February 2014

Economic Impacts Attributable to FY 2013 Federal Grants and Payments to Seven Insular Areas

Final Report

Prepared for

Office of Insular Affairs
U.S. Department of the Interior
1849 C Street, NW
Washington, DC 20240

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EXECUTIVE SUMMARY

The Office of Insular Affairs (OIA) carries out the Department of the Interior's responsibilities for U.S.-affiliated insular areas. These areas are the territories of American Samoa, Guam, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands as well as the Freely Associated States (FAS)[1] of the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau.

The total budget of the OIA for fiscal year (FY) 2013 was $648 million, of which $619 million was direct grants and payments to the insular areas. This assistance played an important role in the economies of each of these areas by providing financial and technical assistance to promote economic growth, education, and public health and the development of more efficient and effective government.

Generally, a lack of sophisticated economic data series for these insular areas deprived territorial and federal leaders of the type of thorough economic analysis that would help them make more informed policy decisions. For the FY 2013 analysis, input-output data from the Bureau of Economic Analysis (BEA) are newly available for U.S. territories via economic impact modeling tools. For FAS, RTI International used the economic base analysis approach employed in previous years' studies.

The following economic aggregates were calculated for each insular area:

- Employment: the number of individuals gainfully employed, which typically consists of full-time and part-time employees but excludes subsistence agriculture and fishing
- Employee compensation: payments made to all employees during the year, including salaries, wages, and other forms of compensation
- Gross domestic product (GDP): a measure of each area's economic output—typically defined as the value of all final goods and services made within the borders of the insular area in a particular year

Table ES-1 summarizes the results of this analysis.

[1] FAS are independent nations that were at one time governed by the United States and continue to maintain a close relationship with the United States through the Compact of Free Association, which makes them eligible to receive funds and assistance from U.S. federal agencies.

Table ES-1. Economic Impact Summary of OIA Grants and Payments (FY 2013)

	Total OIA Payments ($'000, 2013$)	Total OIA Employment Impact	National Employment Supported by OIA Payments (%)	Total OIA Employee Compensation Impact ($'000, 2013$)	National Employee Compensation Supported by OIA Payments (%)	Total OIA GDP Impact ($'000, 2013$)	National GDP Supported by OIA Payments (%)
American Samoa	35,316	1,237	9%	29,134	17%	44,822	7%
Guam	106,787	4,085	15%	108,042	12%	132,955	3%
Northern Mariana Islands	14,888	787	4%	14,397	3%	22,303	3%
U.S. Virgin Islands	268,570	8,012	21%	286,503	23%	412,350	9%
Micronesia	108,584	7,880	52%	56,279	81%	185,986	56%
Marshall Islands	70,926	3,598	34%	35,971	35%	77,819	44%
Palau	14,166	742	8%	7,782	9%	32,821	14%
Total	**619,238**	**26,341**	**19%**	**538,107**	**18%**	**909,056**	**8%**

Note: Total impacts are the sum of estimated direct, indirect, and induced impacts associated with OIA grants and payments. Approximately $28.9 million of a total $648 million was spent outside the seven insular areas that were the primary focus of this study.

Source: RTI estimates.

ES.1 FY 2013 OIA Payments to the Insular Areas

OIA's responsibilities are framed by the long-term security interests of the United States in the western Pacific and serious economic and fiscal problems affecting the U.S. territories and FAS. Although each insular areas situation is unique, they share common challenges, including limited land and resources; small populations; limited local technical expertise; narrow economic bases; and exposure to natural disasters, such as hurricanes and typhoons. OIA strives to empower the local communities, foster economic development, promote sound management, and improve quality of life while respecting and preserving local cultures.

U.S. per capita GDP was estimated to be approximately $51,749 in 2012, presented in 2013 dollars (World Bank, 2013a). By contrast, per capita GDP for the insular areas averages to less than $20,000, although there is great variability in income across areas (Table ES-2).

Table ES-2. Economic Characteristics by Insular Area

	Estimated Population (# in 2012)	Estimated Employment (#)	Estimated Employee Compensation ($'000, 2013$)	GDP ($'000, 2013$)	GDP per Capita (2013$)
American Samoa	55,130	13,692	173,184	671,098	12,173
Guam	162,800	26,700	916,253	4,717,364	28,976
Northern Mariana Islands	53,310	21,399	464,919	674,205	12,647
U.S. Virgin Islands	105,300	38,454	1,221,177	4,511,271	42,842
Micronesia	102,843	15,281	69,431	330,938	3,218
Marshall Islands	53,158	10,618	102,208	174,985	3,292
Palau	17,455	8,944	90,516	231,761	13,278
United States	313,873,685				51,749

Sources: 2012 population estimates were obtained from the World Bank (2013b). Data on estimated 2013 GDP and GDP per capita for the four U.S. territories were collected from the Bureau of Economic Analysis (BEA) (2013) and are presented in 2013 terms. Data on estimated employment and employee compensation for the four U.S. territories are RTI estimates based on IMPLAN (2013). Data on estimated 2012 population, 2013 GDP, and GDP per capita for the three FAS were obtained from Pacific & Virgin Islands Training Initiatives (PITI-VITI) (2013a, 2013b, 2013c). 2013 GDP per capita for the United States was from the World Bank (2013a, 2013b). RTI constructed estimated employment and employee compensation statistics for the three FAS based on data obtained from PITI-VITI (2013a, 2013b, 2013c). The construction of this data for each insular area is explained in more detail in the full report.

For FY 2013, $619 million of OIA's $648 million budget was distributed directly to insular areas for technical assistance, grants, and payments to the insular areas, of which a large majority is considered mandatory, essential assistance to provide basic services or defined by law, while only a small percentage is considered discretionary (OIA, 2013b). OIA payments fund health care, education, government operations, roads, and other types of social and physical infrastructure. From a budgetary standpoint, payments can be separated into three primary categories (Table ES-3):

- *Fiscal payments*, which are the return of taxes collected by the U.S. federal government to Guam and the U.S. Virgin Islands, as required by law
- *Assistance to Territories*, which provides general technical assistance; finances education and health care operations; funds and maintains essential infrastructure; and supports environmental initiatives, including brown tree snake control and the Coral Reef Initiative
- *Compact of Free Association*, which distributes annual payments to FAS, per their treaties with the United States, and provides support to the U.S. western Pacific territories and Hawaii to offset the impact the Compact has on regional social infrastructure

Table ES-3. FY 2013 OIA Payments by Insular Area

	Assistance to Territories ($'000, 2013$)	Compact of Free Association—Current ($'000, 2013$)	Compact of Free Association—Permanent ($'000, 2013$)	Fiscal Payments ($'000, 2013$)	Total OIA Payments ($'000, 2013$)
American Samoa	35,302	—	14	—	35,316
Guam	11,224	—	16,827	78,736	106,787
Northern Mariana Islands	12,958	—	1,930	—	14,888
U.S. Virgin Islands	5,440	—	—	263,130	268,570
Micronesia	1,748	—	106,663	—	108,411
Marshall Islands	2,164	499	68,090	—	70,753
Palau	711	13,455	—	—	14,166
Other[a]	17,310	—	11,576	—	28,886
Total	**86,856**	**13,954**	**205,100**	**341,866**	**647,776**

[a] This other category represents payments being spent outside the seven insular areas, such as Washington, DC; Hawaii; and others.

Source: RTI estimates based on detailed budget information provided by OIA (2013a, 2013b)

ES.2 Study Methodology

Total economic impacts are the sum of direct economic impact and indirect/induced economic impact resulting from recipient organizations' consumption of goods and services and household spending by organizations' employees. RTI reviewed employment, employee compensation, and activity trends for each insular area to estimate the direct impact of OIA payments.

In 2012, economic data for the U.S. Territories—American Samoa, Guam, Northern Mariana Islands, and the U.S. Virgin Islands—became available. This was an indirect result of OIA funding given to BEA to develop more robust economic data for the U.S. territories. Unlike the economic base analysis model, an input/output (I/O) modeling framework allows specific multipliers to be calculated for each industry. Although the economic base analysis performed can use more recent data, it often relies on an amalgamation of various sources. Using the input-output analysis to estimate the economic impacts of OIA payments produces more accurate results because data come from a single data source.

For FAS—Micronesia, Marshall Islands, and the Republic of Palau—indirect/induced impacts were estimated using economic base analysis (EBA). The reasoning underlying EBA is that an individual region's economic activity is derived from its "base" or "primary" sectors, which are defined as those sectors whose revenue is received primarily from outside the

region. Base sectors often include manufacturing, mining, agriculture, and fisheries that produce goods for export and activities that are funded by the U.S. federal government and aid organizations. EBA is best applied to small, relatively specialized regions whose economies rely to a larger extent on exports (Wang and vom Hofe, 2007). Consequently, this methodological approach is well suited to studying the economies of the FAS.

RTI also conducted a supplemental analysis of the economic impact of OIA spending on Washington, DC, and Hawaii.

ES.3 Economic Impact Results

RTI estimated the direct, indirect/induced, and total economic impacts of OIA payments on each insular area in terms of employment, employee compensation, and GDP. Estimates of local employment supported by OIA payments are presented in Table ES-4.

Table ES-4. Estimated Employment Impact of OIA Payments (FY 2013)

	Direct Employment Impact (#)	Indirect/Induced Employment Impact (#)	Total Employment Impact (#)	National Employment Supported by OIA Payments (#)
American Samoa	1,107	130	1,237	9%
Guam	3,926	159	4,085	15%
Northern Mariana Islands	661	125	787	4%
U.S. Virgin Islands	7,248	765	8,012	21%
Micronesia	2,471	5,409	7,880	52%
Marshall Islands	1,556	2,042	3,598	34%
Palau	271	471	742	8%
Total	**17,240**	**9,100**	**26,341**	**16%**

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2013a, 2013b, 2013c).

In the cases of the Marshall Islands and Micronesia, a significant portion of national employment is directly and indirectly supported by OIA payments. Approximately 52% of total recorded employment in Micronesia was either directly or indirectly supported by OIA payments. These data do not include subsistence agriculture or fishing.

Estimates of the amount of employee compensation supported by OIA payments are presented in Table ES-5.

Table ES-5. Estimated Employee Compensation Impact of OIA Payments (FY 2013)

	Direct Employee Compensation Impact ($'000, 2013$)	Indirect/Induced Employee Compensation Impact ($'000, 2013$)	Total Employee Compensation Impact ($'000, 2013$)	National Employee Compensation Supported by OIA Payments ($'000, 2013$)
American Samoa	27,137	1,997	29,134	17%
Guam	105,065	2,976	108,042	12%
Northern Mariana Islands	12,675	1,722	14,397	3%
U.S. Virgin Islands	266,380	20,123	286,503	23%
Micronesia	14,213	42,066	56,279	81%
Marshall Islands	16,360	19,611	35,971	35%
Palau	2,982	4,800	7,782	9%
Total	**444,812**	**93,295**	**538,107**	**16%**

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2013a, 2013b, 2013c).

In the cases of the Marshall Islands and Micronesia, a significant portion of national employee compensation is directly and indirectly supported by OIA payments. For example, approximately 81% of total estimated recorded employee compensation in the Federated States of Micronesia is either directly or indirectly supported by OIA payments.

Estimates of the amount of GDP supported by OIA payments are presented in Table ES-6. Based on RTI's analysis of the economics of each insular area, we determined that for every $1.00 of GDP directly supported by OIA payments, approximately $0.70 of GDP was supported elsewhere in the insular economy, on average. As a result, a significant portion of national employee compensation is directly and indirectly supported by OIA payments. For example, approximately 44% of total GDP in the Marshall Islands is either directly or indirectly supported by OIA payments.

Table ES-6. Estimated GDP Impact of OIA Payments (FY 2013)

	Direct GDP Impact ($'000, 2013$)	Indirect/Induced GDP Impact ($'000, 2013$)	Total GDP Impact ($'000, 2013$)	National GDP Supported by OIA Payments (%)
American Samoa	35,316	9,506	44,822	7%
Guam	106,787	26,169	132,955	3%
Northern Mariana Islands	14,888	7,414	22,303	3%
U.S. Virgin Islands	268,570	143,780	412,350	9%
Micronesia	66,455	119,531	185,986	56%
Marshall Islands	33,654	44,165	77,819	44%
Palau	7,877	24,943	32,821	14%
Total	**533,547**	**375,509**	**909,056**	**8%**

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2013a, 2013b, 2013c).

In addition to the analysis of the seven insular areas, RTI also conducted a supplemental analysis of the economic impact of OIA operations in Washington, DC, and Hawaii. RTI estimated that approximately $7.30 million of OIA's operating budget was spent in Washington, DC, and approximately $15.6 million in Hawaii for OIA operations and to offset the impact Compact provisions have on Hawaii's social infrastructure. To estimate the economic impacts, RTI used IMPLAN modeling software to construct input-output models of each region. Using these models, RTI estimated that OIA's operations and payments would directly support 46 jobs in Washington, DC, receiving approximately $6.64 million of employee compensation, and support a total output of $8.72 million. In Hawaii, OIA spending in FY 2013 is estimated to support 203 employees, receiving $12.84 million of employee compensation, and a total output of $26.28 million.

1. INTRODUCTION

The Office of Insular Affairs (OIA) contracted with RTI International to estimate the economic impacts of federal payments and grants from fiscal year (FY) 2013 to U.S.-affiliated insular areas. These areas are the U.S. territories of American Samoa, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), and the U.S. Virgin Islands (USVI), and the freely associated states (FAS) of the Republic of the Marshall Islands (RMI), the Federated States of Micronesia (FSM), and the Republic of Palau.

OIA distributed approximately $619 million in technical assistance, grants, and payments to the insular areas during FY 2013. These payments play an important role in each area's economy, supporting local jobs and providing employee compensation in regions. The economic characteristics of these areas are displayed in Table 1-1.

Table 1-1. Economic Characteristics by Insular Area

	Estimated Population (2012 #)	Estimated Employment (#)	Estimated Employee Compensation ($'000, 2013$)	GDP ($'000, 2013)	GDP per Capita (2013$)
American Samoa	55,519	13,692	173,184	671,098	12,173
Guam	159,358	26,700	916,253	4,717,364	28,976
Northern Mariana Islands	53,310	21,399	464,919	674,205	12,647
U.S. Virgin Islands	106,405	38,454	1,221,177	4,511,271	42,842
Micronesia	102,843	15,281	69,431	330,938	3,218
Marshall Islands	52,921	10,618	102,208	174,985	3,292
Palau	20,472	8,944	90,516	231,761	13,278
United States	313,873,685				51,749

Sources: 2012 population estimates were obtained from the World Bank (2013b). Data on estimated 2012 GDP and GDP per capita for the four U.S. territories were collected from the BEA (2013) and are presented in 2013 terms. Data on estimated employment and employee compensation for the four U.S. territories are RTI estimates based on IMPLAN (2013). Data on estimated 2012 population, 2013 GDP, and GDP per capita for the three FAS were obtained from Pacific & Virgin Islands Training Initiatives (PITI-VITI) (2013a, 2013b, 2013c). 2013 GDP per capita for the United States was from the World Bank (2013a, 2013b). RTI constructed estimated employment and employee compensation statistics for the three FAS based on data obtained from PITI-VITI (2013a, 2013b, 2013c).

Because the insular areas are not included in many U.S. statistical surveys of economic activity, critical data on local economic activity are often not captured. To some degree this changed through OIA funding of the Bureau of Economic Analysis (BEA) to develop better economic data for U.S. territories under the Statistical Improvement Project. BEA provides benchmark I/O data for the United States. The benchmark accounts show how industries

interact at the detailed level; specifically, they show how more than 500 industrial sectors provide input to, and use output from, each other to produce gross domestic product (GDP).[1] These data are now available for U.S. territories, and they were used for this report.

In this study, RTI estimated direct economic impacts and multipliers for estimating total economic impact, which includes indirect and induced impacts, for each of the seven insular area's economies. Analysis results were designed to be integrated into a larger report that estimates the economic benefits of lands and other resources managed by the Department of the Interior (DOI), thus enabling OIA to report on its economic impacts in the same manner as other Department offices and bureaus (DOI, 2013).

1.1 FY 2013 OIA Payments to Insular Areas

In FY 2013, OIA's total budget was $648 million, of which $619 million was spent directly in the insular areas to provide assistance, grants, and compacts to the insular areas during the fiscal year. In this report, all assistance, grants, and compacts are referred to collectively as "payments," the majority of which are considered mandatory (OIA, 2013b). OIA payments fund health care, education, government operations, roads, and other types of social and physical infrastructure. From a budgetary standpoint, payments can be separated into three primary categories:

- *Fiscal payments*, which are the return of taxes collected by the U.S. federal government to Guam and the USVI, as required by law
- *Assistance to Territories*, which provides general technical assistance; finances education and health care operations; funds and maintains essential infrastructure; and supports environmental initiatives, including Brown Tree Snake Control and the Coral Reef Initiative
- *Compact of Free Association*, which distributes annual payments to FAS, per their treaties with the United States, and provides support to the U.S. western Pacific territories and Hawaii to offset the impact the Compact has on regional social infrastructure

For the purposes of this analysis, RTI received detailed budget information from OIA, which was then used to estimate expenditures in each insular area related to OIA payments (Table 1-2). Although this determination was typically straightforward, in some cases determining where spending would be directed was not possible using readily available information.

