

# Economic Impact Analysis of Georgia's Aerospace Industry

January 2013



Prepared for:

*Center of Innovation for Aerospace*  
Georgia Department of Economic Development

75 Fifth Street NW, Suite 1200  
Atlanta, GA 30308



Prepared by:

*Enterprise Innovation Institute*  
Georgia Institute of Technology

75 Fifth Street NW, Suite 300  
Atlanta, Georgia 30308



# Table of Contents

---

1. Executive Summary	2
2. Introduction	7
3. Economic Impact of Aerospace in Georgia	11
4. Fiscal Impact of Aerospace in Georgia	13
5. Contribution of Aerospace to Georgia's GDP	15
6. Location of Aerospace Firms in Georgia	16
Appendix 1: Methodology, Definitions, and References	17

# Executive Summary

---

Georgia's aerospace industry has many components, which interact with all other sectors of the economy in complex ways. This economic impact study was commissioned by Georgia's Center of Innovation for Aerospace (COIA) to assess the industry's contribution to the state's economy.

More specifically, this analysis quantifies the level of economic activity conducted by the components of the aerospace industry in 2011, estimates its fiscal impact, and quantifies the industry's contribution to the state's Gross Domestic Product (GDP) and total income.

## *Definition of Aerospace Industry in Georgia*

For the purposes of this analysis, the aerospace industry includes the following six-digit North American Industrial Classification System (NAICS) industries:

- *Soil preparation, planting, and cultivating (aerial dusting or spraying)*
- *Search, detection, and navigation instruments*
- *Motor vehicle seating and interior trim manufacturing (aircraft seat manufacturing)*
- *Aircraft manufacturing*
- *Aircraft engine and engine parts manufacturing*
- *Other aircraft parts and equipment*
- *Guided missile and space vehicle manufacturing*
- *Space vehicle propulsion units and parts manufacturing*
- *Other transport. goods merchant wholesalers (aeronautical equipment wholesalers)*
- *Other petroleum merchant wholesalers*
- *Motorcycle and other motor vehicle dealers (aircraft dealers)*
- *Scheduled passenger air transportation*
- *Scheduled freight air transportation*
- *Nonscheduled air passenger chartering*
- *Nonscheduled air freight chartering*
- *Other nonscheduled air transportation*
- *Air traffic control*
- *Other airport operations*
- *Other support activities for air transport*
- *Transportation equipment rental and leasing (aircraft rental/leasing)*
- *Other physical and biological research*
- *Flight training*
- *Other technical and trade schools (air traffic control schools)*

## Economic Impact

Georgia's aerospace industry creates significant direct economic and fiscal benefits for the state. The aerospace industry as defined by the NAICS codes shown on page 3, employed **88,873 workers** in calendar year 2011, including civilian employment at Robins AFB, Moody AFB and Dobbins ARB which accounts for nearly 17 percent of Georgia's direct employment in aerospace industry. These workers were paid nearly **\$8.4 billion in wages and salaries** and generated an economic output of **\$30.7 billion** in 2011.

**Each job in the aerospace industry supports 1.72 additional jobs in Georgia**

output to **\$50.9 billion** (see Table E-1).

The wages of aerospace employees are higher than Georgia's overall average wages of all industries. In 2011, the annual average wage rate of aerospace industry workers, excluding benefits, was **\$74,959** or 66 percent higher than the state's overall average wage rate of **\$45,090**. The average wage rate, including benefits, of aerospace workers in Georgia was **\$94,435**.

While a very large share of the impacts is attributed to direct employment, the total impact (direct, indirect, and induced) is important to the state's economy. The ongoing operations of aerospace generated ripple impacts throughout the state, **supporting an additional 153,171 indirect and induced jobs** with earnings of **\$7.4 billion** and economic output of **\$20.3 billion**. This brings the total economic

In 2011, the employment multiplier of the aerospace industry in Georgia was 2.72 and the income multiplier was 1.88. These multipliers are higher than average due to the industry's high level of output and high wages.

Table E-1 shows a summary of the economic impact of the aerospace industry in Georgia.

