February 2017

Economic Impacts Attributable to FY 2016 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

Prepared by

Ryan J. Callihan
Alan C. O'Connor
Brian Lim
RTI International
3040 E. Cornwallis Road
Research Triangle Park, NC 27709

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Contents

Tables

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) 2016 was $609 million, of which $574 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 2016 analysis, input-output data from the Bureau of Economic Analysis (BEA) are newly available for U.S. territories. 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 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 2016)

	Total OIA Payments ($'000, 2016$)	Total OIA Employment Impact	National Employment Supported by OIA Payments (%)	Total OIA Employee Compensation Impact ($'000, 2016$)	National Employee Compensation Supported by OIA Payments (%)	Total OIA GDP Impact ($'000, 2016$)	National GDP Supported by OIA Payments (%)
American Samoa	35,537	1,140	8%	29,855	15%	32,104	5%
Guam	103,140	3,522	6%	102,994	7%	101,939	2%
Northern Mariana Islands	16,234	812	3%	15,648	3%	15,297	2%
U.S. Virgin Islands	217,682	5,784	15%	231,196	17%	217,693	6%
Micronesia	109,885	8,218	55%	51,497	76%	224,528	70%
Marshall Islands	77,570	4,439	42%	48,308	44%	119,531	63%
Palau	14,403	829	8%	9,937	10%	42,890	15%
Total	**574,452**	**24,745**		**489,436**		**753,983**	

Note: Total impacts are the sum of estimated direct, indirect, and induced impacts associated with OIA grants and payments. Approximately $34.5 million of a total $609 million was spent outside the seven insular areas that were the primary focus of this study.

Source: RTI estimates.

ES.1 FY 2016 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.

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). In contrast, U.S. per capita GDP was estimated to be approximately $56,759 in 2015, presented in 2016 dollars (World Bank, 2016a).

Table ES-2. Economic Characteristics by Insular Area

	Estimated Population (# in 2016)	Estimated Employment (#)	Estimated Employee Compensation ($'000, 2016$)	GDP ($'000, 2016$)	GDP per Capita (2016$)
American Samoa	55,538	13,692	193,521	648,337	11,674
Guam	169,885	60,580	1,421,411	5,799,636	34,139
Northern Mariana Islands	55,070	27,970	498,643	932,554	16,934
U.S. Virgin Islands	103,574	38,454	1,364,580	3,716,413	35,882
Micronesia	104,460	14,808	67,646	322,022	3,083
Marshall Islands	52,993	10,576	110,004	189,061	3,568
Palau	21,291	10,146	103,874	290,690	13,653
United States	321,418,820				56,759

Sources: 2016 population estimates were obtained from the World Bank (2016b). Data on estimated 2016 GDP and GDP per capita for the four U.S. territories were collected from the Bureau of Economic Analysis (BEA) (2016) and are presented in 2015 terms inflated to 2016 dollars. Data on estimated employment and employee compensation for the four U.S. territories are RTI estimates based on IMPLAN (2013). Data on estimated 2015 population, 2016 GDP, and 2016 GDP per capita for the three FAS were obtained from World Bank Indicators (2016a, 2016b). 2016 GDP per capita for the United States was from the World Bank (2016a, 2016b). RTI constructed estimated employment and employee compensation statistics for the three FAS based on data obtained from PITI-VITI (2016b, 2016c, 2016d). The construction of this data for each insular area is explained in more detail in the full report.

