=significantly positive). **Cruise ship tourism rated lower, however still positive**, with a mean response of 3.5.

Focusing specifically on cruise ships, *residents* were surveyed on the impact of Cruise Ships on quality of life on various issues, **and the most unfavorable ratings** (ranked as above 1-5), **were for environmental quality, and crowding** with mean ratings of 2.10 and 2.50 respectively. **Less than desirable ratings were given for public amenities, ambiance/local character, and undesirable business locations.** To determine what an undesirable business establishment was, residents were asked to fill in the blank. By far the most often mentioned type of establishment mentioned was t-shirt shops that are prevalent on Duval Street.

Strong negative ratings were given from both businesses and residents, when asked whether they would be willing to **pay higher taxes or fees to offset a loss in a tax base** from curtailed activity regarding both tourism and cruise ship activity.

TABLE 7.3: SURVERY RESPONSES PAYING HIGHER TAXES	RESIDENT--*YES*	RESIDENT--*NO*	BUSINESS--*YES*	BUSINESS--*NO*
Tourism	25.2	74.9	16.3	83.7
Cruise Ship Activity	36.4	63.6	22.5	77.5

In consideration of the above, the following measures are presented for consideration:

7.A Limitations on port calls and "black out" days so that cruise ships would not land in Key West when tourist activities are already pronounced, such as, but not limited to, Fantasy Fest and New Years Eve. Impacts such as pedestrian and vehicular traffic amounts and patterns, among other things, shall be considered in this analysis.

Some destinations have imposed restrictions with using a carrying capacity approach. Much of the reason for development of the cruise tourism sector was to provide activity in the shoulder months to extend the high season. **Differential seasonal pricing** and capacity constraints such as **limiting the number of ships per day** are worthy of consideration and are analyzed below.

Discussions with the TDC and Chamber of Commerce indicate that peak visitation occurs during major events such as "Fantasy Fest", "Spring Break", the "Key West Regatta", etc. In order to analyze the extent of economic impact which may arise from eliminating cruise ship activity during these peak periods, future cruise ship schedules were reviewed in association with the event calendars for 2005-2006. An illustration of the economic impacts of such black out periods is completed here by looking at the black out days for "Fantasy Fest".

Fantasy Fest is scheduled to occur October 21-30, 2005. Currently during the period, 11 cruise ship port calls are scheduled (7 at pier B, 3 at Outer Mole, 1 at Mallory Dock). Based upon the economic analysis conducted herein, **the average cruise ship brings 2,021 passengers into Key West per call** (Pier B average = 2,249, Outer Mole average = 2,103, Mallory Dock average = 1,208). Combining expenditures by cruise ship passengers and crew members with the purchase of needed inputs for the ships and passenger disembarkation fees, **each port call represents an average of $118,361 in direct economic activity to Key West businesses and government. Excluding the 11 scheduled port calls during the 10 days of Fantasy Fest would remove $1,301,976 from local businesses and government, resulting in an economic loss of under 10% in the Key West economy.** To view this in context, during the same period, Key West lodging is reportedly at an average 82% room occupancy (range 61.7%-98.1%) with an average room rate of $197.84 (range $132.22-$326.38). Using census data for number of rooms available during the period (4,981), the overall occupancy rate of 82%, and the average lodging rate during the period; the lodging revenue per day during the event is estimated to be $808,062, or $7,272,555 over the course of the 10 day event – representing 45% of non-cruise ship tourist expenditures. Imputing additional tourist expenditures for food, entertainment, etc., as developed in this study, yields a total of $16,161,233 in non-cruise tourist expenditures during the period. Additionally, out of town "day trippers" add to the tourist expenditure accounting, as well as the crowding in the Old Town area.

Given the variability in room demand during the 10 day event, a more specific black out strategy may be more optimal in terms of minimizing crowding with the least economic loss. For example, the hotel occupancies on the two weekends during the event averaged 95% occupancy. Sponsors of the Fantasy Fest claim 70,000 participants will converge on the City for the "Captain Morgan Fantasy Fest Parade". Hotel occupancy in conjunction with the parade during the final weekend was reported at 99.7% during the 2004 event. While

extensive efforts are made to provide parking such as shuttle buses from Key West High School, and other areas (and limit the automobiles venturing into Old Town), such sheer numbers clearly defy traffic management practices. Additionally, while the wholesale "black-out" or elimination of cruise ships during the period would not eliminate the adverse crowding effects of the festival, precluding the calling of cruise ships during the weekend of the parade would relieve some of the adverse pressure. For the upcoming 27th Fantasy Fest, one cruise ship is scheduled at Pier B on Saturday of the Fantasy Fest Parade. Excluding that port call would reduce direct economic activity by an estimated $118,361, and eliminate an estimated 2,249 passengers and 570 crew members disembarking at the time of the peak event, providing some relief to the crowding in the down town area.

TABLE 7.4: PROJECTED CRUISE SHIP ECONOMIC IMPACTS —CITY OF KEY WEST —KEY EVENTS 2006

Event	# Ships	# Pax	$ Exp by pax	# Crew	$ Exp by crew	$ Exp by ship	$ Disemb. fee	*TOTAL*
Fantasy Fest 10/21-30/06								
Pier B	7	15,743	$503,776	3,990	$211,470	$66,906	$40,302	$822,454
OM	3	6,309	$201,888	1,710	$90,630	$28,674	$67,065	$388,257
M	1	1,208	$38,656	570	$30,210	$9,558	$12,841	$91,265
Total during event	**11**	**23,260**	**$744,320**	**6,270**	**$332,310**	**$105,138**	**$120,208**	**$1,301,976**
Key West Regatta 1/16-20/06								
Pier B	4	8,996	$287,872	2,280	$120,840	$38,232	$23,030	$469,974
OM	2	4,206	$134,592	1,140	$60,420	$19,116	$44,710	$258,838
M	1	1,208	$38,656	570	$30,210	$9,558	$12,841	$91,265
Total during event	**7**	**14,410**	**$461,120**	**3,990**	**$211,470**	**$66,906**	**$80,581**	**$820,077**
Spring Break (wk 2) 3/25-4/2/06								
Pier B	6	13,494	$431,808	3,420	$181,260	$57,348	$34,545	$704,961
OM	4	8,412	$269,184	2,280	$120,840	$38,232	$89,420	$517,676
M	3	3,624	$115,968	1,710	$90,630	$28,674	$38,523	$273,795
Total during event	**13**	**25,530**	**$816,960**	**7,410**	**$392,730**	**$124,254**	**$162,487**	**$1,496,431**

Other curtailments could include:

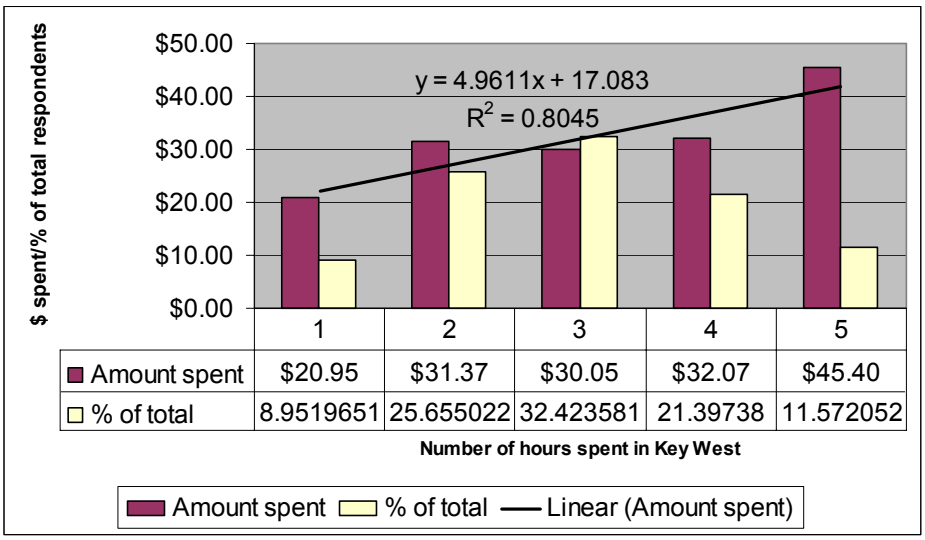
- Limit the total number of passengers disembarking, by limiting the number of ships that may dock per day.
- Limit the size of ships that may dock.
- Prohibit ships from docking on certain Sundays or holidays such as in Bermuda.

7.B: Practices such as increasing the minimum length of stay of cruise ships, increasing passenger spending, passenger management, increasing tariffs (including docking and disembarkation fees), berthing of small cruise ships, or other appropriate measures to maintain and increase revenues while reducing impacts of cruise ships.

Clearly, methods of *increasing the cruise ship passenger's length of stay* while visiting Key West would add economically to the local businesses and the City. It should be reiterated however, that the resident survey gave the least support to this management option, and the business community's support for this was only slightly above neutral. In view of this, fewer ships with longer stays may well balance out in terms of economic impact.

Statistical evidence does suggest that a stay beyond four hours will provide greater economic returns to Key West businesses. **The average time spent off the ship was 2.8 hours**, with 80% spending between two and four hours. Over 13% spent only an hour off the ship while 0.6% spent as much as eight hours in Key West.

As the chart below shows, the difference between the expenditures among those who spent four hours or less, compared to those who spent five or more hours is statistically significant. Specifically, **average passenger spending grew over 50% when passengers increased the length of stay from 3 to 5 hours.**



	1	2	3	4	5
Amount spent	$20.95	$31.37	$30.05	$32.07	$45.40
% of total	8.9519651	25.655022	32.423581	21.39738	11.572052

Breaking down the sample among those who stayed five or more hours, it is found that those who visited Key West for five hours spent an average of $45.40 per passenger. Those who were in Key West for four hours or less spent an average of $29.74 per passenger.

There is a significant disparity between the hours during which the cruise ships are scheduled to be in port, and the typical amount of the port call that passengers spend actually off the vessel in Key West. Indicative of the lengths of port calls in today's cruise ship schedule, the following is a list of cruise ships surveyed during the summer surveys.

TABLE 7.5: CRUISE SHIP'S SURVEYED DURING AUGUST 8-22, 2004

Date	Ship	Dock	Time	Time in Port
8/8	Zuiderdam	(B)	800-1800	10 hours
8/9	Jubilee	(M)	700-1500	8 hours
8/10	Fascination	(B)	730-1400	6.5 hours
8/11	Grandeur	(B)	800-1800	10 hours
8/15	D. Magic	(B)	1130-2215	10.75 hours
8/16	Grandeur	(B)	700-1400	7 hours
8/17	Enchantment	(B)	700-1400	7 hours
8/17	Rhapsody	(B)	1545-0100	9.25 hours
8/18	Grandeur	(B)	800-1800	10 hours
8/18	Jubilee	(M)	700-1500	8 hours
8/19	Majesty	(B)	815-1800	9.75 hours
8/20	Century	(B)	700-1700	10 hours
8/22	Zuiderdam	(B)	800-1800	10 hours

An evaluation was conducted to look at potential lags in a vessel clearing into Key West, to see if there was an administrative issue that could partially explain the difference between average the port call. The average reported port call was just less than 9 hours for the ships surveyed (8.85 hours, range 6.5 hours-10.75 hours). Knowledgeable sources indicate that when vessels arrive into Key West from a foreign port it typically entails at least 2.5 hours to clear the vessel before allowing any disembarkation. The same sources indicate where the vessel is coming in from another U.S. port the disembarkation may occur "almost immediately". Similarly there is an approximate 30 minute deadline prior to departure for the passengers to be back on the vessel. *Taking these two factors into account, for vessels arriving from foreign ports, the posted port of call schedule should be reduced by approximately 3 hours to arrive at the potential time passengers may be off the vessel in Key West.* Of the cruise ships surveyed during 2004 and 2005, 28% were entering Key West from non-U.S. ports. 72% of the cruise ships surveyed had Key West as its first port of call.

A number of explanations have been offered to explain the reported brevity of passenger visits in Key West. These include the fact that it is the first port of call, and passengers are saving money for later port calls where there is more extensive duty-free shopping, more attractive tours, etc. One observation can be made from the schedules noted above; that is, Key West is an early morning port of call typically, and perhaps passengers just embarking on a cruise ship vacation do not desire early morning activities having spent their first night of the cruise on board a luxury passenger vessel. In contrast, one of the most common comments from cruise passengers surveyed was that they suggested "longer stays" or "more time in the city".

Based upon management measures implemented at other ports, increased spending could be targeted in several ways:

- Require ships to suspend on-board entertainment and activities while in port to encourage more people to leave ship.
- Require cruise lines to use local agents for cruise ship organized shore excursions and activities. A maximum service charge for museums, tours, and other local activities sold on ship would be of benefit to area merchants.
- Require restocking of supplies from local companies, although Key West is often an early port of call so that restocking requirements are typically low.
- Develop more sightseeing attractions and entertainment activities for cruise passengers and development of a calendar of cruise-ship visits for distribution to all taxi drivers, hoteliers, and interested parties.
- Focus upon targeted promotion aimed at improving and expanding the proportion of cruise passengers that return to the destination as overnight guests. The cruise passenger surveys clearly indicated the opinion that improved tourism literature and guides to the destination for cruise passengers was needed. Most cruise ship passengers rated Key West very highly as a destination, 68.3% of cruise ship visitors stated that they would return for a longer, non-cruise ship trip
- Attract more upscale, luxury cruise lines, encouraging longer shore stays for these ships with higher-income passengers.

7.C: Increasing tariffs including disembarkation fees was strongly favored by residents, ranking second highest among the five management possibilities provided, and businesses favored this only slightly above neutral.

In consideration of a fee increase***,*** the legal issue of limiting the pricing of such fees to actual cost of providing the access makes completely evaluating the question problematic.

As shown in this analysis, from an operating cost standpoint, the revenues from cruise ship passenger disembarkation and other fees appear to cover the City's operating costs associated with accommodating the cruise ships and their passengers. Cruise ship revenues currently provide 14.0% of the city's budget (FY2003-04). Netting out port operations and other attributable city expenses, the **fiscal balance for cruise ship activity ranges from $1.4 to 1.8 million. or $3,225-$4,147 per ship during that fiscal year.** Absent in this however, is any calculation of the capital costs of the access infrastructure. It is likely that those estimates, when developed, will provide **a basis for increased tariffs.** Cruise ship fees should represent a full cost accounting. Components of the fee structure should include:

- port operations,
- port security, and
- non-port related public services.