Table E-1: Georgia's Aerospace Industry Economic Activity: 2011

	Direct	Indirect	Induced	TOTAL
<b>Employment</b>	88,873	47,107	106,064	242,044
<b>Wages &amp; Salaries</b>	\$8,392,759,400	\$2,568,850,075	\$4,852,155,461	\$15,813,764,936
<b>Output</b>	\$30,714,383,890	\$6,719,509,056	\$13,551,156,674	\$50,985,049,620

## Fiscal Impact

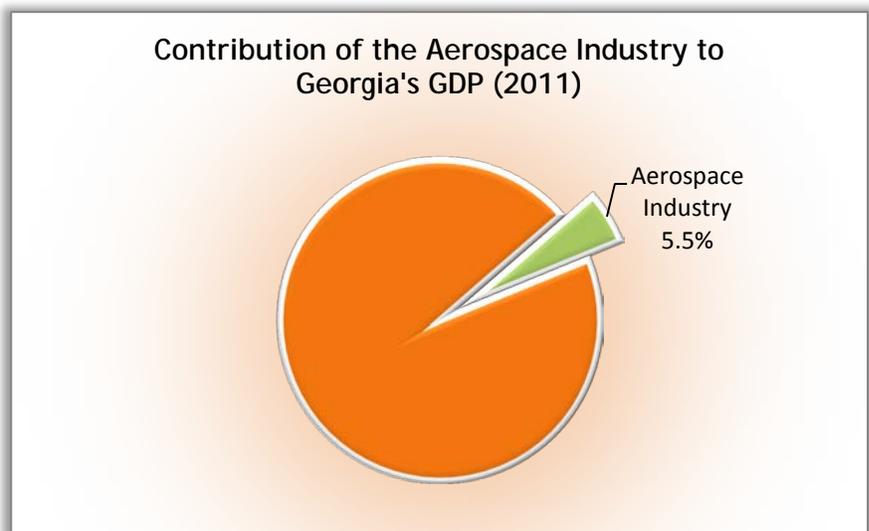
The fiscal impact analysis was calculated by estimating the revenues associated with the aerospace industry's total economic activity and subtracting the costs associated with providing state services to Georgia's households and companies associated with that activity. Revenues included individual and corporate income taxes, sales and use taxes, highway taxes, fees, and miscellaneous revenues. Costs included education; public health, safety, and welfare; highways; administration; and miscellaneous. Table E-2 provides the

fiscal impact estimates based on total impacts. The aerospace industry generated an estimated \$1.6 billion in revenues for the state budget in calendar year 2011, which is 10 percent of the state's total tax revenues in FY2012 (July 1, 2011 - June 30, 2012). When the costs of providing services to all employees were deducted from these revenues, the net contribution of aerospace industry to the state revenues in 2011 was \$874 million.

Table E-2: Aerospace Fiscal Impact Analysis: 2011	
Annual State Government Revenues	\$1,611,138,477
Annual State Government Costs	\$737,177,371
Net Annual Revenues	\$873,961,106

