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Report No. 13-06

Florida's Biotechnology Industry Is Expanding; Cluster Growth Continues to Slowly Progress

at a glance

As of December 31, 2012, seven of the eight biotechnology research entities funded by the Innovation Incentive Program reported creating 806 jobs and making significant investments in scientific equipment.

Although Florida's biotechnology employment declined over a three-year period, the number of businesses and average wages increased. Between 2008 and 2011, the number of businesses grew by 20.1% and average wages increased by 15.5%. In addition, the state's employment growth in the biotechnology research and development sector outpaced growth rates in the nation and other comparison states.

The state's biotechnology clusters continue to slowly grow, with the industry's research and development sector demonstrating the most growth. The six counties where innovation incentive recipients are located experienced varying rates of business and employment growth, with Orange, Palm Beach, and St. Lucie having the largest increases in research and development employment. In all six counties, our analysis showed that incentive recipient presence positively affected employment growth.

The state's investment has helped build a strong research and development foundation. According to stakeholders, Florida's next challenge is to help foster an environment that translates discoveries into marketable products. Fostering such an environment includes providing start-up company assistance, supporting the development of incubators and laboratories, offering programs that encourage entrepreneurship, and developing a statewide biotechnology marketing plan.

Scope

Florida law requires OPPAGA to review the Innovation Incentive Program every three years.¹ This second triennial report evaluates the program's progress toward creating clusters of high-wage, high-skilled, complementary industries that serve as catalysts for economic growth in the regions where they are located and across the state.² The review also examines the state's biotechnology industry and compares its progress to the nation and several other states.

Background

State policy supports biotechnology industry growth. In recent years, Florida has aggressively pursued developing a biotechnology industry to diversify the state's economy and create high-skilled, high-wage jobs. Biotechnology is a component of the life sciences and refers to the use of cellular and molecular processes in solving problems and developing products. Advances in biotechnology processes and products have many applications, such as better diagnosing and treating human diseases and improving agricultural crops.

¹ Section [288.1089](#), *F.S.*

² Our first report concluded that the state's investment in biotechnology had not yet resulted in the growth of biotechnology clusters in the counties where innovation incentive recipients had established facilities. While many factors related to biotechnology cluster growth were present in the state, Florida had limited early stage capital for start-up companies. Please see *Biotechnology Clusters Developing Slowly; Startup Assistance May Encourage Growth*, OPPAGA [Report No. 10-05](#), January 2010.

Enterprise Florida, Inc. (EFI) uses several industry codes to define Florida's life sciences, including research and development in biotechnology, pharmaceutical and medicine manufacturing, and medical devices.^{3, 4} OPPAGA used the 11 industry codes within the three sectors to define the biotechnology industry in Florida. (See Exhibit 1.)

Exhibit 1 Several Sectors Comprise Florida's Biotechnology Industry

Sector/Industry ¹	NAICS Code ²
Research and Development in Biotechnology	
Research and Development in Biotechnology	541711
Pharmaceutical and Medicine Manufacturing	
Medicinal and Botanical Manufacturing	325411
Pharmaceutical Preparation Manufacturing	325412
In-Vitro Diagnostic Substance Manufacturing	325413
Biological Product Manufacturing	325414
Medical Devices	
Electromedical and Electrotherapeutic Apparatus Manufacturing	334510
Analytical Laboratory Instrument Manufacturing	334516
Irradiation Apparatus Manufacturing	334517
Surgical and Medical Instrument Manufacturing	339112
Surgical Appliance and Supplies Manufacturing	339113
Ophthalmic Goods Manufacturing	339115

¹ According to the Department of Economic Opportunity, the life sciences comprised 0.36% of all industries in Florida in 2011. Within life sciences, research and development in biotechnology represented 8%, pharmaceutical and medicine manufacturing represented 17%, and medical devices represented 75%.

² The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

Source: Enterprise Florida, Inc.

To develop Florida's biotechnology industry, the state has offered substantial financial incentives to research institutes to establish locations in Florida. For example, in October 2003, the Legislature appropriated \$310 million to pay for scientific equipment and staff salaries for the Scripps Florida Research Institute during its first 10 years of operation.⁵

The 2006 Legislature created the Innovation Incentive Program to continue the state's investment in research and development and innovation business projects. The program targets funds to "innovation businesses" that expand or locate in Florida, are likely to serve as catalysts for the growth of existing or emerging technology clusters, or significantly impact the regional economy in which they expand or locate. Innovation businesses include those engaged in research and development as well as alternative and renewable energy. To date, the program has targeted primarily biotechnology research and development businesses.

Companies are awarded program funds based on an application and approval process involving EFI, the Governor, the Legislature, and the Department of Economic Opportunity (DEO). To receive program funding, each company is required to submit an application to EFI for joint evaluation with DEO. After reviewing each proposal, DEO makes a recommendation to the Governor. The Governor consults with the President of the Senate and the Speaker of the House of Representatives before approving an award. Upon review and approval of an award by the Legislative Budget Commission, the Executive Office of the Governor releases the funds. Once an award is approved, DEO and the company enter into a contractual agreement that specifies the funds awarded and performance conditions regarding job creation, average wages, and capital investment.⁶ Contracts also include sanctions for failure to meet performance conditions, including "clawback" provisions and reduction or elimination of funds to be disbursed.⁷

³ Enterprise Florida, Inc. is a public-private partnership created by the Legislature to serve as the state's principal economic development organization.

⁴ EFI's definition of life sciences also includes health care industries such as offices of physicians, outpatient care centers, and general medical and surgical hospitals.

⁵ The Scripps Research Institute is a private, not-for-profit, biomedical research organization headquartered in La Jolla, California. In 2004, the institute established the Scripps Florida Research Institute in Palm Beach County.

⁶ For agreements signed after July 1, 2009, an additional performance condition requires innovation incentive recipients to reinvest up to 15% of net royalty revenues, including revenues from spin-off companies and from the sale of stock received from licensing or transferring inventions, methods, processes, and other patentable discoveries made at recipients' Florida facilities or using Florida-based employees.

