

# FY 2007



# Kennedy Space Center Forty-Five Years of Space Exploration



## ***Preface***

The National Aeronautics and Space Administration (NASA) has a number of centers that help the Agency pursue its mission. The Kennedy Space Center (KSC) in Florida is one of those centers, and as such plays an important role in Agency exploration and discovery efforts.

As good stewards of the responsibilities and resources the nation entrusts to the Agency and its centers, NASA strives to maximize the benefits produced by activities it conducts at its centers, including KSC, while minimizing costs. In addition to the technical and social benefits derived from these activities, the total benefit of business NASA conducts also includes significant economic benefits in the locations it operates across the country, including Florida. To help quantify, understand, and communicate this benefit, the Chief Financial Officer (CFO) at KSC annually produces an economic impact assessment of NASA spending in Florida covering three concentric economic areas: local (Brevard county), regional (central Florida counties) and state. The CFO typically enlists the help of one or more outside economic experts in developing these assessments. This year's assessment uses the results of a study conducted by the Transportation Economics Research Institute, a Mt. Dora, FL based private organization under the direction of Dr. Warren McHone, who is also a Professor of Economics at the University of Central Florida. The study was based on data supplied by KSC and its affiliates. The report of this year's economic impact assessment has been collaboratively produced by Dr. McHone and KSC CFO personnel.

The KSC Office of the CFO is pleased to submit the results of the Fiscal Year 2007 assessment, covering the period from October 1, 2006 through September 30, 2007. The study and methodology used has been reviewed and we concur with its findings of that study, contained in this report.

Additional copies of the report are available through the KSC Office of the CFO (321) 867-3726.

National Aeronautics and Space Administration  
Economic Impact of NASA In Florida FY 2007

# Economic Impact of NASA in Florida Fiscal Year 2007

Produced by the NASA Office of the CFO at  
Kennedy Space Center, Florida

with the support of W. Warren McHone, PhD  
Transportation Economics Research Institute (TERI)

National Aeronautics and Space Administration  
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## **1. Study Highlights**

The following is a summary list of highlights from this study.

- *The monetary injections into the Florida economy by KSC and other NASA Centers to support space and research program operations at KSC were \$1.78 billion in FY 2007. Measured in constant dollar terms this was a 0.6% decrease from the FY 2006 level.*
- *KSC & Other NASA Centers managed 1,496 contracts in Florida in FY 2007. 93% of KSC/NASA spending (including Civil Service wages) was concentrated on-site at KSC.*
- *Total KSC/NASA direct spending was \$1.66 billion in Brevard County, \$75 million in other Central Florida counties and \$48 million in other Florida counties.*
- *Commodity purchases by KSC and other NASA Centers in Florida totaled \$1,496 million in FY 2007. Over 70% of these purchases were concentrated in the top four commodity categories. The top commodity category was the \$589 million for Scientific Research & Development Services.*
- *There were a total of 14,456 KSC workers included in this study (of 14,950 total population). 84% of the workers were employed by prime contractors and 94% lived in Brevard County.*
- *Total gross earnings of all NASA/KSC workers in Florida were \$1.1 billion in FY 2007. This was a 7% increase in constant dollar terms over the previous year's level.*
- *The average annual salary for KSC on-site workers was \$77,600 in FY 2007, which was more than twice the wage level of the average Brevard County worker.*



- *1.5 million visitors were welcomed at the KSC Visitor Center (KSCVC). Of these, 918,572 were out-of-state tourists in FY 2007 resulting in a combined \$39 million in wages and purchases within the state by KSCVC. In addition, out-of-state business visitors to KSC spent \$3.2 million in total local travel expenditures in FY 2007.*
- *The total monetary injection of outside money into Florida's economy by all KSC based activities was \$1.8 billion in FY 2007. This total consisted of \$1.1 billion in wage payments to households and \$703 million in non-labor purchases from contractors. 93% of the total injection went to Brevard County businesses and households and another 5% went to business and households in other nearby Central Florida Counties.*
- *The injection of outside money into the state and local economies plus the subsequent indirect transactions that were generated by this spending resulted in a FY 2007 total economic impact of NASA in Florida of \$4 billion in output, \$2 billion in household income and 35,960 jobs. The injections also generated \$206 million of federal taxes and \$91 million of state and local taxes.*
- *97% of the output impact, 99% of the income impact and 97% of the jobs impact occurred in the seven county Central Florida Region.*
- *At the state level each direct job at KSC was multiplied into 2.49 total jobs, each dollar of earnings was multiplied into \$1.82 in total income and each dollar of total direct spending for commodity purchases and wage payments was multiplied into \$2.22 of output production.*



*Discovery Rolls out on its STS-120 mission*

## **2. Kennedy Space Center Celebrates 2007 Achievements**

### **2.1. 2007 Highlights**

The workers at NASA's Kennedy Space Center can reflect on 2007 as a year that celebrated the agency's rich history while adding new chapters to it.

In July, Kennedy marked the 45th year as NASA's launch operations center. Its workers and managers focused on the center's diverse missions, including launching the space shuttle and spacecraft atop expendable launch vehicles, gearing up for the Constellation Program and working toward completing the International Space Station.

Even though a hailstorm caused a late start, Kennedy launched three space shuttle missions this year. Atlantis' STS-117 mission brought the second and third starboard truss segments and another pair of solar power arrays to the station in June. In August, shuttle Endeavour's STS-118 mission installed a third starboard truss segment, the S5 truss, and shuttle Discovery's STS-120 mission delivered the Italian-built U.S. Harmony connecting module in October.



*International Space Station moves away from Space Shuttle Endeavour during the STS-118 mission in August 2007*



*Themis Mission is making important discoveries of spectacular eruptions of the Northern Lights.*

Work at Kennedy for the Constellation Program began moving from concept to construction. This included installing the new lightning protection system at Launch Pad 39B to support future launches of the Ares rocket and Orion spacecraft. Also, a developmental heat shield for the Orion crew exploration vehicle arrived in November at the center and will undergo testing and evaluation.



*Workers install Lightning Protection System at Launch Complex 39B as modifications for Constellation continue*





Kennedy Space Center made advances on the "green power" front. NASA and BMW teamed up to test a fleet of liquid hydrogen-fueled cars that were used throughout the center during an eight-week period in the spring. And in December, NASA and Florida Power and Light signed a memorandum of understanding to study potential renewable energy projects that would be done at the center.

Another first for Kennedy was hosting the World Space Expo in November. The four-day event brought together thousands of people from all over the

world to celebrate the past, present and future of space exploration.

With at least five space shuttle flights and 10 expendable launch vehicle missions, Kennedy's work force is preparing for an aggressive launch schedule in 2008 while continuing construction and other transition work for the new Constellation Program.