### *Aerospace Industry and the State's GDP*

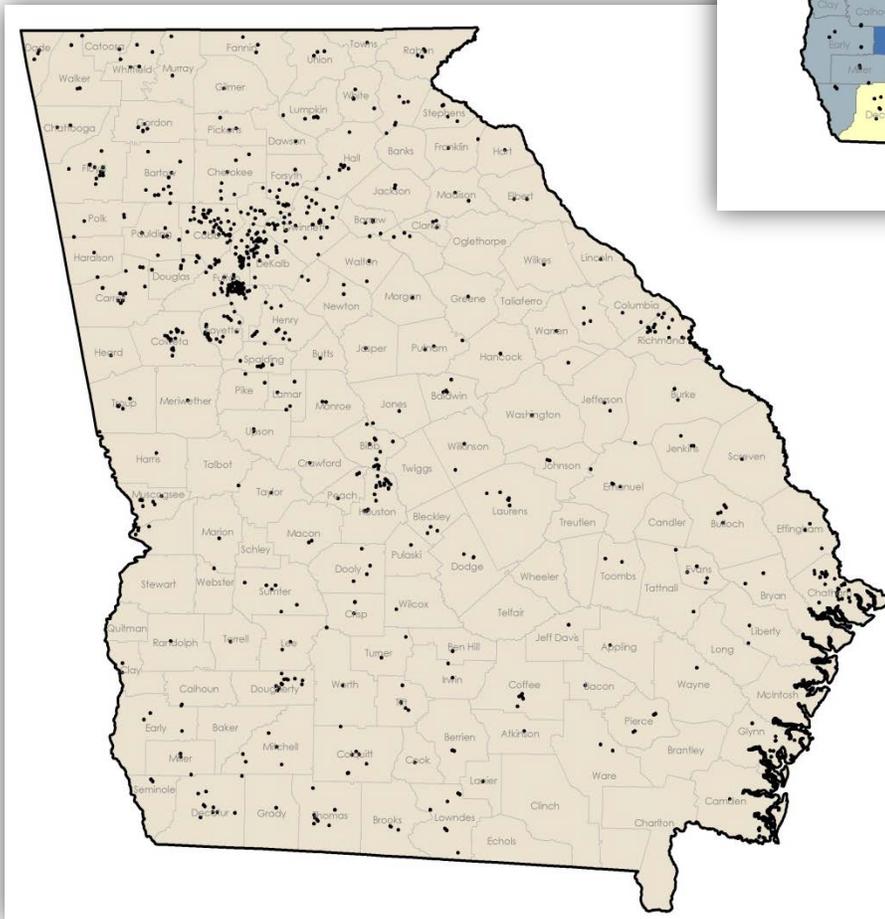
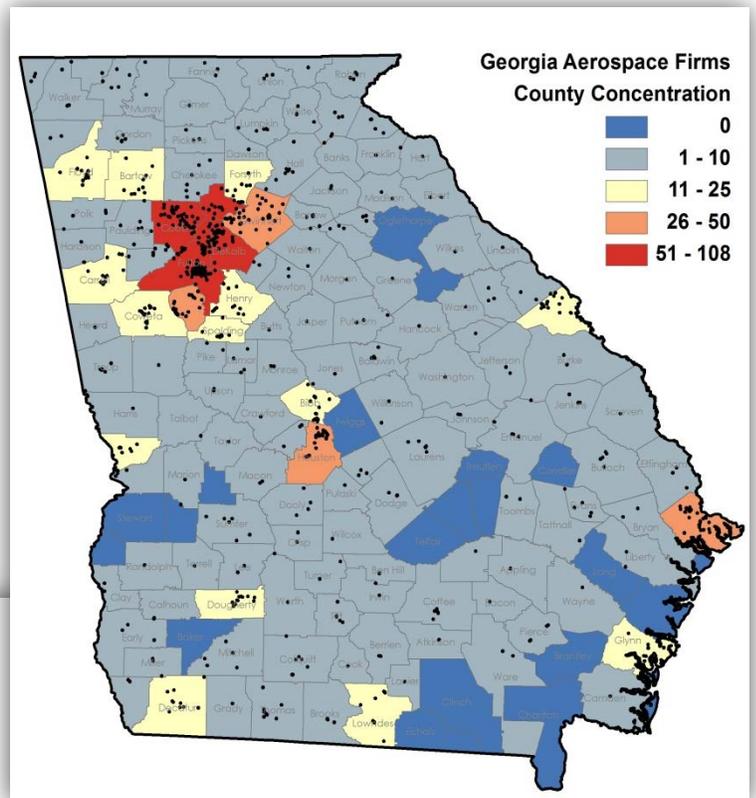
Aerospace contributes significantly to the state's economic activity, and more important, it creates and supports high-paying jobs for Georgia's citizens. In calendar year 2011, aerospace supported 242,044 jobs or nearly 5 percent of the state's employment, and it contributed \$23 billion to the state's GDP or nearly 6 percent.



## Location of Aerospace Firms in Georgia

Georgia's diverse aerospace industry includes a range of firms that manufacture, operate, service, and repair aircraft, provide air transportation, and operate flight schools.

The adjacent maps show the location of aerospace firms in Georgia. Firms were geocoded and mapped based on physical address.



## SECTION 1

# Introduction

---

The economic impact study of Georgia's aerospace industry measured the industry's contribution to the state's economy in 2011 by quantifying its activity in terms of economic output, employment, and employee compensation. An additional factor included how the industry affects state government costs and revenues.

Economic output is typically defined as business revenues, and employee compensation is defined as wages and salaries including benefits, paid by employers. Total activity is generally referred to as the "multiplier effect." This effect occurs whenever dollars are

brought into a state's economy and recirculated before exciting or "leaking out." Section 2 explains the methodology used to estimate total economic activity, and provides perspective on how important these activities are in the overall Georgia economy. Section 3 quantifies the industry's impact on state government costs and revenues. Sections 4 and 5 compare the economic activity of aerospace industry to the state's GDP and show the location of aerospace firms in Georgia, respectively.

### *Definition of the Aerospace Industry in Georgia*

The aerospace industry in Georgia has many diverse components including manufacturing, maintenance/repair and overhaul, operations, and aerospace education and training. Each subsector of these components is classified under the North American Industry Classification System (NAICS). The definition of

aerospace industry varies by state due to its numerous and different components, which explains the lack of a standard industry definition. The sectors included in this study were carefully examined by Georgia's Center of Innovation for Aerospace and encompass NAICS codes described in Table 1-1.