[1] These accounts provide detailed information on the flows of the goods and services that make up the production processes of industries. See http://www.bea.gov.

Table 1-2. FY 2013 OIA Payments by Insular Area

	Assistance to Territories ($'000, 2013$)	Compact of Free Association—Current ($'000, 2013$)	Compact of Free Association—Permanent ($'000, 2013$)	Fiscal Payments ($'000, 2013$)	Total OIA Payments ($'000, 2013$)
American Samoa	35,302	—	14	—	35,316
Guam	11,224	—	16,827	78,736	106,787
Northern Mariana Islands	12,958	—	1,930	—	14,888
U.S. Virgin Islands	5,440	—	—	263,130	268,570
Micronesia	1,748	—	106,663	—	108,411
Marshall Islands	2,164	499	68,090	—	70,753
Palau	711	13,455	—	—	14,166
Other[a]	17,310	—	11,576	—	28,886
Total	**86,856**	**13,954**	**205,100**	**341,866**	**647,776**

[a] This other category represents payments being spent outside the seven insular areas, such as Washington, DC; Hawaii; and others.

Sources: RTI estimates based on detailed budget information provided by OIA (2013a, 2013b).

1.2 Study Objectives

The objectives of this study were to

- estimate the direct economic impacts of OIA payments and indirect/induced multipliers and impacts relevant for OIA grant and payment categories for each insular area;
- review FY 2013 grants and payments and determine affected economic sectors for the American Samoa Operations Grant, Brown Tree Snake Control, Compact of Free Association (permanent and current), Coral Reef Initiative, covenant grants, maintenance assistance fund, return of federal taxes to U.S. Virgin Islands and Guam, and technical assistance;
- model the direct and indirect/induced economic impacts of FY 2013 grants and payments for each insular area and for each payment category;
- compare the results between the IMPLAN analysis and EBA for the U.S. Territories;
- prepare a final report that summarizes assumptions and provides tabular data on economic impacts.

1.3 Overview of Study Methodology

In 2012, input-output data for the U.S. Territories—American Samoa, Guam, Northern Mariana Islands, and the U.S. Virgin Islands—became available following the Statistical Improvement Project. In contrast to the economic base analysis approach used for all

insular areas in previous reports, an I/O modeling framework allows more specific multipliers to be calculated for each industry.[2] I/O models use multipliers to simulate how employment or income generated in one industry can generate additional jobs, income, and output in other industries and for the region's economy as a whole. This allows for greater precision relative to using the economic base multiplier for all sectors.

For the U.S. territories, we use both I/O analysis (via the software tool IMPLAN) to calculate the total impacts of OIA payments as well as EBA for consistency with previous versions of the OIA payments analysis. We also discuss the differences in the results when compared to the economic base analysis in Section 10 of this report. RTI also used IMPLAN to model the economic impact of OIA activities in Washington, DC, and Hawaii, areas in which OIA has operations.

Although the economic impacts of government spending for the U.S. territories are estimated using I/O models, no I/O data were available for the three Freely Associated States (FAS), Federated States of Micronesia, Marshall Islands, and the Republic of Palau. As such, RTI developed multipliers for the FAS using economic base analysis.[3]

The reasoning underlying EBA is that an individual region's economic activity is derived from its "base" or "primary" sectors, which are defined as those sectors whose revenue is received primarily from outside the region—base sectors typically include manufacturing firms, mines, and farms that produce goods for export and activities that are funded by the federal government (Klosterman, 1990). As a result, EBA is best applied to small, relatively specialized regions whose economies rely to a larger extent on exports (Wang and vom Hofe, 2007). Consequently, this methodological approach is well suited to studying the economies of the insular areas.

Estimating the economic impact of federal funds on economic aggregates like regional employment is typically accomplished using a simple mathematical representation of a region's economy, such as

$$\Delta Y = s*\Delta X \qquad (1.1)$$

[2] The IMPLAN data for each U.S. Territory is based on data calculated by the BEA for the territories in 2009.

[3] Other researchers have used I/O models for Hawaii to model economic impacts for U.S. insular territories; however, RTI does not recommend this approach because it assumes that the economic structure of the insular area is the same as that for Hawaii (see Pike [2007]). The model is also static and does not adjust for sectoral responses to materially significant shocks. Another alternative, but one that requires extensive data collection, would be the same as that employed in a 2008 analysis performed for the Department of Commerce and American Samoa (see ASDC [2008]). This latter method is resource intensive but may narrow the confidence interval surrounding economic multipliers.

where

ΔY is the change in total employment,

ΔX is the change in base-sector employment (direct impact), and

s is total employment/base-sector employment (the base employment multiplier).

This model represents how an increase in base-sector employment will generate a larger increase in the region's total employment because of the ripple effect as new base-sector employees spend money on locally produced goods and services. This ripple effect is quantified by the "s" term, called the "base employment multiplier," which is typically estimated by taking the ratio of total employment to base-sector employment.

Using this core approach as a starting point for modeling the economy of each FAS (as well as the secondary method to estimating economic impacts of US territories), RTI estimated economic impacts in a short time period using available economic data. First, RTI computed an estimate of direct impacts for each of the grant and payment categories. This entailed combining these data with existing information on employment and income associated with government spending and other economic activities. Direct impacts are usually computed using ratios of employment or income created per dollar of government funding that have been derived from historical data. Second, to estimate the combined indirect and induced impact, RTI calculated multipliers for employment, income, and GDP by examining the economic structure and activities of each FAS.

To obtain more accurate measures of the direct employment impact of OIA payments, one must obtain an understanding of who receives these payments and what they are being spent on. For example, OIA payments used to fund a construction project will have different employment impacts than OIA payments used to fund education. Therefore, the first question asked when creating a more refined analysis is how OIA payments should be classified or treated as direct impacts. For the purposes of this study, OIA payments can be classified in six different ways:

- Education: payments associated with training or education inside the relevant insular area.
- Construction: payments associated with building new or maintaining existing structures.
- Government: payments associated with general government operations or general technical assistance.
- Health care: payments associated with providing medical and other health care services.

- Private: this classification is used only for payments to the Prior Service Benefits program. Beneficiaries receive this money in appreciation for their service during World War II, and it generates an economic impact when recipients spend it on goods and services. Because data are not available on the spending behavior of these beneficiaries, precise output and employee compensation to employee ratios was difficult to obtain. Therefore, RTI typically used ratios that represented averages for the private nonagricultural sector and assumed 100% of beneficiary funds were spent locally.

- Wholesale: payments associated with purchasing goods or equipment from local wholesalers (companies involved in the resale, sale without transformation, of new and used goods to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers). This treatment assumes that the goods or equipment themselves were not manufactured in the insular area.

In addition to improving our classification of OIA payments, this study sought to refine economic impact estimates in a second way. Generally, only standard industries (agriculture, mining, manufacturing, and federal government) were assumed to be part of the economic base. However, many insular areas attract a number of tourists, which also contributes to the economic base. Similarly, government operations that are funded from external sources should also be included in measures of economic base employment and employee compensation.

1.4 Methodological Limitations

Although I/O and EBA have several advantages that make them the most reasonable methodological approaches, several limitations are associated with it that one must keep in mind when interpreting analysis results.

First, the quality of economic base multipliers relies heavily on the quality of the data being used. Most developing areas have a substantial informal sector composed of subsistence agriculture and fishing, domestic aids, street vendors, producers of clothing and handicrafts, and other workers whose occupation and income often go unreported.

Although accurate data on the size and makeup of the informal sector are difficult to gather, the informal sector in developing island areas was assumed to make up a significant percentage of official employment and income statistics. In a study of 110 countries, Schneider (2002) found that the informal sector made up 41% of official gross national income in developing countries and 38% in transition countries. Lal and Raj (2006) compiled data on the informal sector in developing island nations (data on the insular areas were not included) and found that self-employment as a percentage of total nonagricultural employment averaged 35% for the six islands for which these data were available. Data on the informal sector in the Pacific Island areas may be particularly difficult to obtain because, as a result of the rural nature of these areas, most informal workers operate from homes

rather than working as street vendors, transportation providers, or other typically urban occupations (Duncan and Voigt-Graf, 2008).

Because of the size of the informal sector in the insular areas, much of the data used in this analysis likely underestimate employment, labor income, and GDP. Subsistence agriculture often makes up a substantial portion of unreported employment. A 1996 survey in Palau estimated the value of the primarily agricultural informal sector at $5 million, or twice the size of the recorded agricultural sector in that year. Most of these goods, however, are consumed by the household and traded informally and do not reach the market (FAO, 2006).

Second, with EBA, the division between base and nonbase sectors is often unclear. In this analysis, RTI used standard assumptions for identifying which sectors are considered base and nonbase. However, companies within these sectors are often engaged in satisfying both local and external demand. For example, local manufacturers may produce products that are exported and also consumed by local residents. This concern can often be minimized by using techniques for better estimating the portions of each sector that are truly base and nonbase (for example, surveys can be used to collect this information directly from local businesses); however, given the time and data constraints, these techniques were not feasible for this analysis.

Lastly, EBA in particular focuses exclusively on external demand. Therefore, supply constraints are assumed to not be binding, and nondemand factors that may contribute to regional growth are ignored (such as capital accumulation or productivity improvements). Because supply-side considerations are typically most important for long-term growth, EBA is best suited for short-term analyses.

1.5 Data Limitations

For the FY 2013 analysis, we were able to better estimate GDP base multipliers for each insular area and used newly available I/O data for U.S. territories. This higher level of analysis was possible because of new estimates of GDP released by the BEA in September 2013. Up-to-date employment, employee compensation, and GDP data were available for the FAS through new reports released in October 2013 by PITI-VITI. In addition, PITI-VITI's Performeter Reports[4] for each insular area, now released annually, provided updated information on percentage of government operations that are funded by external sources. These reports helped better estimate aspects of the base economy.

[4] A Performeter Report takes government financial statements and converts these measures into an easy to measure overall rating of government performance and financial health. The Performeter Report also provides trend data of government finance measure such as fund balances, net assets, and revenue dispersion (PITI-VITI 2013d).

When possible, RTI tried to incorporate newer economic data into the FY 2013 EBA model in order to update the output-to-employee and employee compensation-to-employee ratios, as well as the base multipliers. These data are essential to determining the direct and indirect impacts of OIA payments, and we believed these inclusions would better describe the significance of funding given the changing economies of the insular areas. Incorporating these new data sets did, however, cause some of the data to come from differing years. For example, to achieve updated employee compensation-to-employee ratios for the U.S. territories, we used newly released data from the 2011 County Business Patterns (released by the U.S. Census in April 2013). However, these data sets lacked information about sales in each sector, and output-to-employee ratios could not be determined. RTI had to rely on the 2007 Economic Census for these ratios. This approach assumes that employment and compensation have changed over time in the territories, but output-to-employee has remained constant since 2007. Because most of the insular areas have experienced some economic decline since 2007, using output-to-employee ratios from 2007 may underestimate the impacts of OIA payments. During periods of decline and recovery, output-to-employee tends to increase (BEA, 2013); Bureau of Labor Statistics [BLS], 1986). The data from the Census also often exclude information about agricultural and public-sector employment, which leads to even more agglomeration of sources and assumptions to complete the employment statistics.

For the FAS, economic data rely on studies that are funded by the OIA through the PITI-VITI educational program. Although RTI was able to update employment data and employment compensation-to-employee ratios for each of these areas, data on output were unavailable. Therefore, we had to assume that the output-to-employee for these three areas was comparable to that of American Samoa. American Samoa was chosen as the best U.S. Territory comparison because it was most similar to the FAS in terms of GDP per capita and other economic measures. This assumption is also likely an overestimate of the FAS's true output-to-employee ratio because American Samoa has a higher GDP per capita. The use of American Samoa data as a proxy will likely underestimate the impacts of OIA spending because more jobs will be supported by each dollar of OIA spending.

1.6 Report Organization

A separate report section detailing the payments, economic multipliers, and economic impacts was prepared for each insular area (Sections 2 through 8). In addition, a section for Washington, DC, and Hawaii was prepared (Section 9), because OIA locates significant operations in these regions. Section provides a comparison between newer IMPLAN data and the economic base analysis that has been provided in previous studies. Section 10 summarizes economic impact data for all FY 2013 payments.

2. AMERICAN SAMOA

2.1 FY 2013 OIA Payments Summary

American Samoa faces a number of obstacles to economic development, including limited land and resources, a small population, limited local technical expertise, a narrow economic base, and vulnerability to natural disasters. The American Samoa economy is highly dependent on the tuna cannery industry, which accounts for the majority of its exports. In 2009, one of two major tuna canneries closed because of foreign competition, and this closure has caused economic decline and unemployment. Also in 2009, American Samoa was affected by an earthquake and tsunami. Increased government spending and construction activities in response to the disaster helped American Samoa's real GDP grow by 0.5% in 2011(BEA, 2013). However, in 2012 real GDP dropped by 2.4%, largely due to continued decline in consumer spending (BEA, 2013). The average GDP per capita for American Samoa in 2012 was $11,427 (in 2013 U.S. dollars) compared with approximately $51,749 in the United States (BEA, 2013; World Bank, 2013a).

OIA strives to foster economic development, promote sound management, and improve quality of life in American Samoa. OIA payments to American Samoa in FY 2013 totaled $35.3 million and were primarily directed toward the government and construction sectors with additional support for education and health care (Table 2-1).

The largest block of OIA payments came in the form of Assistance to Territories funding, the largest proportion of which is operations grants that total $22.7 million. These grants are used to fund basic Samoan government operations and to support the American Samoa High Court (the highest court in American Samoa excluding the U.S. Supreme Court) and the operation of the LBJ Hospital. The American Samoa Operations Grants made up approximately 18% of American Samoa's general fund and 18% of LBJ Hospital's revenue in recent years (OIA, 2013a).

Other Assistance to Territories funding, totaling $11.1 million, was used to fund economic development programs, judicial training, and other initiatives such as the Compact Impact Discretionary, which provides funding to offset impacts to the educational systems from immigration of FAS citizens, as well as the PITI-VITI. PITI-VITI was established to assist island governments in developing superior leadership, financial stability, accountability, program effectiveness, and economic growth.

Table 2-1. American Samoa: OIA Payments (FY 2013)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Compact of Free Association		
Compact impact	14	Education
Total, Compact of Free Association	*14*	
Assistance to Territories		
American Samoa operations grant—Basic operations	13,971	Government
American Samoa operations grant—LBJ hospital operations	7,848	Health Care
American Samoa operations grant—High court	887	Government
Subtotal, American Samoa Operations Grants	*22,706*	
General technical assistance—Direct Grants	373	Government
General technical assistance—USDA Grad School PITI-VITI	313	Education
General technical assistance—Close-Up Foundation	154	Education
General technical assistance—Judicial Training	53	Government
Subtotal, General Technical Assistance	*892*	
Empowering Insular Communities		
Wholesale Purchases	514	Wholesale
Installations	514	Construction
Capacity Building	514	Government
Subtotal, Empowering Insular Communities	*1,543*	
Northern Mariana Covenant Grants—American Samoa construction	9,964	Construction
Office of Insular Affairs	195	Government
Compact Impact Discretionary	2	Education
Subtotal, Other Assistance to Territories	*10,161*	
Total, Assistance to Territories	*35,302*	
Total Spending Inside American Samoa	**35,316**	

Source: RTI estimates based on OIA (2013a, 2013b).

In addition to funding received from OIA's Assistance to Territories, American Samoa also received $14,000 through the Compact of Free Association Compact Impact Grant, which offsets costs incurred by American Samoan health, educational, and social systems from in-migration of FAS residents. American Samoa allocated its FY 2013 appropriated compact impact payments toward training materials and equipment for the education of college nursing students.

2.2 Economic Impacts of OIA Payments Using Economic Base Analysis

Although the primary economic results were estimated using input-output analysis, the following EBA results are provided to maintain consistency with previous reports. The input-output driven economic results for American Samoa are in Section 2.3.

2.2.1 Direct Economic Impacts

Direct economic impacts of OIA payments were assigned to four economic sectors—education, construction, government, and health care. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following "output" and employee compensation-to-employee ratios:[1]

- **Education:** Based on sales and employment data from the 2007 Economic Census for American Samoa, the average output-to-employee ratio in the education sector (North American Industry Classification System [NAICS] 61) was $44,907 per employee (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$50,454**. Based on payroll and employment data from the Census 2011 County Business Patterns for American Samoa, the average employee compensation-to-employee ratio in the education sector was $12,954 per employee. Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$13,416** (Census, 2013).

- **Construction:** Based on sales and employment data from the 2007 Economic Census for American Samoa, the average output-to-employee ratio in the construction sector (NAICS 23) was $52,431 per employee (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$58,908**. Based on payroll and employment data from the Census 2011 County Business Patterns for American Samoa, the average employee compensation-to-employee ratio in the construction sector was $16,238 per employee (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$16,816**.