In addition, the fee structure should address associated capital and environmental costs, and should be fully recoverable with periodic price adjustments. The City must remain

competitive within the region so that price gouging is not an option. Still, the City must assure that the revenue stream from cruise ship activity covers fully-related expenses. Failure to address basic infrastructure needs will detract from the quality of life for residents and the quality of the recreation experience for tourists.

All fees should be indexed annually for overall increasing price levels.

Port Development Fee – A capital fund has been established with the Navy for the Outer Mole Pier with 40% of disembarkation fees allocated to a capital improvement. *A similar fund for improvements and maintenance at Mallory Pier or other facilities* that may be needed at a future date should be established.

Infrastructure Fund – For non-port related infrastructure, including in particular transportation infrastructure, a *capital improvements fund* should be established. Transportation issues were frequently identified by each of the interest groups including congestion, road and sidewalk improvements, and alternative transportation needs. Levels of service for basic infrastructure have declined with tourism expansion. Improvements including the prospect of turning Duval Street into a pedestrian way benefit the tourist industry as well as residents and capital costs should be allocated equitably with tourists including cruise ship tourists meeting an apportioned share of those capital costs.

Environmental Conservation Fee – Environmental conservation is critical to both residents and the tourism sector. Deterioration of environmental quality has economic cost that bears compensation. Tourism, including cruise ship tourism, should provide tangible support for environmental protection and enhancement.

Differential fees are appropriate, given the private status of Pier B, and the use of Navy facilities at the Outer Mole Pier, where a capital fund has been established.

During 2004, Pier B was responsible for two-thirds of the passengers entering Key West, but was the source of only 1/3 of the revenue to the City for disembarkation fees. The disembarkation fees collected at Pier B averaged $2.56 per passenger or 25% of the $10.63 fee charged at Mallory and the Outer Mole.

Consider implementation of an increase in the existing disembarkation fee. Most cruise destinations charge a head tax. As seen in the following table, such taxes and passenger volume incentives vary widely.

TABLE 7.6: CRUISE SHIP PASSENGER HEAD TAX RATES ANALYSIS

Antigua/Barbuda	$7.50 * (Incentives to $6.00)
Aruba	$3.50 * (Incentives to $2.00)
The Bahamas	$15.00 * (Incentives to $7.50)
	(2nd Port is Free)
Barbados	$6.00
Belize	$5.00
Bermuda	$60.00 (plus $12- $20 per pax /night low - high season)
Bonaire	$10.00
B.V.I.	$7.00 * (Incentives to $2.00)
Cayman Islands	$12.22 (Seasonal) $10.27 (Year-round)
Costa Rica	$2.50
Curaco	$3.50 * (Incentives to $1.75)
Dominica	$5.00 * (Incentives to $3.00)
Dominican Republic	$1.00
Grenada	$4.50
Guadeloupe - Point-a-Pitre	$1.85
Jamaica - Ocho Rios	$15.00 * (Incentives to $6.50)
Montego Bay	$13.00 * (Incentives to $6.50)
Martinique	$0.00
Mexico - Cozumel	$3.85
Norfolk	$6.50
Nicaragua	$2.00
Panama	$4.50 * (Rebates up to $12.00)
Puerto Rico - San Juan	$10.30 * (Incentives to $8.50)
St. Kitts	$5.00 * (Incentives to $3.50)
St. Lucia	$6.50 * (Incentives to $6.00)
St. Maarten	$5.00
St. Vincent & the Grenadines	$6.00
Trinidad & Tobago	$6.00
U.S.V.I. - St. Thomas	$7.50 (Fixed until 2006)
St. Croix	$0.00 (Fixed until 2006)
Port of Houston	$4.00 (In transit)
Port of New Orleans	$3.50 (In transit)
Port Canaveral	$5.28 (In transit)
Port Everglades	$6.62 (Intransit)
Key West	$10.00
Miami	$7.25 (In transit)
Norfolk	$6.50
Palm Beach	$4.00 (In transit)
Tampa	$5.75 (In transit)

Source: FCCA, Thomas J. Murray & Associates, Inc.

One rationale for increasing the disembarkation fee is seasonal tourism demand, which given its variance suggests a **seasonal pricing approach**.

According to resident and visitor surveys and public meetings conducted as part of this study, crowding at peak seasons and events was a critically important cruise ship related issue to residents and businesses. In looking at a fee structure to mitigate against this crowding, there is a logical basis for adopting the *seasonal pricing approach as used by Key West's lodging sector.* For example, the lodging sector typically prices accommodations differently during the two periods of June-November ("low season") and December-May ("high season"). For 2004,

the average hotel room rate was $124.09 during the "low season' and $156.51 during the "high season". For example, adopting a similar demand pricing approach for cruise ships would result in a "low season" disembarkation fee at Mallory and Outer Mole Piers of $10.63 and a high season fee of $13.91 ($2.56/$3.35 respectively for high and low seasons at Pier B), **leading to an overall increase in disembarkation fee revenue to the City of 30.9% during the peak demand months.**

7.D: The use of best management practices regarding dockside cleaning.

The ships are currently practicing standard best practices relative to dockside activities such as water use and cleaning. Cruise lines that visit Key West practice self-imposed waste management policies that are more stringent than the standards in the State-industry Memorandum Of Understanding (MOU). Follow the Environmental Best Practices Committee recommendations. The Committee is currently investigating the feasibility of requiring mandatory pump out for cruise ships in Key West. The engineering and waste treatment aspects have yet to be resolved.

7.E: An assessment of the impacts of cruise ship activities upon public amenities, including recreational facilities and public waterfront access.

The results of the cruise passenger surveys conclude that passengers are not significant users of land and water tours in Key West. They are not a significant user of the City's recreational facilities including the state park, Smathers and other City beaches or other public amenities. However, a frequent complaint from tourists was the need for more public restrooms and cleaner streets. Additionally, it was frequently noted that improvements in the public tour information guides and signage information would be helpful. As stated earlier, the single largest negative impact of the cruise ship activities in Key West is the local crowding associated with disembarkation and foot traffic as they compete for sidewalk and street access throughout Old Town. This issue compounds the vehicular traffic congestion, and recommendations that may help to relieve the pressure for both are discussed below.

7.F: An assessment of the impacts of cruise ship activities upon infrastructure including transportation/traffic, water, sewer and solid waste facilities.

The research concluded a lack of overall negative impacts on City water use, sewer and solid waste. The primary infrastructure issue relates to the cumulative impacts of vehicular and foot traffic in the Old Town area as described above. Specifically, the crowding of sidewalks and compounding delay of vehicular traffic, coincident to the times of passengers clustering after disembarkation. The Resident Visitor Planning Committee has supported the idea of **turning part of Duval Street into a pedestrian mall for certain peak visitation periods**. The use of such closures would be best tested during the peak visitation events outlined above, and then **proper consideration could be given to implementing more permanent and extensive restrictions** on motorized vehicles.

The Planning Department's "Multimodal Transportation Plan", which is being reviewed by the City Commission in September, contains many apt and useful recommendations to deal with the crowding and traffic issues associated with cruise ship and other forms of visitation.

In conjunction with that overall plan, the City should consider developing and implementing "Tourism Best Management Practices" (BMPs) as a **cooperative effort between local tour operators, cruise lines, transportation providers**. A similar approach was adapted successfully by the City of Juneau, Alaska. The voluntary BMPs were developed by local businesses and are intended to minimize the impacts of tourism in a manner that addresses both resident and industry concerns. The BMPs of particular significance for Key West are primarily those dealing with traffic management in the Old City Center, including **provisions for trade vehicles, and one way avenues in high traffic areas.** The details of such plans should be considered by the City of Key West, as the negative impacts are reportedly minimal from such voluntary management practices. The scheduling of Cruise ship disembarkation and re-boarding when vehicular traffic patterns are least should be considered.

7.G: Environmental Best Management Practices

The management strategy receiving the highest ranking for both residents and business establishments was the use of best management practices. Best management practices apply not only to the cruise ship industry but also to other commercial and recreational users. It is recommended that a task force be established with representation to include: the cruise ship industry, other resource dependent industries, residents, and local officials; with input from Florida Department of Environmental Protection, Army Corps of Engineers, Florida Keys National Marine Sanctuary, and the Navy. The task force would review ongoing monitoring activity and recommend appropriate management approaches to accommodate increased utilization without substantial deterioration of the resource base.

Issues of water quality and stress on the adjacent coral reef system are important concerns affecting the quality of life of residents and the economic vitality of the tourism industry. Impacts from cruise ships and other large deep draft vessels are occurring to water quality and bottom habitats in the area of the main channel and harbor in Key West and **ongoing monitoring should address sediment re-suspension and redistribution, harbor dredging, prop wash excavation, and off-shore anchorage.** As part of the City's commitment to improve marine water quality around Key West and properly manage the impacts of cruise ships **the following environmental management recommendations should be reviewed and considered**.

SEWAGE/BLACKWATER

Implement findings of the City of Key West Environmental Best Management Practices Committee. As part of the City's commitment to improve marine water quality around Key West and properly manage increased numbers of cruise ships the Committee is currently investigating the feasibility of requiring mandatory pump out for cruise ships in Key West. The engineering and waste treatment aspects have yet to be resolved.

Implement Federal FKNMS-wide No Discharge Zone. NOAA should begin developing the No Discharge Zone regulation for the federal waters of the FKNMS.

Continue Industry No Discharge Policy within 12 miles of Keys. The 12 mile no discharge industry policy should continue to be implemented for cruise ships with AWT capability.

Review Coral Monitoring. Review the 2004 findings of the EPA/NOAA Coral Reef Evaluation and Monitoring Project and other available data to try to identify the source of sewage found at some coral monitoring sites in 2003.

Review Recommendations of the Ocean Conservation and Tourism Alliance Science Panel. The newly formed Ocean Conservation and Tourism Alliance – a partnership between the International Council of Cruise Lines and Conservation International – will provide recommendations to the cruise ship industry on wastewater management practices. The release of the recommendations is scheduled for Spring 2005.

GRAY WATER

Continue Industry No Discharge Policy within 12 miles of Keys. The 12 mile no discharge industry policy should continue to be implemented for cruise ships with AWT capability.

Consider Adoption of Alaska Gray water Standards. Based on EPA testing of gray water, the State of Alaska requires gray water be treated before being discharged due to the presence of fecal coliform and total suspended solids

Monitor the Monterey Bay National Marine Sanctuary Committee actions. Monitor the Monterey Bay National Marine Sanctuary's investigation of a regulatory prohibition of harmful discharges from cruise ships (Monterey Bay NMS 2003).

TURBIDITY AND SEDIMENT RESUSPENSION

Participate in Ongoing and Post Dredging Turbidity Monitoring. The City should engage the Florida DEP, Army Corps of Engineers, FKNMS, and the Navy in a discussion about City involvement in the current monitoring program for turbidity, and the Resource Health and Sedimentation Monitoring Program for sediment resuspension and redistribution. The critical period will be the 3 month post-dredging monitoring that will provide information on the benefits of the Navy's channel and harbor deepening project in reducing or eliminating resuspended sediment and turbidity in the water column.

Conduct Limited Modeling of Turbidity. Depending on the benefits from the Navy dredging project, there should be a limited modeling effort to establish size and draft of cruise ships that can operate in the channel and harbor and utilize the Outer Mole without violating State water quality standards for turbidity. If turbidity from cruise ships is eliminated as a result of the dredging the modeling would not be needed.

Engage State and Federal Regulatory Agencies in a Discussion of Regulatory Authority. If post-dredging monitoring shows that turbidity from cruise ships has not been eliminated, the City should discuss existing regulatory authority with State and Federal Regulatory agencies and the FKNMS to determine how best to manage the existing problem.

Engage the U.S. Navy in Discussions if Navy Vessels Are Contributing to the Turbidity Problem. If post-dredging monitoring reveals that Navy vessels are also contributing to sediment resuspension and turbidity problems in the channel and harbor the City should request coordination and discussion with the Navy about ways of reducing or eliminating the problem.

Assume That Sediments will be Redeposited in the Channel and Harbor Over Time. Natural processes in active marine systems that fill bottom discontinuities will result in gradual filling of the dredged area with unconsolidated sediments from surrounding bottoms. The City should

anticipate the need for future maintenance dredging in the Port and around the cruise ship berths.

PROP WASH BOTTOM DISTURBANCE

Perform Post-Dredging Sonar Surveys of the Harbor to Determine Conditions. In order to establish a baseline condition of the harbor bottom to see if the Navy's harbor deepening will eliminate the current prop wash excavation out from the Outer Mole and Pier B, the City should contract for detailed bottom surveying as soon as dredging is completed. Methods used should be consistent with those used by the Navy and the FKNMS in 2001 and 2002, with consistent products created for comparison. Surveys would be repeated after several months to see if the problem of bottom disturbance and excavation has been eliminated.

Engage State and Federal Regulatory Agencies in a Discussion of Regulatory Authority. If post-dredging monitoring shows that prop wash dredging by cruise ships in the harbor has not been eliminated, the City should discuss existing regulatory authority with State and Federal Regulatory agencies and the FKNMS to determine how best to manage the existing problem.

Conduct a Review with the Regulatory Agencies and the Key West Bar Pilots. If the problem of prop wash excavation cannot be eliminated the City should initiate a review with agencies, the Bar Pilots and the U.S. Navy to see if alternative means of maneuvering and turning cruise ships in the harbor can be used to eliminate the problem.

Engage the U.S. Navy in Discussions if Navy Vessels Are Contributing to the Prop Wash Excavation Problem. If post-dredging monitoring reveals that Navy vessels are also contributing to prop wash problems in the harbor, the City should request coordination and discussion with the Navy about ways of reducing or eliminating the problem.

IMPACTS TO FISHING AND RECREATION

Conduct a Review to Determine How Historic Uses Can Coexist with Cruise Ship Traffic. Meetings should be held with resource users that have been negatively impacted and/or displaced by the large increase in cruise ship traffic to determine how both activities can coexist in the Harbor area.

USE OF THE CRUISE SHIP ANCHORAGE

Request that the FKNMS and the Key West Bar Pilots Survey the Existing Anchorage. Complete bathymetric surveys using modern technology and diver surveys should immediately be conducted to document depths and map bottom communities throughout the zone currently being used to anchor cruise ships.

Engage the FKNMS, the Bar Pilots and the U.S. Coast Guard in Discussions About Offshore Moorings for Cruise Ships. Unless bottom impacts from large anchors and turbid plumes generated by cruise ships leaving the main channel and using the anchorage can be eliminated the City should request consideration of the placement of large mooring for cruise ships in suitably deep areas.