**Table 1-1: Aerospace Industry Definition Components by NAICS Code**

NAICS CODE	Industry Description
115112	Soil preparation, planting, and cultivating (aerial dusting or spraying)
334511	Search, detection, and navigation instruments
336360	Motor vehicle seating and interior trim manufacturing (aircraft seat manufacturing)
336411	Aircraft manufacturing
336412	Aircraft engine and engine parts manufacturing
336413	Other aircraft parts and equipment
336414	Guided missile and space vehicle manufacturing
336415	Space vehicle propulsion units and parts manufacturing
423860	Other transportation goods merchant wholesalers (aeronautical equipment wholesalers)
424720	Other petroleum merchant wholesalers
441228	Motorcycle and other motor vehicle dealers (aircraft dealers)
481111	Scheduled passenger air transportation
481112	Scheduled freight air transportation
481211	Nonscheduled air passenger chartering
481212	Nonscheduled air freight chartering
481219	Other nonscheduled air transportation
488111	Air traffic control
488119	Other airport operations
488190	Other support activities for air transport
532411	Transportation equipment rental and leasing (aircraft rental/leasing)
541712	Other physical and biological research
611512	Flight training
611519	Other technical and trade schools (air traffic control schools)

*Source: North American Industrial Classification System (2012); Georgia Center of Innovation for Aerospace, Georgia Tech's Enterprise Innovation Institute*

## Top Aerospace Companies in Georgia

In 2011, Georgia ranked fifth in the country in aerospace employment (Source: Georgia Department of Economic Development), and is home to the one of the world's largest air carriers, Delta Air Lines. Georgia is

also home to numerous manufacturing, R&D, and aircraft maintenance, repair, and overhaul (MRO) companies. Table 1-2 displays a list of the top 20 aerospace employers in Georgia.

Table 1-2. Top 20 Aerospace Employers in Georgia

	Company Name	Employees
1	Delta Air Lines	29,492
2	Warner Robins Air Logistics Center (civilian employees only)	13,971
3	Lockheed Martin Aeronautics	8,174
4	Gulfstream Aerospace Corp.	6,160
5	Southwest Airlines (Air Tran)	6,000
6	Express Jet	3,067
7	FAA	2,592
8	Meggitt	1,200
9	EMS Technologies (Honeywell)	1,160
10	Moody AFB (civilians only)	836
11	The Boeing Co.	700
12	Triumph Aerostructures	680
13	Dobbins AFB (civilians only)	627
14	PCC Airfoils LLC	538
15	Northrop Grumman Corp	500
16	Pratt & Whitney	465
17	Aircraft Service International Group Inc.	450
18	Precision Components International Inc.	425
19	Rockwell Collins Inc.	410
20	Global Aviation Holdings	350

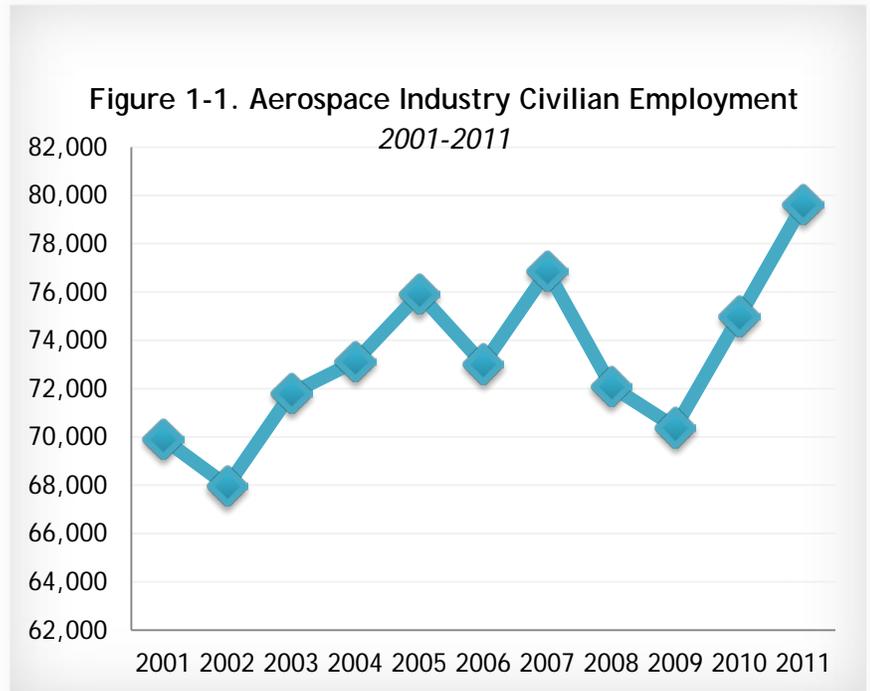
SOURCE: Georgia Center of Innovation for Aerospace