⁷ Clawbacks stipulate that a firm not achieving agreed-upon employment performance targets must pay back a portion of the incentive it received.

The Legislature has directly appropriated a total of \$540 million for the Innovation Incentive Program: \$200 million for Fiscal Year 2006-07, \$250 million for Fiscal Year 2007-08, \$75 million for Fiscal Year 2010-11, and \$15 million for Fiscal Year 2011-12. The Fiscal Year 2012-13 General Appropriations Act specifies that the program is one of several economic development programs eligible to receive funding from a lump sum of \$71 million.

Findings

Since its inception, the Innovation Incentive Program has made eight awards totaling nearly \$450 million

Innovation incentive recipients are located in six counties and conduct research in a number of disciplines. As of December 31, 2012, the program had awarded \$449.7 million to seven not-for-profit research institutes and one for-profit company; to date, the state has distributed \$386.1 million to

innovation incentive recipients.⁸ Public and private partners at the local level have provided matching funds totaling over \$526 million, bringing total funding awards to over \$976 million. The recipients are located in six counties—Hillsborough, Miami-Dade, Orange, Palm Beach, Pinellas, and St. Lucie—and conduct research in several areas, including genetics, vaccine development, and molecular studies. (See Exhibit 2.)

The seven institutes have become fully operational since OPPAGA's 2010 report. For example, in 2009, the Max Planck Institute had two employees and was operating in a 40,000 square foot temporary facility. Currently, the institute has 88 employees, and it moved into a 100,000 square foot permanent facility in 2012. IRX Therapeutics has not yet completed its move to Florida, but anticipates doing so by the end of 2013.

⁸ IRX Therapeutics, Inc., awarded an incentive in 2011, is the first for-profit company to receive program funding.

Exhibit 2

The State Has Committed \$449.7 Million to Attract Eight Biotechnology Research Entities to Florida¹

Incentive Recipient	County	Contract Date	Major Activities	State Funding Commitment	Local Match Commitment
Sanford Burnham Institute for Medical Research	Orange	October 30, 2006	Studies the fundamental molecular mechanisms of diseases	\$155,272,000	\$155,500,000
Torrey Pines Institute for Molecular Studies ²	St. Lucie	November 16, 2006	Conducts basic biomedical research related to disease treatment	24,728,000	\$71,520,000
SRI International	Pinellas	November 22, 2006	Studies surface and subsurface marine environments	20,000,000	At least \$30 million ³
Hussman Institute for Human Genomics	Miami-Dade	January 9, 2008	Explores genetic influences on human health	80,000,000	At least \$100 million in private funds ¹
Max Planck Florida Corporation	Palm Beach	March 12, 2008	Uses bio-imaging to study microscopic molecular processes	94,090,000	\$93,460,000
Vaccine Gene Therapy Institute	St. Lucie	April 17, 2008	Develops vaccines and therapeutics for diseases afflicting the elderly	60,000,000	At least \$60 million ¹
Charles Stark Draper Laboratory, Inc.	Hillsborough	June 30, 2008	Develops miniature medical technologies and military guidance systems	15,000,000	\$15,300,000
IRX Therapeutics, Inc.	Pinellas	October 28, 2011	Develops therapies designed to activate patients' immune systems to fight cancer and related diseases	600,000	\$600,000
Total				\$449,690,000	\$526,380,000

¹ A ninth Innovation Incentive Fund award, in the amount of \$6 million, was approved for Embraer Engineering and Technology Center USA on April 18, 2012 via the General Appropriations Act. Contract negotiations were still in progress as of December 31, 2012.

² The Torrey Pines Institute for Molecular Studies also received \$7,272,000 from the Quick Action Closing Fund.

³ These are minimum figures. Part of the local match, such as building infrastructure, is provided in-kind over a period.

Source: The Department of Economic Opportunity.

Innovation incentive recipients report that they have created jobs and made significant investments in scientific equipment. As of December 31, 2012, the eight innovation incentive recipients reported creating 806 jobs and spending \$89.7 million on capital investments, including scientific equipment. (See Exhibit 3.) Current recipients are contractually required to create a minimum of 1,771 jobs by 2018. However, Innovation Incentive Program managers reported that some recipients either requested or were expected to request extensions on their job creation milestones because of the economic downturn that began in 2007.

Exhibit 3
Innovation Incentive Recipients Reported Creating 806 Jobs and Making \$89.7 Million in Capital Investments

Incentive Recipient	Jobs Created (Jobs Required) ¹	Equipment Purchased ²
Sanford Burnham Institute for Medical Research	223 (303)	\$43,387,054
Hussman Institute for Human Genomics	146 (296)	12,451,164
Torrey Pines Institute for Molecular Studies	109 (189)	3,608,657
Vaccine Gene Therapy Institute	97 (200)	5,936,917
Max Planck Florida Corporation	88 (135)	17,219,157
SRI International	86 (200)	2,047,921
Charles Stark Draper Laboratory, Inc.	57 (165)	5,008,796
IRX Therapeutics, Inc.	0 (283)	0
Total	806 (1,771)	\$89,659,666

¹ Reported as of December 31, 2012. Deadlines for job creation requirements vary by incentive recipient due to different contract dates.

² Due to different contractual reporting deadlines, figures are for varying dates in 2012.

Source: Department of Economic Opportunity and innovation incentive recipient reports.

In addition to reporting data regarding the long-term goal of job creation, innovation incentive recipients are required to report on intermediate factors that may affect cluster development. These measures include additional funding (e.g., contracts and grants) and discoveries (e.g., patents). For example, according to information provided by the Department of Economic Opportunity, the Sanford Burnham Institute for Medical Research has

generated additional funding from 55 active grants with a value of \$11.9 million. In addition, while it has not yet received patents for any of its work in Florida, the institute has filed 16 invention disclosures, 8 provisional patent applications, and 5 patent applications.