## **2.2. Other NASA Funded Activities in Florida**

Not all NASA activities in Florida originate from the Kennedy Space Center. As in previous years, other NASA Centers funded and managed many contracts (and in turn, subcontracts, vendors and suppliers) for a multitude of Florida products and services. For example, a major Florida aerospace contractor continues support for the Space Shuttle Main Engine (SSME), which is work performed under a Marshall Space Flight Center (MSFC) contract. All NASA costs are included in this study.

## **2.3. Sources of NASA's Economic Impact in Florida**

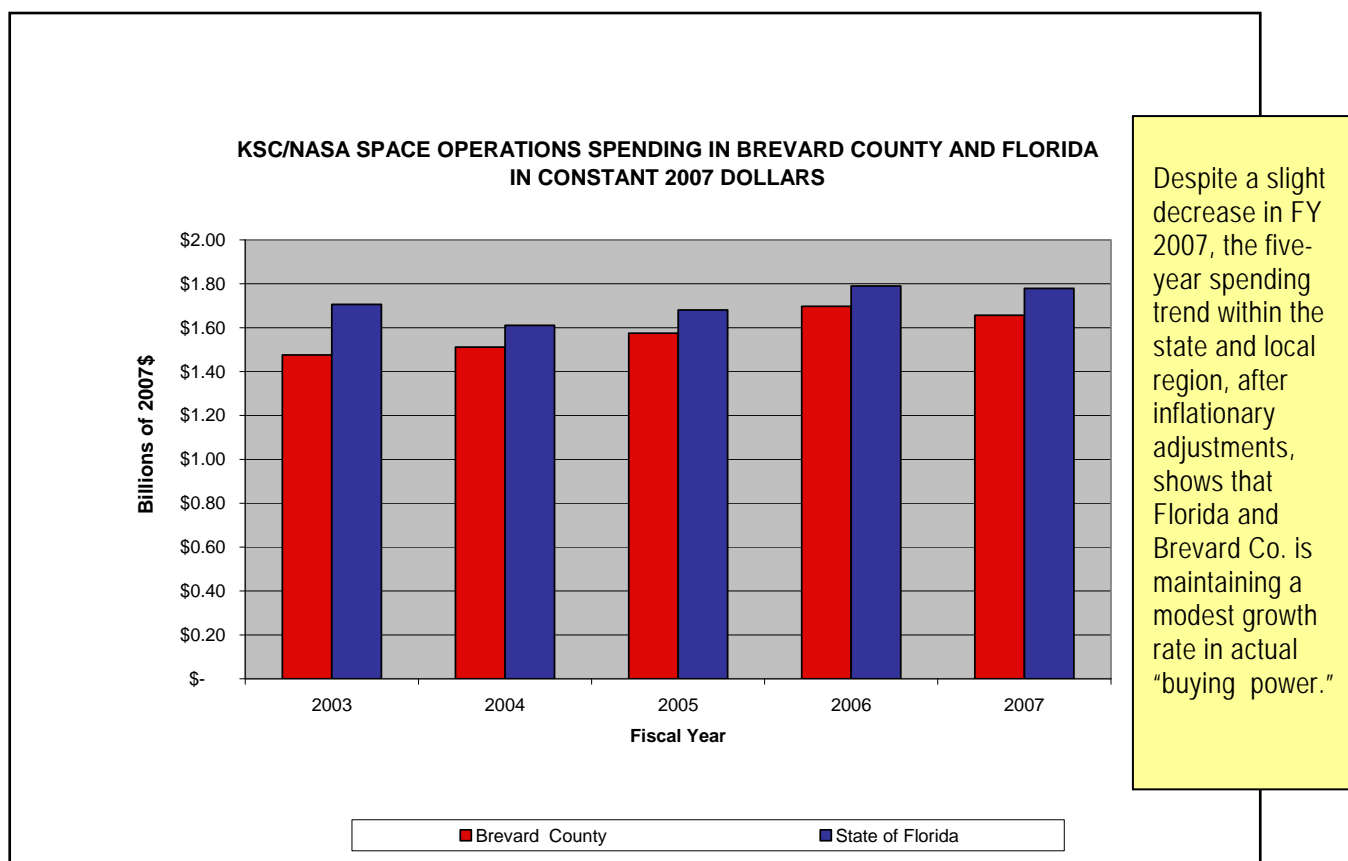
In addition to KSC/NASA's spending on space operations and research, there are a number of other activities directly associated with KSC that add to its total economic impact. These include the local travel expenditures of out-of-state business and government personnel that travel to KSC to conduct business and the Kennedy Space Center Visitor Center's (KSCVC) sales to out-of-state visitors.

The economic impact of all of these activities is presented in this report. The analysis is conducted at three geographic levels – Brevard County, the larger Central Florida Region (includes Brevard, Flagler, Lake, Orange, Osceola, Seminole and Volusia counties) and the State as a whole.

### 3. NASA Space Program Spending In Florida

#### 3.1. Recent Trends in NASA's Spending in Florida

The money that NASA spends in Florida to support its space missions and other research activities represents an enormous injection into the economies of Brevard County, the larger Central Florida region and the State of Florida. These injections come in the form of wages to local residents and the purchase of goods and services from local businesses and organizations. In FY 2007 KSC and other NASA Centers injected \$1.78 billion into the Florida economy and \$1.66 billion into the Brevard County economy to support space program launch and landing operations at KSC (see Exhibit 1). After adjusting for inflation, these amounts represented a 0.6% decrease for the State and a 2.3% decrease for the county compared to their FY 2006 levels. As shown in Exhibit 1 this is the first decrease in constant dollar terms since 2004.