Use of the Offshore Anchorage by Cruise Ships Calling on Key West. If strategies cannot be developed to prevent bottom damage by cruise ship anchors and the routine creation of turbid plumes in the offshore anchorage, the City should request that cruise ships no longer anchor out when calling on Key West.

Bar Pilots recommendations. Consider further placement of out bound range markers in Cut B of the main channel to allow large vessels to safely depart at slower speeds helping to reduce turbidity levels (BP 2005).

7.H: Affordable Housing

Housing prices have continued to escalate, and affordability is a serious issue for the city's workforce. Both public and private involvement is necessary to address this housing crunch. Private development options should include density bonuses, tax credits for housing investment and employer initiated housing programs. Public initiatives to provide housing options for teachers and other essential public employees also are necessary.

The following recommendations are made based on the analysis of housing data relative to Key West, and the brief review of housing policies in other island communities (see section 5.E).

Develop a Regional Affordable Housing Strategy. While the data show that conditions relative to affordable housing are slightly worse in Key West than in the rest of Monroe County, the shortage of developable land, limitations on building permits and geographic isolation are a problem throughout the Florida Keys. For that reason, there is a clear benefit in regional coordination on these issues. In addition, there are numerous public, private, and non-profit entities that have a stake in affordable housing. Coordinating incentives relative to affordable housing, developing a regional housing fund, and establishing a centralized source of information and expertise related to affordable housing all have the potential to contribute more effective planning and development of affordable housing.

Seek Modifications to ROGO to Allow for Additional Affordable Housing Units. Currently, ROGO allows for small one bedroom apartments, less than 600 square feet to be counted as 0.55 units rather than full units. Future changes to ROGO might allow for somewhat larger units, appropriate for families or larger households, to be considered as less than full units if appropriate restrictions on the number of persons per unit were in place.

Support Employer-Assisted and Temporary Housing. Local or state tax breaks should be established for employers providing housing assistance or constructing new housing for their employees. Pooled housing options for small business owners should be included in the mix. Housing for public-sector employees with programs similar to what is being considered on the Outer Banks also might be appropriate to assure the availability of teachers and other essential public employees. Allowing for temporary housing for service workers is another alternative that might be appropriate outside of hurricane season when evacuation is not an issue. Lower land costs on Stock Island, make it a prime location for employer-assisted and/or temporary housing.

Identify New Funding Sources for Affordable Housing Development. Housing assistance programs should augment rather than replace market conditions correcting for market distortions. Market enhancements should include incentives, gap financing, and density bonuses. To affect market outcomes, it is essential that the city's Affordable Housing Trust Fund be expanded to leverage public and private monies. Revenue sources must be broad based addressing resident and tourism induced impacts on the housing market. Housing impact fees on new development and real estate transfers as well as local option

sales tax revenues to address housing and infrastructure, bed tax revenues and disembarkation fees should be included in the revenue mix.

Develop an Effective Public Transit System. Part of the housing shortage is tied to effectively moving workers to the job. Employees indicated that transportation was the second most important issue behind housing affordability. An effective transit system can complement tourism related transportation and improve overall mobility.

7.1 Cruise Ship Tourism Management Practices in Other Locations

Primarily communities have limited cruise ship management practices to environmental best management practices. Typically states have established Memoranda of Understanding (MOU) with the cruise industry outlining standards and related operational policies and procedures. These MOU relevant to Key West have been presented in the environmental section. In addition to this primary environmental focus, there are generally two additional sets of management practices which have been used in selected areas to address the socioeconomic impacts of cruise ship tourism. These are appropriate to present here in discussing potential measures to mitigate any adverse impacts of cruise ships on the quality of life in Key West. Practices in other ports have been aimed at limiting negative social impacts and increasing the economic benefit generated by cruise ship related tourism. The following are examples of general categories of management schemes adopted elsewhere to mitigate socioeconomic impacts. They are presented here for consideration as well.

Destination Summaries

The following summaries give a destination-by-destination summary of management schemes in place to mitigate adverse socioeconomic impacts.

Bermuda

Bermuda seems to be the most well-known for limiting the socioeconomic impacts of the cruise tourism industry. Bermuda sets a limit on the maximum number of cruise visitors allowed to visit, currently set at 7,500 per day at 3 ports and 225,000 per year (actual numbers have historically been lower). As a result, the island has a reputation for being an upscale cruise destination. In contrast, islands which cater to mass tourism such as the Bahamas (with over 3.3 million cruise passenger arrivals in 2004) tend to have more tourism arrivals per year with each tourist spending on average less money. Islands such as Bermuda appeal to niche tourism (including ecotourism or luxury tourism) generally have fewer arrivals but successfully elicit more money from each tourist. For Bermuda, these limits are self-imposed to ensure that each passenger has a quality experience. Originally, the limits were set in proportion to hotel rooms on Bermuda to ensure a balance between the cruise tourism and hotel tourism sectors. However, as hotel occupancy has gone down in recent years, there have been movements to increase the limits on cruise passengers to ensure a steady stream of income from tourism on the island. Also, some limits on the number and size of ships are necessary due to infrastructure constraints. As cruise ships have been growing larger over the years, two of Bermuda's three ports (Hamilton and St. George) can only accommodate smaller, older cruise ships. These ports may be upgraded, however, to accommodate larger, newer ships.

Bermuda is also well known for having a high head tax in comparison to the Caribbean. Since Bermuda is about 1200 miles north of the Caribbean, approximately off the coast of

North Carolina, the island reportedly attracts a different market share than does the Caribbean. Typically, instead of embarking from Miami and visiting several Caribbean islands during a week-long cruise, a Bermuda cruise may leave from New York or another northeast or mid-Atlantic port and spend several days in Bermuda. As such, the per-passenger head tax has been $60.00 in recent years, no matter the length of stay. In 2005 (likely in April), the head tax will be changed to $20.00 per person per day to allow for shorter stays by cruise ships. This change would not impact a 3-day cruise, as passengers would still pay $60.00. These fees are in addition to a $14.00 per cabin tax for occupied cabins on the ship.[66]

Alaska

While the State of Alaska has strict environmental policies in place, there are few policies to reduce the socioeconomic impact of cruise tourism. There are no limits to the number of passengers that may disembark or limit to dock. It is not clear whether, within the United States, interstate commerce laws prohibit a state or local municipality from limiting passengers or ships. Alaska does not charge a head tax to cruise passengers, but the city of Juneau collects a $5.00 per head tax that must be spent on tourism related activities or improvements. In addition, the state has regulations in place to collect environmental compliance fees annually from cruise ships.[67] In 2004, the City of Juneau developed "Tourism Best Management Practices" (BMPs) as a cooperative effort between local tour operators, cruise lines, transportation providers and the City of Juneau. The BMPs are intended to minimize the impacts of tourism in a manner that addresses both resident and industry concerns.[68]

The port of Juneau assesses a $5.00 marine passenger fee per arriving passenger. Additionally a port development fee of $.18 per passenger is assessed for deposit into a fund used to finance the cost of certain capital improvement and planning efforts related to large passenger vessels. An additional $2.00 per passenger fee is assessed on passengers arriving at City and Borough of Juneau facilities.

Belize

Belize charges a head tax for cruise tourists, but it is significantly less than the departure tax charged to visitors departing by air or land. The total airport departure fee is US $35.00 for those departing by air. For those international passengers departing by land, the departure fee is US $18.75. Each of these fees includes a $3.75 conservation fee in addition to other fees including a security fee and border processing fee. The total sea departure fee, however, consists solely of the conservation fee of $3.75.[69] Belize also limits the number of passengers that may disembark in its major port of Belize City to 3,000 people per day.

The following policy is in place to require cruise passengers to patronize local tour operators:

[66] Larry Jacobs, personal communication. Bermuda Tourism Board.

[67] Carolyn Morehouse, personal communication. Alaska Department of Conservation.

[68] www.Juneau.org/tourism

[69] (http://www.travelbelize.org/immigration.html

"As part of the licensing procedures to be implemented by the Belize Tourism Board, all cruise ships will be required to offer passenger's inland and small island excursions run by Belizean tour operators and conducted by licensed tour guides. The port agents and the tour operators will be responsible for ensuring that all manner of services for excursions, including but not limited to transportation, food and beverage, handicraft sales, guide services, etc are sourced in the country, and that all laws are adhered to. These requirements are non-negotiable and must be agreed in writing upon by the port agent, tour operator and cruise line prior to the granting of a license".[70]

The Belize Tourism Board also limits the number of tourists that may visit certain sites at any one time to avoid overcrowding and be sensitive to the environment. This is done through setting of carrying capacities for various attractions and suggesting ratios of tour guides to tourists for both marine and terrestrial sites.

British Virgin Islands

The Tourist Board of the British Virgin Islands (BVI) has a cruise strategy, which includes several policies and new plans to increase the economic benefits generated by cruise passengers. Goals are outlined by timeframe and responsible parties. One of these plans is a cruise passenger conversion plan, which seeks to get cruise passengers to return to the BVI as overnight tourists. An additional goal is to "Increase the economic benefits from cruise tourism by improving tourism literature and guides to the destinations for cruise passengers," although it is not clear exactly how this would be accomplished. Further efforts to increase the economic contribution of each passenger include the development of more sightseeing attractions and entertainment activities for cruise passengers and development of a calendar of cruise-ship visits for distribution to all hoteliers, taxi drivers and interested parties. Like Bermuda, the BVI are also considering limits on the number of cruises ships and passengers to the islands on a given day.[71]

[70](http://www.destinationsbelize.com/cruises.htm)

[71] (http://dpu.gov.vg/Plans/NIDS/Challenges_Facing_Tourism/ChallengesFacingTourism4.htm).

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APPENDIX 1: CRUISE PASSENGER SURVEY INSTRUMENT

City of Key West Cruise Passenger Survey

1. Is this your first visit to Key West? YES NO
2. If this is NOT your first visit, then how would you rate this visit to the last time you visited Key West?

   Much Better Better Same Worse Much Worse
3. How long were you off the ship in Key West?_____hours
4. Please rate your experience on the following items and activities.

Items	Poor	Less than Average	Average	Above Average	Excellent
Visitor information/signage					
Traffic/congestion					
Security					
Hospitality of locals					
Activities					
Attraction/excursion *					
Shopping					
Restaurant/bar					
Overall experience					

5. Based on your experience, how likely are you to return to Key West for another cruise vacation?

   Very unlikely Unlikely Neither Likely Very Likely
6. Based on your experience, how likely are you to return to Key West for an extended-stay vacation, i.e. other than as a cruise ship passenger?

   Very unlikely Unlikely Neither Likely Very Likely
7. What did you like most about Key West?

   _____
8. What did you like least about Key West?

   _____
9. How many individuals in your party?_____
10. Please estimate the amount of money you (or your party) has spent in each category below.

Expense (SELF____/GROUP____)	Amount
Restaurants/Eating establishments*	
Bars/Drinking establishments*	
Basic ground transportation	
Water based excursions	
Land based excursions	
Attractions/Museums/Historic Sites	
Clothing/apparel	
T-shirts and other souvenir clothing/apparel	
Health care products	
Jewelry/china/fragrances etc.	
Artwork	
Miscellaneous souvenirs	
Business services - financial, legal	
Personal services – medical, haircuts, etc.	
Other (write in)	

* Differentiated by primary orientation of establishment.

11. How many persons in your party fall into each of these age categories?

    _0-17 __18-24 __25-34 __35-44 __45-54 __55-64 __65+
12. What is your primary residence?

    Zip code_____ Country of residence_____
13. Which of the following best describes your household income?

    <$10,000 $10,000-24,999 $25,000-49,999 $50,000-99,999

    $100,000-199,999 $200,000 or more
14. Any suggestions to make the experience of visitors to Key West more rewarding?

    _____

Date_____ Pier_____ Ship_____ Sex of respondent: M F

Attraction codes: 1 – Dive/snorkel trip; 2 – Charter fishing trip; 3 – Group train tour; 4 – Walking tour; 5 – Pleasure boat; 6 – Watercraft rental; 7 – Museum tour

APPENDIX 2: GENERAL VISITOR SURVEY INSTRUMENT

City of Key West Visitor Survey

1. Is this your first visit to Key West? YES NO
2. If this is NOT your first visit, then how would you rate this visit to the last time you visited Key West?

Much Better Better Same Worse Much Worse

3. Are you a day visitor or and overnight visitor in Key West?

   Day visitor Overnight visitor

   If an overnight visitor, the number of days spent in Key West were/will be _____ days
4. Did you arrive in Key West by: Air Auto/Car Boat Other
5. Please rate your experience on the following items and activities.

Items	Poor	Less than Average	Average	Above Average	Excellent
Visitor information/signage					
Traffic/congestion					
Security					
Hospitality of locals					
Activities					
*Attraction/excursion					
Shopping					
Restaurant/bar					
Overall experience					

6. Based on your experience, how likely are you to return to Key West for another vacation?

   Very unlikely Unlikely Neither Likely Very Likely
7. What did you like most about Key West?

   _____
8. What did you like least about Key West?

   _____
9. How many individuals in your party?_____
10. Please estimate the amount of money you (or your party) has spent in each category up to now: TOTAL days_____ INTERIM days_____

Expense (SELF____/GROUP____)	Final Expenditures	Interim Expenditures
Lodging		
Food in grocery stores		
Restaurants/Eating establishments*		
Bars/Drinking establishments*		
Basic ground transportation		
Water based excursions		
Land based excursions		
Attractions		
Clothing/apparel		
T-shirts and other souvenir clothing/apparel		
Health care products		
Jewelry/china/fragrances etc.		
Artwork		
Miscellaneous souvenirs		
Business services - financial, legal		
Personal services – medical, haircuts, etc.		
Other (write in)		
Total		

* Differentiated by primary orientation of establishment.

11. How many persons in your party fall into each of these age categories?

    __ 0-17 __18-24 __25-34 __35-44 __45-54 __55-64 __65+
12. What is your primary residence?

    Zip code_____ Country of residence_____
13. Which of the following best describes your household income?

    <$10,000 $10,000-24,999 $25,000-49,999 $50,000-99,999

    $100,000-199,999 $200,000 or more
14. Any suggestions to make the experience of visitors to Key West more rewarding?

    _____

Date_____ Location_____ Sex of respondent: M F

Attraction codes: 1 – Dive/snorkel trip; 2 – Charter fishing trip; 3 – Group train tour; 4 – Walking tour; 5 – Pleasure boat; 6 – Watercraft rental; 7 – Museum tour

APPENDIX 3: 2004 SUMMER SESSION VISITOR STUDY RESULTS

Summer Session Report on Cruise Passenger and Visitor Surveys Conducted in Key West, Florida as Part of the Key West Quality of Life Study

I. Executive Summary

The summer session report describes the methodology used to conduct a total of 59 sessions in Key West during the months of July and August 2004, during which a total of 1,018 surveys were conducted with cruise passengers (521 surveys) and air, land vehicle, and vessel-based visitors (497 surveys). The methodological part of the report describes the sampling session, and the result section discusses major, visitor demographics and opinions, as well as some information on expenditures.