- **Government:** According to American Samoa's Basic Financial Statements (American Samoa Treasury Department [ASTD], 2010), the government of American Samoa received approximately $225 million in revenue and employed 6,035 individuals in 2009. Adjusting for inflation, this implies an output-to-employee ratio of **$40,491**. Because data on government employee compensation were unavailable, the average employee compensation-to-employee ratio for nonagricultural private-sector workers ($14,601) from the 2011 County Business Patterns was used as a proxy (Census, 2013). Adjusting for inflation, this implies an employee compensation-to-employee ratio of **$15,122** in 2013 dollars.

- **Health care:** Based on sales and employment data from the 2007 Economic Census for American Samoa, the average output-to-employee ratio in the health care sector (NAICS 62) was $37,445 per employee (Census, 2009). Adjusting this ratio to 2011

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

dollars gives an output-to-employee ratio of **$42,071**. Based on payroll and employment data from the Census 2011 County Business Patterns for American Samoa, the average employee compensation-to-employee ratio in the health care sector was $19,038 per employee (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$19,716**.

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts. Multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 2-2.

Table 2-2. American Samoa: Estimated Direct Economic Impacts Using EBA (FY 2013)

Industry	FY2012 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	482	50,454	13,416	10	128
Construction	10,478	58,908	16,816	178	2,991
Government	15,993	40,491	15,122	395	5,973
Health care	7,848	42,071	19,717	187	3,678
Wholesale	514	1,050,461	15,728	0.49	8
Total	**35,316**			**769**	**12,770**

Sources: RTI estimates based on Census (2009, 2013), ASTD (2010), and OIA (2013a, 2013b). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

2.2.2 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using the best available employment and employee compensation data for American Samoa (Table 2-3). Table 2-3 was developed from a combination of data sources. First, total employment for American Samoa as a whole was listed in the 2011 Government Accountability Office (GAO) report as 15,434 total employees for the year 2009. Employment in the tuna cannery industry for 2009 was estimated by applying the average change in employment in the sector from 2001 to 2008, which was obtained from American Samoa's Financial Statement (ASTD, 2010). Next, employment for the remaining industries was distributed assuming that the proportion of total employment associated with each remaining industry was the same as it was in 2002. 2002 employment data by industry were obtained from American Samoa Department of Commerce [ASDC] [2008]). After employment by industry was estimated, total employee compensation in each industry was estimated by applying

Table 2-3. American Samoa: Employment and Employee Compensation by Industry (2011 estimates)

Industry	Employment Estimates, 2011	Employee Compensation ($'000, 2013$)
Economic Base Industries		
Agriculture, fishing, and mining	361	247
Government—American Samoa government[a]	2,906	33,882
Government—Federal government	110	1,314
Manufacturing—Fish processing	3,843	75,773
Manufacturing—Other	39	611
Tourism—Accommodation	31	359
Tourism—Food services and drinking places	396	5,316
Noneconomic Base Industries		
Construction	415	6,978
Educational and health care services	532	11,242
Financial activities	227	3,424
Information	204	3,669
Other services	244	4,802
Professional and business services	625	12,314
Retail trade	1,287	18,313
Transportation and warehousing	545	10,802
Utilities	344	6,786
Wholesale trade	244	3,332
Total	**12,351**	**199,167**

[a] Because 59% of American Samoa's budget comes from external sources, we assumed that only 59% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on Census (2013), USDA (2011), GAO (2011), ASTD (2010), and ASDC (2008). 2013 employment estimates were based on the rate of decline in total employment from 2002 to 2011 from Census (2013) employment data for 2011. All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

employee compensation-to-employee ratios for each industry that were obtained from the 2011 County Business Patterns and 2007 Agricultural Census to the employment totals (Census, 2013; USDA, 2011). Because employee compensation data for government employees were not available from either of these sources, government employees were assumed to earn the same employee compensation-to-employee as the average for the nonagricultural private sector.

The economic base of American Samoa is agriculture, fishing, mining, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on measures of the number of employees who are supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and, therefore, are part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of American Samoa's territorial government is considered part of the economic base. Because an average of approximately 59% of American Samoa's budget comes from external sources, this analysis assumes 59% of territorial government employment is considered base employment (PITI-VITI, 2013d). Based on these assumptions and the data in Table 2-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 7,685 employees out of a total of 12,351. Dividing total employment by base employment yields a multiplier of **1.83**, meaning that for every base employment position supported by OIA funding, an estimated 0.83 additional jobs are formed elsewhere in the economy.

- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $107 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **1.87**, meaning that every dollar of employee compensation supported by the 2013 spending will create an additional $0.87 in employee compensation.

Multiplying the direct employment impact and employee compensation impacts in Table 2-2 by these multipliers yields a total employment impact of 1,407 employees and a total employee compensation impact of $23.9 million.

2.2.3 GDP Base Multipliers

In recent years, OIA has funded the U.S. Bureau of Economic Analysis (BEA) under the Statistical Improvement Program to estimate more detailed and accurate economic data for the U.S. territories. In September 2013, the BEA released updated economic reports for each U.S. territory, including American Samoa, which included an estimate of GDP by industry. With this new data, we were able to better estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that American Samoa's GDP was $648 million in 2012, or $671 million in 2013 dollars (BEA, 2013). Dividing this by the total number of employees estimated to be working in American Samoa (12,351) implies a GDP-to-employee ratio of $54,336. Multiplying this ratio by the direct employment impact in the private sector (374 employees) yields a direct private-sector GDP impact of $20.3 million. This private-sector impact is then added to the $16 million of OIA payments spent in the public sector to produce an estimate of approximately $36.3 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we used the recent BEA data (Table 2-4) on GDP by industry to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the federal government and manufacturing sectors were economic base sectors, along with 59% of the territorial government. The remaining territorial government and nonmanufacturing sectors were included in the noneconomic base industries.

Table 2-4. American Samoa: GDP by Industry (2011)

Sector	GDP (in millions of 2013$)
Economic base industries	
Government—Federal	18
Government—Territorial[a]	176
Manufacturing	23
Noneconomic base industries	
Nonmanufacturing	455
Total	**671**

[a] Because 59% of American Samoa's budget comes from external sources, we assumed that only 59% of the GDP associated with the territorial government was part of the base sector. The remaining GDP was assumed to be part of the nonbase sector.

Source: RTI estimates based on BEA (2013). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

Based on these assumptions and the data in Table 2-4, base GDP was calculated to be $160 million. Dividing total GDP by base GDP yields a multiplier of **4.20**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 3.20 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $153 million.

2.2.4 EBA Economic Impact Estimate

The $35.3 million of OIA payments directly support 769 jobs, $12.8 million in employee compensation, and $36.3 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 1,407 jobs, $23.9 million in employee compensation, and $153 million in GDP. A summary of economic impact measures is presented in Table 2-5.

Table 2-5. American Samoa: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	769	638	1,407
Employee compensation ($'000; 2013$)	12,770	11,091	23,861
GDP ($'000; 2013$)	36,313	116,314	152,542

Sources: RTI estimates based on Census (2009, 2013), OIA (2013a, 2013b), PITI-VITI (2013d), GAO (2011), ASTD (2010), ASDC (2008), USDA (2011), and BEA (2013). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

2.3 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in American Samoa, the payments from Table 2-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios within the IMPLAN modeling system. The direct employment, employee compensation, and output inputs are reported in Table 2-6.

We estimated that the $35.3 million spent in American Samoa directly supported 1,107 jobs and $27.1 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the region's economy. The relevant multipliers that were estimated for this analysis are reported in Table 2-7. Note the OIA payments from 2013 are treated as the output inputs.

Using these multipliers, we compute the total economic impacts associated with OIA payments to American Samoa. The total economic impacts of this activity in American Samoa support 1,237 employees, $29.1 million in employee compensation, and $44.8 million in GDP. These results are displayed in Table 2-8.

Table 2-6. American Samoa: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2013)

Industry	IMPLAN Code	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
State and Local Government, non-Education	437	15,993	$27,566	$27,566	580	15,993
State and Local Government, Education	438	482	$20,140	$20,140	24	482
Hospitals	397	7,848	$32,933	$24,774	238	5,904
Wholesale trade business	319	514	$934,956	$14,314	1	8
Maintenance and repair construction of nonresidential structures	39	10,478	$39,688	$17,992	264	4,750
Total		**35,316**			**1,107**	**27,137**

Source: RTI estimates based IMPLAN (2013).

Table 2-7. American Samoa: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Output Impact Multiplier
State and Local Government, non-Education	437	1.12	1.07	1.32
State and Local Government, Education	438	1.09	1.07	1.32
Hospitals	397	1.12	1.07	1.25
Wholesale trade business	319	1.90	1.89	1.07
Maintenance and repair construction of nonresidential structures	39	1.11	1.10	1.21

Source: RTI estimates based IMPLAN (2013).

Table 2-8. American Samoa: Total Economic Impacts Using I/O Analysis (FY 2013)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000 2013$)	Total Output Impact ($'000 2013$)
State and Local Government, non-Education	437	650	$17,073	$21,083
State and Local Government, Education	438	26	$515	$635
Hospitals	397	266	$6,326	$9,838
Wholesale trade business	319	1	$15	$548
Maintenance and repair construction of nonresidential structures	39	294	$5,205	$12,718
Total		**1,237**	**$29,134**	**$44,822**

Source: RTI estimates based IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the American Samoa economy as a whole, which is summarized in Table 2-9. As this table illustrates, the 1,237 jobs directly and indirectly supported by OIA payments represent 9% of American Samoa's estimated total employment. Similarly, $29.1 million of employee compensation associated with these employees accounts for approximately 15% of total employee compensation inside the region, and the $44.8 million of GDP associated with these employees represents 7% of total GDP produced by the insular area.

Table 2-9. American Samoa: Estimated Impact Relative to National Economy (FY2013)

	Total Economic Impact for FY2013 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	1,237	13,692	9%
Employee compensation ($'000; 2013$)	29,134	173,184	17%
GDP ($'000; 2013$)	44,822	671,098	7%

Source: RTI estimates based IMPLAN (2013).

3. GUAM

3.1 FY 2013 OIA Payments Summary

Although among the wealthier of the insular areas, Guam continues to face challenges in implementing effective government, health care, and education systems. Guam's economy is largely based on tourism from Asia and is, therefore, sensitive to regional consumer spending trends. Tourism sectors like accommodations and amusement have only recently begun to experience growth after years of decline. Guam is also experiencing growth due to proposed relocation of 8,000 U.S. Marines from the military base in Okinawa, Japan, to the insular area by the end of 2014.

In addition to the relocation of U.S. Marines, the US Navy's Joint Program Office issued an Environmental Impact Statement that estimated a far greater impact resulting from the military realignment. According to the study, the total military population on Guam would increase by 30,190, including 9,182 permanent military personnel, 9,950 dependents, 9,222 transient military personnel, and 1,836 civilian workers (Kan, 2013). Additionally, nearly 80,000 construction workers and contractors could be present at the height of relocation in 2014.

The Department of Defense has been the largest contributor to GDP in recent years as the federal government has been supporting construction and infrastructure preparations on the island (BEA, 2012). From 2011 to 2012, real GDP of Guam grew by 0.5% (BEA, 2013). The average GDP per capita for Guam in 2012 was $29,976 (2013$), about 56% of the GDP per capita of the United States ($51,749) (BEA, 2013; World Bank, 2013a).

OIA payments to Guam in FY 2013 totaled $106.8 million and were primarily directed to the government sector with additional support for education and construction. A detailed breakdown of OIA payments is presented in Table 3-1. The largest block of OIA payments, totaling $78.7 million, came in the form of fiscal payments associated with Section 30 Income Taxes. These are funds transferred by OIA from the U.S. Treasury to Guam and largely consist of federal income taxes paid by military personnel stationed on Guam, immigration fees, and miscellaneous duties (Limtiaco, 2008). OIA also provided nearly $17 million through the Compact of Free Association, which Guam intends to use for a variety of equipment purchases and infrastructure.

Guam received $1.9 million through the Assistance to Territories—General Technical Assistance payments, which provided direct grants, judicial training, and funding for the PITI-VITI and the Close-Up Foundation. The Close Up Foundation is a civic education program designed to teach democracy and citizenship and improve civic education in the insular areas. Other technical assistance programs, which made up about $9.3 million of the

Table 3-1. Guam: OIA Payments (FY 2013)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Fiscal Payments		
Guam Section 30 income taxes	78,736	Government
Total, Fiscal Payments	*78,736*	
Compact of Free Association		
DPW Schools Leaseback	7,100	Education
GMHA Operations Offset	6,000	Government
GPD Operations Offset	2,850	Government
DPW School Bus Satellite Facilities Renovations	350	Wholesale
DISID Individualized Budget Program	200	Government
BSP Centralized Data Center Project	300	Government
Balance	27	Government
Total, Compact of Free Association	*16,827*	
Assistance to Territories		
General technical assistance—Direct Grants	1,376	Government
General technical assistance—USDA Grad School PITI-VITI	313	Education
General technical assistance—Close-Up Foundation	154	Education
General technical assistance—Judicial Training	53	Government
Subtotal, General Technical Assistance	*1,896*	
Brown Tree Snake Control	200	Government
Northern Mariana Covenant Grants—Guam construction	6,128	Construction
Maintenance assistance	200	Government
Compact Impact Discretionary	2,800	Education
Subtotal, Other	*9,328*	
Total, Assistance to Territories	*11,224*	
Total Spending Inside Guam	**106,787**	

Source: RTI estimates based on OIA (2013a, 2013b).

Assistance to Territories payments, include infrastructure maintenance assistance, funding for Guam Construction, and Brown Tree Snake Control. The Brown Tree Snake Control program is intended to fund research and implementation techniques to eradicate this invasive species. OIA distributed funds for the Compact Impact Discretionary, which provides funding to offset impacts to the educational systems from immigration of FAS citizens.

3.2 Economic Impacts of OIA Payments Using Economic Base Analysis

Although the primary economic results were estimated using input-output analysis, the following EBA results are provided to maintain consistency with previous reports. The input-output driven economic results for Guam are in Section 3.3.

3.2.1 Direct Economic Impacts

Direct economic impacts of OIA payments were assigned to four economic sectors—education, construction, government, and wholesale. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on sales and employment data from the 2007 Economic Census for Guam, the average output-to-employee ratio in the education sector (NAICS 61) was $38,853 per employee (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$43,653**. Based on payroll and employment data from the Census 2011 County Business Patterns for Guam, the average employee compensation-to-employee ratio in the education sector was $21,473 per employee. Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$22,238** (Census, 2013).

- **Construction:** Based on sales and employment data from the 2007 Economic Census for Guam, the average output-per-employee ratio in the construction sector (NAICS 23) was $96,302 per employee (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$108,199**. Based on payroll and employment data from the Census 2011 County Business Patterns for Guam, the average employee compensation-to-employee ratio in the construction sector was $24,208 per employee (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$25,115**.

- **Government:** According to Guam's Office of Finance and Budget, the revenue of the government of Guam was estimated to be $552 million (GBSP, 2012a). The government of Guam employed approximately 11,705 individuals in 2011 accordingly to the GBSP's 2010 Statistical Yearbook Updates (GBSP, 2012a). This implies an output-per-employee ratio of **$47,194**. Because data on government employee compensation were unavailable, the average employee compensation-per-employee ratio for nonagricultural private-sector workers ($24,028) from the 2011 County Business Patterns was used as a proxy (Census, 2013). Adjusting for inflation, this implies an employee compensation-to-employee ratio of **$25,115**.

- **Wholesale:** Based on sales and employment data from the 2007 Economic Census, the average output-per-employee ratio in the wholesale sector (NAICS 42) was $334,104 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$375,379**. Based on payroll and employment data from the Census 2011 County Business Patterns for Guam, the average employee

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

compensation-to-employee ratio in the wholesale sector was $26,519 per employee (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$27,464**.

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 3-2.

Table 3-2. Guam: Estimated Direct Economic Impacts Using EBA (FY 2013)

Industry	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	10,366	43,653	22,238	237	5,281
Construction	6,128	108,199	25,115	57	1,422
Government	89,943	48,876	24,885	1,840	45,794
Wholesale	350	375,379	27,464	1	26
Total	**106,787**			**2,135**	**52,523**

Sources: RTI estimates based on Census (2009, 2013), OIA (2013a, 2013b), GOFB (2010), and GBSP (2012a). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

3.2.2 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using the best available employment and employee compensation data presented in Table 3-3. This table was developed from a combination of data sources. First, 2011 data on employment by industry and military employment were obtained from the 2011 Statistical Yearbook Updates. Next, employee compensation for each industry was estimated by applying the annual payroll to employee ratios found in the 2011 County Business Patterns and from the 2007 Agricultural Census (adjusted for inflation) to the employment totals (Census, 2013; USDA, 2009a). For the government and military sectors, the average employee compensation-to-employee ratio for nonagricultural private-sector workers was used as a proxy.