Innovation incentive recipients are also encouraged to establish collaborative relationships with other research institutes, Florida universities, and private business entities; such relationships have been shown to encourage cluster development. For example, Torrey Pines reported partnering with the Florida Atlantic University's Harbor Branch Oceanographic Institute and the Martin Memorial Medical Center. The institute is also working with the MannKind Corporation to develop a pain reliever.⁹

Florida's biotechnology industry has grown; research and development sector employment outpaced the nation, while employment declined in other sectors

The state's biotechnology industry has experienced an increase in businesses and wages. To examine growth in Florida's biotechnology industry, we analyzed 2008 and 2011 employment data for the entire industry as well as for the three sectors that comprise the industry—research and development in biotechnology, pharmaceutical and medicine manufacturing, and medical devices. For each category, we compared the number of businesses, number of employees, and average wages and calculated the percent change for each measure.

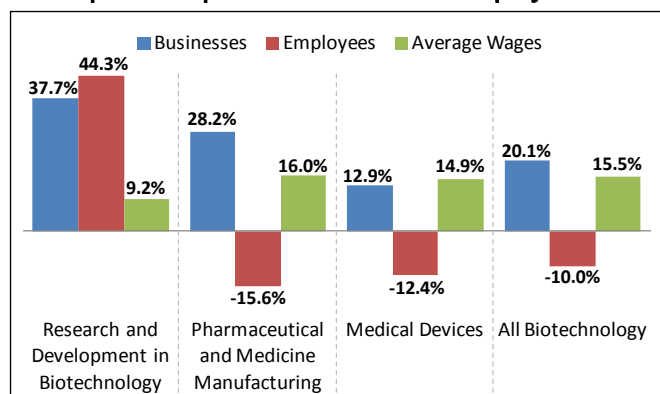
For all biotechnology industries, the number of businesses and average wages increased, as shown in Exhibit 4. Specifically, between 2008 and 2011, the number of businesses grew by 20.1% and average wages increased by 15.5%. However, during the same period, the number of employees for all biotechnology industries decreased by 10.0%. The decline was due to the state's loss of employees in the pharmaceutical

⁹ The MannKind Corporation is a publicly traded company that focuses on the discovery, development, and commercialization of therapeutic products for diseases such as diabetes and cancer.

and medicine manufacturing and medical devices sectors. Of the three sectors, only research and development experienced growth in businesses (37.7%), employees (44.3%), and average wages (9.2%). For additional information on businesses, employees, and average wages, see Appendix A.

Exhibit 4

Businesses and Wages Increased for All Biotechnology Sectors; Only Research and Development Experienced Growth in Employees



Source: OPPAGA analysis of Department of Economic Opportunity data.

Florida's research and development sector employment growth outpaced the nation and other states; employment declined in other sectors. We compared biotechnology employment growth for Florida, the nation, and five other states from 2008 to 2011.¹⁰ Our analysis focused on growth in the industry as a whole and within the three target sectors.

As shown in Exhibit 5, relative to the nation and other comparison states, Florida's employment growth varied significantly across the three biotechnology industry sectors. For example, for research and development, Florida's employment growth (44.3%) exceeded growth for the nation and all five comparison states. Conversely, for the pharmaceutical and medicine manufacturing and medical devices sectors, Florida's employment growth fell below growth nationwide and in the comparison states, at -15.6% and -12.4%, respectively. Other comparison states also experienced declines in these sectors.

¹⁰ We reviewed employment information for 10 states with emerging or established biotechnology clusters, but due to data limitations were able to make equivalent comparisons for only five—California, Massachusetts, New York, Pennsylvania, and Texas.

Exhibit 5

From 2008 to 2011, Florida's Employment Growth in the Research and Development Sector Exceeded Growth in the Nation and in Five Comparison States

State	Research and Development in Biotechnology	Pharmaceutical and Medicine Manufacturing	Medical Devices	All Biotechnology
FL	44.3%	-15.6%	-12.4%	-10.0%
NY	30.5%	-6.6%	-11.9%	-6.4%
MA	6.6%	-10.9%	3.7%	2.6%
CA	6.3%	-0.3%	-1.1%	0.4%
US	-1.3%	-6.8%	-0.7%	-3.0%
TX	-4.9%	-4.8%	-3.8%	-4.4%
PA	-22.9%	-9.0%	-9.0%	-12.8%

Source: OPPAGA analysis of U. S. Bureau of Labor Statistics and Department of Economic Opportunity data.

To validate the trends presented in Exhibit 5, we conducted additional analysis comparing Florida's change in biotechnology industry employment to the national biotechnology industry and economy.¹¹ Our analysis confirmed that while Florida's employment for all biotechnology industry sectors was less than the national level in 2011, the research and development sector grew between 2008 and 2011. Our analysis further showed that Florida's biotechnology research and development sector outpaced national and industry employment trends. For additional information on this analysis, see Appendices B and C.

The state's biotechnology clusters are slowly growing, with progress varying by county

Florida's biotechnology clusters continue to grow, with several counties outperforming others in research and development. Our 2010 report found that biotechnology clusters had not grown substantially in the six counties where innovation incentive recipients established facilities. The report measured biotechnology growth in each county between the time the research institutes were established and December 2008. The current review, measuring biotechnology business and employment growth between December 2008 and December 2011, found mixed results.