## Aerospace Industry Employment in Georgia

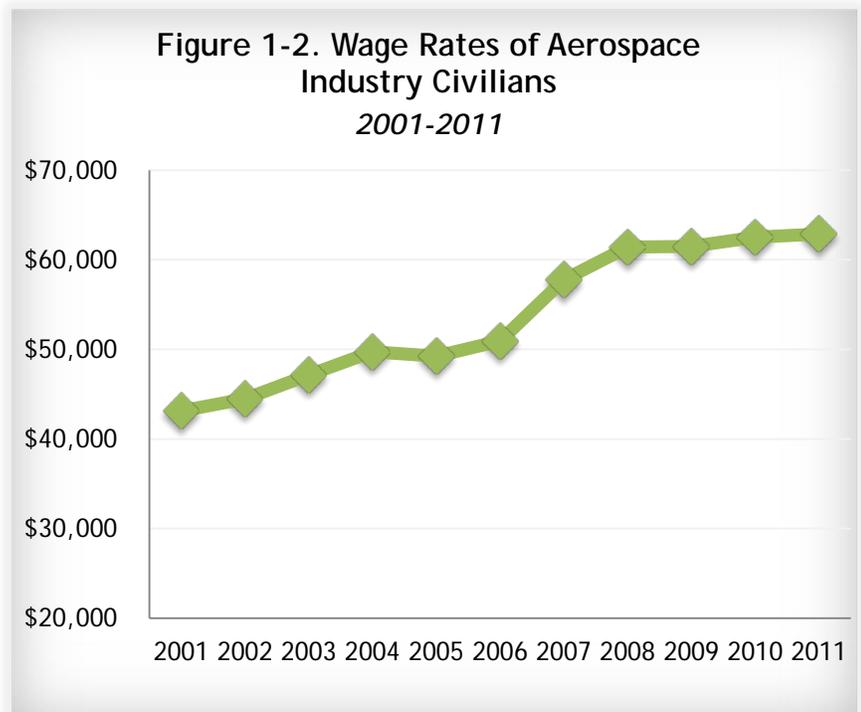
As shown in Figure 1-1, civilian aerospace employment fluctuated greatly during the 2001-2011 period. This trend reflects of the economic challenges of the past few years. However, employment in 2011 recovered to pre-recession rates, showing solid annual growth of more than 6 percent.

Aerospace wage rates also are in an upward trend, albeit growing at a slower pace than employment (Figure 1-2).

It should be noted that the historical employment and wage rate numbers are not an exact match of direct employment shown in this study due to the industry classification changes introduced by the 2012 NAICS code system, as well as the nondisclosure limitations of the data from the Bureau of Labor Statistics. Furthermore, data presented in Figures 1-1 and 1-2 were derived from the BLS Quarterly Census of Employment and Wages. BLS figures usually include companies that may be classified under aerospace-related NAICS codes but provide services to other sectors.



Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages



Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages

## SECTION 2

# Economic Impact Analysis

---

The conceptual basis for estimating economic benefits of an industry is that resources brought into a state's economy by that industry raise the level of economic activity. The aerospace industry provides a wide range of direct economic benefits in Georgia. These benefits are measured by analyzing jobs, wages, and output. From these direct impacts, multiplier effects are also evaluated, as wages and other spending are re-spent in the local economy thereby supporting increased employment, income, and business revenues. These increases are estimated from an input-output (I/O) economic model.

In this study, the analytical process of estimating economic impacts (direct, indirect, and induced) of aerospace involved the following steps:

- ✓ Direct employment for each sector (by NAICS code) was quantified. This study counted the number of employees working for companies whose primary business supports the aerospace industry in Georgia. The best source for employment and wages is the employment security data collected and maintained by the Georgia Department of Labor. Commonly called ES202 data, it has the advantage of being current, allowing an estimate of the economic benefits occurring in 2011. It has the drawback, however, of not including single proprietorships (because they have no employees).
  - verified by calling individual firms (calls were conducted by Georgia's Center of Innovation for Aerospace), and changes were made where necessary. During the vetting process, it became apparent that many companies were classified under the wrong code. Every attempt was made to capture all aerospace-related employment as defined by the NAICS codes listed on page 8. We recognize that there are many supporting companies that are not included in this study.
- ✓ Review of employment data was a critical part of this analysis due to the broad definition of NAICS codes for aerospace sectors. Employment was
  - ✓ The third step was to use the I/O model to estimate total impacts, which were divided into three components. The first was the *direct* impacts (the value of resources brought into the state); the second was *indirect* impacts (impacts from recirculation of resources resulting from aerospace

industry purchases from other industries, and the third was *induced* impacts, resulting from activities in the household sector. The total impact was the sum of direct, indirect, and induced impacts.

Table 2-1 provides estimates of the impacts of aerospace industry sectors contained in the industry's definition. Georgia's aerospace industry employed **88,873 workers** in 2011, who earned nearly **\$8.4 billion in wages and salaries** and generated an economic output of **\$30.1 billion**. The direct employment included

civilian employment at Robins AFB, Moody AFB and Dobbins ARB, which in 2011 accounted for nearly 17 percent of Georgia's direct employment in aerospace industry.