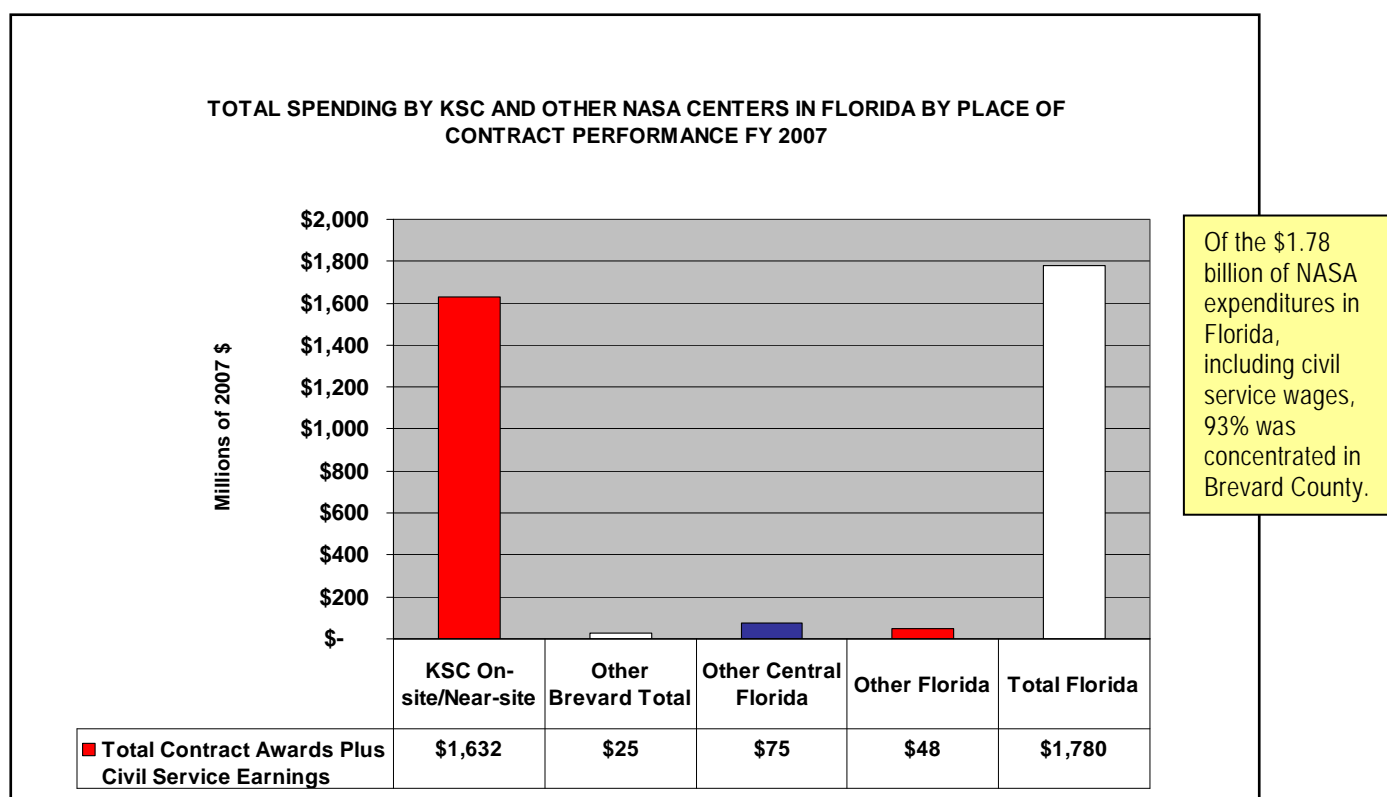


**Exhibit 1**

### 3.2. The Location of NASA Spending in Florida

Brevard County (KSC and CCAFS) is the primary launch site for most of NASA's space missions. To support the launch and other related responsibilities, KSC managed 1034 separate contracts in FY 2007 with a total value of \$875 million. Eight other NASA Centers managed a total of 462 contracts in Florida in FY 2007 with a fiscal year value of \$621 million. The NASA Space Shuttle Program's Space Program Operations Contract (SPOC) is managed by Johnson Space Center in Texas, and expends \$983 million through its Florida operation. The portion of the contract performed in Florida was \$588 million which was 95% of the spending by the eight other NASA centers in Florida in FY 2007. While the majority of the KSC/NASA contract dollars was concentrated in awards to major contractors, close to 50% of the awards were for small contracts (\$50,000 or less).

All together KSC and the other eight NASA Centers spent \$1.78 billion in Florida in FY 2007. 93% percent of this spending was for awards to on-site/near-site contractors and wages to on-site Civil Service and contractor workers. Total direct spending in Brevard County was \$1.66 billion. Direct spending in other Central Florida counties and other counties in Florida totaled \$75 million and \$48 million, respectively.



**Exhibit 2**

### 3.3. Major Commodity Purchases in Florida

As shown in Exhibit 3, KSC and other NASA Centers' commodity purchases in Florida totaled \$1,496 million in FY 2007. For the purposes of this exhibit, the on-site labor expenditures of the NASA Space Shuttle Programs Space Flight Operations Contract (SPOC) and the Space Gateway Systems (SGS) Base Management Contract were allocated to relevant commodity categories. NASA /KSC civil service wages are not included in this total. The top four commodity categories constituted over 70% of the total commodity purchases that were made by KSC and other NASA Centers in Florida in FY 2007. The top commodity category in FY 2007 was the \$589 million in Scientific Research and Development. A large share of the purchases in this category was spending on personnel that are employed on the Johnson Space Center's SPOC.