The economic base of Guam is agriculture, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on the number of employees supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and are, therefore, part of the

Table 3-3. Guam: Estimated Employment and Employee Compensation by Industry (2013)

Industry	Employment (2011 #)	Employee Compensation ($'000, 2013$)
Economic Base Industries		
Agriculture	300	503
Government—Government of Guam[a]	11,705	291,279
Government—Federal government (military)	6,275	156,153
Government—Federal government (non-military)	4,033	100,349
Manufacturing	1,718	47,903
Tourism—Accommodation and food services	7,644	119,969
Noneconomic Base Industries		
Construction	6,073	152,511
Finance, insurance, and real estate	2,688	106,160
Other services	9,639	217,570
Trade	13,580	292,508
Transportation	4,373	186,306
Total	**68,025**	**1,671,210**

[a] Note that because 35% of Guam's budget comes from external sources, it was assumed that only 35% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on GBSP (2012a, 2012b), Census (2013), and USDA (2009a). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of Guam's territorial government is considered part of the economic base. Because 35% of Guam's government revenue comes from external sources, 35% of territorial government employment was included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2013d).[3] Based on these assumptions and the data in Table 3-3, the following multipliers were calculated:

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

[3] The government of Guam also receives support from various other federal government agencies, not solely the OI, including the Department of Education, Department of Health and Human Services, and Department of Homeland Security (GAO, 2006).

- **Base employment multiplier:** Base employment was calculated to include 23,939 employees out of a total of 68,025. Dividing total employment by base employment yields a multiplier of **2.84**, meaning that for every base employment position supported by OIA funding, an estimated 1.84 additional jobs are formed elsewhere in the economy.

- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $524 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **3.19**, meaning that every dollar of employee compensation will create an additional $2.19 in employee compensation elsewhere in the economy.

Multiplying the direct employment impact and employee compensation impacts in Table 3-2 by these multipliers yields a total employment impact of 6,065 employees and a total employee compensation impact of $168 million.

3.2.3 GDP Base Multipliers

In recent years, OIA has funded the BEA under the Statistical Improvement Program to estimate more detailed and accurate economic data for the U.S. territories. In September 2013, the BEA released updated economic reports for each U.S. territory, including Guam, which included for the first time an estimate of GDP by industry. With this new data, we were able to better estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that Guam's GDP was $4,555 million in 2012, or $4,717 million in 2013 dollars (BEA, 2013). Dividing this by the total number of employees estimated to be working in Guam (68,025) implies a GDP-to-employee ratio of $69,348. Multiplying this ratio by the direct employment impact in the private sector (295 employees) yields a direct private-sector GDP impact of $20.5 million. This private-sector impact is then added to the $86.3 million of OIA payments spent in the public sector to produce an estimate of approximately $110 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we used the recent BEA data (Table 3-4) on GDP by industry to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the federal government and accommodation and amusement sectors were economic base sectors, along with 35% of the territorial government. The remaining territorial government, construction, distributive services, and other private sectors were included in the noneconomic base industries.

Table 3-4. Guam: GDP by Industry (2011)

GDP by Industry, 2011[a]	GDP (in millions of 2013$)
Economic Base Industries	
Government—Federal	1,459
Government—Territorial[b]	858
Accommodation and Amusement	405
Noneconomic Base Industries	
Construction	291
Distributive Services	405
Other private	1,301
Total	**4,717**

[a] 2011 data are used in the table because disaggregated industry data were not available for 2012, despite 2012 GDP being presented in the text.

[b] Note that because 35% of Guam's budget comes from external sources, it was assumed that only 35% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on BEA (2013). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

Based on these assumptions and the data in Table 3-4, base GDP was calculated to be $2,156 million. Dividing total GDP by base GDP yields a multiplier of **2.19**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 1.19 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $242 million.

3.2.4 EBA Economic Impact Estimate

The $106.8 million of OIA payments directly supports 2,135 jobs, $52.5 million in employee compensation, and $110 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 6,065 jobs,$168 million in employee compensation, and $242 million in GDP. A summary of economic impact measures is presented in Table 3-5.

Table 3-5. Guam: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	2,135	3,930	6,065
Employee compensation ($'000; 2013$)	52,523	115,018	167,541
GDP ($'000; 2013$)	110,402	131,192	241,594

Sources: RTI estimates based on Census (2009, 2013), GBSP (2012a, 2012b), GOFB (2010), OIA (2013a, 2013b), PITI-VITI (2013d), USDA (2009a), and BEA (2013). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

3.3 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in Guam, the payments from Table 4-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN modeling system. The direct employment, employee compensation, and output inputs are reported in Table 3-6.

Table 3-6. Guam: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2013)

Industry	IMPLAN Code	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
State and Local Government, non-Education	437	89,943	$27,566	$27,566	3,263	89,943
State and Local Government, Education	438	10,366	$20,140	$20,140	515	10,366
Wholesale trade business	319	350	$334,104	$23,270	1	24
Maintenance and repair construction of nonresidential structures	39	6,128	$41,622	$32,141	147	4,732
Total		**106,787**			**3,926**	**105,065**

Source: RTI estimates based IMPLAN (2013).

We estimated that the $107 million spent in Guam directly supported 3,926 jobs and $105.1 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the state's economy. The relevant multipliers that were estimated for this analysis are reported in Table 3-7. Note the OIA payments from 2013 are treated as the output inputs.

Table 3-7. Guam: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Output Impact Multiplier
State and Local Government, non-Education	437	1.04	1.03	1.25
State and Local Government, Education	438	1.03	1.03	1.25
Wholesale trade business	319	1.27	1.29	1.09
Maintenance and repair construction of nonresidential structures	39	1.05	1.03	1.21

Source: RTI estimates based IMPLAN (2013).

By multiplying the direct impacts of each sector with their corresponding Type II SAM Multiplier, we can compute the total economic impacts associated with OIA payments to Guam. The total economic impacts of this activity in Guam support 4,085 employees, $108 million in employee compensation, and $133 million in GDP. These results are displayed in Table 3-8.

Table 3-8. Guam: Total Economic Impacts Using I/O Analysis (FY 2013)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2013)	Total Output Impact ($'000, 2013)
State and Local Government, non-Education	437	3,398	$92,467	$112,216
State and Local Government, Education	438	530	$10,657	$12,933
Wholesale trade business	319	1	$31	$380
Maintenance and repair construction of nonresidential structures	39	155	$4,886	$7,426
Total		**4,085**	**$108,042**	**$132,955**

Source: RTI estimates based IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the Guam economy as a whole, which is summarized in Table 3-9. As this table illustrates, the 4,085 jobs directly and indirectly supported by OIA payments represent 15% of Guam's total employment. Similarly, $108 million of employee compensation associated with these employees accounts for approximately 12% of total employee compensation inside the region, and the $133 million of GDP associated with these employees represents 3% of total GDP produced by the region.

Table 3-9. Guam: Estimated Impact Relative to National Economy (FY 2013)

	Total Economic Impact for FY2013 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	4,085	26,700	15%
Employee compensation ($'000; 2013$)	108,042	916,253	12%
GDP ($'000; 2013$)	132,955	4,717,364	3%

Source: RTI estimates based IMPLAN (2013).

4. COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS (CNMI)

4.1 FY 2013 OIA Payments Summary

In 2012, the GDP per capita for CNMI was approximately $12,674 (2013$), close to 25% of the U.S. GDP per capita $51,749 (BEA, 2013; World Bank, 2013a). This represents a decline of approximately 15% from 2010 to 2012 GDP (in 2013$). Once home to a billion-dollar garment industry, garment factories closed in the face of foreign competition; as a result, real GDP declined steadily. However, in 2012, real GDP increased by 5.2% from 2011 due to an increase in territorial government spending, exports of goods and services, and tourism services (BEA, 2013).

OIA payments to CNMI in 2013 totaled $14.9 million and were primarily directed to the construction and government sectors with additional support for education and the private sector (Table 4-1). Assistance to Territories payments, totaling about $13 million, made up the majority of funding to CNMI. General technical assistance, which made up $2 million of all Assistance to Territories, provided payments for direct grants, judicial training, and PITI-VITI. Also included in general technical assistance were the Close Up Foundation, the CNMI Ombudsman's Office, CNMI Immigration, Labor and Law Enforcement General, Compact Impact (discretionary) and the Prior Service Benefits Program, which issues benefits to CNMI citizens who worked for the U.S. Navy or the U.S. Trust Territory of the Pacific Islands from 1944 through 1968. The remainder of the Assistance to Territories funding went to other activities such as the Coral Reef Initiative, maintenance assistance, construction, and Brown Tree Snake Control.

OIA also provided $1.9 million through the Compact of Free Association, which CNMI intends to use for a variety of government purposes, including funding for the Department of Public Health and Division of Youth Services.

4.2 Economic Impacts of OIA Payments Using Economic Base Analysis

Although the primary economic results were estimated using input-output analysis, the following EBA results are provided to maintain consistency with previous reports. The input-output driven economic results for CNMI are in Section 4.3.

4.2.1 Direct Economic Impacts

Direct economic impacts of OIA payments were assigned to four economic sectors—education, construction, government, and the general private sector. To calculate the

Table 4-1. CNMI: OIA Payments (FY 2013)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Compact of Free Association		
Department of Public Health	779	Government
Division of Youth Services	50	Government
Department of Public Safety	515	Government
Department of Corrections	185	Government
Office of Public Defender	27	Government
Northern Mariana College	167	Education
Public School System	177	Education
Balance	30	Government
Total, Compact of Free Association	*1,930*	
Assistance to Territories		
General technical assistance—Direct Grants	885	Government
General technical assistance—USDA Grad School PITI-VITI	313	Education
General technical assistance—Close-Up Foundation	154	Education
General technical assistance—Prior Service	219	Private
General technical assistance—Judicial Training	53	Government
General technical assistance—Ombudsman's Office	250	Government
General technical assistance—Immigration, Labor and Law Enforcement	150	Government
Subtotal, General Technical Assistance	*2,023*	
Empowering Insular Communities		
Wholesale Purchases	622	Wholesale
Installations	400	Construction
Capacity Building	400	Government
Subtotal, Empowering Insular Communities	*1,422*	
Brown Tree Snake Control	404	Government
Coral Reef Initiative	41	Government
Maintenance assistance	13	Government
Northern Mariana Covenant Grants—CNMI construction	8,732	Construction
Office of Insular Affairs	2	Government
Compact Impact Discretionary	321	Education
Subtotal Other	*9,513*	
Total, Assistance to Territories	*12,958*	
Total Spending Inside CNMI	**14,888**	

Source: RTI estimates based on OIA (2013b).

employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education**: Based on sales and employment data from the 2007 Economic Census for CNMI, the average output-to-employee ratio in the education sector (NAICS 61) was $26,228 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$29,468**. Based on payroll and employment data from the Census 2011 County Business Patterns for CNMI, the average employee compensation-to-employee ratio in the education sector was $15,264 per employee (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$15,808**.

- **Construction:** Based on sales and employment data from the 2007 Economic Census for CNMI, the average output-to-employee ratio in the construction sector (NAICS 23) was $59,466 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of $**66,812**. Based on payroll and employment data from the Census 2011 County Business Patterns for CNMI, the average employee compensation-to-employee ratio in the construction sector was $7,217 (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of $**7,474**.

- **Government:** According to CNMI's Single Audit Financial Statements, the government of CNMI received approximately $260 million in revenue in 2010 or $260 million in 2013 dollars (CNMI Office of the Public Auditor, 2012). We calculated government employment to be 4,582 individuals based on reports from the CNMI Department of Commerce (2012a, 2012b). This implies a government revenue-to-employee ratio of **$60,617** in 2013 dollars. Because data on government employee compensation were unavailable, the average employee compensation-to-employee ratio for nonagricultural private-sector workers ($14,666) from the Census 2011 County Business Patterns was used as a proxy (Census, 2013). Adjusting for inflation, this implies an employee compensation-to-employee ratio of **$15,189**.

- **Wholesale:** Based on sales and employment data from the 2007 Economic Census, the average output-per-employee ratio in the wholesale sector (NAICS 42) was $163,909 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$184,159**. Based on payroll and employment data from the Census 2011 County Business Patterns for Guam, the average employee compensation-to-employee ratio in the wholesale sector was $14,354per employee (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$14,866**.

- **Private:** Based on sales and payroll data from the 2007 Economic Census, the average output-to-employee in the nonagricultural private sector was $56,767 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of $**63,780**. Based on payroll and employment data from the Census 2011 County Business Patterns for CNMI, the average employee compensation-to-employee ratio in the nonagricultural private sector was $14,666 (Census, 2013).

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

Adjusting this ratio for inflation gives an employee compensation-to-employee ratio of $**115,189**.

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 4-2.

Table 4-2. CNMI: Estimated Direct Economic Impacts Using EBA (FY 2013)

Industry	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	1,131	29,468	15,808	38	607
Construction	9,132	66,812	7,474	137	1,022
Government	3,784	60,617	15,189	62	948
Wholesale	622	184,159	14,866	3	50
Private	219	63,780	15,189	3	52
Total	**14,888**			**244**	**2,679**

Sources: RTI estimates based on Census (2009, 2013), OIA (2013b), CNMI Office of the Public Auditor (2012), and CNMI Department of Commerce (2012a, 2012b). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

4.2.2 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using the employment and employee compensation data presented in Table 4-3. CNMI Department of Commerce conducted a workforce study called the Prevailing Wage and Workforce Assessment Study (PWWAS) that sampled a large percentage of CNMI's workforce. The PWWAS study was released in two parts. The first portion of the PWWAS study listed total employment in CNMI to be 21,399 employees based on government tax data in 2011 (CNMI Department of Commerce, 2012b). The second PWWAS report sampled 14,450 employees in CNMI and listed this sample employment by industry (CNMI Department of Commerce, 2012a). To estimate total employment by sector, employment was distributed assuming that the proportion of total employment associated with each industry was the same as it was in the PWWAS sample. After estimating the employment by industry, we estimated total employee compensation in each industry by applying employee compensation-to-employee ratios for each industry that were obtained from the 2011 County Business Patterns (Census, 2013). To estimate the employee compensation for the agriculture, mining, forestry, fishing and hunting sector we took the average between the compensation-to-employee ratios from the Agricultural Census and the 2011 County

Table 4-3. CNMI: Estimated Employment and Employee Compensation by Industry (2011 estimates)

Industry	Employment (2011 #)	Payroll ($000s 2013 USD)
Economic Base Industries		
Agriculture, Mining, Forestry, Fishing and Hunting	67	5,551
Government	4,582	34,293
Manufacturing	576	7,321
Tourism—Accommodation and food services	2,937	32,372
Tourism—Arts, entertainment, and recreation	541	6,733
Noneconomic Base Industries		
Utilities	542	84,365
Construction	1,259	9,408
Wholesale trade	589	8,762
Retail trade	2,346	32,295
Transportation and warehousing	908	15,226
Information	391	10,912
Finance and insurance	215	6,032
Real estate and rental and leasing	772	9,977
Professional, scientific, and technical services	501	14,733
Management, Administrative, Support, and Waste Mang and Remediation Srvs	1,511	128,431
Educational services	2,301	36,379
Health care and social assistance	338	7,166
Other services (except public administration)	1,026	14,962
Total	**21,399**	**464,919**

[a] Note that because 31% of CNMI's budget comes from external sources, it was assumed that only 31% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on Census (2013) (USDA, 2009b), and CNMI Department of Commerce (2012a, 2012b). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

Business Patterns and applied it to the number of employees (USDA, 2009b; Census, 2013). To estimate employee compensation information for the public administration industry, we used the average employee compensation-to-employee ratio for nonagricultural, private-sector industries.

The economic base of CNMI is agriculture, fishing, mining, and manufacturing. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on the number of employees who are supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services and arts, entertainment, and recreation industries are supported by tourism and are, therefore, part of the economic base.[2] This is likely a highly conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of CNMI's territorial government is considered part of the economic base. Specifically, because 31% of CNMI's government revenue comes from external sources, only 31% of territorial government (public administration) employment was included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2013d).[3] Based on these assumptions and the data in Table 4-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 6,140 employees out of a total of 21,399. Dividing total employment by base employment yields a multiplier of **3.48**, meaning that for every base employment position supported by OIA funding, an estimated 2.48 additional jobs are formed elsewhere in the economy.
- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $67.1 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **6.93**, meaning that every dollar of employee compensation will create an additional $5.93 in employee compensation elsewhere in the economy.

Multiplying the direct employment impact and employee compensation impacts in Table 4-2 by these multipliers yields a total employment impact of 851 employees and a total employee compensation impact of $18.6 million.