While a very large share of the impacts is attributed to direct employment, the total impact (direct, indirect and induced) is important to the state's economy. The ongoing operations of aerospace generated ripple impacts throughout the state supporting an additional **153,171 indirect and induced jobs** with earnings of **\$7.4 billion** and economic output of **\$20.3 billion**.

**Table 2-1: Georgia's Aerospace Industry Economic Activity: 2011**

	Direct	Indirect	Induced	TOTAL
<b>Employment</b>	88,873	47,107	106,064	242,044
<b>Wages &amp; Salaries</b>	\$8,392,759,400	\$2,568,850,075	\$4,852,155,461	\$15,813,764,936
<b>Output</b>	\$30,714,383,890	\$6,719,509,056	\$13,551,156,674	\$50,985,049,620

Source: GA Tech's Enterprise Innovation Institute, IMPLAN Pro 2012

Overall, wage rates of aerospace employees were higher than Georgia's average wage rates of all industries. In 2011, the annual average wage of aerospace industry workers, excluding benefits, was **\$74,959** or **66 percent higher** than the state's overall average wage rate of **\$45,090**. The average wage rate, including

benefits, of aerospace workers in Georgia was **\$94,435**.

The employment multiplier of the aerospace industry in Georgia was 2.67 and the income multiplier was 1.85. These multipliers were higher than average due to the industry's high level of output and high wages.

## SECTION 3

# Fiscal Impact Analysis

---

This analysis also includes a fiscal assessment of how aerospace affects state tax revenues. The fiscal impact analysis was calculated by estimating the revenues associated with the aerospace industry's total economic activity and subtracting the costs associated with providing state services to Georgia's households and companies associated with that activity. Revenues included individual and corporate income taxes, sales and use taxes, highway taxes, fees, and miscellaneous revenues. Costs included education; public health, safety, and welfare; highways; administration; and miscellaneous. Table 3-1 provides the fiscal impact estimates based on total impacts. The analysis suggests that total annual tax revenues generated by aerospace industry in calendar year 2011 amounted to \$1.6 billion, 10 percent of the state's total tax revenues<sup>1</sup> in FY2012. When the costs of providing services to all employees were deducted from these revenues, net annual state revenues generated by the aerospace industry were \$874 million.

**Table 3-1: Aerospace Fiscal Impact Analysis (2011)**

Annual State Government Revenues	\$1,611,138,477
Annual State Government Costs	\$737,177,371
Net Annual Revenues	\$873,961,106

---

<sup>1</sup> Source: Office of the Governor, press release July 2012

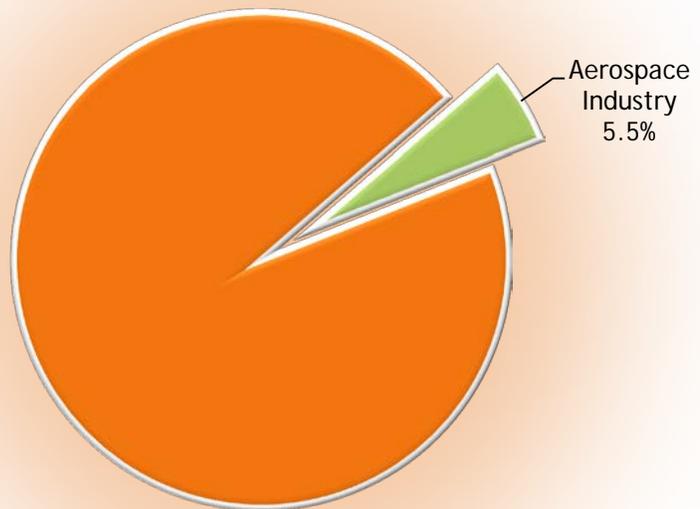
## SECTION 4

# Aerospace Industry's Contribution to Georgia's GDP

---

Georgia's aerospace industry supports a significant proportion of the state's economic activity. More important, it creates and supports high-paying jobs for Georgia's citizens. In 2011, aerospace supported 242,044 jobs or nearly 5 percent of the state's employment, and it contributed \$23 billion to the state's GDP or nearly 6 percent.