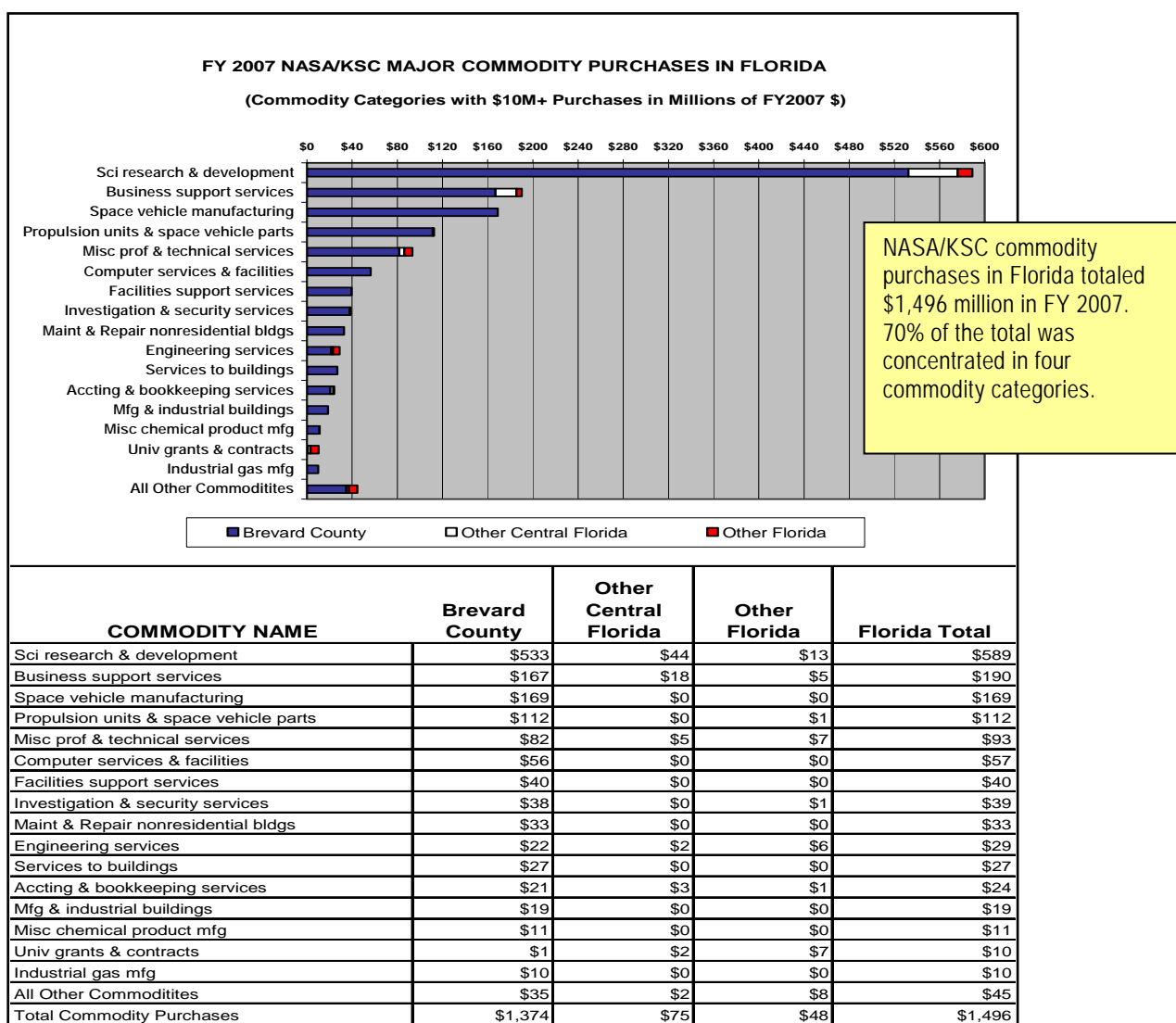


Exhibit 3

### **3.4. Employment at KSC**

There were a total of 14,950 on and near-site workers at KSC at the end of FY 2007. This includes workers involved in launch and launch control, payload processing, mission integration and technology development, as well as those workers involved in planning, maintenance, operation and management of KSC employees, infrastructure, environment and the KSC Visitors Center. It also includes support service workers and contract and lease tenants, who work on-site at KSC, but are not directly attributable to the KSC and NASA mission.

For purposes of this study, 494 workers have been excluded from the economic analysis on the basis that their activity does not contribute new economic stimulus to the state or local economy, but merely transfers it from one segment to another. Exclusions include lease tenants and culinary staff (209), as well as 38% of the KSC Visitors Center Staff (285), which was adjusted in proportion to the number of in-state vs. out-of-state visitors (see Section 4.2. for further explanation). Thus, the total workforce upon which this study is based is 14,456.

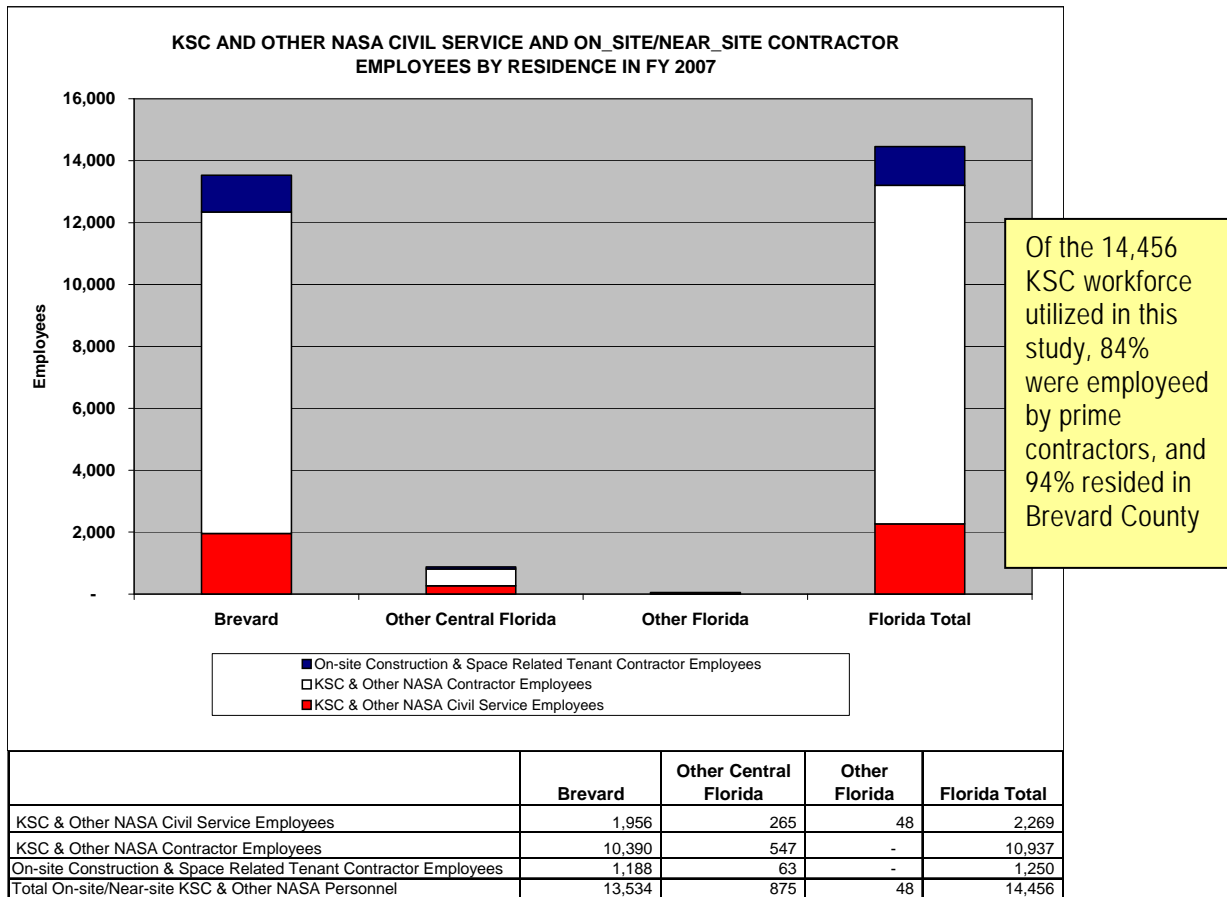
The overwhelming majority (84%) of on-site workers was employed by KSC and NASA prime contractors. The remainder was federal civil service workers employed by KSC and other NASA Centers. As might be expected, most (94%) of the employees at KSC lived in Brevard County. However, as illustrated in Exhibit 4, almost 1,000 workers commuted from nearby Central Florida counties and a small number of workers lived elsewhere.