II. Introduction

The summer session report is the first in a series of three submissions to be completed as part of Task VI of the Key West Quality of Life Study. The summer session report focuses on cruise passenger and visitor data collection, as obtained by formal surveys conducted with members of each group on a periodic basis over a two month period. The methodology, described in greater detail in the following section, was formulated by the research team following other, similar studies (Leeworthy and Wiley, 1996), and the data collected is to demonstrate general visitor trends. Moreover, the research team concluded that it would be best to divide the sampling effort into a period of four months, separated in equal sampling periods in the summer and winter, respectively. Using such a balanced approach, the research team determined, shall provide for meaningful analyses for comparisons between summer and winter visitors.

III. Methodology

The methodology adopted for the survey sessions is that which is described in a memorandum titled, "Pilot survey session methodological and results findings" (Shivlani, 2004), and which is attached as appendix I of this report. Within that memorandum, it was suggested that, based on pilot survey returns, that a total of 30 sessions be conducted for each month that is sampled, and that a total of 60 sessions be conducted for the summer period (of 30 sessions per month). To standardize effort between months, it was further recommended that 10 sampling days be dedicated for each month, and that three sessions lasting two hours each be conducted per sampling day.

The approach adopted did not account for days during which cruise ships would not be making calls to Key West, and it did not consider rain days when cruise and visitor surveys were not possible. As a result of Hurricane Frances and because of the cruise-free days that inevitably were lodged between the 10-day sample periods, the summer session did not reach its expected total of 60 sampling sessions; that is, 59 sampling sessions were conducted (28 in July and 31 in August). The table below shows monthly effort:

Table 1: July 2004 survey effort

Date	*Cruise surveys*	*Air passenger surveys*	*Other visitor surveys*
7/11/04	20	21	16
7/13/04	21	16	
	20		
7/14/04	20	13	
	18		
7/15/04	15	7	
7/16/04	22	22	21
7/18/04	15	4	21
7/19/04		19	15
7/20/04	20	16	
	12		
7/21/04	15	19	
	15		
7/22/04	15	16	16
TOTAL	228	153	89

Table 2: August 2004 survey effort

Date	*Cruise surveys**	*Air passenger surveys**	*Other visitor surveys**
8/6/04	10 (31)	16 (3)	15 (4)
8/7/04		22 (3)	18 (3)
8/8/04	16 (27)	18 (4)	14 (5)
8/9/04	21 (20)	4 (2)	
8/10/04	21 (23)	14 (2)	
8/11/04	14 (19)		
8/16/04		12 (1)	20 (3)
8/17/04	24 (26)	12 (3)	
	17 (28)		
8/18/04	21 (17)	17 (3)	
	26 (27)		
8/19/04			15 (7)
8/20/04			17 (6)
8/22/04	20 (21)	22 (3)	19 (3)
8/23/04	24 (17)		
8/24/04	20 (22)		
	24 (23)		
8/25/04	17 (33)		
8/26/04	18 (26)		
TOTAL	293	137	118

** Parenthetical totals refer to number of visitors who refused participation.*

As shown in Tables 1 and 2, survey effort concentrated on the cruise passengers, and the rest of the sessions were split unevenly among air passenger and other visitor surveys. As agreed upon by the survey team, an equal number of sessions (or as close as could be reached) would be spent on cruise surveys and on other visitor surveys. However, logistical issues made that balance difficult at times. Apart from the aforementioned cruise-free days and delays resulting from Hurricane Frances (which resulted in the August session being extended), other challenges

included the weather. Data collection was often hampered by rain, during which visitors could only be surveyed indoors (i.e. the airport). Thus, to maximize field time, sessions were held at the airport when the weather conditions did not permit outdoor interviews.

Notwithstanding the challenges, project personnel successfully completed a total of 59 sessions over 20 total sampling days, from which a total of 1,018 surveys were completed. This total represents a much higher number than what was estimated in the pilot session.

Also, as shown in Table 2, rejection rates were higher among cruise passengers than within the other two groups. Rejection rates for the cruise passenger group were 1.22 (or 1.22 rejections per completed survey); by contrast, the rejection rates for the air-based visitor group and other visitor group were 0.18 and 0.26, respectively. Project personnel identified three reasons for high rejection rates specific to the cruise passengers: passengers were always interviewed upon their return, and several were hurried to return to the vessel when prompted to participate; many days in the summer are very warm, and because the surveys were conducted near the berthing piers (where there is little shade), passengers often did not stop to participate; and days which had been affected by rain led to lower rates of participation.

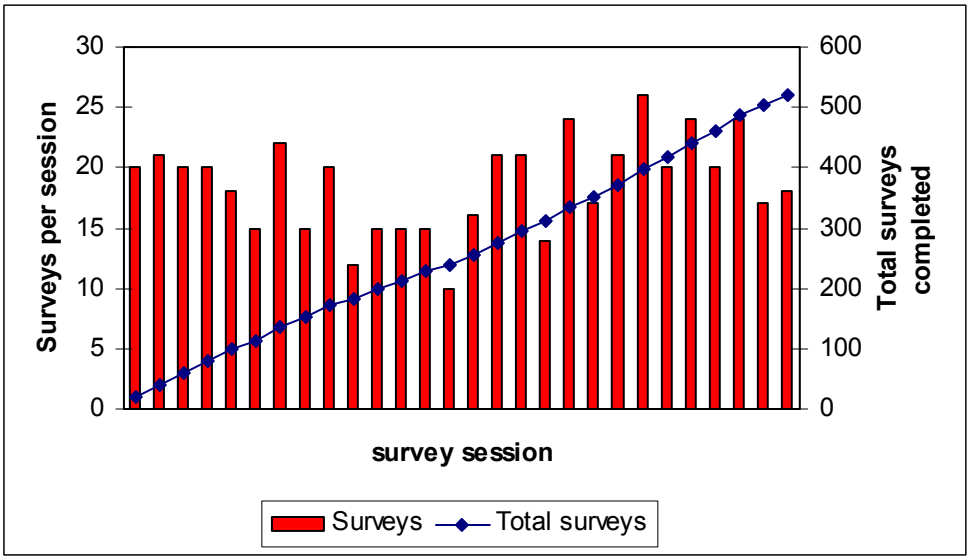

Figure 1: Cruise surveys per session

Figure 1 shows the number of cruise surveys completed per session. They ranged from a low of 10 surveys to a high of 26 surveys. The average number of surveys completed per session was 18.6 surveys (SD = 3.87), or a survey every 6.5 minutes. For July, the research team completed a total of 228 surveys in 13 sessions, or 17.5 surveys per session. For August, the research team completed a total of 293 surveys in 15 sessions, or 19.5 surveys per session. Clearly, the retention of a single data collector and familiarity with the survey instrument played key roles in increasing survey rates per session.

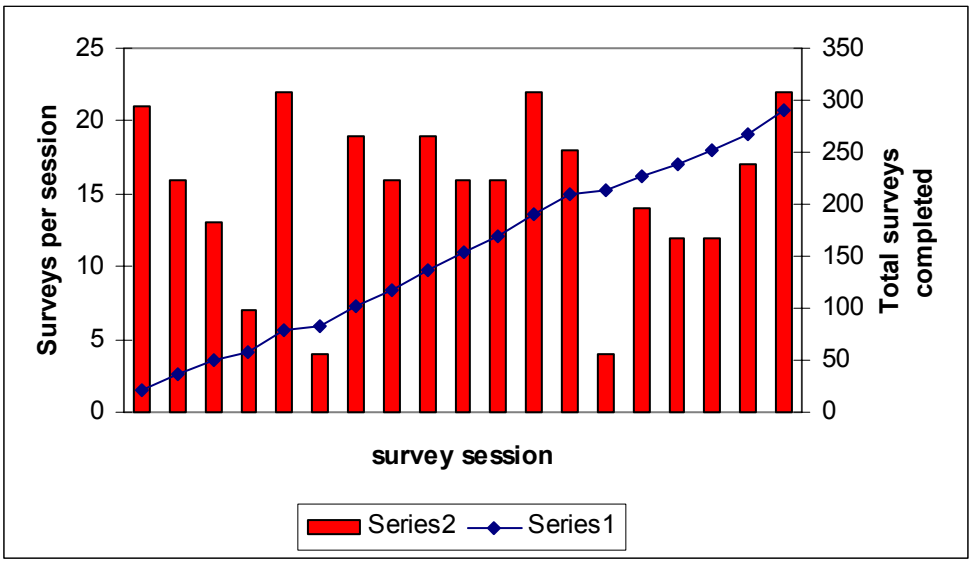

Figure 2: Air-based visitor surveys per session

Figure 2 shows the number of air-based visitor surveys completed per session. The range of surveys completed ranged from a low of 4 surveys (on two occasions) and a high of 22 surveys (again, on two occasions). The number of surveys completed per session averaged to 15.3 surveys (SD = 5.58), and that average increases to 16.6 surveys (SD = 4.41) if the two sessions during which only 4 surveys were completed are excluded. These sessions, where only 4 surveys were completed, were actually results of handheld malfunction. In the first instance, the survey session had to be curtailed, and in the second instance, a dozen surveys were erased. To avoid future recurrences, the research team terminated handheld use following the second incident. On average, the amount of time that it took to complete an air-based visitor survey was approximately 7.25 minutes, or slightly longer than it took to complete a cruise passenger survey. The main reason for the longer time is due to the expanded expenditure section of the air-based and other visitor surveys. This section requests lodging, meals, and other extended-trip related information that takes respondents longer to calculate and thus answer.

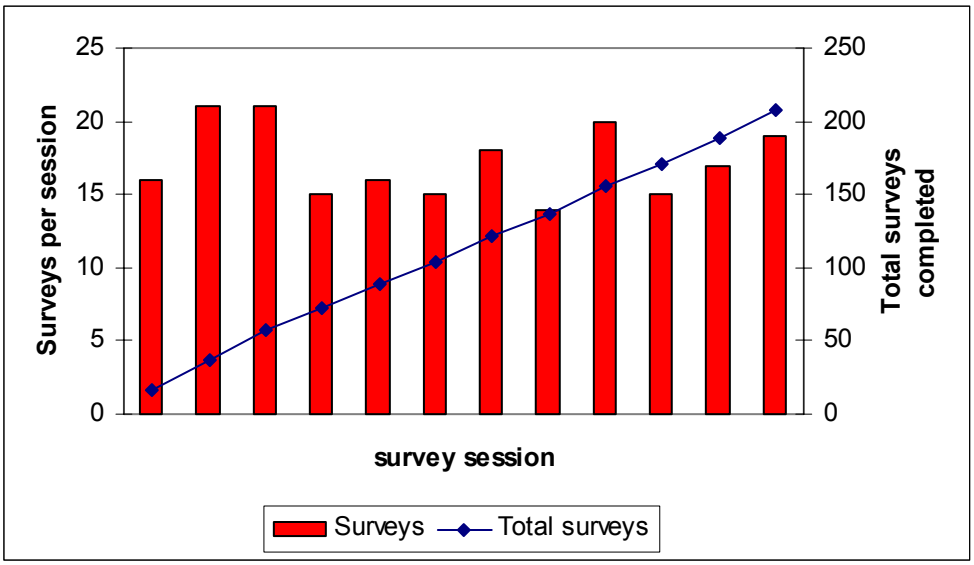

Figure 3: Other visitor surveys per session

Figure 3 shows that number of visitor surveys completed with the general visitor population was generally consistent across sessions. Data collection yielded an average of 17.3 surveys per session (SD = 2.49), and the range was from a low of 14 surveys to a high of 21 surveys. Surveys were generally completed within an average of 6.9 minutes, taking longer than the cruise surveys (see the previous paragraph for an explanation on the reasons for differing survey rates).

As stated earlier, one of the major reasons why more sessions could not be held (n = 12) was due to weather conditions. Because the methodology calls for 10-day sampling periods, rain-affected sessions could not be made up easily for two reasons. The first was because cruise surveys take priority and thus affect make-up dates, and the second was because of the total time (as affected by the budget) that could be allocated for each sampling period. As shown in Tables 1 and 2, while 10-day samples were achieved for each month, project personnel had to spend 14 days in the field for the July session and 24 days in the field for the August session (mainly to make up for the delays caused by Hurricane Frances).

It is expected that weather-related issues shall not affect winter sampling sessions as drastically as they did the summer sampling sessions. However, it should also be noted that all sampling days were utilized; that is, 20 sampling days were completed, and thus, the project methodology adhered to its initial design. Moreover, as previously stated, estimated survey totals were exceeded by 8.3%, as 78 more surveys were completed than the 940 surveys expected.

IV. Results

The summer session report presents only major results in frequency format. All analysis shall be conducted when both the summer and winter sessions have been completed. Results are presented in three sections: socio-demographic or background information; expenditures; and attitudes and perceptions.

1. Cruise Passenger Results

a. Socio-demographic information

Overall, more women (58.3%) were interviewed than men. This trend was true for all groups, and it could not be accounted for by project personnel. However, it should be noted that both women and men responded for an entire group for almost 71% of the time, and since 85.1% of all group sizes were over one person that the data collected may be less skewed than the sexes surveyed.

Almost 91% of those interviewed provided a US zip code that they identified as their residence, although 78 of the respondents, or 15% of the sample, also listed a non-US country of residence. Further data analysis (ex. coupling and sorting the columns to determine double entries) shall assist in better assessing the demographic make-up of the respondents.