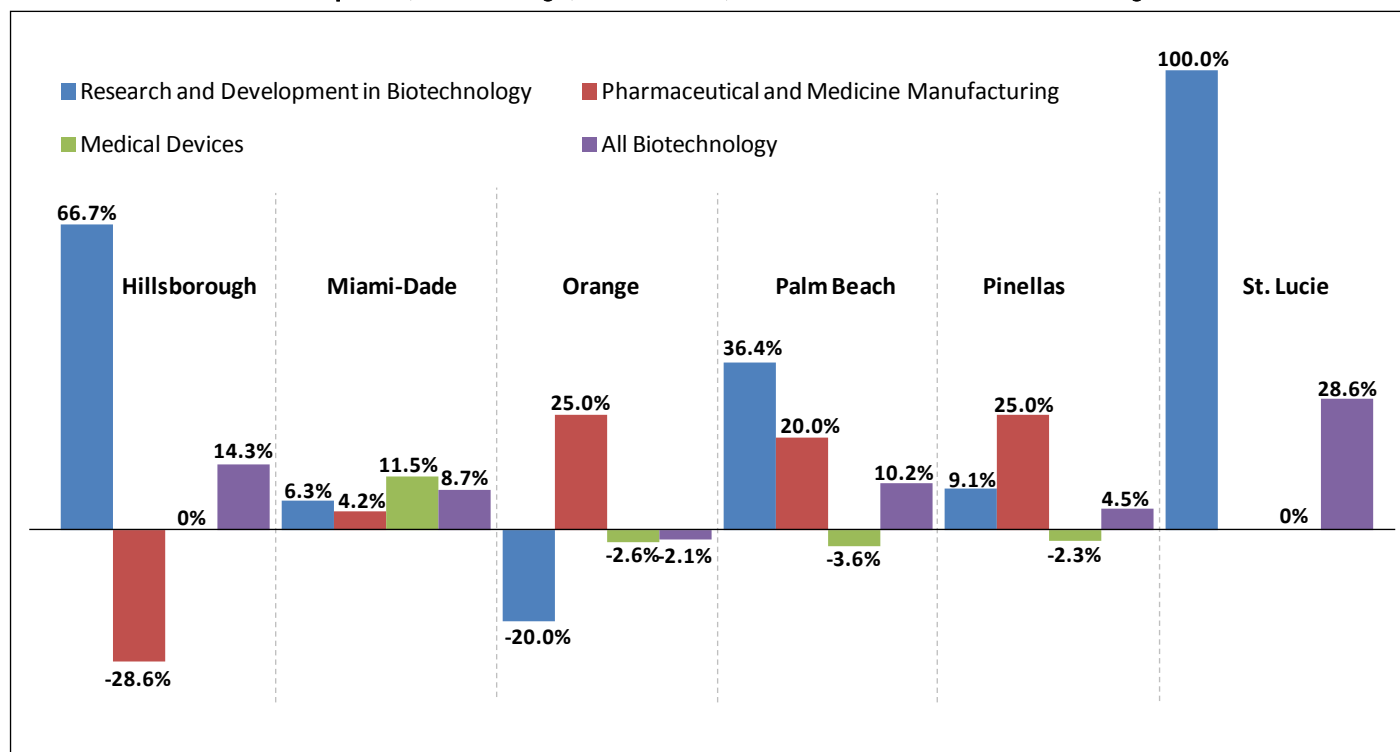
¹¹ We calculated location quotients and shift-share analyses using Florida and national employment data.

Within the biotechnology research and development sector, three counties demonstrated the greatest business growth—Hillsborough, Palm Beach, and St. Lucie. For example, the number of research and development businesses within

Hillsborough County increased by 66.7%. However, during the period, the county's pharmaceutical and medicine manufacturing businesses declined by 28.6%, and there was no growth within its medical devices sector. (See Exhibit 6.)

Exhibit 6

Within Research and Development, Hillsborough, Palm Beach, and St. Lucie Counties Had the Highest Business Growth¹



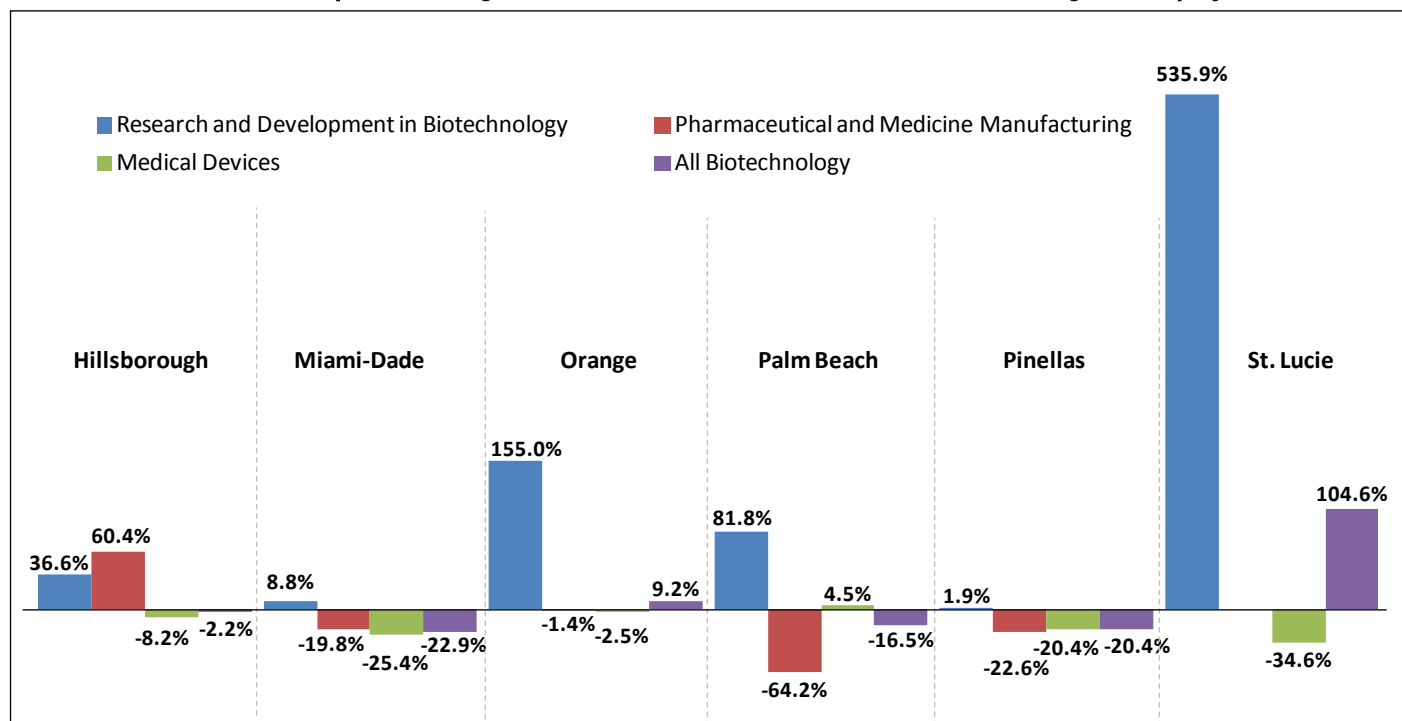
¹ For Palm Beach County's pharmaceutical and medicine manufacturing sector, changes in the number of establishments and employees were the result of non-economic industry code changes. Specifically, every year, one-third of all employers are surveyed by the Department of Economic Opportunity to verify county and industry codes assigned to Florida employers. If the employer indicates a change is needed, the department changes the county and industry codes in the first quarter of the year. These changes are considered non-economic.