*The crew of STS-118 prior to their August 2007 mission*



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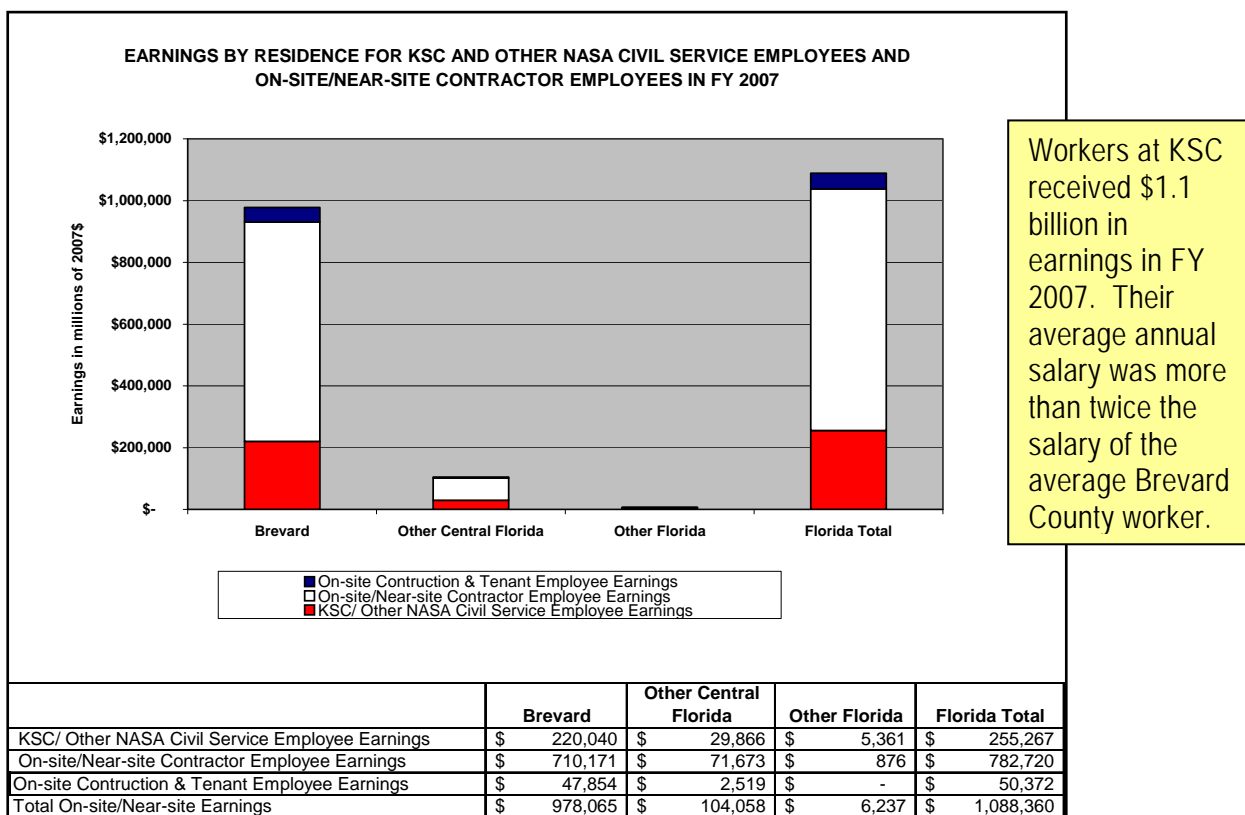


**Exhibit 4**



### 3.5. Earnings at KSC

Total earnings for contract and civil service workers at KSC were \$1.1 billion dollars in FY 2007 (see Exhibit 5). Over 99% of these wages were paid to residents of Brevard and other Central Florida counties. A large majority of the workers at KSC are highly trained engineers, scientists and technicians that command relatively high salaries. Accordingly the average annual salary for the workforce at KSC was \$77,000, which was twice the \$37,000 salary that was earned by the average Brevard County worker.



**Exhibit 5**

## **4. Spending By Tourists and Business Visitors**

### **4.1. KSC Visitor Center Operations**

KSC's economic presence in Florida is not just limited to the contracts and employees that are required to carry out NASA launch and research programs. KSC's Visitor Center welcomed approximately 1.5 million visitors in FY 2007. Out-of-state residents accounted for 918,572 of those visitors, spending a little over \$52 million on goods and services provided by the Visitor Center. The KSCVC had 749 employees which it paid \$25 million in wages. All of these employees were residents of Central Florida. In addition to its payroll expenses, the Visitor Center spent \$28 million to purchase the merchandise and services that are required to operate the facility.