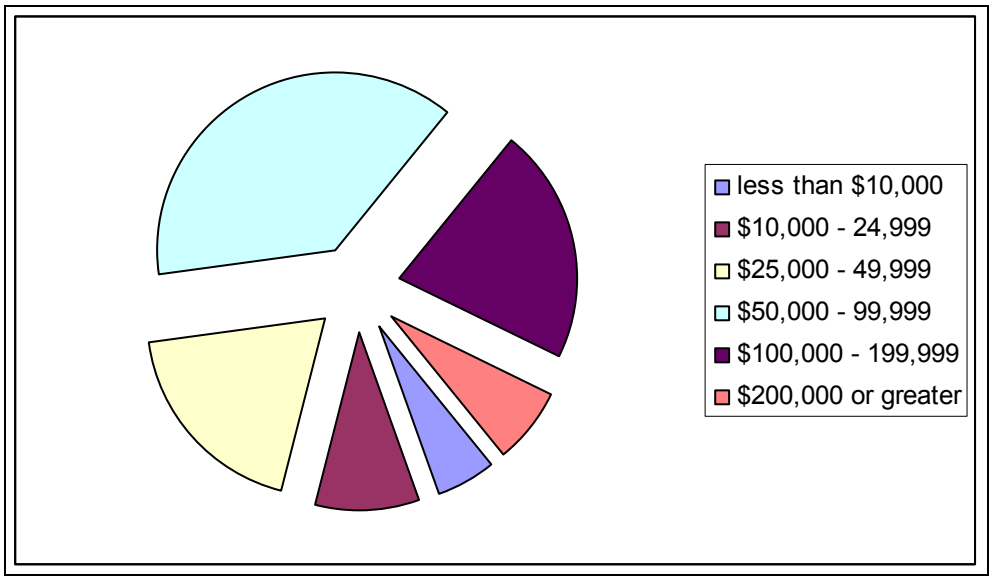

Figure 4: Income breakdown

Most respondents (38%) reported household incomes of between $50,000 – 99,999, whereas the respondents reporting the lowest (5%) and highest (7%) incomes comprised the smallest groups. The average income among respondents was 3.8 (SD = 1.2), or approximately $50,000 – 99,999.

Group sizes varied considerably, but the most common size consisted of two persons (47%). Also, the average number of visitors per age group varied somewhat, with the age groups ranging from 18 to 54 making up a majority of the visitors.

Cruise visitors, who are effectively day-trippers, spent a long range of hours on shore. Over 13% spent only an hour off the ship while 0.6% spent as much as eight hours in Key West. The average time spent off the ship was 2.8 hours.

b. Expenditure information

Cruise passengers were requested to provide basic information on their expenditures while in the city, separated by a variety of categories. As stated previously, almost 71% reported group costs, and only 29% reported self costs. Of those individuals traveling in a group of two or more persons, 83.6% reported group costs. In fact, when the group sizes are compared, it is shown that those individuals who reported self costs traveled in groups that averaged 6.9 persons (SD = 3.1), compared to an average group size of 2.9 persons (SD = 1.7) for individuals reporting group costs; it may be that individuals who reported group costs were more likely to be part of a family group than the respondents reporting self costs. Average costs per category are shown in the figure below.

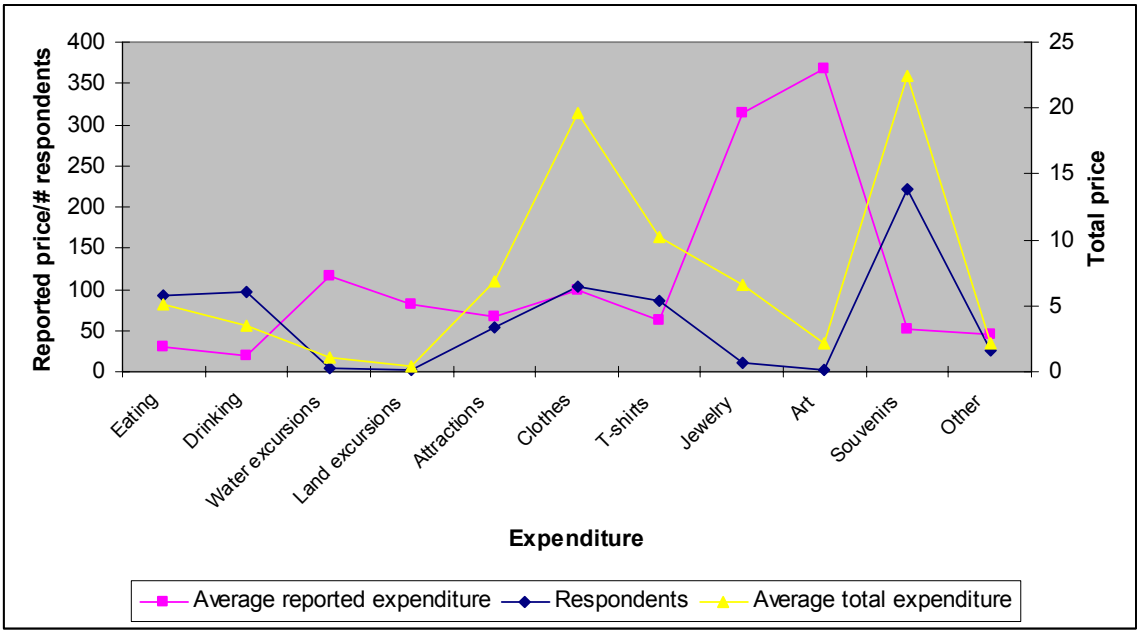

Figure 5: Average reported vs. total expenditure

Figure 5 shows that some expenditures were lower when average to the entire sample but nevertheless represented major purchases for the respondents who bought the items. For example, the entire sample spent only an average of $5 for jewelry, but when only the 11 persons (or 2.1% of the sample) who actually reported purchasing jewelry were considered, their average purchase exceeded $313. Similarly, art was purchased by only by 0.5% of the sample, accounting for less than $4 for the entire group; however, those who purchased art spent an average of $367. However, some items – such as clothing, t-shirt shop items, souvenirs, and attractions – were more important to the entire sample than others. These items made up a majority of the total sample's average costs, with the

four items accounting for almost $60, or 73.8% of the $80.38 spent on average by the total sample.

c. Attitudes and perceptions

Over two-thirds of the cruise passengers (69.2%) had not been to Key West before, and of those who had, most (61%) rated the city as "same", 33% rated it as "better" than before, and only 6% rated it as "worse" than before. Thus, the favorable and neutral ratings were higher than the negative ratings.

Table 3: Cruise passenger views on activities

Item/activity	*Below average*	*Average*	*Above average*
1. Information (n = 489)	25	15	60
2. Traffic (n = 510)	10	29	61
3. Security (n = 514)	19	18	63
4. Hospitality (n = 514)	4	7	89
5. Train tour (n = 59)	3	8	91
6. Shopping (n = 489)	9	15	76
7. Restaurant/bar (n = 204)	3	8	91
8. Overall (n = 516)	2	11	87

As is clear from Table 3, most cruise passengers had favorable opinions on Key West activities and conditions. Most (60%) believed that information provided, the traffic conditions encountered, and security perceived in the city were either good or excellent. Similarly, cruise tourists related highly positive (76% or greater) experiences with the activities in which they participated in Key West. Overall, 87% of the respondents reported a favorable reaction to their stopover in Key West.

When asked whether they would return, 61% of the passengers surveyed stated that they would do so via another cruise, and only 22% stated that they would not. An even higher percentage of the respondents, or 73%, stated that they would return for a longer stay vacation to Key West, and only 16% stated that they would not. These results suggest that, coupled with the overall positive trip they experienced off their cruise ships, cruise visitors were either likely or very likely to return to the city. Interestingly, of those persons who stated that they would not return on another cruise trip, 54% believed that it was either likely or very likely that they would return for a longer-stay vacation. Thus, there is a clear indication that cruise-based exposure to the City of Key West may attract longer-term visitation in those instances where it does not affect return *cruise* visits.

2. ***Air and land-based visitor results***

a. Socio-demographic information

As in the cruise passenger sample, the visitor sample contained more responses from women (54.1%) than from men (45.9%). However, as in the cruise passenger sample, it should also be noted that both women and men responded for an entire group for over 82% of the time, suggesting that the data collected may be less skewed (that is, women may have been responding for the men in their groups).

Most persons surveyed, or 92.8%, provided either a US zip code or a state of residency, identifying them as US-based visitors. Non-US visitors, conversely, made up only 9.7% of the population. As with the cruise passenger data, it is clear that some persons provided both countries of residence which were outside the US and a zip code. Further data analysis shall assist in better assessing the demographic make-up of the respondents.

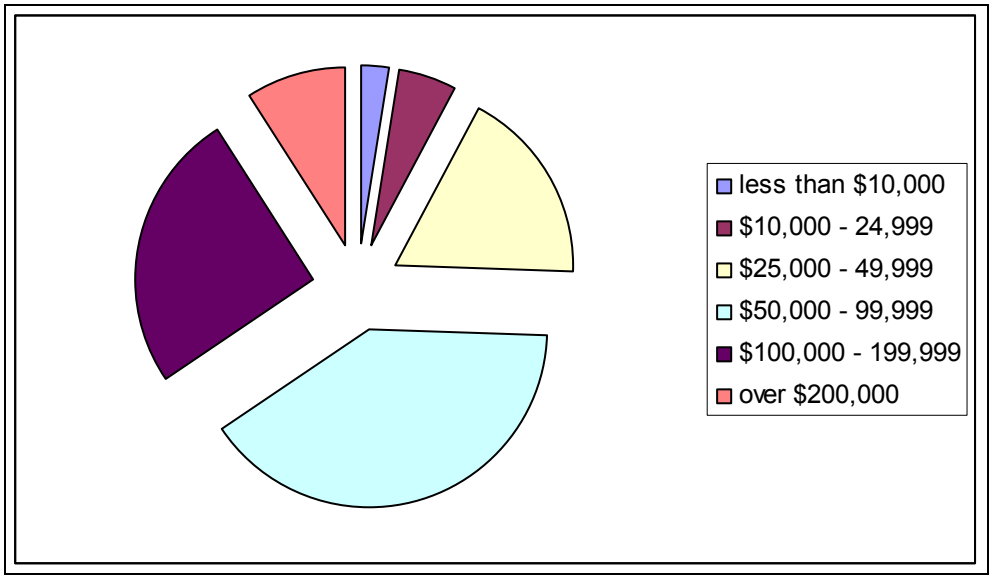

Figure 6: Income breakdown

As with the cruise passenger sample, most respondents (40%) reported household incomes of between $50,000 – 99,999. However, unlike the cruise passenger sample, a higher percentage (9.2%) reported an income of over $200,000. Altogether, the highest income brackets ($100,000 or greater) made up over 34% of the sample, compared to over 28% of the cruise passenger sample. Conversely, only 7.7% of the visitor sample consisted of respondents making less than $25,000, compared to almost 15% of the cruise passenger sample earning the same amount. The average income was 4.1 (SD = 1.1), or slightly over $50,000 – 99,999, which was significantly higher (Mann-Whitney U-test; $p < 0.01$) than the 3.8 reported for the cruise passenger sample. The summer sample results thus suggest that air and land-based visitors were generally more affluent than their cruise counterparts.

Group sizes consisting of two persons (42%) dominated the group size distribution, but group sizes ranged from as few as a single visitor to over 10 persons. The most common age groups ranged from 25 to 54 years old, and visitors 55 years or older were less common than visitors younger than 25 years old. Generally, the most common age groups were one level older than those who visited via cruise ships, but cruise ship passengers had higher percentages of older (55 years or older) visitors.

A total of 82 persons (16.5%) identified themselves as day-trippers; however, as the survey asked a follow-up question on the number of days that the respondent would spent in Key West, it was found that only 12.1% would spend a single day in the city. Thus, it appears that at least a partial percentage may have misunderstood the preceding question; therefore, it is recommended that only the number of days stated be used as an indicator on the amount of time that respondents spent or would spend in Key West.

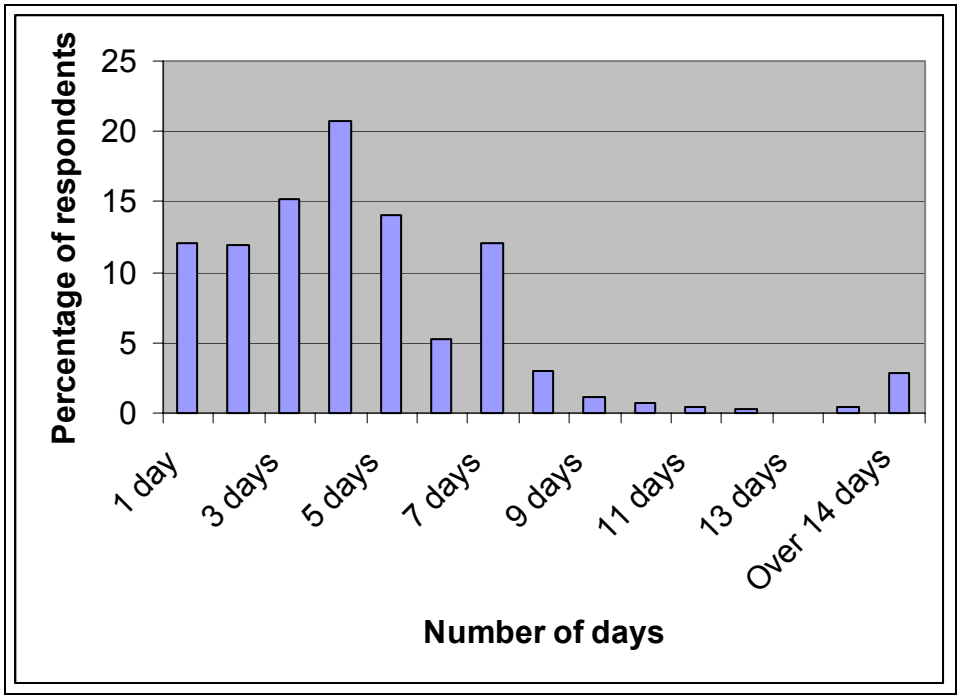

Figure 7: Number of days spent in Key West

Over 20% of the respondents reported that their trip would last four days, and it was the most common response. Generally, trips lasting a week or fewer days dominated the sample, and only less than 9% reported staying for over a week. If all trips greater than 14-days were set at 15 days, then the average time spent in Key West by visitors from the summer session was 4.5 days (SD = 2.85).

b. Expenditure information

As previously stated, 82% of the sample reported group sizes of over one person, and 72% of the respondents provided group costs. Of those individuals traveling in a group of two or more persons, 86.5% reported group costs. As with the cruise passenger sample, it may be that individuals who reported group costs were more likely to be part of a family group than the respondents reporting self costs. Overall, over 80% of the sample provided total costs for their trip. The remainder provided costs for an average of 2.2 days of their trips. Further analysis shall assist in projecting totals costs for the part of the sample that provided only interim costs. The results provided below represent an average of costs provided by the entire sample (both total and interim costs).