Source: OPPAGA analysis of Department of Economic Opportunity data.

Similarly, research and development employment growth was higher in three counties—Orange, Palm Beach, and St. Lucie. For example, within the research and development sector, Orange County experienced a 155.0% increase in employees, although pharmaceutical and medicine manufacturing and medical devices both experienced declines, -1.4% and -2.5%, respectively.

(See Exhibit 7.) Additional analysis further showed that employment trends in these three counties' research and development sector outperformed those of the state economy and its biotechnology industry.¹² For additional information on this analysis, see Appendices B and C.

¹² We calculated location quotients and shift-share analyses using Florida and county employment data.

Exhibit 7**Within Research and Development, Orange, Palm Beach, and St. Lucie Counties Had the Highest Employment Growth¹**

¹For Palm Beach County's pharmaceutical and medicine manufacturing sector, changes in the number of establishments and employees were the result of non-economic industry code changes. Specifically, every year, one-third of all employers are surveyed by the Department of Economic Opportunity to verify county and industry codes assigned to Florida employers. If the employer indicates a change is needed, the department changes the county and industry codes in the first quarter of the year. These changes are considered non-economic.

Source: OPPAGA analysis of Department of Economic Opportunity data.

Innovation incentive recipients influence county-level biotechnology research and development employment growth. To examine the effect of innovation incentive recipients' presence on county biotechnology research and development employment growth, we analyzed county-level employment growth with and without recipient employment data. As shown in Exhibit 8, for all six counties, employment growth rates declined when innovation incentive recipients were excluded from the analysis. This was most evident in St. Lucie County, where employment growth dropped from 535.9% to zero when Torrey Pines Institute for Molecular Studies and Vaccine Gene Therapy Institute Florida Corporation were left out of the analysis.

Exhibit 8
From 2008 to 2011, Innovation Incentive Recipients Contributed to Biotechnology Research and Development Employment Growth

County	Employment Growth Without Recipient	Employment Growth With Recipient
Hillsborough	14.6%	36.6%
Miami-Dade	-20.0%	8.8%
Orange	23.9%	155.0%
Palm Beach	60.1%	81.8%
Pinellas	-45.5%	1.9%
St. Lucie	0	535.9%
Statewide	19.0%	44.3%

Source: OPPAGA Analysis of Department of Economic Opportunity data.

Florida appears to have the potential for further growth of the biotechnology industry

Stakeholders identified opportunities for enhancing the state's biotechnology industry and cluster growth, as well as barriers that may need to be overcome. To assess the status of the biotechnology industry for factors other than employment and business growth, we sought input from numerous stakeholders. Our methods included surveying BioFlorida members, conducting a focus group with members of BioFlorida's Board of Directors, interviewing innovation incentive recipients, and contacting newly established companies in the six counties where recipients are located.¹³ We also consulted with national experts about the strengths and weaknesses of Florida's environment for further development of biotechnology industry clusters.

Stakeholders cited several factors that make Florida an attractive location for biotechnology industry growth, including a

- favorable business climate such as relatively low land, labor, and tax costs;
- strong state university research base;
- collaborative environment among researchers; and
- diverse population suitable for clinical trials.

In addition, stakeholders credited the state for investing in further developing the state's research base through the Innovation Incentive Program. Innovation incentive recipients also reported that program staff has begun to encourage what was identified as beneficial collaboration and communication among incentive recipients. For example, program staff recently began facilitating conference calls among all recipients to provide a forum for sharing information and discussing research. Staff also is in the process of developing an inventory of equipment available at recipients' facilities, so that the research and development institutes funded through the program can share resources when possible rather than duplicating capacity.

¹³ BioFlorida is Florida's bioscience industry association, representing and advocating for the state's biotechnology, pharmaceutical, and medical device industries. BioFlorida's membership includes partner organizations, service providers, and suppliers from various sectors of the bioscience industry.

We also learned of collaborative efforts occurring at the local level. Innovation incentive recipients reported joint efforts with other recipients and public universities. For example, the Vaccine and Gene Therapy Institute reported having collaborative arrangements with Florida Atlantic University, the University of Florida, the Scripps Research Institute, and the Max Planck Florida Institute; these arrangements entail sharing meeting space and equipment. In addition, Orlando's Medical City is a partnership committed to helping several organizations and the region further develop the emerging biomedical cluster at Lake Nona.¹⁴

However, stakeholders reported several barriers to further developing Florida's biotechnology industry. While they attributed some of these barriers to the economic downturn that began in 2007 and to uncertainty about federal fiscal issues, they also cited issues more specific to Florida.¹⁵ For example, stakeholders described state-specific financial barriers such as a lack of venture capital for start-up and early-stage companies. In addition, stakeholders suggested that a lack of facilities (e.g., incubators and laboratories), as well as a shortage of entrepreneurial managers able to transform scientific discoveries into commercialized products, adversely affects biotechnology industry growth. Moreover, some stakeholders contended that the state could do more to market the state's biotechnology industry.

Stakeholders identified several actions that could promote biotechnology industry and cluster growth in Florida. Many stakeholders that we consulted agreed that Florida has built a strong research foundation, but asserted that it takes decades for biotechnology clusters to mature. The state's next challenge to furthering cluster development is to foster an environment that translates discoveries into marketable products. Florida stakeholders and national

¹⁴ The partnership includes the Sanford-Burnham Medical Research Institute, the University of Central Florida College of Medicine, the Orlando U.S. Department of Veterans Affairs Medical Center, the M.D. Anderson Cancer Research Institute, Nemours Children's Hospital, and the University of Florida Academic and Research Center.