**KSC Visitor Complex**

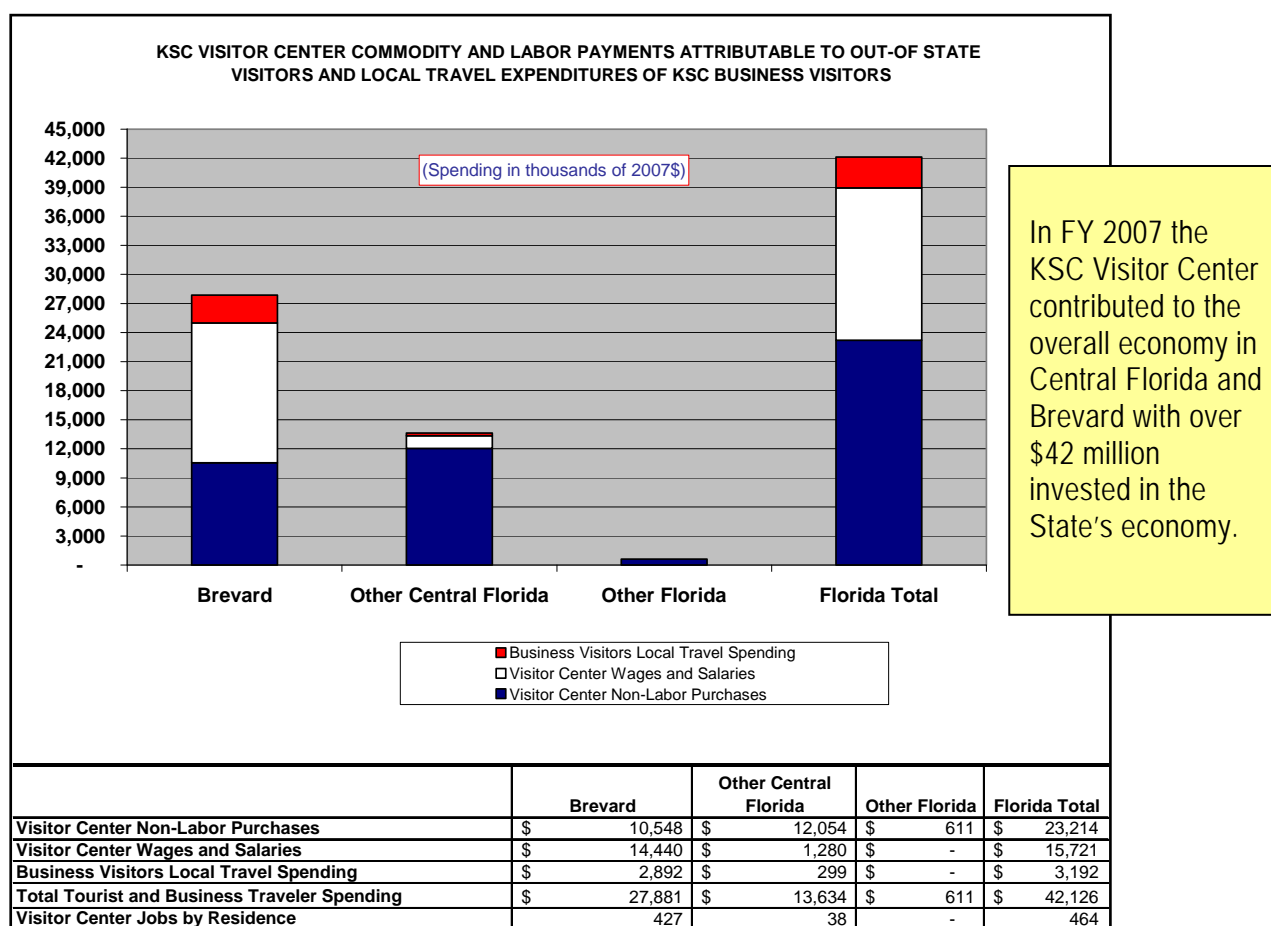
### **4.2. Impact Relevant Visitor Center Spending**

In considering the economic impact of Visitor Center expenditures in Florida, it is necessary to focus only on the portion of the purchases and wages that went to Florida firms and residents. While all of the wages paid by the KSCVC went to Brevard and other Central Florida residents, only 48% of the procurement purchases was from Florida firms. In addition to adjusting for out-of-state purchases, it is also necessary to adjust the in-state spending to reflect the portion that is attributable to out-of-state visitors. The logic behind such an adjustment is that the expenditures by in-state visitors do not represent an injection of outside money into the state and local economies. Instead, these expenditures are only a transfer of economic activity between sectors within the state or local economy. Based on the geographic distribution of visitors, it was determined that 62% of the total activity at the Visitor Center could be attributed to out-of-state visitors. Consequently, the amounts of KSCVC spending that were relevant for the state level impact analysis were \$23 million in salaries, \$16 million in other non-labor purchases for a total injection of \$39 million.

### 4.3. Business Visitor Spending

One other source of NASA's economic stimulus in Florida was the local travel expenditures of out-of-state business visitors that came to KSC in FY 2007. This includes visitors that came from NASA Headquarters, other NASA Centers and out-of-state contractor personnel. The purpose of the visits included pre-launch meetings and reviews, general information exchange and a variety of other business functions. It was estimated that the total local (Brevard and other Central Florida Counties) spending for lodging, food, car rentals and other miscellaneous items by business visitors in FY 2007 was \$3.2 million.

All of these expenditures represented an injection of outside money into the local economy. The spending by the Visitor Center attributed to out-of-state visitors and the local travel expenditures of KSC business visitors' resulted in a total injection of \$42 million dollars into the Florida economy in FY 2007. The details of this injection are show in Exhibit 6.



**Exhibit 6**

## 5. Monetary Injections into Florida Economies

The purchases and household income payments that are described in the preceding sections of this study are injections of outside money into the economies of Brevard County, the larger seven-county Central Florida region and the State as a whole. These injections enter the economy through direct purchases of goods and services from contractors and the direct payment of earnings to workers. For the purpose of this analysis, all on-site contractors' awards were divided into their wage and non-wage components. The wage portion of these contracts was added to the earnings of KSC and NASA Civil Service workers to arrive at the amount of direct household income received by all on-site workers at KSC. Exhibit 7 shows the total direct commodity purchases and direct household income payments resulting from spending for space program operations, KSC Visitor Center sales to out-of-state tourists and KSC business visitors' local travel spending.

The total injection of outside money into Florida's economy by all KSC based activities was \$1.8 billion in FY 2007. Direct earnings payments to Florida households totaled \$1.1 billion and the total direct commodity purchases from contractors were \$703 million. 98% of the direct payments went to Central Florida businesses and households.