Figure 4-1: Contribution of the Aerospace Industry to Georgia's GDP (2011)



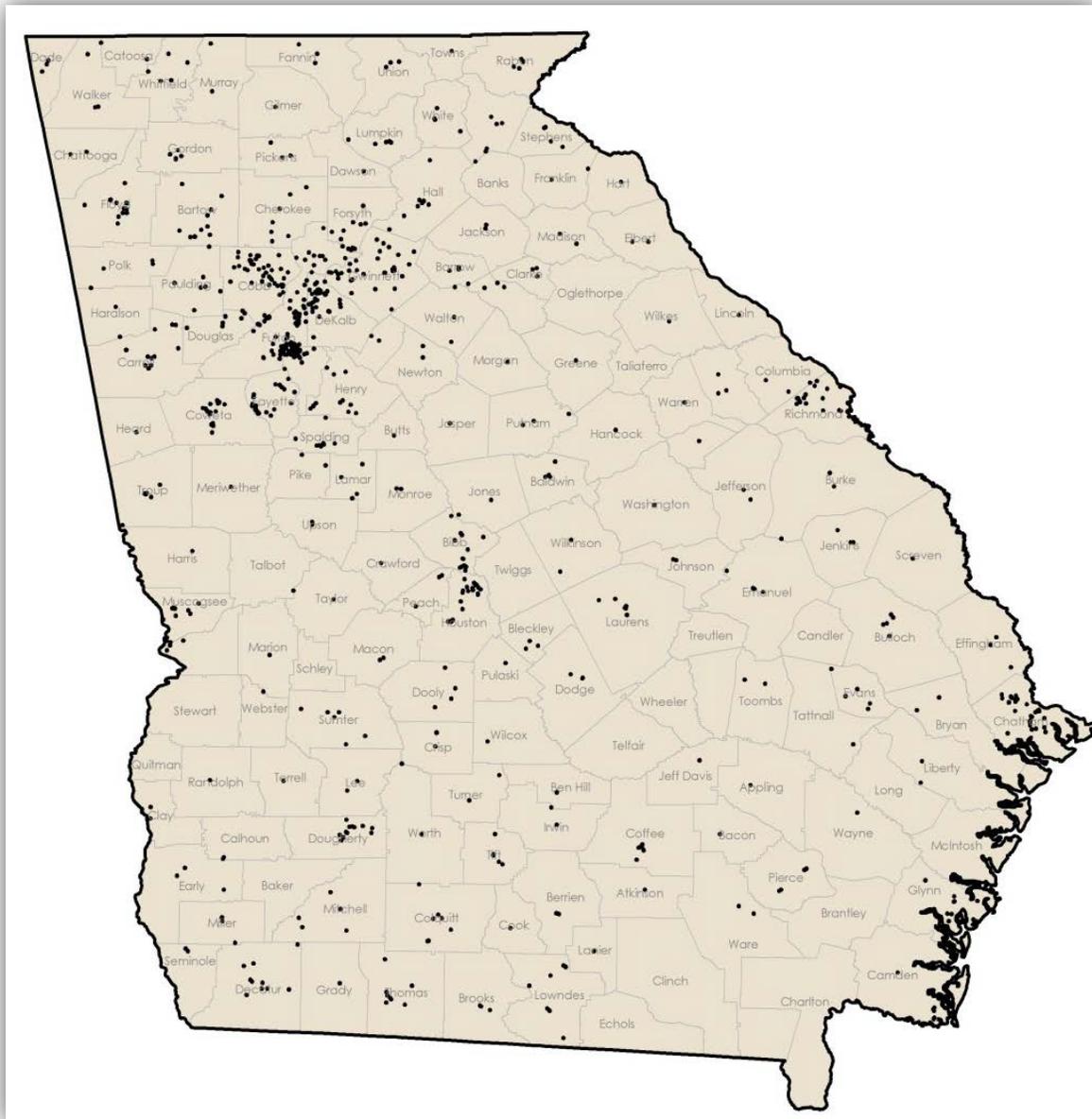
## SECTION 5

# Location of Aerospace Firms

Georgia's diverse aerospace industry includes a range of firms that service and repair aircraft, provide air transportation, and operate flight schools.

The following maps show the location of aerospace firms in Georgia. Firms were geocoded and mapped based on physical address.