For FY 2016, $574 million of OIA's $609 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, 2016b). 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 2016 OIA Payments by Insular Area

	Assistance to Territories ($'000; 2016$)	Compact of Free Association—Current ($'000; 2016$)	Compact of Free Association—Permanent ($'000; 2016$)	Fiscal Payments ($'000; 2016$)	Total OIA Payments ($'000; 2016$)
American Samoa	35,515	—	22	—	35,537
Guam	8,995	—	14,907	79,238	103,140
Northern Mariana Islands	13,925	—	2,309	—	16,234
U.S. Virgin Islands	5,831	—	—	211,851	217,682
Micronesia	527	0	109,359	—	109,885
Marshall Islands	2,290	500	74,781	—	77,570
Palau	706	13,697	0	—	14,403
Other[a]	19,187	2,268	12,762	—	34,217

[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 (2016a, 2016b)

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 a mix 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 2016)

	Direct Employment Impact (#)	Indirect/Induced Employment Impact (#)	Total Employment Impact (#)	National Employment Supported by OIA Payments (#)
American Samoa	1,022	119	1,140	8%
Guam	3,384	138	3,522	6%
Northern Mariana Islands	685	128	812	3%
U.S. Virgin Islands	5,231	553	5,784	15%
Micronesia	2,722	5,496	8,218	55%
Marshall Islands	1,872	2,567	4,439	42%
Palau	277	553	829	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 (2016b, 2016c, 2016d).

In the cases of the Marshall Islands and Micronesia, a significant portion of national employment is directly and indirectly supported by OIA payments. Approximately 55% 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 2016)

	Direct Employee Compensation Impact ($'000, 2016$)	Indirect/Induced Employee Compensation Impact ($'000, 2016$)	Total Employee Compensation Impact ($'000, 2016$)	National Employee Compensation Supported by OIA Payments ($'000, 2016$)
American Samoa	27,822	2,034	29,855	15%
Guam	100,130	2,864	102,994	7%
Northern Mariana Islands	13,774	1,874	15,648	3%
U.S. Virgin Islands	214,938	16,258	231,196	17%
Micronesia	13,883	37,614	51,497	76%
Marshall Islands	22,838	25,470	48,308	44%
Palau	3,533	6,404	9,937	10%

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2016b, 2016c, 2016d).

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 76% 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 $0.48 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 63% 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 2016)

	Direct GDP Impact ($'000, 2016$)	Indirect/Induced GDP Impact ($'000, 2016$)	Total GDP Impact ($'000, 2016$)	National GDP Supported by OIA Payments (%)
American Samoa	32,007	96	32,104	5%
Guam	101,772	167	101,939	2%
Northern Mariana Islands	15,227	70	15,297	2%
U.S. Virgin Islands	216,268	1,425	217,693	6%
Micronesia	77,474	147,054	224,528	70%
Marshall Islands	54,332	65,199	119,531	63%
Palau	9,946	32,944	42,890	15%

Source: RTI estimates for the four U.S. territories are based on IMPLAN (2013). Estimates for the three FAS were based on PITI-VITI (2016b, 2016c, 2016d).

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 $6.3 million of OIA's operating budget was spent in Washington, DC, and approximately $21.4 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 31 jobs in Washington, DC, receiving approximately $5.2 million of employee compensation, and support a total output of $6.3 million. In Hawaii, OIA spending in FY 2016 is estimated to support 181 employees, receiving $13.95 million of employee compensation, and a total output of $16.1 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) 2016 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.

Out of its budget of $609 million, OIA distributed approximately $574 million in technical assistance, grants, and payments directly to the insular areas during FY 2016. 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 (2015 #)	Estimated Employment (#)	Estimated Employee Compensation ($'000, 2016$)	GDP ($'000, 2016)	GDP per Capita (2016$)
American Samoa	55,538	13,692	193,521	648,337	11,674
Guam	169,885	60,580	1,421,411	5,799,636	34,139
Northern Mariana Islands	55,070	27,970	498,643	932,554	16,934
U.S. Virgin Islands	103,574	38,454	1,364,580	3,716,413	35,882
Micronesia	104,460	14,808	67,646	322,022	3,083
Marshall Islands	52,993	10,576	110,004	189,061	3,568
Palau	21,291	10,146	103,874	290,690	13,653
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Sources: 2016 population estimates were obtained from the World Bank (2016b). Data on estimated 2015 GDP and GDP per capita for the four U.S. territories were collected from the Bureau of Economic Analysis (BEA) (2016) and are presented in 2016 terms. Data on estimated employment and employee compensation for the four U.S. territories are RTI estimates based on IMPLAN (2013). Data on estimated 2015 population, 2016 GDP, and GDP per capita for the three FAS were obtained from World Bank Indicators (2016a, 2016b). 2016 GDP per capita for the United States was from the World Bank (2016a, 2016b). RTI constructed estimated employment and employee compensation statistics for the three FAS based on data obtained from PITI-VITI (2016b, 2016c, 2016d).