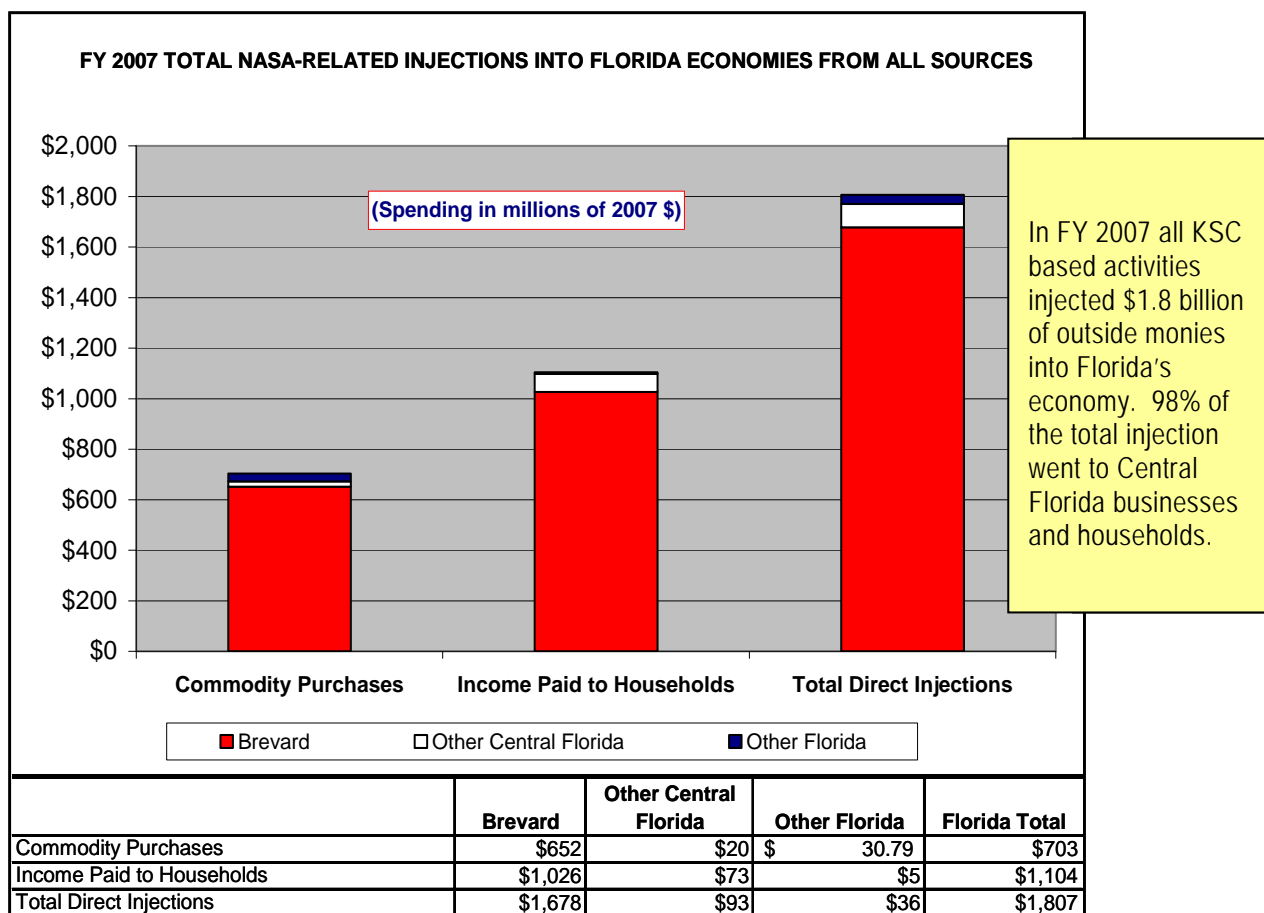


Exhibit 7

## **6. Total Economic Impact of NASA in Florida**

### **6.1. Indirect Economic Activity Generated by NASA Spending**

The economic activity generated by NASA organizations in Florida begins, but does not end, with the direct purchases of these organizations and the wage payments to their workers. This first round of spending generates a secondary set of economic interactions in the local businesses that supply goods and services to NASA contractors and employees. These businesses, in turn, pay wages to their employees and buy goods and services from their own suppliers and the process continues through many subsequent rounds of purchases. All of these rounds of indirect activity are referred to as the generated impact of the initial KSC/NASA injections into the economy.

The tracing and accumulation of all of the many rounds of generated economic activity that are set in motion by NASA's initial stimulus requires a complex set of economic models that map the structure of the economy and the way in which the many sectors of the economy interact to support each other. These models are referred to as regional input-output models. The specific models used in this study utilize a highly detailed breakdown (500 plus economic sectors) of the economy to trace economic transactions. Separate models were built for Brevard County, the larger seven-county Central Florida region and the State of Florida as a whole.

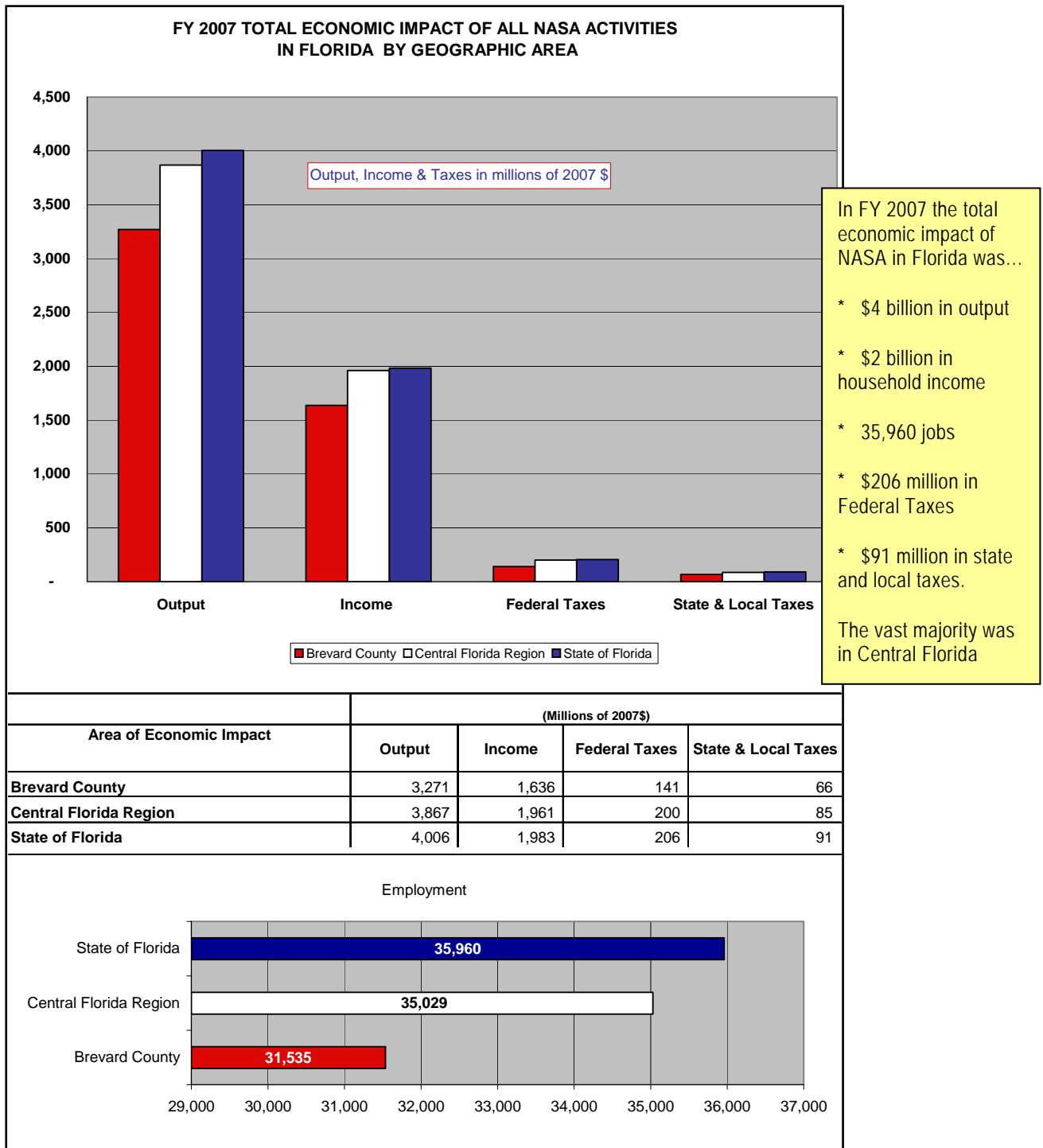
### **6.2. Total Economic Impact**

The total impact of all KSC/NASA activities in Florida (see Exhibit 8) is the sum of the initial injection of earnings and commodity purchases plus the subsequently generated impact of these injections. In FY 2007, this total impact in Florida was \$4 billion in output; \$2 billion of household income and 35,960 jobs. This activity also generated \$206 million of federal taxes and \$91 million of state and local taxes. The largest share of the impact—97% of the output impact, 99% of the income impact and 97% of the employment impact—occurred in Central Florida.