4.2.3 GDP Base Multipliers

In recent years, OIA has funded the BEA under the Statistical Improvement Program to estimate more detailed and accurate economic data for the U.S. Territories. In September 2013, the BEA released updated economic reports for each U.S. Territory, including CNMI, which included for the first time an estimate of GDP by industry. With this new data, we

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

[3] In addition to payments from the OIA and the Department of the Interior, the government of CNMI also receives support from various other federal government agencies, including the Department of Agriculture, Department of Health and Human Services, and Department of Homeland Security (GAO, 2006).

were able to better estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that CNMI's GDP was $651 million in 2011, or $674 million in 2013 dollars (BEA, 2013). Dividing this by the total number of employees estimated to be working in CNMI (21,399) implies a GDP-to-employee ratio of $31,506. Multiplying this ratio by the direct employment impact in the private sector (182 employees) yields a direct private-sector GDP impact of $5.7 million. This private-sector impact is then added to the $3.8 million of OIA payments spent in the public sector to produce an estimate of approximately $9.5 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we used the recent BEA data (Table 4-4) on GDP by industry to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the federal government, manufacturing, accommodation, and amusement sectors were economic base sectors, along with 31% of the territorial government. The remaining territorial government, distributive services, and other private sectors were included in the noneconomic base industries.

Table 4-4. CNMI: GDP by Industry (2011)

GDP by Industry, 2011[a]	GDP (in millions of 2013$)
Economic Base Industries	
Government—Federal	14
Government—Territorial[b]	206
Manufacturing	25
Accommodation and Amusement	94
Noneconomic Base Industries	
Distributive Services	90
Other private	244
Total	**674**

[a] 2011 data are used in the table because disaggregated industry data were not available for 2012, despite 2012 GDP being presented in the text.

[b] Note that because 31% of CNMI's budget comes from external sources, it was assumed that only 31% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on BEA (2013). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

Based on these assumptions and the data in Table 4-4, base GDP was calculated to be $224 million. Dividing total GDP by base GDP yields a multiplier of **3.00**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 2.00 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $28.6 million.

4.2.4 EBA Economic Impact Estimate

The $14.9 million of OIA payments directly support 241 jobs, $2.6 million in employee compensation, and $9.5 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 851 jobs, $18.6 million in employee compensation, and $28.6 million in GDP. A summary of economic impact measures is presented in Table 4-5.

Table 4-5. CNMI: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	244	607	851
Employee compensation ($'000; 2013$)	2,679	15,883	18,562
GDP ($'000; 2013$)	9,515	19,061	28,576

Sources: RTI estimates based on Census (2009, 2013), OIA (2013b), (USDA, 2009b), PITI-VITI (2013d), BEA (2013), CNMI Office of the Public Auditor (2012), and CNMI Department of Commerce (2012a, 2012b). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

4.3 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in CNMI, the payments from Table 3-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN model software. For the Prior Service Benefits we used the average ratios of the entire private sector. The direct employment, employee compensation, and output inputs are reported in Table 4-6.

We estimated that the $14.9 million spent in CNMI directly supported 661 jobs and $12.7 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the region's economy. For the private sector, we used the average multiplier across all private sector industries. The relevant multipliers that were estimated for this analysis are reported in Table 4-7. Note the OIA payments from 2013 are treated as the output inputs.

Table 4-6. CNMI: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2013)

Industry	IMPLAN Code	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
State and Local Government, non-Education	437	3,784	$27,566	$27,566	137	3,784
State and Local Government, Education	438	1,131	$20,140	$20,140	56	1,131
Wholesale trade business	319	622	$163,909	$11,518	4	44
Maintenance and repair construction of nonresidential structures	39	9,132	$19,825	$16,646	461	7,668
Private Sector	—	219	$61,359	$13,447	4	48
Total		**14,888**			**661**	**12,675**

Source: RTI estimates based IMPLAN (2013).

Table 4-7. CNMI: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Output Impact Multiplier
State and Local Government, non-Education	437	1.25	1.13	1.54
State and Local Government, Education	438	1.18	1.13	1.54
Wholesale trade business	319	1.60	1.81	1.22
Maintenance and repair construction of nonresidential structures	39	1.17	1.14	1.50
Private Sector	—	1.31	1.31	1.37

Source: RTI estimates based IMPLAN (2013).

By multiplying the direct impacts of each sector with their corresponding Type II SAM Multiplier, we can compute the total economic impacts associated with OIA payments to CNMI. The total economic impacts of this activity in CNMI support 787 employees, $14.4 million in employee compensation, and $22.3 in GDP. These results are displayed in Table 4-8.

Table 4-8. CNMI: Total Economic Impacts Using I/O Analysis (FY 2013)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2013)	Total Output Impact ($'000, 2013)
State and Local Government, non-Education	437	172	$4,260	$5,837
State and Local Government, Education	438	67	$1,273	$1,745
Wholesale trade business	319	6	$79	$760
Maintenance and repair construction of nonresidential structures	39	537	$8,722	$13,662
Private Sector	—	5	$63	$299
Total		**787**	**$14,397**	**$22,303**

Source: RTI estimates based IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the CNMI economy as a whole, which is summarized in Table 4-9. As this table illustrates, the 787 jobs directly and indirectly supported by OIA payments represent 1% of CNMI's total employment. Similarly, $14.4 million of employee compensation associated with these employees accounts for approximately 2% of total employee compensation inside the region, and the $22.3 million of GDP associated with these employees represents 3% of total GDP produced by the region.

Table 4-9. CNMI: Estimated Impact Relative to National Economy (FY2013)

	Total Economic Impact for FY2013 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	787	21,399	4%
Employee compensation ($'000; 2013$)	14,397	464,919	3%
GDP ($'000; 2013$)	22,303	674,205	3%

Source: RTI estimates based IMPLAN (2013).

5. U.S. VIRGIN ISLANDS (USVI)

5.1 FY 2013 OIA Payments Summary

In 2012, the GDP per capita in USVI was about $42,842 (2013$) compared with $51,749 in the United States (BEA, 2013; World Bank, 2013a). USVI's economy relies heavily on tourism and oil refining. The economy of USVI shrunk in both 2011 and 2012, however, by 6.6% and13.2% in 2011 and 2012, respectively. The sharp decline is largely attributable to decreases in exported goods and territorial government spending (BEA, 2013). One of the world's largest oil refineries, the Hovensa refinery, shut down operations on St. Croix in 2012, which greatly affected USVI's net trade (BEA, 2013). The petroleum refining industry primarily reflects the drop in GDP from 2011 to 2012.

OIA payments to USVI in 2013 totaled $268.6 million (Table 5-1). The largest block of OIA payments to USVI came in the form of Rum Excise Tax Payments totaling $263 million. Under current U.S. law, excise taxes are collected on rum imported into the United States that is not of USVI or Puerto Rican origin. A fixed percentage of these excise taxes is distributed by the U.S. government to USVI. Although this funding is not designated for a particular purpose, USVI generally uses it to finance public infrastructure or provide support to the rum industry (Maguire and Teefy, 2010). The Assistance to Territories—General Technical Assistance payments totaled about $2.3 million and provided for general technical assistance for direct grants, the Close Up Foundation, and the PITI-VITI, which are jointly managed by the USDA Graduate School. USVI experienced a substantial increase in OIA payments from FY 2012 to FY 2013, mostly because of higher expected returns from the rum excise taxes.

Through other Assistance to Territories programs, which made up $3.2 million in payments, OIA funds items such as USVI construction as part of the Northern Mariana Covenant Grant, and the Coral Reef Initiative, which pursues the sustainable maintenance and protection of coral reefs through education, outreach programs, and the establishment of protected areas.

5.2 Economic Impacts of OIA Payments Using Economic Base Analysis

Although the primary economic results were estimated using input-output analysis, the following EBA results are provided to maintain consistency with previous reports. The input-output driven economic results for USVI are in Section 3.3.

Table 5-1. USVI: OIA Payments (FY 2013)

Appropriation	Spending ($'000; 2013$)	Impact Treatment
Fiscal Payment		
USVI rum excise tax payments	263,130	Government
Total, Fiscal Payments	*263,130*	
Assistance to Territories		
General technical assistance—Direct Grants	1,798	Government
General technical assistance—USDA Grad School PITI-VITI	313	Education
General technical assistance—Close-Up Foundation	154	Education
Subtotal, General Technical Assistance	*2,264*	
Coral Reef Initiative	150	Government
Northern Mariana Covenant Grants—USVI construction	2,896	Construction
Office of Insular Affairs	130	Government
Subtotal, Other	*3,176*	
Total, Assistance to Territories	*5,440*	
Total Spending Inside Virgin Islands	**268,570**	

Source: RTI estimates based on OIA (2013b).

5.2.1 Direct Economic Impacts

Direct economic impacts of OIA payments were assigned to three economic sectors—education, construction, and government. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following "output" and employee compensation-to-employee ratios:[1]

- **Education:** Based on sales and employment data from the 2007 Economic Census for USVI, the average output-to-employee ratio in the education sector (NAICS 61) was $66,737 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-per-employee ratio of **$74,982**. Based on payroll and employment data from the Census 2011 County Business Patterns for USVI, the average employee compensation-to-employee ratio in the education sector was $25,194 per employee. Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$26,092** (Census, 2013).

- **Construction:** Based on sales and employment data from the 2007 Economic Census for USVI, the average output-to-employee ratio in the construction sector (NAICS 23) was $103,782 (Census, 2009). Adjusting this ratio to 2013 dollars gives an output-to-employee ratio of **$116,604**. Based on payroll and employment data from the Census 2011 County Business Patterns for USVI, the average employee

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

compensation-to-employee ratio in the construction sector was $32,701 (Census, 2013). Adjusting this ratio to 2013 dollars gives an employee compensation-to-employee ratio of **$33,866.**

- **Government:** According to the U.S. Virgin Islands Annual Economic Indicators (U.S. Virgin Islands Bureau of Economic Research, 2012), the government revenue-to-employee ratio in 2011 was **$51,028.** Adjusting for inflation, this ratio gives a revenue-to-employee ratio of $53,028. Because data on government employee compensation were unavailable, the average employee compensation-to-employee ratio for nonagricultural private-sector workers ($33,385) from the Census 2011 County Business Patterns was used as a proxy (Census, 2013). Adjusting for inflation gives an employee compensation-to-employee ratio of **$34,576**.

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 5-2.

Table 5-2. USVI: Estimated Direct Economic Impacts Using EBA (FY 2013)

Industry	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	466	74,982	26,092	6	162
Construction	2,896	116,604	33,866	25	841
Government	265,208	53,028	34,576	5,001	172,923
Total	**268,570**			**5,032**	**173,926**

Sources: RTI estimates based on Census (2009, 2013), OIA (2013b), and U.S. Virgin Islands Bureau of Economic Research (2012). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

5.2.2 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using the employment and employee compensation data presented in Table 5-3. This table was developed from a combination of data sources. First, employment and employee compensation information for nonagricultural, private-sector industries was obtained from the Census 2011 County Business Patterns. Next, employment and employee compensation data for the agricultural industry were obtained from the 2007 Agricultural Census (USDA, 2009c). Lastly, employment associated with the federal and territorial governments was obtained for 2010 from the USVI Annual Economic Indicators (U.S. Virgin Islands Bureau of Economic Research, 2012). To estimate employee compensation information for these

Table 5-3. USVI: Employment and Employee Compensation by Industry (2011 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2013$)
Economic Base Industries		
Agriculture	511	561
Government—Federal government	962	33,262
Government—Territorial government[a]	12,116	418,917
Mining, quarrying, and oil and gas extraction	10	853
Manufacturing	1,750	157,131
Tourism—Accommodation and food services	6,709	158,246
Tourism Arts, entertainment, and recreation	583	12,897
Noneconomic Base Industries		
Administrative and support and waste management and remediation services	1,988	54,429
Construction	1,957	66,276
Educational services	914	23,848
Finance and insurance	1,139	56,892
Health care and social assistance	2,241	83,148
Information	750	67,316
Management of companies and enterprises	89	4,783
Other services (except public administration)	2,294	88,182
Professional, scientific, and technical services	1,153	54,892
Real estate and rental and leasing	1,063	37,645
Retail trade	6,492	152,501
Transportation and warehousing	1,770	56,223
Utilities	175	15,673
Wholesale trade	779	30,097
Total	**45,443**	**1,573,771**

[a] Note that because 24% of USVI's budget comes from external sources, we assumed that only 24% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on Census (2009, 2013), USDA (2009c), and U.S. Virgin Islands Bureau of Economic Research (2012). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

government workers, we used the average employee compensation-to-employee ratio for nonagricultural, private-sector industries.

The economic base of USVI is agriculture, fishing, mining, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on measures of the number of employees supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and therefore part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of USVI's territorial government is considered part of the economic base. Because 24% of USVI's government revenue comes from external sources, only 24% of territorial government employment was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2013d). Based on these assumptions and the data in Table 5-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 14,765 employees out of a total of 45,443. Dividing total employment by base employment yields a multiplier of **3.08**, meaning that for every base employment position supported by OIA funding, an estimated 2.08 additional jobs are formed elsewhere in the economy.

- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $510 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **3.09**, meaning that every dollar of employee compensation will create an additional $2.09 in employee compensation.

Multiplying the direct employment impact and employee compensation impacts in Table 5-2 by these multipliers yields a total employment impact of 15,489 employees and a total employee compensation impact of $537 million.

5.2.3 GDP Base Multipliers

In recent years, OIA has funded the BEA under the Statistical Improvement Program to estimate more detailed and accurate economic data for the U.S. Territories. In September 2013, the BEA released updated economic reports for each U.S. Territory, including USVI, which included for the first time an estimate of GDP by industry. With this new data, we were able to better estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that USVI's GDP was $4,356 million in 2012, or $4,511 million in 2013 dollars (BEA, 2013). Dividing this by the total number of employees estimated to be working in USVI (45,443) implies a GDP-to-employee ratio of $99,273. Multiplying this ratio by the direct employment impact in the private sector (31 employees) yields a direct private-sector GDP impact of $3.1 million. This private-sector impact is then added to the $265 million of OIA payments spent in the public sector to produce an estimate of approximately $268 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we used the recent BEA data (Table 5-4) on GDP by industry to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the federal government, good-producing industries, accommodation, and food services sectors were economic base sectors, along with 24% of the territorial government. The remaining territorial government, wholesale and retail trade, and other private sectors were included in the noneconomic base industries.

Table 5-4. USVI: GDP by Industry (2011)

GDP by Industry, 2011[a]	GDP (in millions of 2013$)
Economic Base Industries	
Goods-producing industries	971
Government—Federal	150
Government—Territorial[b]	729
Accommodation and Food Services	434
Noneconomic Base Industries	
Wholesale and retail trade	389
Other Services, except government	1,837
Total	**4,511**

[a] 2011 data are used in the table because disaggregated industry data were not available for 2012, despite 2012 GDP being presented in the text.

[b] Note that because 24% of USVI's budget comes from external sources, we assumed that only 24% of the employment and employee compensation associated with the territorial government was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on BEA (2013). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

Based on these assumptions and the data in Table 5-4, the base GDP was calculated to be $1,81 million. Dividing total GDP by base GDP yields a multiplier of **2.49**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 1.49 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $668 million.

5.2.4 EBA Economic Impact Estimate

In summary, the $269 million spent by OIA directly supports 5,032 jobs, $174 million in employee compensation, and $268 million in GDP. Accounting for the multiplier process, we estimate that OIA spending supports a total of 15,489 jobs, $537 million in employee compensation, and $668 million in GDP. A summary of economic impact measures is presented in Table 5-5.

Table 5-5. USVI: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	5,032	10,456	15,489
Employee compensation ($'000; 2013$)	173,926	363,233	537,159
GDP ($'000; 2013$)	268,290	400,134	668,424

Sources: RTI estimates based on Census (2009, 2013), OIA (2013b), BEA (2013), USDA (2009c), and U.S. Virgin Islands Bureau of Economic Research (2012). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

5.3 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in the USVI, the payments from Table 5-1 were each applied to a corresponding IMPLAN sector code. Direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN modeling system. The direct employment, employee compensation, and output inputs are reported in Table 5-6.

We estimated that the $269 million spent in USVI directly supported 7,248 jobs and $266 million in employee compensation. These direct impacts were multiplied by Type II Social Accounting Matrix multipliers to estimate the total impact of OIA payments on the region's economy. The relevant multipliers that were estimated for this analysis are reported in Table 5-7. Note the OIA payments from 2013 are treated as the output inputs.

Table 5-6. USVI: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2013)

Industry	IMPLAN Code	FY2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
State and Local Government, non-Education	437	265,208	$36,755	$36,755	7,216	265,208
State and Local Government, Education	438	466	$26,854	$26,854	17	466
Maintenance and repair construction of nonresidential structures	39	2,896	$192,706	$47,012	15	707
Total		**268,570**			**7,248**	**266,380**

Source: RTI estimates based IMPLAN (2013).

Table 5-7. USVI: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Output Impact Multiplier
State and Local Government, non-Education	437	1.11	1.08	1.54
State and Local Government, Education	438	1.08	1.08	1.54
Maintenance and repair construction of nonresidential structures	39	1.27	1.17	1.33

Source: RTI estimates based IMPLAN (2013).

By multiplying the direct impacts of each sector with their corresponding Type II SAM Multiplier, we can compute the total economic impacts associated with OIA payments to USVI. The total economic impacts of this activity in USVI support 8,012 employees, $287 million in employee compensation, and $412 million in GDP. These results are displayed in Table 5-8.