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 2016 OIA Payments to Insular Areas

In FY 2016, OIA's total budget was $609 million, of which $574 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, 2016b). 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 2016 OIA Payments by Insular Area

	Assistance to Territories ($'000, 2016$)	Compact of Free Association -- Current ($'000, 2016$)	Compact of Free Association -- Permanent ($'000, 2016$)	Fiscal Payments ($'000, 2016$)	Total OIA Payments ($'000, 2016$)
American Samoa	35,515	—	22	—	35,537
Guam	8,995	—	14,907	79,238	103,140
Northern Mariana Islands	13,925	—	2,309	—	16,234
U.S. Virgin Islands	5,831	—	—	211,851	217,682
Micronesia	527	0	109,359	—	109,885
Marshall Islands	2,290	500	74,781	—	77,570
Palau	706	13,697	0	—	14,403
Other[a]	19,187	2,268	12,762	—	34,217
Total	86,976	16,465	214,139	291,089	608,669

[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 (2016a, 2016b).

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 2016 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 2016 grants and payments for each insular area and for each payment category;
- 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. We used the IMPLAN software tool.

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

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

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).

[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.

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, 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. Direct Total Value Added impacts were calculated for American Samoa, Guam, the Northern Mariana Islands, the US Virgin Islands, Hawaii, and DC by multiplying OIA payments to these countries by IMPLAN total value added direct effects. 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 non-agricultural 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 non-agricultural 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 non-base sectors is often unclear. In this analysis, RTI used standard assumptions for identifying which sectors are considered base and non-base. 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 non-base (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.

Third, EBA in particular focuses exclusively on external demand. Therefore, supply constraints are assumed to not be binding, and non-demand 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 2014 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 2014; this data was not updated in time for the FY 2016 report. Up-to-date employment, employee compensation, and GDP data were available for the FAS through new reports released in September 2016 by PITI-VITI. These reports helped better estimate aspects of the base economy.

When possible, we incorporated new economic data into the FY 2016 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 2014 County Business Patterns (released by the U.S. Census in April 2016). 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 2012 Economic Census for these ratios. 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 we were 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 or in the case of Micronesia, the Commonwealth of Northern Marinas Islands (CNMI). These was chosen as the best U.S. Territory comparison because they were the 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 they have a higher GDP per capita. The use of American Samoa and CNMI 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 10 summarizes economic impact data for all FY 2016 payments.

2. AMERICAN SAMOA

2.1 FY 2016 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 2015 was $11,674 (in 2016 U.S. dollars) compared with approximately $56,759 in the United States (BEA, 2016; World Bank, 2016a).

OIA strives to foster economic development, promote sound management, and improve quality of life in American Samoa. OIA payments to American Samoa in FY 2016 totaled $36 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 $22.8 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 13% of American Samoa's general fund and 11% of LBJ Hospital's revenue in recent years (OIA, 2016a).

Other Assistance to Territories funding, totaling $10.1 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 2016)