*Astronaut Clay Anderson, in the Destiny laboratory  
aboard the International Space Station.*

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**Exhibit 8**



### 6.3. Impact Multipliers

Impact multipliers provide a summary measure of the economic potency of a particular economic activity. Multipliers were calculated in this study for Output, Income and Employment. The Output Multiplier is the total output impact as shown in Exhibit 8 above divided by the total direct spending for commodity purchases and wage payments to workers. The Income Multiplier is the total income impact shown in Exhibit 8 divided by the wage payments to all KSC based employees. Finally, the employment multiplier is the total employment impact shown in Exhibit 8 divided by the number of on-site employees at KSC.

The multipliers that were calculated for each of the geographic study areas in this analysis are shown in Exhibit 9. The jobs multiplier for the State as a whole indicates that each direct on-site job (i.e. Civil Service and contractor employees) at KSC was multiplied into 2.49 total jobs throughout the Florida economy. It should be noted that this represents the direct job itself plus 1.49 jobs that were generated through the indirect economic process. The Florida income multiplier indicates that each dollar of direct wages that was paid at the KSC complex resulted in \$1.82 of total income in the State. The output multiplier shows that each dollar of direct total spending for commodity purchases and wage payments resulted in \$2.22 in total statewide output. Similar interpretations apply to the Central Florida and Brevard County multipliers.

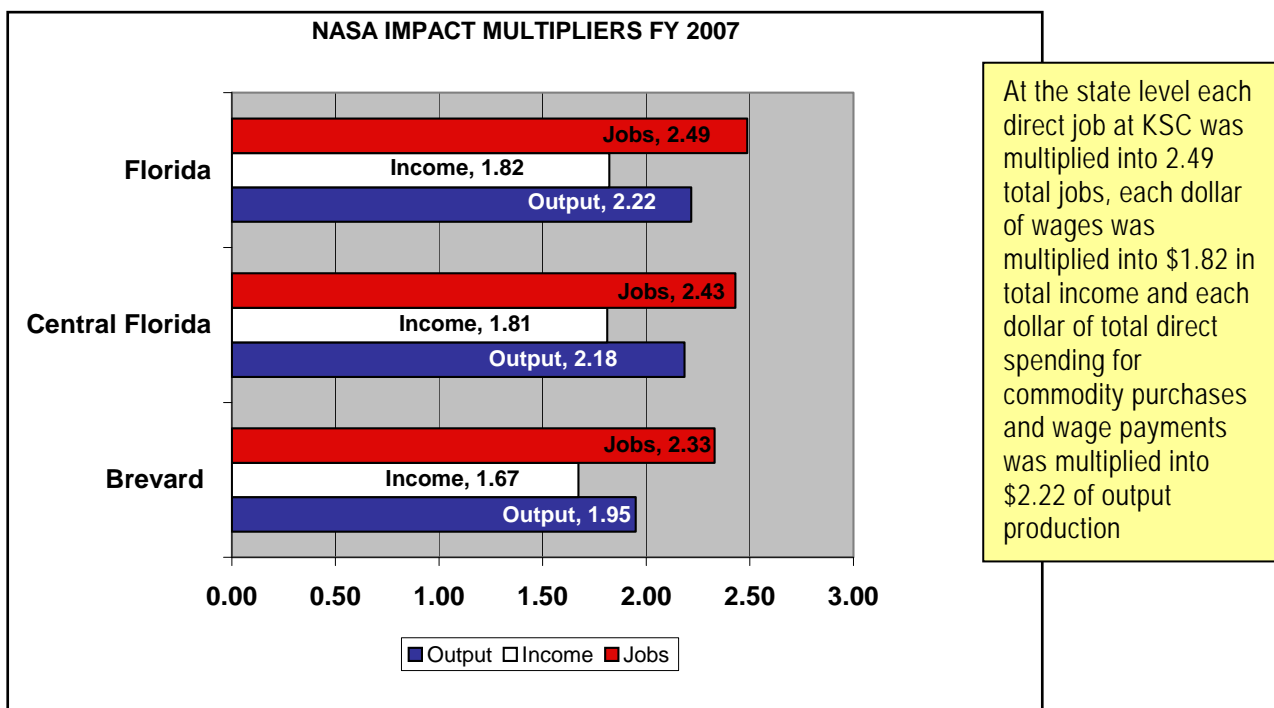


Exhibit 9



## **7. Summary**

Since its beginning 45 years ago, the John F Kennedy Space Center has provided a major economic anchor for Brevard County and the surrounding Central Florida Region. Its economic presence and importance have grown tremendously over the years and has provided a great source of high quality economic diversity to Central Florida and the state's service-based economies. While the Space Shuttle program winds down at the end of this decade, NASA and KSC have already planned the next phase of the U.S. space program — Constellation. The Constellation Program is now moving from concept to construction. This new phase of NASA space exploration will bring with it new challenges and economic opportunities for KSC and other NASA Centers around the country and will continue to provide a major economic base for Brevard, Central Florida and the State of Florida.

## **8. Notes**

The following are some notes about the study and this report.

**Impact Models:** The economic impact analysis presented in this report is generated by a set of regional input-output models constructed by the Transportation Economics Research Institute using the Minnesota IMPLAN Groups (MIG) software package. Structural data for the models, which is updated on an annual basis, was also provided by MIG.

**Study Areas:** Input-output models were constructed for three geographic areas—Brevard County, Central Florida (which includes Brevard, Flagler, Lake, Orange, Osceola, Seminole and Volusia Counties) and the State of Florida.

**Data Sources:** All data and numbers reported and used in this study are based on reports and data files provided through the Office of KSC's Chief Financial Officer or found on the KSC internet site. Numbers reported in the impact section of the report were generated by the economic impact models constructed for this study.

**Methodology and Study Details:** The methods of analysis, report assumptions and detailed tables of results are available upon request.





National Aeronautics and Space Administration

**John F. Kennedy Space Center**

Kennedy Space Center, FL 32899

**[www.nasa.gov](http://www.nasa.gov)**

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