¹⁵ An overall decrease in federal funding would result in fewer research funds from federal agencies such as the National Institute of Health.

experts reported that this could be accomplished by supporting the establishment of start-up companies, establishing more incubators and laboratories, linking research ideas with entrepreneurial talent, and conducting additional marketing of the state's biotechnology industry and the Innovation Incentive Program.

For example, multiple stakeholders mentioned the Florida Institute for the Commercialization of Public Research as an existing resource to help support and fund start-up companies.¹⁶ Some economic development representatives also indicated that their organizations help start-up companies obtain venture capital.

In addition, two innovation incentive recipients indicated that they are pursuing the development of incubators. The Torrey Pines Institute for Molecular Studies and the Vaccine Gene Therapy Institute reported that they intend to provide small amounts of space in their facilities for business incubators.

¹⁶ The institute is intended to be Florida's one-stop-shop for investors and entrepreneurs seeking to identify new opportunities based on technologies developed through publicly funded research. The institute currently operates a loan program (Seed Capital Accelerator Program) that provides qualified companies repayable loans ranging from \$50,000 to \$300,000.

Moreover, many focus group attendees offered ideas for encouraging biotechnology entrepreneurship. Several suggested that the state could provide grants that encourage entrepreneurship and could support the creation of entrepreneur in residence programs.

With regard to marketing, stakeholders reported that the state should establish a marketing plan for the biotechnology industry. For example, a local economic development official suggested that the Governor, Enterprise Florida, Inc., and BioFlorida should collaborate to develop a recruitment plan to bring more biotechnology companies to the state, especially pharmaceutical companies. Stakeholders further suggested that EFI staff should regularly attend national industry trade shows to promote Florida as an attractive location to establish a biotechnology business.

Agency Response

In accordance with the provisions of s. 11.51(5), *Florida Statutes*, a draft of our report was submitted to the Executive Director of the Department of Economic Opportunity and to the Secretary of Commerce for review and response. Their written responses to this report are in Appendix D.

Appendix A

Biotechnology Industry Data

The exhibit below presents data on the number of businesses, number of employees, and average wages in 2008 and 2011 by biotechnology industry sector for the six counties where the innovation incentive recipients are located and statewide; cells with asterisks represent data that the Department of Economic Opportunity considers confidential. Exhibit 1, on page 2 of this report, defines the industry codes within these biotechnology industry sectors. The sum of the three sectors equals the amount shown in the “All Biotechnology” column.

Exhibit A-1

Businesses, Employees, and Average Wages in 2008 and 2011 by Biotechnology Industry Sector

Location	Research and Development in Biotechnology	Pharmaceutical and Medicine Manufacturing	Medical Devices	All Biotechnology
Hillsborough				
Establishments (2008)	12	*	23	42
Establishments (2011)	20	*	23	48
Employees (2008)	93	*	1,105	1,246
Employees (2011)	127	*	1,014	1,218
Average Wages (2008)	\$67,889	*	\$49,170	\$50,016
Average Wages (2011)	\$70,143	*	\$52,585	\$52,972
Miami-Dade				
Establishments (2008)	16	24	52	92
Establishments (2011)	17	25	58	100
Employees (2008)	297	1,315	5,327	6,940
Employees (2011)	323	1,054	3,972	5,350
Average Wages (2008)	\$69,683	\$63,129	\$51,111	\$54,185
Average Wages (2011)	\$75,628	\$78,050	\$65,072	\$68,268
Orange				
Establishments (2008)	5	*	38	47
Establishments (2011)	4	*	37	46
Employees (2008)	89	*	613	1,239
Employees (2011)	226	*	598	1,353
Average Wages (2008)	\$75,618	*	\$62,296	\$53,827
Average Wages (2011)	\$70,248	*	\$58,663	\$56,036
Palm Beach¹				
Establishments (2008)	*	10	28	49
Establishments (2011)	*	12	27	54
Employees (2008)	*	808	540	1,624
Employees (2011)	*	289	564	1,355
Average Wages (2008)	*	\$41,391	\$53,384	\$50,517
Average Wages (2011)	*	\$43,374	\$59,840	\$60,537

Location	Research and Development in Biotechnology	Pharmaceutical and Medicine Manufacturing	Medical Devices	All Biotechnology
Pinellas				
Establishments (2008)	11	12	44	67
Establishments (2011)	12	15	43	70
Employees (2008)	113	1,063	3,840	5,016
Employees (2011)	115	823	3,056	3,994
Average Wages (2008)	\$78,432	\$52,103	\$47,486	\$49,159
Average Wages (2011)	\$94,640	\$56,171	\$54,702	\$56,151
St. Lucie				
Establishments (2008)	*	*	6	7
Establishments (2011)	*	*	6	9
Employees (2008)	*	*	77	102
Employees (2011)	*	*	50	208
Average Wages (2008)	*	*	\$31,161	\$41,578
Average Wages (2011)	*	*	\$36,241	\$60,184
Statewide				
Establishments (2008)	130	117	448	695
Establishments (2011)	179	150	506	835
Employees (2008)	1,454	4,861	21,373	27,688
Employees (2011)	2,097	4,103	18,730	24,931
Average Wages (2008)	\$68,084	\$49,842	\$53,378	\$53,530
Average Wages (2011)	\$74,345	\$57,805	\$61,312	\$61,831

¹ For Palm Beach County's pharmaceutical and medicine manufacturing sector, changes in the number of establishments and employees were the result of non-economic industry code changes. Specifically, every year, one-third of all employers are surveyed by the Department of Economic Opportunity to verify county and industry codes assigned to Florida employers. If the employer indicates a change is needed, the department changes the county and industry codes in the first quarter of the year. These changes are considered non-economic.

Source: OPPAGA analysis of Department of Economic Opportunity data.

Appendix B

Location Quotient

We calculated location quotients for each biotechnology industry sector in Florida and the six counties where innovation incentive recipients are located. Location quotients compare local employment in a given industry to statewide or national employment in that industry. Location quotients exceeding 1.0 indicate that their levels of industry employment were higher than the state or national level. A positive change in location quotient indicates that the industry is growing relative to the state or nation; the shaded cells in the exhibits below represent positive changes in location quotients from 2008 to 2011.