Appropriation	Spending ($'000; 2016$)	Impact Treatment
Compact of Free Association		
Compact impact	22	Education
Total, Compact of Free Association	22	
Assistance to Territories		
American Samoa operations grant—Basic operations	12,639	Government
American Samoa operations grant—LBJ hospital operations	7,900	Health Care
American Samoa operations grant—High court	855	Government
American Samoa operations grant—ASCC Operations	1,358	Government
Subtotal, American Samoa Operations Grants	22,752	
General technical assistance - Direct Grants	1,260	Government
General technical assistance - USDA Grad School PITI-VITI	206	Education
General technical assistance - Close-Up Foundation	36	Education
General technical assistance - NEPA review	40	Government
General technical assistance - Judicial Training	0	Government
Subtotal, General Technical Assistance	1,541	
Empowering Insular Communities		
Wholesale Purchases	367	Wholesale
Installations	367	Construction
Capacity Building	367	Government
Subtotal, Empowering Insular Communities	1,101	
American Samoa construction	9,505	Construction
Maintenance assistance	250	Government
Coral Reef Initiative	124	Government
Office of Insular Affairs	240	Government
Compact Impact Discretionary	2	Education
Subtotal, Other Assistance to Territories	10,121	
Total, Assistance to Territories	35,515	
Total Spending Inside American Samoa	**35,537**	

Source: RTI estimates based on OIA (2016a, 2016b).

In addition to funding received from OIA's Assistance to Territories, American Samoa also received $22,000 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 2016 appropriated compact

impact payments toward training materials and equipment for the education of college nursing students.

2.2 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 2-2.

We estimated that the $35.5 million spent in American Samoa directly supported 1,022 jobs and $27.8 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 2-3. Note the OIA payments from 2016 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 1,140 employees, $29.9 million in employee compensation, and $32.1 million in GDP. These results are displayed in Table 2-4.

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 2-5. As this table illustrates, the 1,140 jobs directly and indirectly supported by OIA payments represent 8% of American Samoa's estimated total employment. Similarly, $29.9 million of employee compensation associated with these employees' accounts for approximately 15% of total employee compensation inside the region, and the $32.1 million of GDP associated with these employees represents 5% of total GDP produced by the insular area.

Table 2-2. American Samoa: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2016)

Industry	IMPLAN Code	FY2015 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)	Direct Effects[a]	Direct Value Added Change ($'000, 2016$)
State and local government, non-education	437	15,774	$30,804	$30,804	512	15,774	1.00	15,774
State and local government, education	438	1,624	$22,505	$22,505	72	1,624	1.00	1,624
Hospitals	397	7,900	$36,801	$27,683	215	5,943	0.88	6,957
Wholesale trade business	319	367	$1,044,749	$15,995	0	6	0.66	243
Maintenance and repair construction of non-residential structures	39	9,872	$44,349	$20,105	223	4,475	0.75	7,408
Total		**35,537**			**1,022**	**27,822**		**32,007**

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

Table 2-3. American Samoa: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value Added Multiplier
State and local government, non-education	437	1.12	1.07	1.003
State and local government, education	438	1.09	1.07	1.003
Hospitals	397	1.12	1.07	1.003
Wholesale trade business	319	1.90	1.89	1.002
Maintenance and repair construction of non-residential structures	39	1.11	1.10	1.002

Source: RTI estimates based on IMPLAN (2013).

Table 2-4. American Samoa: Total Economic Impacts Using I/O Analysis (FY 2016)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000 2016$)	Total Value Added Impact ($'000 2016$)
State and local government, non-education	437	574	$16,839	$15,827
State and local government, education	438	78	$1,733	$1,629
Hospitals	397	239	$6,368	$6,980
Wholesale trade business	319	1	$11	$244
Maintenance and repair construction of non-residential structures	39	248	$4,904	$7,424
Total		**1,140**	**$29,855**	**$32,104**

Source: RTI estimates based on IMPLAN (2013).

Table 2-5. American Samoa: Estimated Impact Relative to National Economy (FY2016)

	Total Economic Impact for FY2016 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	1,140	13,692	8%
Employee compensation ($'000; 2016$)	29,855	193,521	15%
GDP ($'000; 2016$)	32,104	648,337	5%

Source: RTI estimates based on IMPLAN (2013).

3. GUAM

3.1 FY 2016 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 5,000 U.S. Marines and roughly 1,300 dependents from the military base in Okinawa, Japan, to the insular area by 2021. Major construction and infrastructure improvements are underway in preparation for the move, which recently cleared the last regulatory hurdle (Olson, 2015).