Table 5-8. USVI: Total Economic Impacts Using I/O Analysis (FY 2013)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000; 2013$)	Total Output Impact ($'000; 2013$)
State and Local Government, non-Education	437	7,975	285,174	407,782
State and Local Government, Education	438	19	501	717
Maintenance and repair construction of nonresidential structures	39	19	828	3,851
Total		**8,012**	**$286,503**	**$412,350**

Source: RTI estimates based IMPLAN (2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the USVI economy as a whole, which is summarized in Table 5-9. As this table illustrates, the 8,012 jobs directly and indirectly supported by OIA payments represent 21% of USVI's total employment. Similarly, $286 million of employee compensation associated with these employees accounts for approximately 23% of total employee compensation inside the region, and the $412 million of GDP associated with these employees represents 9% of total GDP produced by the insular area.

Table 5-9. USVI: Estimated Impact Relative to National Economy (FY 2013)

	Total Economic Impact for FY2012 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	8,012	38,454	21%
Employee compensation ($'000; 2013$)	286,503	1,221,177	23%
GDP ($'000; 2013$)	412,350	4,511,271	9%

Source: RTI estimates based IMPLAN (2013).

6. FEDERATED STATES OF MICRONESIA (FSM)

6.1 FY 2013 OIA Payments Summary

FSM faces severe challenges in implementing effective government, education, and health care systems and relies heavily on OIA support. FSM's economy is based in large part on the fishing industry, which earns income through licensing fees charged to foreign tuna fishing vessels for fishing rights in FSM's exclusive economic zone. The FSM had an average GDP per capita of about $3,218 in 2012. According to PITI-VITI (2013a), FSM's economy, after several years of loss in the early 2000s, experienced positive real GDP growth between FY2009 and FY2011. This recent growth has been spurred by investments to improve infrastructure largely from a FAA stimulus In FY2012, there was growth in the fisheries sector but the FAA stimulus came to a close and economic growth was flat.

OIA payments to FSM in 2013 totaled $108.6 million. A detailed breakdown of these payments is presented in Table 6-1. The largest block of OIA payments to FSM, totaling $106.7 million, came through the Compact of Free Association. The Compact provides essential funding for operating FSM's education, health care, and government systems and improves the insular area's infrastructure.

Payments associated with Assistance to Territories totaled $1.7 million. General technical assistance provided direct grants, judicial training, the Close Up Foundation, the Prior Service Benefits Program, and the PITI-VITI. Other Assistance to Territories programs included items such as the Coral Reef Initiative.

Table 6-1. FSM: OIA Payments (FY 2013)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Compact of Free Association		
Judicial training U.S. territories	174	Government
Education	28,035	Education
Health	20,693	Health care
Capacity building	2,946	Government
Private sector	2,373	Government
Environment	1,718	Government
Enhanced reporting and accountability	1,481	Government
Infrastructure	24,438	Construction
Balance	24,979	Government
Total, Compact of Free Association	*106,837*	

(continued)

Table 6-1. FSM: OIA Payments (FY 2013) (continued)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Assistance to Territories		
General technical assistance—Direct grants	223	Government
General technical assistance—USDA Grad School PITI-VITI	154	Education
General technical assistance—Close Up Foundation	444	Education
General technical assistance—Prior Service Benefits Program	53	Private
General technical assistance—Judicial training	223	Government
Subtotal, General Technical Assistance	*1,186*	
Office of Insular Affairs	51	Government
Maintenance assistance	261	Government
Coral Reef Initiative	250	Government
Subtotal, Other	*562*	
Total, Assistance to Territories	*1,748*	
Total Spending Inside FSM	**108,584**	

Source: OIA, 2013b.

6.2 Direct Economic Impacts

Direct economic impacts of OIA payments were assigned to five economic sectors—education, construction, government, health care, and an assortment of private industries through the spending of Prior Service Benefits recipients. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on employment and gross wage data provided in Fiscal Year 2012 Economic Review for FSM (PITI-VITI, 2013a), the employee compensation-to-employee ratio for private-sector workers in the education sector was $**5,254** in 2012. Because information was not available for output associated with the education industry, the output-to-employee ratio for American Samoa was used ($50,454). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to FSM than for any other area for which output-to-employee data were available. However, it should be noted that to the extent this proxy overestimates the true output-to-employee ratio for FSM the direct impacts of OIA spending will be underestimated because more jobs will be supported by each dollar of OIA spending.
- **Construction:** Based on employment and gross wage data provided in Fiscal Year 2012 Economic Review for FSM (PITI-VITI, 2013a), the employee compensation-to-

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

employee ratio for private-sector workers in the construction sector was $**6,757** in 2012. Because information was not available for output associated with the construction industry, the output-to-employee ratio for American Samoa was used ($58,908).

- **Government:** According to the Fiscal Year 2012 Economic Review for FSM (PITI-VITI 2013a), the government of Micronesia received approximately $215.2 million in revenue and employed approximately 6,303 individuals in 2012. Adjusting for inflation, this implies an output-to-employee ratio of **$34,645**. Similarly, according to information presented in the same report, these workers received approximately $22.1 million in employee compensation in 2012. This implies an employee compensation-to-employee ratio of **$3,558**.

- **Health care:** Based on employment and gross wage data provided in Fiscal Year 2012 Economic Review for FSM (PITI-VITI, 2013a), the employee compensation-to-employee ratio for private-sector workers in the health care sector was $**9,922** in 2012. Because information was not available for output associated with the health care industry, the output-to-employee ratio for American Samoa was used ($42,071).

- **Private:** Based on employment and gross wage data provided in Fiscal Year 2012 Economic Review for FSM (PITI-VITI, 2013a), the average wage for a private-sector worker was $**5,196** in 2012. Because information was not available for output associated with the private sector, the output-to-employee ratio for American Samoa was used ($127,685).

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 6-2.

Table 6-2. FSM: Estimated Direct Economic Impacts Using EBA (FY 2013)

Industry	FY 2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	28,501	50,454	5,254	565	2,968
Construction	24,438	58,908	6,757	415	2,803
Government	34,510	34,645	3,558	996	3,544
Health care	20,693	42,071	9,922	492	4,880
Private	444	127,685	5,196	3	18
Total	**108,584**			**2,471**	**14,213**

Sources: RTI estimates based on PITI-VITI (2013a), Census (2009), and OIA (2013b). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

6.3 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using 2012 employment and gross wage data from the Micronesia Fiscal Year 2012 Economic Review performed by researchers at PITI-VITI (Table 6-3).

The economic base of FSM is agriculture, fishing, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on the number of employees who are supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and are, therefore, part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of FSM's territorial government is considered part of the economic base. Specifically, because over half of FSM's government revenue comes from external sources, approximately 58% of public administration was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2013d). Based on these assumptions and the data in Table 6-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 4,792 employees out of a total of 15,281. Dividing total employment by base employment yields a multiplier of **3.19**, meaning that for every base employment position supported by OIA funding, an estimated 2.19 additional jobs are formed elsewhere in the economy.
- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $17.5 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **3.96**, meaning that every dollar of employee compensation supported by the FY 2013 spending will create an additional $2.96 in employee compensation.

Multiplying the direct employment and employee compensation impacts in Table 6-2 by these multipliers yields a total employment impact of 7,880 employees and $56.3 million of employee compensation.

6.4 GDP Base Multipliers

As part of its strategic goals, OIA has funded the PITI-VITI to estimate more detailed and accurate economic indicators for the FAS. In August 2013, PITI-VITI released updated FY 2012 economic reports for the Freely Associated States, which included estimates of GDP by

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

Table 6-3. FSM: Employment and Employee Compensation by Industry (2012 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2013$)
Economic Base Industries		
Agriculture, hunting, and forestry	14	45
Mining and quarrying	0	0
Fishing	242	1,269
Extra-territorial organizations	50	0
Government (Public administration)[a]	6,303	22,101
Manufacturing	124	494
Tourism—Hotels and restaurants	681	2,820
Noneconomic Base Industries		
Construction	1,391	9,263
Education	866	4,392
Electricity, gas, and water supply	297	1,082
Financial intermediation	236	2,638
Health and social work	113	1,103
Other services	483	2,410
Private households with employed persons	7	24
Real estate, renting, and business activities	363	2,715
Transport, storage, and communications	971	5,649
Wholesale and retail trade and repairs	3,141	13,427
Total	**15,281**	**69,431**

[a] Because 58% of FSM's budget comes from external sources, it was assumed that only 58% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Note: A significant portion of employment across all sectors was accounted for by public enterprises. However, employee compensation statistics were only provided for private-sector workers. Therefore, to estimate total employee compensation for all workers across industries, we assumed that the employee compensation-to-employee ratio was the same for public-sector workers and private-sector workers in each industry.

Source: RTI estimates based on PITI-VITI (2013a).

industry. Using this data we were able to estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that FSM's GDP

was $330.9 million in 2012 (PITI-VITI, 2013a). Dividing this by the total number of employees estimated to be working in FSM (15,281) implies a GDP-to-employee ratio of $21,657. Multiplying this ratio by the direct employment impact in the private sector (1,475 employees) yields a direct private-sector GDP impact of $31.9 million. This private-sector impact is then added to the $34.5 million of OIA payments spent in the public sector to produce an estimate of approximately $66.5 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we used the recent PITI-VITI data (Table 6-4) on GDP by industry to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the agriculture, hunting, and forestry; mining and quarrying; fishing; hotels and restaurants; and manufacturing sectors were economic base sectors, along with 58% of the territorial government. The remaining territorial government and other private sectors were included in the noneconomic base industries.

Table 6-4. FSM: GDP by Industry (2012)

Industry	GDP (in millions of 2013$)
Economic Base Industries	
Agriculture, hunting, and forestry	44.9
Mining and quarrying	0.0
Fishing	47.5
Government (Public administration)[a]	32.6
Manufacturing	1.3
Tourism—Hotels and restaurants	5.5
Noneconomic Base Industries	
Construction	21.1
Education	34.3
Electricity, gas, and water supply	5.7
Financial intermediation	6.7
Health and social work	14.8
Other services	3.9
Real estate, renting, and business activities	35.5
Transport, storage, and communications	18.2

(continued)

Table 6-4. FSM: GDP by Industry (2012) (continued)

Industry	GDP (in millions of 2013$)
Wholesale and retail trade and repairs	37.5
less intermediate FISIM	*-4.66*
Total at Basic Prices	**304.8**
Taxes on products less subsidies	26.1
Total at Purchasers' Prices	**330.9**

[a] Because 58% of FSM's budget comes from external sources, it was assumed that only 58% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Sources: RTI estimates based on PITI-VITI (2013a).

Based on these assumptions and the data in Table 6-4, base GDP was calculated to be $118.2 million. Dividing total GDP by base GDP yields a multiplier of **2.80**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 1.80 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $186 million.

6.5 EBA Economic Impact Estimate

In summary, the $108.6 million spent by OIA inside FSM directly supports 2,471 jobs, $14.2 million in employee compensation, and $66.5 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 7,880 jobs, $56.3 million in employee compensation, and $186 million in GDP. This information is summarized in Table 6-5.

Table 6-5. FSM: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	2,471	5,409	7,880
Employee compensation ($'000; 2013$)	14,213	42,066	56,279
GDP ($'000; 2013$)	66,455	119,531	185,986

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013a, 2013d), and Census (2009)). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the FSM economy as a whole, which is summarized in Table 6-6. The 7,880 jobs directly and indirectly supported by OIA payments represent 52% of FSM's total employment in 2012. Similarly, $56.3 million of employee compensation associated with these employees accounts for approximately 81% of total employee compensation inside the region, and the $186 million of GDP associated with these employees represents 56% of the $331 million of total GDP produced by the region.

Table 6-6. FSM: Estimated Impact Relative to National Economy Using EBA (FY2013)

	Total Economic Impact for FY 2013, OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	7,880	15,281	52%
Employee compensation ($'000, 2013$)	56,279	69,431	81%
GDP ($'000, 2013$)	185,986	330,938	56%

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013a, 2013d), and Census (2009). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

7. REPUBLIC OF THE MARSHALL ISLANDS (RMI)

7.1 FY 2013 OIA Payments Summary

RMI faces severe challenges in implementing effective government, education, and health care systems and relies heavily on OIA support. RMI has an average GDP per capita of only about $3,292 in 2012. RMI's economy is based on fishing, subsistence farming, and production of copra, its largest export. The public sector is also a significant factor in RMI's economy. RMI's economy has grown each year since FY2010, including 3.2% growth in FY2012 (PITI-VITI, 2013b).

OIA payments to RMI in 2013 totaled $70.9 million. A detailed breakdown of these payments is presented in Table 7-1. The largest block of OIA payments, totaling $68.7 million in spending inside RMI, came through the Compact of Free Association. The Compact provides essential funding for operating RMI's education, government, and health care systems; improving infrastructure; and protecting the environment. In 2012, the Compact and Ebeye Special Needs contributed nearly 75% of the funding available for education in RMI and 37% of the budget for health care (OIA, 2013b). Assistance to Territories payments totaled $2.2 million. General technical assistance provided direct grants, judicial training, the 4 Atoll Health Care Program (which provides health care services, including a full-time primary care physician for each atoll, for Enewetak, Bikini, Rongelap, and Utrik), the Close Up Foundation, the Prior Service Benefits Program, and PITI-VITI. Other Assistance to Territories programs included items such as Maintenance Assistance.

Table 7-1. RMI: OIA Payments (FY 2013)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Compact of Free Association		
Enewetak	499	69% government, 31% transfer
Judicial training U.S. territories	174	Government
Education	11,599	Education
Health	6,694	Health care
Infrastructure	9,407	Construction
Environment	325	Government
Ebeye Special Needs—Education	1,758	Education
Ebeye Special Needs—Health care	231	Health care
Kwajalein Environmental impact	13,307	Government
RMI Trust Fund	17,357	Government
Kwajalein Landowner Payments	458	Private

(continued)

Table 7-1. RMI: OIA Payments (FY 2013) (continued)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Disaster Assistance Emergency Fund	500	Government
RMI Single Audit (FY12)	1,275	Government
Kwajalein Impact Fund	3,351	Government
Balance	325	Government
Total, Compact of Free Association	*68,763*	
Assistance to Territories		
General technical assistance—Direct grants	228	Government
General technical assistance—USDA Grad School PITI-VITI	313	Education
General technical assistance—Close Up Foundation	154	Education
General technical assistance—Prior Service Benefits Program	146	Private
General technical assistance—Judicial training	53	Government
General technical assistance—4 Atoll Health Care Program	990	Health care
Subtotal, General Technical Assistance	*1,884*	
Maintenance assistance	179	Government
Office of Insular Affairs	101	Government
Subtotal, Other	*280*	
Total, Assistance to Territories	*2,164*	
Total Payments	**70,926**	
Spending Outside RMI	**155**	
Total Spending Inside RMI	**70,772**	

Source: RTI estimates based on OIA (2013b).

For the Enewetak assistance program, 31% of funding provides imported food for the citizens of this atoll and, thus, was not included in the analysis because this assistance is not being spent in the insular area. Therefore, the total amount of OIA payments spent within RMI is about $70.8 million.

7.2 Economic Impacts of OIA Payments Using Economic Base Analysis

Direct economic impacts of OIA payments were assigned to five economic sectors—education, construction, government, health care, and an assortment of private industries through the spending of Prior Service Benefits recipients. To calculate the employment and employee compensation impacts associated with this spending, as described in the

methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on FY 2012 employment and wage cost data provided in the Fiscal Year 2012 Economic Review for RMI (released in August 2013), the employee compensation-to-employee ratio for private-sector workers in the education sector was **$12,412** in 2011 (PITI-VITI, 2013b). Because information was not available for output associated with the education industry, the output-to-employee ratio for American Samoa was used ($50,454). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to RMI than for any other area for which output-to-employee data were available. However, it should be noted that to the extent this proxy overestimates the true output-to-employee ratio for RMI the direct impacts of OIA spending will be underestimated because more jobs will be supported by each dollar of OIA spending.

- **Construction:** Based on employment and wage cost data provided in the Fiscal Year 2012 Economic Review for RMI, the employee compensation-to-employee ratio for private-sector workers in the construction sector was estimated to be **$7,749** in 2012 (PITI-VITI, 2013b). Because information was not available for output associated with the construction industry, the output-to-employee ratio for American Samoa was used ($58,908).

- **Government:** Based on data provided in the Fiscal Year 2012 Economic Review for RMI, the RMI government received approximately $94.8 million in revenue and employed approximately 3,559individuals in 2012 (PITI-VITI, 2013b). Adjusting for inflation, this implies an output-to-employee ratio of **$27,025** in 2013 dollars. Similarly, 3,559 government workers received $41.2 million in employee compensation in 2012. This implies an employee compensation-to-employee ratio of **$11,738**.

- **Health care:** Based on employment and wage cost data provided in the Fiscal Year 2012 Economic Review for RMI, the employee compensation-to-employee ratio for private-sector workers in the health care sector was estimated to be **$9,222** in 2013 dollars (PITI-VITI, 2013b). Because information was not available for output associated with the health care industry, the output-to-employee ratio for American Samoa was used ($42,071). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to RMI than for any other area for which data were available.