Exhibit B-1

Location Quotients for Florida Biotechnology Industries in 2008 and 2011

Florida Industry (NAICS)	Location Quotient (2008)	Location Quotient (2011)
Medicinal and Botanical Manufacturing (325411)	0.21	0.27
Pharmaceutical Preparation Manufacturing (325412)	0.29	0.26
In-Vitro Diagnostic Substance Manufacturing (325413)	0.10	0.10
Other Biological Product Manufacturing (325414)	0.03	0.04
Electromedical and Electrotherapeutic Apparatus Manufacturing (334510)	0.81	0.77
Analytical Laboratory Instrument Manufacturing (334516)	0.24	0.26
Irradiation Apparatus Manufacturing (334517)	0.09	0.09
Surgical and Medical Instrument Manufacturing (339112)	1.05	0.87
Surgical Appliance and Supplies Manufacturing (339113)	0.81	0.76
Ophthalmic Goods Manufacturing (339115)	1.86	1.71
Research and Development in Biotechnology (541711)	0.15	0.23
Pharmaceutical and Medicine Manufacturing (325411, 325412, 325413, and 325414)	0.25	0.23
Medical Devices (334510, 334516, 334517, 339112, 339113, and 339115)	0.90	0.81
All Biotechnology (includes 11 NAICS codes)	0.52	0.49

Source: OPPAGA analysis of Department of Economic Opportunity data.

Exhibit B-2

Location Quotients for County Biotechnology Industry Sectors in 2008 and 2011

Florida Industry	Location Quotient (2008)	Location Quotient (2011)
Hillsborough		
Research and Development in Biotechnology	0.80	0.76
Pharmaceutical and Medicine Manufacturing	0.12	0.24
Medical Devices	0.65	0.68
All Biotechnology	0.56	0.61
Miami-Dade		
Research and Development in Biotechnology	1.56	1.14
Pharmaceutical and Medicine Manufacturing	2.06	1.91
Medical Devices	1.90	1.57
All Biotechnology	1.91	1.59
Orange		
Research and Development in Biotechnology	0.68	1.18
Pharmaceutical and Medicine Manufacturing	1.23	1.41
Medical Devices	0.32	0.35
All Biotechnology	0.50	0.59
Palm Beach		
Research and Development in Biotechnology	2.75	3.49
Pharmaceutical and Medicine Manufacturing	2.40	1.03
Medical Devices	0.36	0.44
All Biotechnology	0.85	0.79
Pinellas		
Research and Development in Biotechnology	1.41	1.05
Pharmaceutical and Medicine Manufacturing	3.99	3.84
Medical Devices	3.28	3.12
All Biotechnology	3.30	3.06
St. Lucie		
Research and Development in Biotechnology	1.85	8.39
Pharmaceutical and Medicine Manufacturing	0.00	0.03
Medical Devices	0.39	0.30
All Biotechnology	0.40	0.94

Source: OPPAGA analysis of Department of Economic Opportunity data.

Appendix C

Shift-Share Analysis

We conducted a shift-share analysis for each biotechnology industry sector in Florida and the six counties where innovation incentive recipients are located. Shift-share represents how much of the employment growth or decline in the state or county industry was due to the national or state economy, the national or state level trend within the particular industry, and the state or county's characteristics. Shift-share is comprised of the three components listed below. The change in employment between 2008 and 2011 equals the sum of the three components.

- **National (or State) Growth Share** is the change in employment due to the growth of the overall national or state economy. If the national or state economy is growing, then you expect to see a positive change in each industry in the state or county.
- **Industry Mix Share** is the change in employment due to the growth (or decline) of the overall industry in the nation or state relative to the growth (or decline) of the overall national or state economy.
- **Regional Shift** is the change in employment due to the state or county's characteristics (also referred to as "competitive share"). It is the most important component. A positive regional shift indicates the state or county industry is outperforming the national or state trend. A negative effect indicates that the state or county industry is underperforming compared to the national or state trend.

In the exhibits below, shaded cells represent instances where the county industry is outperforming the national or state trend. Cells with asterisks represent data that the Department of Economic Opportunity considers confidential.

Exhibit C-1

Shift-Share Analysis for Florida Biotechnology Industries and Sectors

Industry/Sector	Employment Change (2008-2011)	National Growth Share	Industry Mix Share	Regional Shift
Medicinal and Botanical Manufacturing	20	-15	-41	76
Pharmaceutical Preparation Manufacturing	-789	-192	-137	-459
In-Vitro Diagnostic Substance Manufacturing	-10	-6	9	-13
Other Biological Product Manufacturing	21	-2	3	19
Electromedical and Electrotherapeutic Apparatus Manufacturing	-319	-150	29	-198
Analytical Laboratory Instrument Manufacturing	9	-24	-3	36
Irradiation Apparatus Manufacturing	1	-3	5	0
Surgical and Medical Instrument Manufacturing	-1,291	-356	592	-1,528
Surgical Appliance and Supplies Manufacturing	-413	-239	242	-415
Ophthalmic Goods Manufacturing	-631	-173	-101	-357
Research and Development in Biotechnology	643	-64	46	662
Pharmaceutical and Medicine Manufacturing	-758	-215	-116	-427
Medical Devices	-2,643	-945	801	-2,499
All Biotechnology	-2,757	-1,224	380	-1,913

Source: OPPAGA analysis of Department of Economic Opportunity data.