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. Due to this study, there was significant push back from the local population on Guam and the proposed number of military personnel was decreased to the number mentioned in the previous paragraph. This will still likely lead to a significant increase in population during the relocation and construction periods.

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 2015 was $34,139 (2016$), about 60% of the GDP per capita of the United States ($56,759) (BEA, 2016; World Bank, 2016a).

OIA payments to Guam in FY 2016 totaled $103.14 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 $79.2 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 $14.9 million through the Compact of Free Association, which Guam intends to use for a variety of equipment purchases and infrastructure.

Table 3-1. Guam: OIA Payments (FY 2016)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Fiscal Payments		
Guam Section 30 income taxes	79,238	Government
Total, Fiscal Payments	79,238	
Compact of Free Association		
DOE/DPW Schools Leaseback	7,100	Education
DOE/DPW Operations Offset	5,349	Government
DPHSS Operations Offset	2,257	Healthcare
GMHA Operations Offset	200	Healthcare
DOE/DPW Operations Offset	0	Government
Balance	0	Government
Total, Compact of Free Association	14,907	
Empowering Insular Communities		
Wholesale Purchases		
Installations		
Capacity Building		
Subtotal, Empowering Insular Communities		
Assistance to Territories		
General technical assistance - Direct Grants	0	Government
General technical assistance - USDA Grad School PITI-VITI	1,454	Education
General technical assistance - NEPA review	13	Government
General technical assistance - Close-Up Foundation	11	Education
General technical assistance - Judicial Training	0	Government
Subtotal, General Technical Assistance	1,478	
Brown Tree Snake Control	0	Government
Northern Mariana Covenant Grants—Guam construction	5,670	Construction
Maintenance assistance	250	Government
Coral Reef Initiative	106	Government
Compact Impact Discretionary	1,491	Education
Subtotal, Other	7,517	
Total, Assistance to Territories	8,995	
Total Spending Inside Guam	**103,140**	

Source: RTI estimates based on OIA (2016a, 2016b).

Guam received $1.5 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 $7.5 million of the 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 Input-Output Analysis

To determine the direct impacts of OIA payments in Guam, 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 modeling system. The direct employment, employee compensation, and output inputs are reported in Table 3-2.

Table 3-2. Guam: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2016)

Industry	IMPLAN Code	FY2016 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)	Direct Effects[a]	Direct Value Added Change ($'000, 2016$)
State and local government, non-education	437	$84,957	$30,451	$30,451	2,790	84,957	1.00	$84,956.63
State and local government, education	438	$10,056	$22,248	$22,248	452	10,056	1.00	$10,055.94
Wholesale trade business	319	0	$369,066	$25,705	0	0	0.68	$0.00
Maintenance and repair construction of non-residential structures	39	$5,670	$45,978	$35,505	123	4,378	0.90	$5,080.43
Health care	396	$2,457	$129,691	$38,997	19	739	0.68	$1,678.67
Total		**103,140**			**3,384**	**100,130**		**101,772**

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

We estimated that the $103.14 million spent in Guam directly supported 3,384 jobs and $100.13 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 3-3.

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

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value Added Multiplier
State and local government, non-education	437	1.04	1.03	1.002
State and local government, education	438	1.03	1.03	1.002
Wholesale trade business	319	1.27	1.29	1.001
Maintenance and repair construction of non-residential structures	39	1.05	1.03	1.002
Health care	396	1.12	1.07	1.001

Source: RTI estimates based on 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 3,522 employees, $102.99 million in employee compensation, and $101.9 million in GDP. These results are displayed in Table 3-4.