- **Private:** According to the Fiscal Year 2012 Economic Review for RMI, the average wage for a private worker in RMI was estimated to be **$5,246** in 2012 (PITI-VITI, 2013b). Because information was not available for output associated with the private industry, the output-to-employee ratio for American Samoa was used ($127,685). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to RMI than for any other area for which data were available.

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 7-2.

Table 7-2. RMI: Estimated Direct Economic Impacts Using EBA (FY 2013)

Industry	FY 2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	13,894	50,454	12,412	275	3,418
Construction	9,407	58,908	7,749	160	1,237
Government	20,526	27,025	11,738	760	8,916
Health care	9,441	42,071	9,222	224	2,070
Private	17,502	127,685	5,246	137	719
Total	**70,772**			**1,556**	**16,360**

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013b), and Census (2009). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

Employment and Employee Compensation Base Multipliers. The employment and employee compensation multipliers were developed for 2012 using data from the RMI Fiscal Year 2012 Economic Review performed by researchers at PITI-VITI (Table 7-3).

Table 7-3. RMI: Employment and Employee Compensation by Industry (2012 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2013$)
Economic Base Industries		
Agriculture, hunting, and forestry	10	37
Fishing	1,173	3,658
Extra-territorial organizations	930	16,122
Government (Public administration)[a]	3,559	41,168
Manufacturing	94	655
Tourism—Hotels and restaurants	264	1,476
Noneconomic Base Industries		
Community, social, and personal service activities	218	1,712
Construction	449	3,360

(continued)

Table 7-3. RMI: Employment and Employee Compensation by Industry (2012 estimates) (continued)

Industry	Employment (#)	Employee Compensation ($'000, 2013$)
Education	546	6,548
Electricity, gas, and water supply	317	4,455
Financial intermediation	230	3,794
Health and social work	244	2,172
Private households with employed person	7	12
Real estate, renting, and business activities	224	1,699
Transport, storage, and communications	636	6,127
Wholesale and retail trade	1,718	9,213
Total	**10,618**	**102,208**

[a] Because 60% of RMI's budget comes from external sources, we assumed that only 60% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Note: A significant portion of employment across all sectors was accounted for by public enterprises. However, employee compensation statistics were provided only for private-sector workers. Therefore, to estimate total employee compensation for all workers across industries, we assumed that the employee compensation-to-employee ratio was the same for public-sector workers and private-sector workers in each industry.

Source: RTI estimates based on PITI-VITI (2013b).

The economic base of RMI is agriculture, hunting, forestry, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on the number of employees supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and are, therefore, part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of RMI's territorial government is considered part of the economic base. Specifically, because approximately 60% of RMI's government revenue comes from external sources, 60% of public administration was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2013d). Based on these assumptions and the data in Table 7-3, we calculated the following multipliers:

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

- **Base employment multiplier:** Base employment was calculated to include 4,592 employees out of a total of 10,618. Dividing total employment by base employment yields a multiplier of **2.31**, meaning that for every base employment position supported by OIA funding, an estimated 1.31 additional jobs are formed elsewhere in the economy.

- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $46.5 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **2.20**, meaning that every dollar of employee compensation supported by the FY 2013 spending will create an additional $1.20 in employee compensation.

Multiplying the direct employment and employee compensation impacts in Table 7-2 by these multipliers yields a total employment impact of 3,598 employees and $36 million of employee compensation.

7.3 GDP Base Multipliers

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that RMI's GDP was $176 million in 2012 (PITI-VITI, 2013b). Dividing this by the total number of employees estimated to be working in RMI (10,618) implies a GDP-to-employee ratio of $16,480. Multiplying this ratio by the direct employment impact in the private sector (797 employees) yields a direct private-sector GDP impact of $13.1 million. This private-sector impact is then added to the $20.5 million of OIA payments spent in the public sector to produce an estimate of approximately $33.7 million in direct GDP impacts.

Total GDP impacts are determined by multiplying the direct GDP impacts by a GDP base multiplier. Because of RMI's high percentage of OIA payments compared with GDP (a ratio of 0.41, the highest of the insular areas), small size of economy, and small base sector (in terms of GDP), using a GDP base multiplier from the PITI-VITI FY 2012 Economic Report would create a high base GDP multiplier and potentially overestimate the impacts of OIA payments on GDP. Therefore, we used the smaller value employment base multiplier of **2.20** as a proxy GDP base multiplier. Using this multiplier created a total GDP impact that was consistent with previous analyses and the other FAS.

By multiplying the direct GDP impacts of OIA payments by the proxy GDP base multiplier, we estimate the total impact on GDP is $77.8 million.

7.4 EBA Economic Impact Estimate

In summary, the $70.8 million spent by OIA inside RMI directly supports 1,556 jobs, $16.4 million in employee compensation, and $33.7 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 3,598 jobs, $36 million in

employee compensation, and $77.8 million in GDP. This information is summarized in Table 7-4.

Table 7-4. RMI: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	1,556	2,042	3,598
Employee compensation ($'000, 2013$)	16,360	19,611	35,971
GDP ($'000, 2013$)	33,654	44,165	77,819

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013b, 2013d), and Census (2009). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the RMI economy as a whole, which is summarized in Table 7-5. As this table illustrates, the 3,598 jobs directly and indirectly supported by OIA payments represent 34% of RMI's total employment in 2012. Similarly, $36 million of employee compensation associated with these employees accounts for approximately 35% of total employee compensation inside the region, and the $77.8 million of GDP associated with these employees represents 44% of total GDP produced by the insular area.

Table 7-5. RMI: Estimated Impacts Relative to National Economy Using EBA (FY2013)

	Total Economic Impact for FY 2013 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	3,598	10,618	34%
Employee compensation ($'000, 2013$)	35,971	102,208	35%
GDP ($'000, 2013$)	77,819	174,985	44%

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013b, 2013d), and Census (2009). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

8. REPUBLIC OF PALAU

8.1 FY 2013 OIA Payments Summary

Like the other insular areas, Palau faces a number of obstacles to economic development, including limited land and resources, a small population, limited local technical expertise, a narrow economic base, and vulnerability to natural disasters. The average GDP per capita for Palau in 2012 was $13,278 (2013$) as compared with the GDP per capita of the United States, which was $51,749 (World Bank, 2013a). Through their funding and support, OIA strives to foster economic development, promote sound management, and improve quality of life in Palau.

In September 2010, the governments of the United States and Palau signed a new 15-year compact agreement that offers $250 million in assistance through 2024. The assistance will fund direct economic assistance and infrastructural projects, and the amount of funding will decline each year to promote Palau's self-sufficiency (OIA, 2013b). These payments, which are dispersed through OIA, were enacted in FY 2012. OIA payments made to Palau in 2013 totaled $14.2 million and were primarily dedicated to the government sector with some additional support for education, construction, and the private sector. A detailed breakdown of OIA payments to Palau is presented in Table 8-1. The largest block of OIA payments to Palau, totaling $13.5 million in spending inside the island, came through the Compact of Free Association. This includes funding for infrastructure improvements, economic assistance, and government fiscal support (OIA, 2012a). Under the new compact agreement, the OIA also funds a subsidy for the U.S. Postal Service to provide mail service to the insular area; because this payment is a direct transfer, this value was not included in the analysis of the direct impacts of OIA's assistance.

Table 8-1. Palau: Grant Spending by Appropriation (FY 2013)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
Compact of Free Association		
Federal Services Assistance	308	Transfer
Program Grant Assistance	2,000	Government
Infrastructure projects	8,000	Construction
Economic assistance	1,147	Government
Total, Compact of Free Association	*13,455*	
Assistance to Territories		
General technical assistance—USDA Grad School PITI-VITI	313	Education
General technical assistance—Close Up Foundation	154	Education

(continued)

Table 8-1. Palau: Grant Spending by Appropriation (FY 2013) (continued)

Appropriation	Spending ($'000, 2013$)	Impact Treatment
General technical assistance—Prior Service Benefits Program	192	Private
General technical assistance—Judicial training	53	Government
Subtotal, General Technical Assistance	*711*	
Total, Assistance to Territories	*711*	
Total Payments	**14,166**	
Spending Outside RMI	**308**	
Total Spending Inside RMI	**13,858**	

Source: RTI estimates based on OIA (2013b).

Assistance to Territories payments totaled $0.7 million. General technical assistance provided direct grants, judicial training, the Close Up Foundation, the Prior Service Benefits Program, and the PITI-VITI. Therefore, the total amount of OIA payments spent within Palau is about $13.9 million.

8.2 Direct Economic Impacts of Payments

Direct economic impacts of OIA payments were assigned to four economic sectors—education, construction, government, and an assortment of private industries through the spending of Prior Service Benefits recipients. To calculate the employment and employee compensation impacts associated with this spending, as described in the methodology, we used the following output and employee compensation-to-employee ratios:[1]

- **Education:** Based on data provided in the Fiscal Year 2012 Economic Review for Palau, the employee compensation-to-employee ratio in the education sector in 2012 was $10,939. Adjusting for inflation, this implies an employee compensation-to-employee ratio of **$11,836** in 2013 dollars (PITI-VITI, 2013c). Because information was not available for output associated with the education sector, the output-per-employee ratio for American Samoa was used ($50,454). American Samoa was chosen to be the best point of comparison in this context because economic metrics, such as GDP per capita, were more similar to Palau than for any other area for which data were available. However, it should be noted that to the extent this proxy overestimates the true output-to-employee ratio for Palau the direct impacts of OIA spending will be underestimated because more jobs would be supported by each dollar of OIA spending.

- **Construction:** According to the PITI-VITI (2013c) economic review, in 2012 534 workers were located in the construction sector who received $4.2 million in employee compensation in 2012. This implies an average employee compensation-to-employee ratio of **$8,555** in 2013 dollars. Because information was not available

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2013).

for output associated with the construction sector, the output-to-employee ratio for American Samoa was used ($58,908).

- **Government**: Based on data reports by the Asian Development Bank, the government of Palau received $94.2 million in revenue in 2012 and employed approximately 2,706 people that year (ADB, 2012; PITI-VITI, 2013c). This implies the ratio of government revenue to government employees was $34,812 in 2012, or **$35,321** in 2013 dollars. Similarly, based on 2012 average wage estimates from the PITI-VITI (2013c) 2012 Economic Review, the employee compensation-to-employee ratio for government workers was estimated to be $14,341 in 2008, or **$15,517** in 2013 dollars.

- **Private:** Based on quarterly employment and gross wage/salary reports from PITI-VITI, 6,849workers were located in the private sector who received $59.4 million in employee compensation in 2012. This implies an average employee compensation-to-employee ratio of **$9,376** in 2013 dollars. Because information was not available for output associated with the private sector, the output-to-employee ratio for American Samoa was used ($127,685).

Dividing the payments directed toward each sector by the output-to-employee ratio yields the direct employment impacts, while multiplying the direct employment impacts by the employee compensation-to-employee ratio yields the direct employee compensation impacts. Direct impacts are reported in Table 8-2.

Table 8-2. Palau: Estimated Direct Economic Impacts (FY 2013)

Industry	FY 2013 Payments ($'000, 2013$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2013$)
Education	466	50,454	11,836	9	109
Construction	10,000	58,908	8,555	170	1,452
Government	3,200	35,321	15,517	91	1,406
Private	192	127,685	9,376	1	14
Total	**13,858**			271	2,982

Sources: RTI estimates based on OIA (2013b), ADB (2013), Census (2009), and PITI-VITI (2013c). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

8.3 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using data from the PITI-VITI 2012 Economic Review of Palau (Table 8-3).

Table 8-3. Palau: Estimated Employment and Employee Compensation by Industry (2012)

Industry	Employment (#)	Employee Compensation ($'000, 2013$)
Economic Base Industries		
Agriculture, hunting, and forestry	82	320
Fishing	91	493
Extra-territorial organizations	26	377
Government (Public administration)[a]	2,706	39,375
Mining and quarrying	99	929
Manufacturing	147	1,071
Tourism—Hotels and restaurants	1,553	13,025
Noneconomic Base Industries		
Construction	534	4,284
Education	495	5,494
Financial intermediation	104	2,254
Health and social work	52	729
Other service activities	296	1,926
Private households with employed person	622	1,210
Real estate, renting, and business activities	138	1,527
Transport, storage, and communications	618	6,221
Wholesale and retail trade; repair of motorcycles; personal and household goods	1,381	11,282
Total	**8,944**	**90,516**

[a] Note that because 47% of Palau's budget comes from external sources, it was assumed that only 47% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Source: RTI estimates based on PITI-VITI (2013c). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

The economic base of Palau is agriculture, hunting, forestry, manufacturing, and federal government activities. Industries supported by tourism can also be considered part of the economic base. Ideally, data would be available on measures of the number of employees who are supported by tourism. However, because these data were unavailable, we assumed that the entire accommodation and food services industries are supported by tourism and are, therefore, part of the economic base.[2] This is likely a conservative approach because,

[2] A similar approach for creating a proxy for measuring the role of tourism in insular area economies was used in GAO (2006).

to the extent that this approximation overrepresents the portion of the economy supported by tourism, employment and employee compensation multipliers will be reduced.

In addition to these industries, a portion of Palau's territorial government is considered part of the economic base. Because approximately 47% of Palau's government revenue comes from external sources, 47% of public administration was included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2013c). Based on these assumptions and the data in Table 8-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 3,267 employees out of a total of 8,944. Dividing total employment by base employment yields a multiplier of **2.74**, meaning that for every base employment position supported by OIA spending, an estimated 1.74 additional jobs are formed elsewhere in the economy.
- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $34.7 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **2.61**, meaning that every dollar of employee compensation supported by the FY 2013 spending will create an additional $1.61 in employee compensation.

Multiplying the direct employment and employee compensation impacts in Table 8-2 by these multipliers yields a total employment impact of 763 employees and $7.6 million of employee compensation.

8.4 GDP Base Multipliers

As part of its strategic goals, OIA has funded the PITI-VITI to estimate more detailed and accurate economic indicators for the FAS. In June 2013, PITI-VITI released updated FY 2012 economic reports for the Freely Associated States. With this data, we were able to better estimate GDP multipliers, making for a more detailed analysis of the GDP impacts of OIA payments.

Direct GDP impacts are the sum of OIA payments to insular governments plus the impacts of OIA payments on private sectors. A GDP-to-employee ratio was used to determine the direct GDP impacts of OIA payments in the private sector. It is estimated that Palau's GDP was $232 million in 2012 (PITI-VITI, 2013c). Dividing this by the total number of employees estimated to be working in Palau (8,944) implies a GDP-to-employee ratio of $25,913. Multiplying this ratio by the direct employment impact in the private sector (180 employees) yields a direct private-sector GDP impact of $4.7 million. This private-sector impact is then added to the $3.2 million of OIA payments spent in the public sector to produce an estimate of approximately $7.9 million in direct GDP impacts.

To determine the indirect and induced effects of OIA payments on GDP, we estimated the breakdown of GDP by industry using the proportion of GDP by industry from the PITI-VITI

(2013d). We then used this estimate of GDP by industry (Table 8-4) to calculate a base multiplier using the same methodology as the employment and employee compensation base multipliers. It was assumed that the agriculture, mining, manufacturing, and trade sectors were economic base sectors, along with 47% of the territorial government. The remaining territorial government and other private sectors were included in the noneconomic base industries.

Table 8-4. Palau: GDP by Industry (2013)

Industry	GDP (in millions of 2013$)
Economic base industries	
Agriculture	10.0
Mining	1.1
Manufacturing	2.0
Trade	28.4
Government (Public administration)[a]	30.1
Noneconomic base industries	
Electricity, gas, and water	2.2
Construction	11.3
Transport and communications	20.7
Finance	11.8
Other services	88.5
Total at basic prices	**206.0**
Taxes on imports less imputed bank service charges	25.7
Total at purchasers' prices	**231.8**

[a] Note that because 47% of Palau's budget comes from external sources, it was assumed that only 47% of the employment and employee compensation associated with public administration was part of the base sector. The remaining employees and employee compensation were assumed to be part of the nonbase sector.

Source: RTI estimates based on PITI-VITI (2013c)

Based on these assumptions and the data in Table 8-4, base GDP was calculated to be $55.6 million. Dividing total GDP by base GDP yields a multiplier of **4.17**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 3.17 of additional GDP dollars are formed elsewhere in the economy. By multiplying the direct GDP impacts of OIA payments by the GDP base multiplier, we estimate the total impact on GDP is $32.8 million.

8.5 EBA Economic Impact Estimate

In summary, the $13.9 million spent by OIA inside Palau directly supports 271 jobs, $2.9 million in employee compensation, and $7.9 million in GDP. Accounting for secondary

effects, we estimate that OIA spending supports a total of 742 jobs, $7.8 million in employee compensation, and $32.8 million. A summary of the economic impacts associated with OIA payments is presented in Table 8-5.