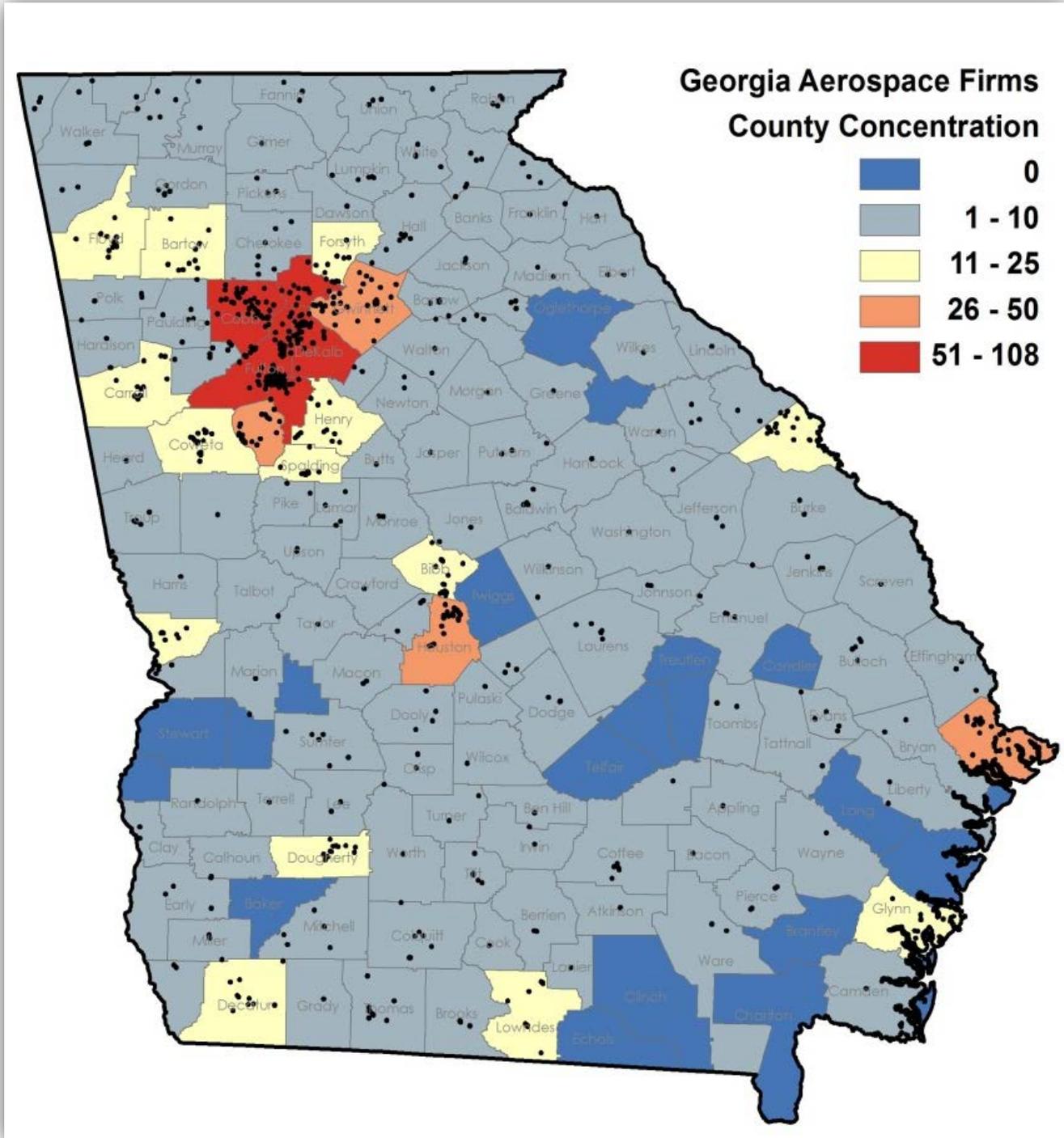
Figure 5-1: Georgia Aerospace Firms: 2011



Incomplete addresses were either not displayed on the map or mapped based on the address information available - e.g., P.O. Box or zip code maps to the center of the 5-digit zip;

city name only maps to the center of the city. Only 85 percent of the records had enough address information to display on the map.

Figure 5-2: Georgia Aerospace Firms by County: 2011



## APPENDIX

# Methodology, Definitions, and References

---

## METHODOLOGY AND DEFINITIONS

The economic impact of the aerospace industry was measured using IMPLAN, an economic impact assessment model customized to reflect Georgia's economy. The model estimates the multiplier (indirect and induced) effects of direct economic activity for each sector of the aerospace industry.

### *Direct Impacts*

Direct impacts measure employment, wages and salaries, and expenditures of goods and services within the aerospace industry.

### *Indirect Impacts*

Indirect impacts result from the purchase of goods and services by suppliers to the aerospace industry.

### *Induced Impacts*

Induced impacts result from the expenditures of aerospace employee wages and salaries.

## REFERENCES

Bureau of Economic Analysis Input-Output Sectors as contained in "IMPLAN Pro: Data Guide," Minnesota IMPLAN Group Inc., Stillwater, MN, 2011.

Georgia Department of Labor, ES202 Wage and Employment Data: 2011.

North American Industrial Classification System (NAICS),  
<http://www.census.gov/epcd/www/naicstab.htm>

U.S. Department of Labor, Bureau of Labor Statistics, "Employer Costs for Employee Compensation," <http://data.bls.gov/cgi-bin/surveymost>