Table 3-4. Guam: Total Economic Impacts Using I/O Analysis (FY 2016)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2016)	Total Value Added Impact ($'000, 2016)
State and local government, non-education	437	2905	$87,341	$85,097
State and local government, education	438	466	$10,338	$10,072
Wholesale trade business	319	0	$0	$0
Maintenance and repair construction of non-residential structures	39	130	$4,521	$5,089
Health care	396	21	$794	$1,681
Total		**3,522**	**$102,994**	**$101,939**

Source: RTI estimates based on 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 3-5. As this table illustrates, the 3,522 jobs directly and indirectly supported by OIA payments represent 6% of Guam's total employment. Similarly, $102.99 million of employee compensation associated with these employees' accounts for approximately 7% of total employee compensation inside the region, and the $101.9 million of GDP associated with these employees represents 2% of total GDP produced by the region.

Table 3-5. Guam: Estimated Impact Relative to National Economy (FY 2016)

	Total Economic Impact for FY2016 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	3,522	60,580	6%
Employee compensation ($'000; 2016$)	102,994	1,421,411	7%
GDP ($'000; 2016$)	101,939	5,799,636	2%

Source: RTI estimates based on IMPLAN (2013).

4. COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS (CNMI)

4.1 FY 2016 OIA Payments Summary

In 2015, the GDP per capita for CNMI was approximately $16,934 (2016$), approximately 30% of the U.S. GDP per capita $56,759 (BEA, 2016; World Bank, 2016a). 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 2.5% from 2011 due to an increase in territorial government spending, exports of goods and services, and tourism services (BEA, 2014).

OIA payments to CNMI in 2016 totaled $16.2 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 $13.9 million, made up the majority of funding to CNMI. General technical assistance, which made up $2.3 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 $2.3 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.

Table 4-1. CNMI: OIA Payments (FY 2016)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Division of Youth Services		
Department of Public Health	671	Government
Division of Youth Services	63	Government
Department of Public Safety	492	Government
Department of Corrections	217	Government
Office of Public Defender	31	Government

(continued)

Table 4-1. CNMI: OIA Payments (FY 2016) (continued)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Northern Mariana College	129	Education
Public School System	270	Education
Karidat	73	Education
Judiciary	172	Government
Balance	191	Government
Total, Compact of Free Association	2,309	
Assistance to Territories		
General technical assistance - Direct Grants	466	Government
General technical assistance - USDA Grad School PITI-VITI	150	Education
General technical assistance - Close-Up Foundation	868	Education
General technical assistance - Prior Service	722	Private
General technical assistance - NEPA review	108	Government
General technical assistance - Judicial Training	0	Government
Subtotal, General Technical Assistance	2,314	
Empowering Insular Communities		
Wholesale Purchases	326	Wholesale
Installations	326	Construction
Capacity Building	326	Government
Subtotal, Empowering Insular Communities	979	
Brown Tree Snake Control	437	Government
Coral Reef Initiative	140	Government
Maintenance assistance	99	Government
Northern Mariana Covenant Grants—CNMI construction	9,606	Construction
Office of Insular Affairs	119	Government
Compact Impact Discretionary	231	Education
Subtotal Other	10,632	
Total, Assistance to Territories	13,925	
Total Spending Inside CNMI	**16,234**	

Source: RTI estimates based on OIA (2016b).

4.2 Economic Impacts of OIA Payments Using Input-Output Analysis

To determine the direct impacts of OIA payments in CNMI, 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 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 4-2.

Table 4-2. CNMI: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2016)

Industry	IMPLAN Code	FY2016 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)	Direct Effects[a]	Direct Value Added Change ($'000, 2016$)
State and local government, non-education	437	3,532	$30,804	$30,804	115	$3,532	1.00	$3,532
State and local government, education	438	1,722	$22,142	$22,142	78	$1,722	1.00	$1,722
Wholesale trade business	319	326	$174,687	$12,276	2	$23	0.68	$223
Maintenance and repair construction of non-residential structures	39	9,932	$20,700	$17,381	480	$8,340	0.93	$9,205
Private sector	—	722	$68,564	$15,027	11	$158	0.76	$546
Total		**16,234**			**685**	**$13,774**		**$15,227**

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

We estimated that the $16.2 million spent in CNMI directly supported 685 jobs and $13.8 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 4-3.

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 812 employees, $15.6

million in employee compensation, and $15.3 million in GDP. These results are displayed in Table 4-4.