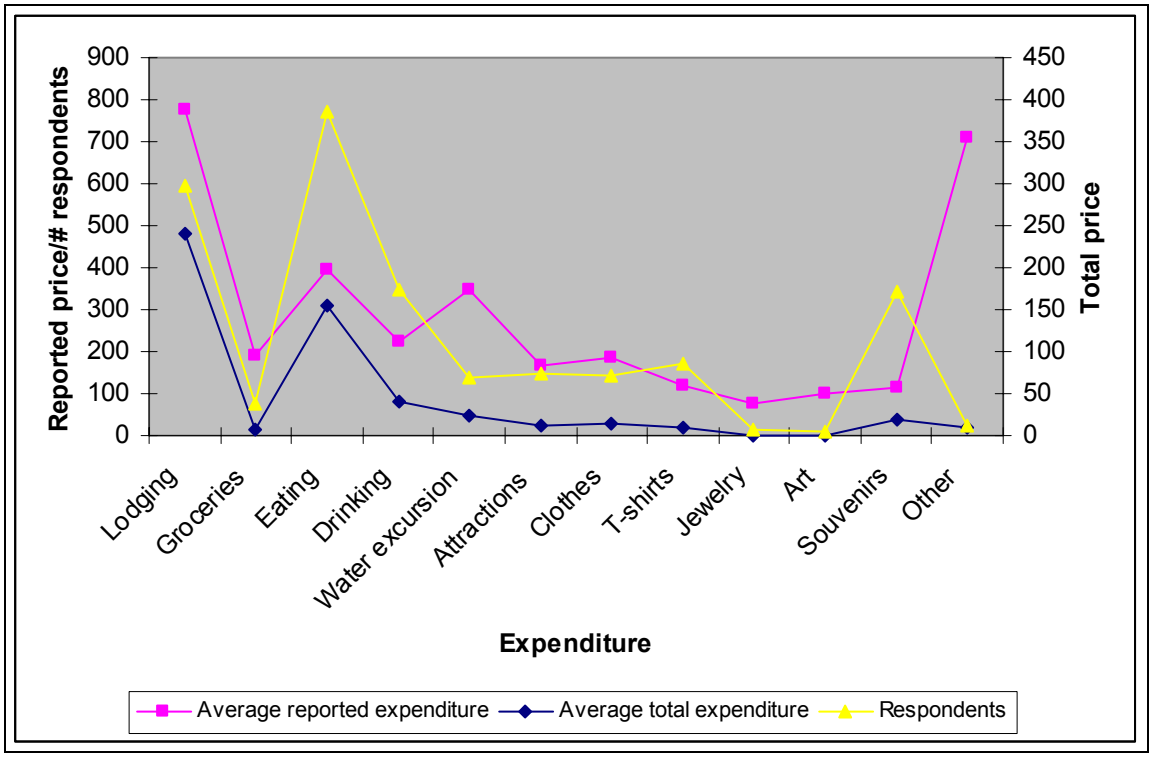

Figure 8: Average reported vs. total expenditure

Figure 8 shows the average expenditures within the entire sample and average reported expenditures by respondents who spent in those categories. The results clearly demonstrate that for the sample, the highest average expenditures were lodging ($480), eating establishments ($308), and drinking establishments ($79). Most respondents reported making all three expenditures. If the costs are determined as those made by only the respondents who reported them, or the average reported expenditure, then it shows that almost 60% of the sample spent an average of $778 in lodging, over 77% spent an average of $396 in eating establishments, over 35% spent an average of $223 in drinking establishments, almost 14% spent an average of $346 in water excursions and $190 in clothing, and over 17% spent an average of $119 in t-shirt shops. In total, the average total expenditure per respondent was $1,060, whereas the average reported expenditure per respondent was $3,405, both of which are significantly higher than the average total expenditure of the cruise passenger sample of $80.

c. Attitudes and perceptions

Less than half of the visitors surveyed, or 46%, had not been to Key West before, compared to over 69% of the cruise passenger sample. Of those who had visited previously, 63% rated the city as “same”, 30% rated it as “better” than their previous trip, and over 7% rated it as “worse” than before. The favorable ratings were thus almost four times higher than the negative ratings.

Table 4: Visitor views on activities

Item/activity	*Below average*	*Average*	*Above average*
1. Information (n = 451)	24	14	62
2. Traffic (n = 491)	16	36	48
3. Security (n = 486)	8	26	66
4. Hospitality (n = 486)	2	9	89
5. Dive trip (n = 77)	0	14	86
6. Charter fishing (n = 36)	14	6	80
7. Train tour (n = 37)	3	11	86
8. Walking tour (n = 17)	6	6	88
9. Boating (n = 45)	2	7	91
10. Watercraft rental (n =48)	0	0	100
11. Museum tour (n = 43)	2	16	82
12. Shopping (n = 443)	6	20	74
13. Restaurant/bar (n = 468)	1	12	87
14. Overall (n = 486)	1	7	92

As shown in Table 4, visitors had very favorable opinions on Key West activities and conditions. The only item that did not receive a majority positive rating was traffic, which more visitors described as being below average or average than did those who felt that traffic conditions were above average. Otherwise, all activities received very high ratings (74% or greater), including land and water-based excursions, such as dive and snorkel trips, charter fishing trips, museum and sundry tours, shopping, and eating and drinking establishments. Accordingly, 92% of the visitors surveyed rated their overall experience as above average (45%) or excellent (46%).

When asked whether they would return, 83% of the responded stated they were likely or very likely to return for another trip; however, only less than a third, or 33%, believed that they would return on a cruise ship. Part of their response may be a result of the activities in which they participated (and which are listed in Table 5), which can only be taken on a longer trip. Another reason may be due to the type of tourist the visitor sample represents: a more affluent group that spends several days on vacation and has high expenditures in lodging and eating and drinking establishments.

APPENDIX 4: 2005 WINTER SESSION VISITOR STUDY RESULTS

Winter session report on cruise passenger and visitor surveys conducted in Key West, Florida as part of the Key West Quality of Life Study

V. Executive Summary

The winter session report describes the methodology used to conduct a total of 60 sessions in Key West during the months of January and February 2004, during which a total of 804 surveys were conducted with cruise passengers (398 surveys) and air, land vehicle, and vessel-based visitors (406 surveys). The methodological part of the report describes the sampling session, and the result section discusses major, visitor demographics and opinions, as well as some information on expenditures.

VI. Introduction

The winter session report is the second in a series of three submissions to be completed as part of Task VI of the Key West Quality of Life Study. The summer session report focuses on cruise passenger and visitor data collection, as obtained by formal surveys conducted with members of each group on a periodic basis over a two month period. The methodology, described in greater detail in the following section, was formulated by the research team following other, similar studies (Leeworthy and Wiley, 1996), and the data collected is to demonstrate general visitor trends. Moreover, the research team concluded that it would be best to divide the sampling effort into a period of four months, separated in equal sampling periods in the summer and winter, respectively. Using such a balanced approach, the research team determined, shall provide for meaningful analyses for comparisons between summer and winter visitors.

VII. Methodology

The methodology adopted for the survey sessions is that which is described in a memorandum titled, “Pilot survey session methodological and results findings” (Shivlani, 2004), and which is attached as appendix I of this report. Within that memorandum, it was suggested that, based on pilot survey returns, that a total of 30 sessions be conducted for each month that is sampled, and that a total of 60 sessions be conducted for the summer period (of 30 sessions per month). To standardize effort between months, it was further recommended that 10 sampling days be dedicated for each month, and that three sessions lasting two hours each be conducted per sampling day. The table below shows monthly effort:

Table 1: January 2005 survey effort

Date	Cruise surveys*	Air passenger	***Other visitor***
1/19		7(10)	
1/20	8(16)		7(15)
	9(8)		
1/21	16(18)	16(4)	14(15)
1/22		11(4)	18(19)
		13(10)	
1/23	8(12)	17(5)	12(14)
1/24	15(9)		
	13(15)		
	13(10)		
1/25	14(17)		
	13(4)		
	12(6)		
1/26	12(10)	14(6)	12(14)
1/27	14(16)		13(14)
	15(10)		
1/28	12(6)		13(17)
	14(15)		
1/29		11(4)	
		13(3)	
TOTAL	188(172)	102(46)	89(108)

Table 2: February 2005 survey effort

Date	Cruise surveys*	Air passenger	***Other visitor***
2/1	16(14)	16(6)	14(8)
2/2		16(3)	12(7)
2/3	14(9)	13(5)	13(8)
	16(10)		
2/4	13(16)		14(6)
	14(10)		
2/5		14(5)	14(7)
		15(6)	
2/6	15(11)	15(3)	
	14(14)		
2/7	14(16)		14(10)
	13(10)		
2/8	14(12)		15(9)
	15(14)		
2/9	12(9)		13(6)
2/10	13(14)	17(10)	
	13(12)		
	14(8)		
TOTAL	210(179)	106(38)	109(61)

** Parenthetical totals refer to number of visitors who refused participation.*

As shown in Tables 1 and 2, survey effort concentrated on the cruise passengers, and the rest of the sessions were split unevenly among air passenger and other visitor surveys. As agreed upon by the survey team, an equal number of sessions (or as close as could be reached) would be spent on cruise surveys and on other visitor surveys. However, logistical issues made that balance difficult at times. Data collection was often hampered by rain, during which visitors could only be surveyed indoors (i.e. the airport). Thus, to maximize field time, sessions were held at the airport when the weather conditions did not permit outdoor interviews.

Notwithstanding the challenges, project personnel successfully completed a total of 60 sessions over 21 total sampling days, from which a total of 804 surveys were completed. While lower than the summer session total, it still represents a broad survey of the cruise and other visitors.

Also, as shown in Tables 1 and 2, rejection rates were higher among cruise passengers than within the other two groups. Rejection rates for the cruise passenger group were 0.88 (or 0.88 rejections per completed survey; however, rejection rates for the other visitors (0.85) and air-based visitors (0.40) were also high, leading to higher overall rejection rates in the winter session than in the summer session. While it remains unclear why this may be the case, it was anecdotally reported that there were more visitors during winter session surveys, leading to more crowding and perhaps a lower willingness to participate. Also, unlike in the summer session where precipitation played a role in reducing participation on given days, two cold fronts that depressed temperatures may have affected participation in the winter session.

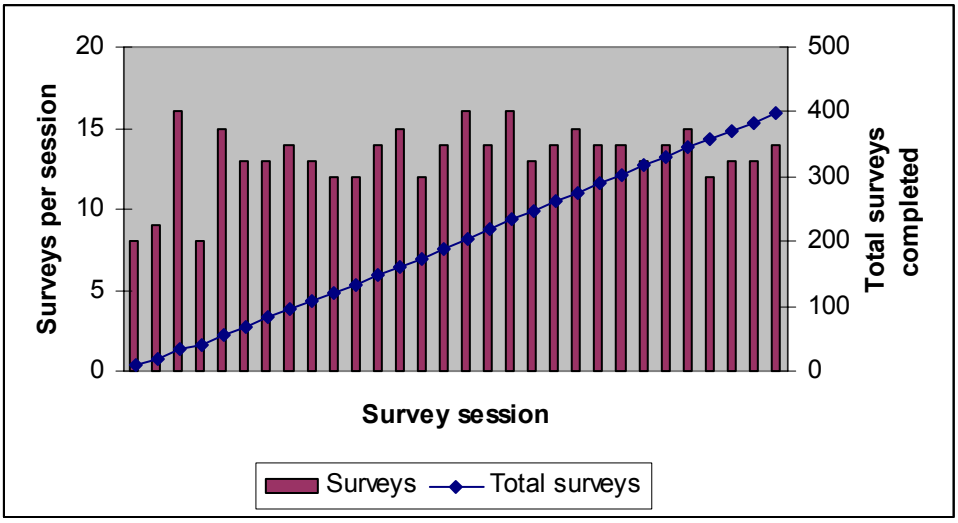

Figure 1: Cruise surveys per session

Figure 1 shows the number of cruise surveys completed per session. They ranged from a low of 8 surveys to a high of 16 surveys. The average number of surveys completed per session was 13.3 surveys (SD = 2.03), or a survey every 9.0 minutes. For January, the research team completed a total of 188 surveys in 15 sessions, or 12.6 surveys per session. For February, the research team completed a total of 210 surveys in 15 sessions, or 14 surveys per session.

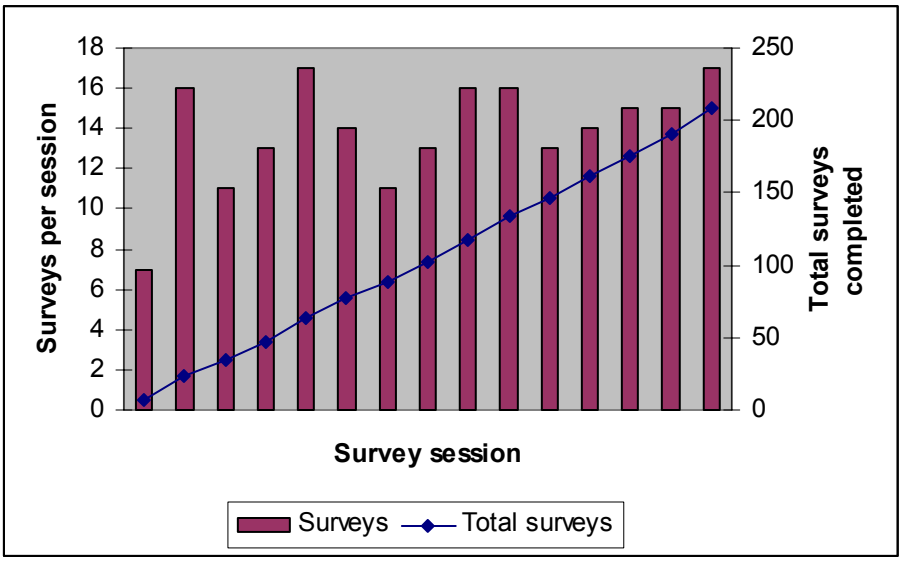

Figure 2: Air-based visitor surveys per session

Figure 2 shows the number of air-based visitor surveys completed per session. The range of surveys completed ranged from a low of 7 surveys and a high of 17 surveys. The number of surveys completed per session averaged to 13.9 surveys (SD = 2.70), or a survey every 8.6 minutes. This was largely a result of lower rejection rates, which led to more airline passengers being interviewed during each session.