Table 8-5. Palau: Total Estimated Economic Impact Using EBA (FY 2013)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	271	471	742
Employee compensation ($'000, 2013$)	2,982	4,800	7,782
GDP ($'000, 2013$)	7,877	24,943	32,821

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013c), PITI-VITI (2013d), Census (2009), ADB (2013), and World Bank (2013a). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

The significance of OIA's economic contributions can be better understood when viewed in relation to the Palau economy as a whole, which is summarized in Table 8-6. Specifically, the 742 jobs directly and indirectly supported by OIA payments represent 8% of Palau's total employment. Similarly, $7.8 million of employee compensation associated with these employees accounts for approximately 9% of total employee compensation inside the region, and the $32.8 million of GDP associated with these employees represents 14% of total GDP produced by the insular area.

Table 8-6. Palau: Estimated Impacts Relative to National Economy Using EBA (FY 2013)

	Total Economic Impact for FY 2013 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	742	8,944	8%
Employee compensation ($'000, 2013$)	7,782	90,516	9%
GDP ($'000, 2013$)	32,821	231,761	14%

Sources: RTI estimates based on OIA (2013b), PITI-VITI (2013c), POPS (2008), Census (2009), ADB (2013), and World Bank (2013a). All data were adjusted to 2013 dollars using the consumer price index (BLS, 2013).

9. DISTRICT OF COLUMBIA AND HAWAII

In addition to payments spent directly in the insular areas, the OIA operates and spends payments in the District of Columbia and Hawaii. The economic impact of OIA operations in the District of Columbia and Hawaii was calculated using IMPLAN I/O modeling software.[1] Similarly to modeling for the US territories, IMPLAN uses an I/O modeling framework that allows specific multipliers to be calculated for each industry.

9.1 Economic Impact Assessment of OIA Operations in District of Columbia

The FY 2013 budget for OIA operations and the Coral Reef Initiative in Washington, DC, was $7.3million, which falls within the IMPLAN industry code 439: Federal Government, Non-Military. Similar to the analysis used for the insular areas, direct employment and employee compensation impacts can be measured using the output-to-employee and employee compensation-to-employee ratios for this sector.

Direct impacts were multiplied by IMPLAN-generated multipliers to estimate the total impact of OIA activity in Washington, DC. The relevant multipliers and total impacts that were estimated for this analysis are reported in Table 9-1. The total economic impacts of OIA operations on DC are

- 46 employees,
- $6.6 million in employee compensation, and
- $7.3 million in output.

[1] To estimate the total economic impact associated with this funding, we used 2010 I/O models of the Washington, DC, and Hawaii economies constructed using IMPLAN economic modeling software. IMPLAN categorizes businesses in these industries into a system of 440 industry codes. IMPLAN was selected because it is one of the most widely used I/O modeling software packages in economic development analysis. IMPLAN, like all I/O models, quantifies the economic impact using multipliers to represent indirect and induced impacts. Total impacts can be estimated by multiplying the direct impacts of the project by these multipliers.

Table 9-1. Economic Impact Assessment of OIA Operations in District of Columbia (FY 2013)

Federal Government, Nonmilitary (439)	Employment (# of employees)	Employee Compensation ($'000, 2013)	Output ($'000, 2013)
Direct Economic Impact			
OIA operations	46	$6,635	$7,297
Indirect and Induced Economic Impacts			
Multiplier	1.19	1.08	1.19
Total Economic Impact	55	$7,142	$8,717

Sources: RTI estimates based on OIA (2013b) and IMPLAN.

9.2 Economic Impact Assessment of OIA Operations in Hawaii

The FY 2013 budget for OIA operations in Hawaii was $15.6 million. The details of these payments and the IMPLAN codes to which they were assigned are reported in Table 9-2.

Table 9-2. 2013 OIA Operations in Hawaii and Corresponding IMPLAN Codes

Funding Description	Funding Amount ($2013)	Industry Description	IMPLAN Code
Compact of Free Association			
Compact Impact	11,229	Hospitals	397
Total, Compact of Free Association	*11,229*		
Assistance to Territories			
General technical assistance—USDA Grad School PITI-VITI	*313*	State and local government, education	438
General Technical Assistance—Pacific Basin Development Center	*150*	Federal government, nonmilitary	439
Subtotal, General Technical Assistance	*463*		
Coral Reef Initiative			439
Brown Tree Snake Control	156	Federal government, nonmilitary	439
Maintenance assistance	1,243	Federal government, nonmilitary	439
Office of Insular Affairs	645	Federal government, nonmilitary	439
Compact Impact Discretionary	1,867	State and local government, education	438
Subtotal Other	*3,911*		
Total, Assistance to Territories	*4,374*		
Total Spending Inside Hawaii	**15,603**		

Sources: RTI estimates based on OIA (2013b) and IMPLAN.

As in the previous analysis, direct impacts were estimated using output and employee compensation-to-employee ratios from the IMPLAN model. The direct employment, employee compensation, and output inputs are reported in Table 9-3.

Table 9-3. Direct Economic Impacts of OIA Operations in Hawaii (FY 2013)

Industry Description	IMPLAN Code	Employment (# of employees)	Employee Compensation ($'000, 2013)	Output ($'000, 2013)
Federal Government, Nonmilitary	439	18	$1,995	$2,194
State and local government, education	438	38	$1,931	$2,180
Hospitals	397	81	$6,049	$11,229
Total		136	**$9,975**	**$15,603**

Sources: RTI estimates based on OIA (2013b) and IMPLAN.

As previously discussed, direct impacts were multiplied by Type II Social Accounting Matrix multipliers generated in IMPLAN to estimate the total impact of OIA payments on the state's economy. The relevant multipliers that were estimated for this analysis are reported in Table 9-4.

Table 9-4. Selected Multipliers by Industry, Hawaii

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Output Impact Multiplier
Federal government, nonmilitary	439	1.65	1.19	1.63
State and local government, education	438	1.29	1.19	1.61
Hospitals	397	1.78	1.34	1.71

Source: IMPLAN.

Using these multipliers, we can compute the total economic impacts associated with OIA operations in Hawaii. The total economic impacts of this activity in Hawaii are

- 221 employees,
- $12.8 million in employee compensation, and
- $26.3 million in output.

These impacts are reported in Table 9-5.

Table 9-5. Total Economic Impacts of OIA Payments, Hawaii

Industry Description	IMPLAN Code	Employment (# of employees)	Employee Compensation ($'000, 2013)	Output ($'000, 2013)
Federal government, nonmilitary	439	29	$2,370	$3,575
State and local government, education	438	49	$2,294	$3,517
Hospitals	397	143	$8,121	$19,159
Total[a]		**221**	**$12,785**	**$26,250**

[a] Values may not add to total because of rounding.

Sources: RTI estimates based on OIA (2013b) and IMPLAN.

10. COMPARISON OF ECONOMIC BASE ANALYSIS AND INPUT-OUTPUT ANALYSIS RESULTS

Table 10-1 demonstrates how the total impacts by territory differ when using EBA or I/O analysis. Overall, the total impacts to the insular areas are smaller when predicted with I/O analysis.

Table 10-1. Comparison of EBA and IMPLAN Total Impacts by Insular Area

	EBA			IMPLAN		
	Employment (#)	Employee compensation ($'000; 2013$)	GDP ($'000; 2013$)	Employment (#)	Employee compensation ($'000; 2013$)	GDP ($'000; 2013$)
American Samoa	1,407	23,861	152,542	1,237	29,134	44,822
Percentage of Total Economy	11%	12%	23%	9%	17%	7%
Guam	6,065	167,541	241,594	4,085	108,042	132,955
Percentage of Total Economy	9%	10%	5%	15%	12%	3%
CNMI	851	18,562	28,256	787	14,397	22,303
Percentage of Total Economy	4%	4%	4%	1%	2%	3%
USVI	15,711	544,910	677,712	8,012	286,503	412,350
Percentage of Total Economy	35%	35%	15%	21%	23%	9%

There are a few reasons that likely explain the discrepancy. First, I/O analysis's ability to calculate a multiplier for each individual sector uses more precision than EBA, where one multiplier is used for the entire economy. In general, the I/O multipliers were smaller than the multipliers estimated using EBA. Most I/O multipliers fell between 1.00 and 2.00 while economic base multipliers usually ranged from 1.83 to 4.20, with one base multiplier for CNMI being 6.93.

In addition to smaller multipliers, IMPLAN's estimates based on BEA data had larger estimates for output-to-employee and employee compensation-to-employee ratios. These ratios were applied to OIA payments to determine direct impacts. With higher ratios for these values there were fewer estimated direct impacts.

Being that this is the first year that the I/O data were available we decided to calculate total impacts to the U.S. Territories using both the EBA and I/O methods. It should be noted there is the benefit of consistency since the EBA has been used since FY2010 to estimate

the economic impacts to the insular areas. At the same time, the BEA data underlying IMPLAN could be simpler and more accurate because the data comes from one source. Most likely in the future I/O analysis using IMPLAN will only be available for the U.S. Territories and EBA will be the only option for determining the total impacts to the Freely Associated States.

In this report we present both estimates for the OIA to compare the results and determine what role EBA and IMPLAN will have on the future of the economic impact analysis for the insular areas.

11. ANALYSIS SUMMARY

The purpose of this study was to measure the economic impact of OIA payments on insular areas as measured by economic aggregates such as employment, employee compensation, and GDP. This task was accomplished primarily through the use of simple economic base models that were constructed for each of the seven insular areas. The results of this analysis are presented in the following tables and in the Executive Summary.

Table 11-1. Estimated Employment Impact of OIA Payments (FY 2013)

	Direct Employment Impact (#)	Indirect/Induced Employment Impact (#)	Total Employment Impact (#)	Percentage of National Employment Supported by OIA Payments (%)
American Samoa	1,107	130	1,237	9%
Guam	3,926	159	4,085	15%
Northern Mariana Islands	661	125	787	1%
U.S. Virgin Islands	7,248	765	8,012	21%
Micronesia	2,471	5,409	7,880	52%
Marshall Islands	1,556	2,042	3,598	34%
Palau	271	471	742	8%
Total	**17,240**	**9,100**	**26,341**	**14%**

Source: RTI estimates.

Table 11-2. Estimated Employee Compensation Impact of OIA Payments (FY 2013)

	Direct Employee Compensation Impact (‘000, 2013$)	Indirect/ Induced Employee Compensation Impact (‘000, 2013$)	Total Employee Compensation Impact (‘000, 2013$)	Percentage of National Employee Compensation Supported by OIA Payments (%)
American Samoa	27,137	1,997	29,134	17%
Guam	105,065	2,976	108,042	12%
Northern Mariana Islands	12,675	1,722	14,397	2%
U.S. Virgin Islands	266,380	20,123	286,503	23%
Micronesia	14,213	42,066	56,279	81%
Marshall Islands	16,360	19,611	35,971	35%
Palau	2,982	4,800	7,782	9%
Total	**444,812**	**93,295**	**538,107**	**14%**

Source: RTI estimates.

Table 11-3. Estimated GDP Impact of OIA Payments (FY 2013)

	Direct GDP Impact (`000, 2013$)	Indirect/Induced GDP Impact (`000, 2013$)	Total GDP Impact (`000, 2013$)	Percentage of National GDP Supported by OIA Payments (%)
American Samoa	35,316	9,506	44,822	7%
Guam	106,787	26,169	132,955	3%
Northern Mariana Islands	14,888	7,414	22,303	3%
U.S. Virgin Islands	268,570	143,780	412,350	9%
Micronesia	66,455	119,531	185,986	56%
Marshall Islands	33,654	44,165	77,819	44%
Palau	7,877	24,943	32,821	14%
Total	**533,547**	**375,509**	**909,056**	**9%**

Source: RTI estimates.

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APPENDIX A:
ALLOCATION OF FY 2013 TECHNICAL ASSISTANCE AND OTHER PAYMENTS BY INSULAR AREA

OIA grants and federal payments for technical assistance and other initiatives are made or distributed as needed during each fiscal year. For FY2013 payments we relied on two sources to determine payments to the insular areas. First we used the 2015 Congressional Report as the most recent estimate of FY2013 funding, we then used the 2014 Budget Justification from the OIA to further breakdown spending categories in order to understand which economic sector to apply certain payments. Table A-1 presents a breakdown of general technical assistance by grant/program and by the insular area receiving the funds. In several cases, the exact amount of funding going to each insular area was indicated in the Congressional Report or Budget Justification. However, in several cases, information was not available for how the funds associated with particular grants/programs would be distributed by area, so we made assumptions. These cases included the following:

- Allocation for the Direct Grants to Insular Areas, part of General Technical Assistance funding, was not available at the time of this report. Therefore, RTI applied percentage distributions based on the FY 2013 budget (Table A-2).
- USDA Graduate School PITI-VITI: A total of $2.5million was allocated to this program for FY 2013. Because the PITI-VITI serves all seven insular areas, this $2.5 million was distributed evenly across all seven areas and Hawaii (where the PITI-VITI offices are located).
- Close Up Foundation: A total of $1.08 million was allocated to this program for FY 2013. This money is received directly by the Close Up Foundation, but no additional information for how these funds might be distributed across each insular areas was provided. Therefore, the $1.08 million was divided evenly across all seven insular areas.
- Prior Service Benefits Program: A total of $1 million was allocated to this program, which is distributed to 351 recipients in CNMI, 711 in FSM, 234 in RMI, and 307 in Palau. It was assumed that this $1 million was distributed to each of these insular areas in proportion to the number of recipients located in each.
- Judicial training: A total of $320,000 was allocated to this program for FY 2013. According to OIA (2012b), these payments fund judicial training for the insular areas in the Pacific. Therefore, the funding was allocated evenly through the Pacific insular areas.
- In a few instances the OIA's Congressional Report or Budget Justification did not explain where certain payments had been allocated, but further information about these payments was found using OIA's website announcements. A statement made by the OIA's Assistant Secretary of the Interior to Congress also provided details on payment allocations for Palau (OIA, 2012c). We assumed this distribution was similar for FY2013. For several other categories of OIA funding, the actual allocation by insular area was unknown, but information about the total amount of funding for the funding category was listed. RTI was able to use the funding totals and percentage distribution from FY 2012's budget to estimate FY 2013 allocations by island for the American Samoa Operations Grants, and direct payments to the insular areas (Table A-2).

Table A-1. Estimation of FY 2013 General Technical Assistance by Area

	Treatment	American Samoa	Guam	CNMI	US Virgin Islands	Federated States of Micronesia	Republic of Marshall Islands	Republic of Palau	Hawaii	Other	Total
Direct Grants To Insular Areas	Government	$372,620	$885,082	$1,376,303	$1,797,603	$223,041	$228,351	$—	$—	$—	$4,883,000
USDA Grad School PITI VITI	Education	$312,500	$312,500	$312,500	$312,500	$312,500	$312,500	$312,500	$312,500	$—	$2,500,000
U.S. Bureau of Commerce, BEA (for GDP data)	Internal Transfer	$—	$—	$—	$—	$—	$—	$—	$—	$750,000	$750,000
Close Up Foundation	Education	$153,571	$153,571	$153,571	$153,571	$153,571	$153,571	$153,571	$—	$—	$1,075,000
Junior Statesmen	Internal Transfer	$—	$—	$—	$—	$—	$—	$—	$—	$357,000	$357,000
4 A Toll Health Care Program	Health Care	$—	$—	$—	$—	$—	$990,000	$—	$—	$—	$990,000
Pacific Basin Development Center	Government	$—	$—	$—	$—	$—	$—	$—	$150,000	$—	$150,000
Prior Service Benefits Program	Private	$—	$218,964	$—	$—	$443,543	$145,976	$191,516	$—	$—	$1,000,000
Judicial Training	Government	$53,333	$53,333	$53,333	$—	$53,333	$53,333	$53,333	$—	$—	$320,000
CDC	Internal Transfer	$—	$—	$—	$—	$—	$—	$—	$—	$50,000	$50,000
CNMI Ombudsman's Office	Government	$—	$250,000	$—	$—	$—	$—	$—	$—	$—	$250,000
CNMI Immigration, Labor and Law Enforcement	Government	$—	$150,000	$—	$—	$—	$—	$—	$—	$—	$150,000
Total	**$—**	**$892,024**	**$2,023,452**	**$1,895,708**	**$2,263,674**	**$1,185,989**	**$1,883,732**	**$710,921**	**$462,500**	**$1,157,000**	**$12,475,000**

Table A-2. Estimation for FY 2013 Payments by Insular Area Using FY 2012 Actuals

Insular Area	FY 2012 Actual Payments ($'000, 2012$)	FY 2012 Distribution, by Insular Area (%)	Estimated FY 2013 Payments ($'000, 2013$)
General Technical Assistance—Direct Grants to Insular Area			
American Samoa	842	7.63%	373
Guam	3,110	28.19%	1,376
Northern Mariana Islands	2,000	18.13%	885
U.S. Virgin Islands	4,062	36.81%	1,798
Federated States of Micronesia	504	4.57%	223
Republic of the Marshall Islands	516	4.68%	228
Republic of Palau	—	—	—
Hawaii	—	—	—
Other	—	—	—
Total	**11,034**		**4,883**
American Samoa Operations Grants			
General Operations	14,063	61.53%	13,971
LBJ Hospital Operations	7,900	34.56%	7,848
High Court	893	3.91%	887
Total	**7,900**	**34.56%**	**7,848**

Source: RTI estimates based on OIA (2013b).