Exhibit C-2
Shift-Share Analysis for Biotechnology Industry Sectors by County

County/Industry	Employment Change (2008 to 2011)	State Growth Share	Industry Mix Share	Regional Shift
Hillsborough				
Research and Development in Biotechnology	34	-6	47	-7
Pharmaceutical and Medicine Manufacturing	*	*	*	*
Medical Devices	-91	-67	-70	46
All Biotechnology	-28	-76	-48	96
Miami-Dade				
Research and Development in Biotechnology	26	-18	150	-105
Pharmaceutical and Medicine Manufacturing	-261	-80	-125	-56
Medical Devices	-1,355	-324	-335	-696
All Biotechnology	-1,590	-421	-270	-899
Orange				
Research and Development in Biotechnology	137	-5	45	98
Pharmaceutical and Medicine Manufacturing	*	*	*	*
Medical Devices	-15	-37	-39	60
All Biotechnology	114	-75	-48	238
Palm Beach				
Research and Development in Biotechnology	*	*	*	*
Pharmaceutical and Medicine Manufacturing ¹	-519	-49	-77	-393
Medical Devices	24	-33	-34	91
All Biotechnology	-268	-99	-63	-107
Pinellas				
Research and Development in Biotechnology	2	-7	57	-48
Pharmaceutical and Medicine Manufacturing	-240	-65	-101	-74
Medical Devices	-784	-233	-242	-309
All Biotechnology	-1,022	-305	-195	-523
St. Lucie County				
Research and Development in Biotechnology	*	*	*	*
Pharmaceutical and Medicine Manufacturing	*	*	*	*
Medical Devices	-27	-5	-5	-17
All Biotechnology	106	-6	-4	116

¹ Changes in the number of establishments and employees were the result of non-economic industry code changes. Specifically, every year, one-third of all employers are surveyed by the Department of Economic Opportunity to verify county and industry codes assigned to Florida employers. If the employer indicates a change is needed, the department changes the county and industry codes in the first quarter of the year. These changes are considered non-economic.

Source: OPPAGA analysis of Department of Economic Opportunity data.

Appendix D

Rick Scott
GOVERNOR



Jesse Panuccio
EXECUTIVE DIRECTOR

February 28, 2013

Mr. R. Philip Twogood
Coordinator
The Office of Program Policy Analysis
and Government Accountability
312 Claude Pepper Building
111 West Madison Street
Tallahassee, FL 32399-1475

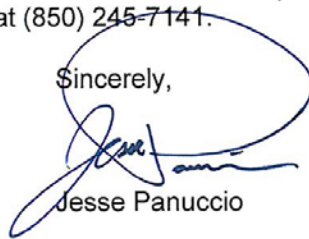
Dear Mr. Twogood:

Pursuant to Section 11.51(2), Florida Statutes, this letter represents our response to the preliminary report titled: *Florida's Biotechnology Industry Is Expanding; Cluster Growth Continues to Slowly Progress*.

We thank you and your staff for the review and will take under advisement the actions recommended to promote biotechnology industry and cluster growth in Florida.

If you have any questions or require additional information, please contact Mr. Joseph K. Maleszewski, Inspector General at (850) 245-7141.

Sincerely,



Jesse Panuccio

JP/jkm

Enclosure



February 27, 2013

Mr. R. Philip Twogood, Coordinator
Government Operations Policy Area
The Florida Legislature's Office of Program
Policy Analysis and Government Accountability
111 West Madison Street, Suite 312
Tallahassee, Florida 32399-1475

Dear Mr. Twogood,

Thank you for the opportunity to review your report on Florida's Biotechnology Industry. As you noted, the industry continues to grow, creating high-wage, high-impact jobs for Florida's communities. We agree with your report that in order to continue to grow the industry in the state, we must aggressively market our distinct business advantages.

Enterprise Florida, Inc. (EFI) believes that job creation is supported by three types of growth: organic, facilitated and competitive. While Enterprise Florida supports organic growth through improving Florida's business climate through policy and legislative recommendations and facilitated growth through international trade and capital programs, the organization's primary business development and marketing activities focus on the cultivation of competitive job creation projects – projects that are considering multiple locations for new growth or expansion.

EFI has identified the life sciences industry – comprised of biotechnology, pharmaceuticals, medical devices, and health care – as an industry in which Florida is a viable competitor to other states in the eyes of companies looking to locate or expand their life sciences business.

As such, EFI has developed a marketing strategy and implemented a number of marketing and business development programs to ensure those decision makers and influencers of businesses considering expansion or relocation are aware of Florida's business advantages and our desire to compete for their business. A sampling of our marketing activities includes:

- Producing unique recruitment events in conjunction with national and international industry trade shows. The events provide opportunities to meet with key business executives and researchers while building relationships and supporting Florida businesses.
- Host events and attend in-state industry trade shows and events to cultivate the industry, including BioFlorida's annual conference, the Medical Device &

Governor Rick Scott, Chairman • Brett Couch, Vice Chairman • Gray Swoope, President & CEO



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Manufacturing Florida trade show, Florida Medical Device Manufacturing Symposium, Moffitt's Business of Biotech as well as numerous life science company project announcements.

- Proactively meeting one-on-one with life science business executives to discuss Florida's business advantages.
- Development of a life sciences microsite, which provides up-to-date news about recent expansions of life sciences companies in Florida, as well as in-depth information about Florida's life sciences cluster.
- Creation of targeted industry specific marketing materials to promote the state's industry cluster strengths.

However, we continue to look for new and innovative ways to expand our marketing efforts. Again, we appreciate the opportunity to review the report and the key findings about the ongoing success of the Innovation Incentive Program.

Sincerely,

A handwritten signature in black ink, appearing to read "Gray Swoope". The signature is fluid and cursive, with the first name "Gray" and last name "Swoope" clearly distinguishable.

Gray Swoope
Secretary of Commerce
President & CEO, Enterprise Florida Inc.

The Florida Legislature

Office of Program Policy Analysis and Government Accountability



OPPAGA provides performance and accountability information about Florida government in several ways.

- [Reports](#) deliver program evaluation and policy analysis to assist the Legislature in overseeing government operations, developing policy choices, and making Florida government more efficient and effective.
- [PolicyCasts](#), short narrated slide presentations, provide bottom-line briefings of findings and recommendations for select reports.
- Government Program Summaries (GPS), an online encyclopedia, www.oppaga.state.fl.us/government, provides descriptive, evaluative, and performance information on more than 200 Florida state government programs.
- [PolicyNotes](#), an electronic newsletter, delivers brief announcements of research reports, conferences, and other resources of interest for Florida's policy research and program evaluation community.
- Visit OPPAGA's website at www.oppaga.state.fl.us

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