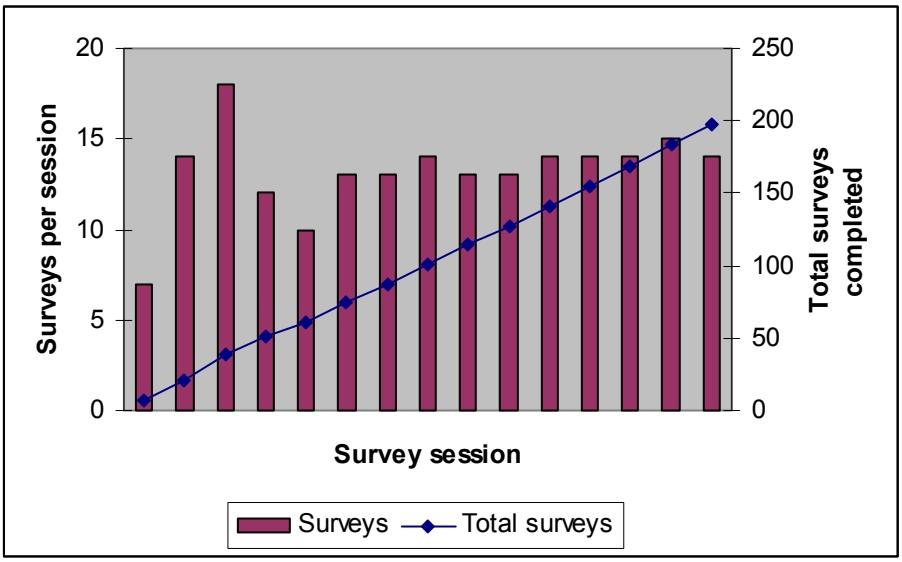

Figure 3: Other visitor surveys per session

Figure 3 shows that number of visitor surveys completed with the general visitor population was generally consistent across sessions. Data collection yielded an average of 13.2 surveys per session (SD = 2.4), and the range was from a low of 7 surveys to a high of 18 surveys. Surveys were generally completed within an average of 9.1 minutes.

Overall, the survey rate per session averaged 13.4 surveys over the 60 session period. While this is lower than the 17.3 survey rate obtained in the summer session, it must be noted that weather conditions (and most likely crowding conditions) played a major role in reducing participation. The average temperature during the January 2005 sampling period was 64 degrees Fahrenheit (range = 56 – 71 degrees Fahrenheit), or five degrees cooler than the averaged observed temperature for January over the past 100 years (NOAA, 2005). February conditions were milder (average temperature was 69 degrees Fahrenheit), but two sampling days had to be re-planned due to precipitation and strong winds resulting from arriving cold fronts (NOAA, 2005). Thus, meteorological conditions strongly affected survey rates.

VIII. Results

Winter session results are presented in three sections: socio-demographic or background information; expenditures; and attitudes and perceptions.

3. Cruise passenger results

a. Socio-demographic information

The sample was relatively evenly split between male (52%) and female respondents (48%). The parity was further reinforced by the fact that the respondent was more often (93.7% of the time) speaking on behalf of a group (consisting of two or more persons).

Of the persons who listed a residence, almost 84% provided a US zip code that they identified as their domicile, whereas the remaining 16% listed a non-US country of residence. Thus, most of the cruise passengers interviewed were US residents. Common foreign domiciles included Canada and the UK.

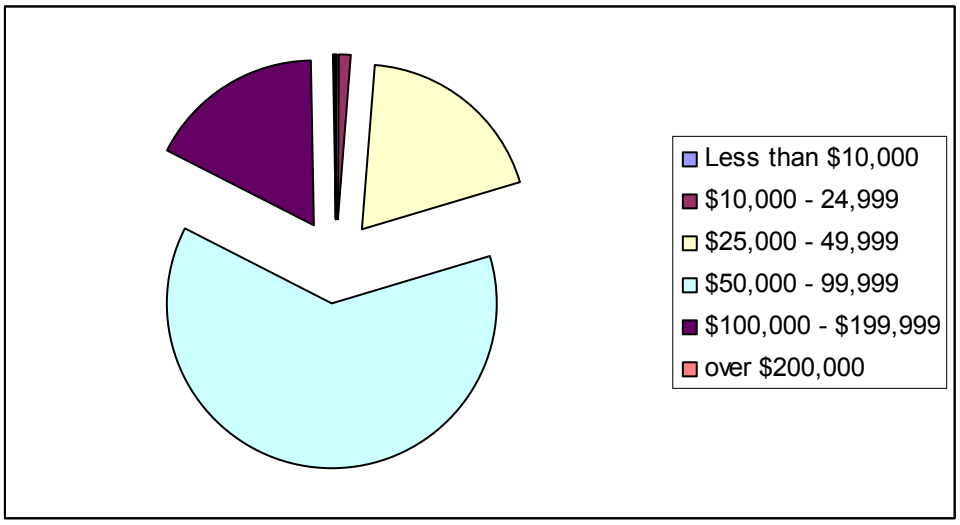

Figure 4: Income breakdown

Over 61% of the respondents reported an annual household income of between $50,000 – 99,999, whereas those reporting the lowest (0.3%) and highest (0.3%) incomes comprised the smallest groups. The average income among respondents was 3.95 (SD = 0.67), or between $50,000 – 99,999.

Only 6.3% of the respondents had traveled alone to Key West. Of the remaining 93.7%, the most common group size consisted of two persons (over 60%), followed by groups of four persons (17.8%). The average of visitors per age group was dominated by those persons aged between 35 – 65 years old; however, all age groups were represented in the distribution.

Most cruise passengers surveyed (85%) spent four or fewer hours off the ship; the most common length of shore time was three hours (37%), followed by four hours (29%). The average time spent of the ship was 3.4 hours (SD = 1.19).

b. Expenditure information

Cruise passengers were requested to provide basic information on their expenditures while in the city, separated by a variety of categories. As stated previously, over 94% reported group costs, and only 6% reported self costs. Average costs per category are shown in the figure below.

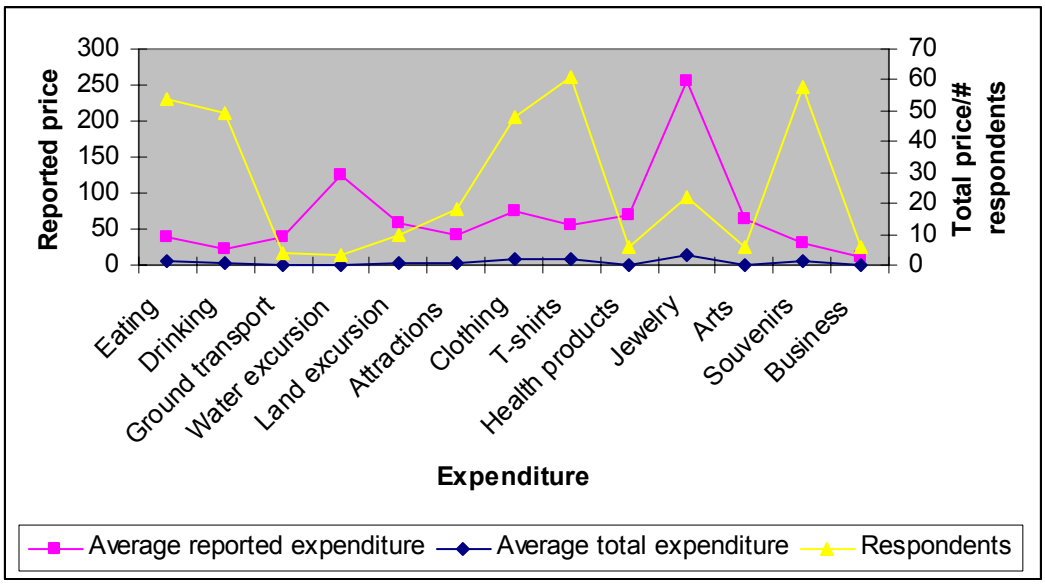

Figure 5: Average reported vs. total expenditure

Figure 5 shows that some expenditures were lower when averaged to the entire sample but nevertheless represented major purchases for the respondents who bought the items. For example, the entire sample spent only an average of $14 for jewelry, but when only the 22 persons (or 5.5% of the sample) who actually reported purchasing jewelry were considered, their average purchase exceeded $256. Similarly, only three persons, comprising less than 1% of the sample, took water excursions; but, they spent an average of $126 each for the excursion. Some items – such as clothing, t-shirt shop items, and souvenirs – were more important to the entire sample than others. These items accounted for almost $36, which made up more than 70% of the average total of $51.02 spent by each cruise passenger in Key West.

c. Attitudes and perceptions

A majority, or 58%, of cruise passengers had not been to Key West before. Of those who had, 49% rated the city as the 'same' compared to their previous visit, 34% rated it as 'better' than before, and 11% rated it as 'worse' than before. Thus, the favorable and neutral rating were much higher than the negative ratings.

Over two-thirds of the cruise passengers (69.2%) had not been to Key West before, and of those who had, most (61%) rated the city as "same", 33% rated it as "better" than before, and only 6% rated it as "worse" than before. Thus, the favorable and neutral ratings were higher than the negative ratings.

Table 3: Cruise passenger views on activities

Item/activity	*Below average*	*Average*	*Above average*
1. Information (n = 397)	5	23	72
2. Traffic (n = 398)	8	22	70
3. Security (n = 398)	2	30	68
4. Hospitality (n = 398)	2	21	77
5. Train tour (n = 140)	1	1	98
6. Museum tour (n = 43)	0	0	100
5. Shopping (n = 382)	0	17	83
6. Restaurant/bar (n = 369)	0	15	85
7. Overall (n = 396)	1	12	87

As is clear from Table 3, most cruise passengers had favorable opinions on Key West activities and conditions. Most (68% or greater) believed that information provided, the traffic conditions encountered, and security perceived in the city were either good or excellent. Similarly, cruise tourists related highly positive experiences with activities such as the train and museum tours, as well as frequenting restaurants and shopping in Key West. Interestingly, almost no cruise passengers reported undertaking water-based activities, and this may be a result of the weather conditions in particular but also a result of the time spent on shore. Overall, 87% of the respondents reported a favorable reaction to their stopover in Key West.

When asked whether they would return, over 65% of the passengers surveyed stated that they would do so via another cruise, and only 10% stated that they would not. An equal percentage of the respondents, or 63%, stated that they would return for a longer stay vacation to Key West, and only 12% stated that they would not. These results suggest that, coupled with the overall positive trip they experienced off their cruise ships, cruise visitors were either likely or very likely to return to the city. Interestingly, of those persons who stated that they would not return on another cruise trip, 31% were either undecided (15%) or believed that it was either likely or very likely (16%) that they would return for a longer-stay vacation. Thus, there is a clear indication that cruise-based exposure to the City of Key West may attract longer-term visitation in those instances where it does not affect return *cruise* visits.

4. ***Air and land-based visitor results***

a. Socio-demographic information

The visitor sample contained more responses from men (59.1%) than from women (40.9%); however, as in the summer session, over 91% of the respondents reported having more than one member in their group, suggesting that both sexes were adequately represented in the survey effort.

Most persons surveyed, or 93.7%, were from the US. Only 6.3% of the winter respondents were from elsewhere, and of that total, almost all were Canadian (95.6% of all foreign tourists).

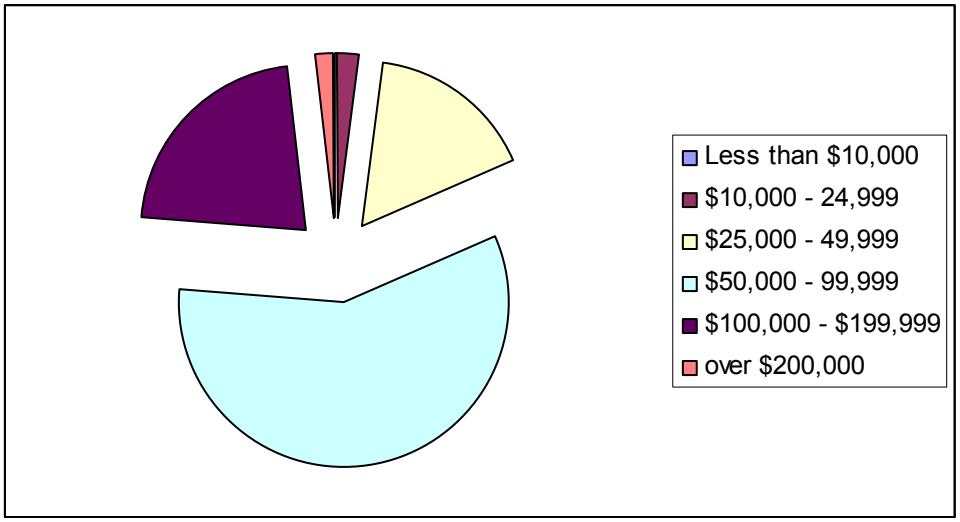

Figure 6: Income breakdown

Most respondents (57%) reported household incomes of between $50,000 – 99,999. Only 1.7% reported an income of over $200,000. The higher income brackets ($100,000 or greater) made up just under 25% of the sample. Lower income respondents (those making less than $25,000) accounted for only 2.2% of the visitors.

Group sizes ranged from a single person (8.6% of the sample) to groups of seven or more persons (3.2% of the sample). The dominant group size was that of two persons (comprising almost 54% of the sample), followed by groups of four persons (17.5% of the sample). The most common age group was that of persons between the ages of 45-54 years, followed by the 35-44 year age group, and the 55-64 year age group. Younger and older age groups were less common.

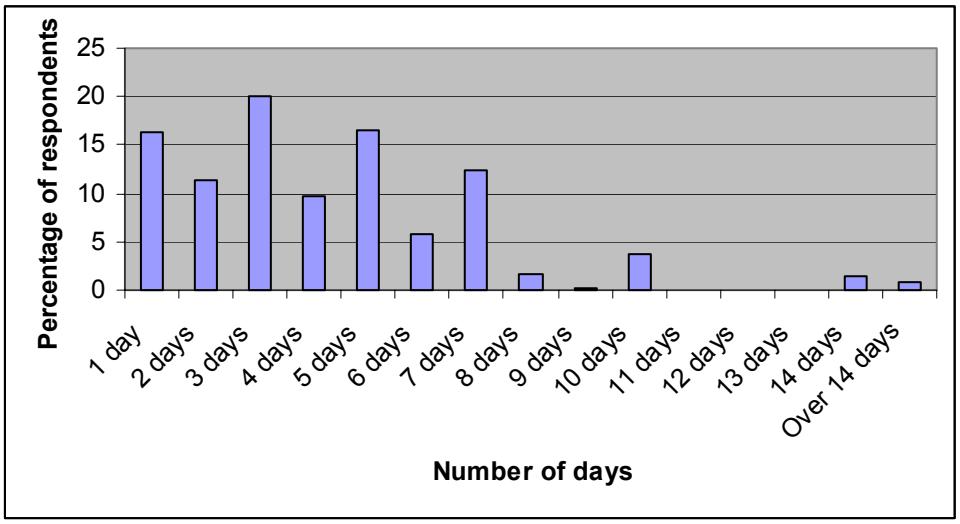

Figure 7: Number of days spent in Key West

Those persons not staying overnight ('day trippers') accounted for 17% of the sample; 82.7% reported spending one or more nights in Key West. Over 20% of the respondents reported that their trip would last three days, and it was the most common response. Generally, trips lasting a week or fewer days dominated the sample, and only less than 8% reported staying for over a week. If all trips greater than 14-days were set at 15 days, then the average time spent in Key West by visitors from the winter session is 4.3 days.

b. Expenditure information

As previously stated, 92% of the sample reported group sizes of over one person, and an equal percentage of the respondents provided group costs. The results provided below represent an average of costs provided by the entire sample.

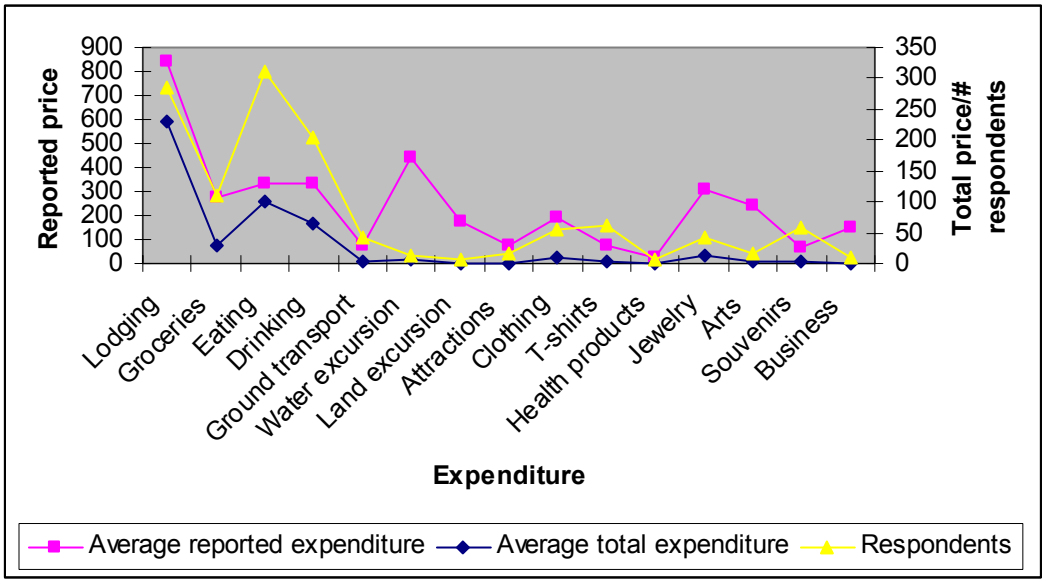

Figure 8: Average reported vs. total expenditure

Figure 8 shows the average expenditures within the entire sample and average reported expenditures by respondents who spent in those categories. The results clearly demonstrate that for the sample, the highest average expenditures were lodging ($589), eating establishments ($255), and drinking establishments ($169). Most respondents reported making all three expenditures. If the costs are determined as those made by only the respondents who reported them, or the average reported expenditure, then it shows that almost 70% of the sample spent an average of $842 in lodging, almost 77% spent an average of $333 in eating establishments, over 50% spent an average of $335 in drinking establishments, over 15% spent an average of $75 in t-shirt shops and $188 in clothing, and over 14% spent an average of $65 in souvenirs. In total, the average total expenditure per respondent was $1,240 (for 16 expense areas), whereas the average reported expenditure per respondent was $3,600.

c. Attitudes and perceptions

Less than half of the visitors surveyed, or 44.5%, had not been to Key West before, and of those who had visited previously, 55% rated the city as "same", 39% rated it as "better" than their previous trip, and 5% rated it as "worse" than before. The favorable ratings were eight times higher than the negative ratings.

Table 4: Visitor views on activities

Item/activity	*Below average*	*Average*	*Above average*
1. Information (n = 401)	6	25	69
2. Traffic (n = 399)	12	24	64
3. Security (n = 405)	4	30	66
4. Hospitality (n = 406)	2	22	76
5. Dive trip (n = 1)			
6. Charter fishing (n = 11)	0	0	100
7. Train tour (n = 15)	0	0	100
8. Walking tour (n = 8)	0	0	100
9. Boating (n = 13)	0	0	100
10. Watercraft rental (n =2)	0	0	100
11. Museum tour (n = 38)	0	0	100
12. Shopping (n = 406)	0	19	81
13. Restaurant/bar (n = 405)	1	12	87
14. Overall (n = 406)	1	12	87

As shown in Table 4, visitors had very favorable opinions on Key West activities and conditions. Almost all activities in which they participated, visitors gave the activities the highest ratings. It should be noted that not many visitors reported taking water-based activities, especially as compared to the summer session visitors. This may be due to the cooler temperatures experienced in the winter, which may prevent visitors from undertaking diving and snorkeling and other water-based activities. Overall, the sample rated Key West with an 87% approval rating, suggesting that it remains a very attractive tourist destination.

When asked whether they would return, 43% of the respondents reported that they would most likely return to Key West for a vacation. Another 43% stated that they would likely return for another vacation. Only 2% felt otherwise, arguing that it was unlikely or very unlikely that they would return. An additional 12% of the sample was neutral.

APPENDIX 5: RESIDENT SURVEY INSTRUMENT

City of Key West
Quality of Life Study

Survey of Residents

1. How long have you lived in Key West?
Years ___

2. Are you a full-time or part-time resident?
☐ Full-time ☐ Part-time

3. If a part-time resident then for how many months in a year do you live in Key West?
Months ___

4. Do you rent property to tourists?
☐ Yes ☐ No

5. In what part of the city do you live? *(Please refer to map of residential zones on page 1 of the attached sheets.)* Zone___

6. In what commission district do you live? *(Please refer to map of commission districts on page 2 of the attached sheets.)* Commission District___

7. What is your current work affiliation? *(Please refer to map of industry codes on page 3 of the attached sheets. Retired and not currently employed have listings as well.)* ___

8. In your estimation, how has the quality of life for residents been affected by the following?

a) tourism in general
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

b) cruise ship tourism in particular
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

9. Please rate the impact of cruise ship activity on quality of life in Key West for the following issues:

a) Economic base of Key West
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

b) Local tax base
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

c) Exposure of Key West as a tourism destination
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

d) Restaurants
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

e) Entertainment options
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

f) Attractions/recreational opportunities
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

g) Public amenities
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

h) Environmental qualities
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

i) Ambience/local character
☐ strongly negative ☐ generally positive
☐ generally negative ☐ strongly positive
☐ neutral

j) Crowding particularly in the historic district
☐ strongly negative ☐ generallly positive
☐ generally negative ☐ strongly positive
☐ neutral

k) Undesirable business locations
☐ strongly negative ☐ generallly positive
☐ generally negative ☐ strongly positive
☐ neutral

10. What do you consider to be undesirable business?

11. What in your estimation is the proper level for the following activities in Key West?

a) tourism activity
☐ much less ☐ a little more
☐ a little less ☐ much more
☐ at the current level

b) cruise ship activity
☐ much less ☐ a little more
☐ a little less ☐ much more
☐ at the current level

City of Key West, Quality of Life Study
Survey of Residents

12. To what extent should the city be involved in regulating cruise ships relative to current levels?

a) tourism activity

- ☐ none
- ☐ less than current levels
- ☐ same as current levels
- ☐ more than current levels
- ☐ much more than current levels

b) cruise ship activity

- ☐ none
- ☐ less than current levels
- ☐ same as current levels
- ☐ more than current levels
- ☐ much more than current levels

13. If tighter restrictions on tourism / cruise ships affect activity levels, would you be willing to pay higher taxes and/or fees to offset a loss of revenue stream from:

a) tourism activity?

☐ yes ☐ no

b) cruise ship activity?

☐ yes ☐ no

A number of management strategies have been suggested to deal with cruise ships in Key West. Some of more frequently cited strategies are listed below. As a starting point please rate the following options as to the appropriateness of these measures in dealing with cruise ship activity in Key West.

14. Limitations on the number of port calls along with black out days so that cruise ships would not land on days when tourist activities are pronounced, such as, but not limited to, Fantasy Fest and New Years Eve.

- ☐ very inappropriate ☐ appropriate
- ☐ inappropriate ☐ very appropriate
- ☐ neutral

15. Increasing the minimum length of stay of cruise ships to increase passenger spending.

- ☐ very inappropriate ☐ appropriate
- ☐ inappropriate ☐ very appropriate
- ☐ neutral

16. Increasing tariffs (including dockside and disembarkation fees) to compensate for impacts generated by cruise ship vessels and passengers.

- ☐ very inappropriate ☐ appropriate
- ☐ inappropriate ☐ very appropriate
- ☐ neutral

17. Tighter controls to assure that best management practices are performed by cruise ships regarding dockside cleaning and vessel operations.

- ☐ very inappropriate ☐ appropriate
- ☐ inappropriate ☐ very appropriate
- ☐ neutral

18. Are there any other thoughts or specific strategies to eliminate, where possible, or reduce impacts associated with tourism in general or cruise ships in particular that you would like to have conveyed to city officials?

Thank you for your time. Please send your completed survey in the enclosed postage paid envelope.

APPENDIX 6: BUSINESS SURVEY INSTRUMENT

City of Key West
Quality of Life Study

Survey of Business Establishments

1. What industrial classification best describes the type of establishment you operate?
__ Industry Code (*Please refer to Industry Codes on page 1 of the attached sheets.*)

2. In what part of the city is your primary establishment located?
__ Zone (*Please refer to map of business zones on page 2 of the attached sheets.*)

3. Where do you live?
☐ Old Town Key West
☐ New Town Key West
☐ Outside the City of Key West

4. How long has your business establishment been in the Key West?
__ years

5. What is your position within the firm?
☐ Owner
☐ Manager
☐ Employee

6. What share of your total workforce based in the city of Key West are _____?
__ full-time employees
__ part-time employees

7. What share of your workforce lives in:
a) the city of Key West? __ %
b) outside the city of Key West? __ %

8. Please indicate your level of gross annual sales for the last calendar year. *(Note: These figures will be evaluated in the strictest confidence by the external consultants and will be used only to estimate economic impacts. No individual business data will ever be disclosed, and only aggregate industry total will be included in the report. You may elect not to answer this question.)*
$_____ ☐ choose not to answer

9. Please estimate what share of your annual sales came from:
a) tourists __ %
b) locals __ %

10. Of your <u>tourism-related</u> sales, please estimate the share of those sales from the following groups (should add to 100%):
a) overnight visitors __ %
b) cruise ship passengers __ %
c) day trippers (not on a cruise) __ %

11. Please estimate what share of your of your inputs are purchased from vendors located:
a) in the city of Key West __ %
b) elsewhere in Monroe County __ %
c) outside of Monroe County __ %

12. On balance what is the effect on your business operations of the following:
a) tourism
☐ significantly negative ☐ moderately positive
☐ moderately negative ☐ significantly positive
☐ neutral
b) cruise ships
☐ significantly negative ☐ moderately positive
☐ moderately negative ☐ significantly positive
☐ neutral

13. What in your estimation is the proper level for the following activities in Key West?
a) tourism activity
☐ much less ☐ a little more
☐ a little less ☐ much more
☐ at the current level
b) cruise ship activity
☐ much less ☐ a little more
☐ a little less ☐ much more
☐ at the current level

14. To what extent should the city be involved in regulating cruise ships related to current levels?
a) tourism activity
☐ none
☐ less than current levels
☐ same as current levels
☐ more than current levels
☐ much more than current levels
b) cruise ship activity
☐ none
☐ less than current levels
☐ same as current levels
☐ more than current levels
☐ much more than current levels

15. If tighter restrictions on tourism / cruise ships affect activity levels, would you be willing to pay higher taxes and/or fees to offset a loss of revenue stream from:
a) tourism activity?
☐ Yes ☐ no
b) cruise ship activity?
☐ Yes ☐ no

City of Key West, Quality of Life Study
Survey of Business Establishments

A number of management strategies have been suggested to deal with cruise ships in Key West. Some of more frequently cited strategies are listed below. As a starting point, please rate the following options as to the appropriateness of these measures in dealing with cruise ship activity in Key West.

16. Limitations on the number of port calls along with black out days so that cruise ships would not land on days when tourist activities are pronounced, such as, but not limited to, Fantasy Fest and New Years Eve.

- ☐ very inappropriate
- ☐ inappropriate
- ☐ neutral
- ☐ appropriate
- ☐ very appropriate

17. Increasing the minimum length of stay of cruise ships to maximize passenger spending.

- ☐ very inappropriate
- ☐ inappropriate
- ☐ neutral
- ☐ appropriate
- ☐ very appropriate

18. Increasing tariffs (including dockside and disembarkation fees) to compensate for impacts generated by cruise ship vessels and passengers.

- ☐ very inappropriate
- ☐ inappropriate
- ☐ neutral
- ☐ appropriate
- ☐ very appropriate

19. Tighter controls to assure that best management practices are performed by cruise ships regarding dockside cleaning and vessel operations.

- ☐ very inappropriate
- ☐ inappropriate
- ☐ neutral
- ☐ appropriate
- ☐ very appropriate

20. Are there any other thoughts or specific strategies to eliminate, where possible, or reduce impacts associated with tourism in general or cruise ships in particular that you would like to have conveyed to city officials?

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Thank you for your time. Please send your completed survey in the enclosed postage paid envelope.

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APPENDIX 7: EMPLOYEE SURVEY

City of Key West
Quality of Life Study

Survey of Employees

1. **What industry classification best describes the business that you work for?**
   ___ **Industry Code** ***(please refer to the attached list of industry codes.)***
2. **Where do you live?**
   ___ **inside the city of Key West**
   ___ **outside the city of Key West**
3. **If you live outside of the city of Key West , do you live:**
   ___ **on Stock Island**
   ___ **Boca Chica through Sugarloaf**
   ___ **Cudjoe Key through the Seven Mile Bridge**
   ___ **beyond the Seven Mile Bridge**
4. **If you live outside the city of Key West, what is your primary reason for doing so?**
   ___ **affordable housing**
   ___ **quality of life**
   ___ **seeking a quieter location**
   ___ **family ties**
   ___ **other** _____
5. **What are the most important issues in getting to and from your work setting?**
   ___ **travel distance**
   ___ **traffic congestion**
   ___ **pedestrian congestion**
   ___ **parking**
   ___ **other** _____
6. **What can the city do to make Key West a more attractive place to work?**