Table 4-3. CNMI: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value Added Multiplier
State and local government, non-education	437	1.25	1.13	1.003
State and local government, education	438	1.18	1.13	1.003
Wholesale trade business	319	1.60	1.81	1.001
Maintenance and repair construction of non-residential structures	39	1.17	1.14	1.005
Private sector	—	1.31	1.31	1.006

Source: RTI estimates based on IMPLAN (2013).

Table 4-4. CNMI: Total Economic Impacts Using I/O Analysis (FY 2016)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000, 2016)	Total Value Added Impact ($'000, 2016)
State and local government, non-education	437	144	$3,976	$3,544
State and local government, education	438	92	$1,938	$1,728
Wholesale trade business	319	3	$41	$223
Maintenance and repair construction of non-residential structures	39	560	$9,486	$9,254
Private sector	—	14	$207	$549
Total		812	$15,648	$15,297

Source: RTI estimates based on 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 4-5. As this table illustrates, the 812 jobs directly and indirectly supported by OIA payments represent 3% of CNMI's total employment. Similarly, $15.6 million of employee compensation associated with these employees' accounts for approximately 3% of total employee compensation inside the region, and the $15.3 million of GDP associated with these employees represents 2% of total GDP produced by the region.

Table 4-5. CNMI: Estimated Impact Relative to National Economy (FY2016)

	Total Economic Impact for FY2016 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	812	27,970	3%
Employee compensation ($'000; 2016$)	15,648	498,643	3%
GDP ($'000; 2016$)	15,297	932,554	2%

Source: RTI estimates based on IMPLAN (2013).

5. U.S. VIRGIN ISLANDS (USVI)

5.1 FY 2016 OIA Payments Summary

In 2015, the GDP per capita in USVI was about $35,882 (2016$) compared with $56,759 in the United States (BEA, 2016; World Bank, 2016a). USVI's economy relies heavily on tourism and oil refining. The economy of USVI shrunk in both 2012 and 2013, by 3.4% and 8.5% 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 2012 to 2013.

OIA payments to USVI in 2016 totaled $217.7 million (Table 5-1). The largest block of OIA payments to USVI came in the form of Rum Excise Tax Payments totaling $211.9 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 $1.6 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.

Through other Assistance to Territories programs, which made up $4.2 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.

Table 5-1. USVI: OIA Payments (FY 2016)

Appropriation	Spending ($'000; 2016$)	Impact Treatment
Fiscal Payment		
USVI rum excise tax payments	211,851	Government
Total, Fiscal Payments	211,851	
Assistance to Territories		
General technical assistance - Direct Grants	1,433	Government
General technical assistance - NEPA review	39	Government
General technical assistance - USDA Grad School PITI-VITI	79	Education
General technical assistance - Close-Up Foundation	50	Education
General technical assistance - Judicial Training	-	Government
Subtotal, General Technical Assistance	1,601	
Empowering Insular Communities		
Wholesale Purchases	297	Wholesale
Installations	297	Construction
Capacity Building	297	Government
Subtotal, Empowering Insular Communities	891	
Coral Reef Initiative	131	Government
Northern Mariana Covenant Grants—USVI construction	2,939	Construction
Maintenance assistance	269	Government
Office of Insular Affairs	-	Government
Subtotal, Other	4,230	
Total, Assistance to Territories	5,831	
Total Spending Inside Virgin Islands	**217,682**	

Source: RTI estimates based on OIA (2016b).

5.2 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 5-2.

We estimated that the $217.4 million spent in USVI directly supported 5,231 jobs and $214.9 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 5-3.

Table 5-2. USVI: Direct Economic Impacts of OIA Payments Using I/O Analysis (FY 2016)

Industry	IMPLAN Code	FY2016 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)	Direct Effects[a]	Direct Value Added Change ($'000, 2016$)
State and local government, non-education	437	$214,020	$41,071	$41,071	5,211	$214,020	1.000	$214,020
State and local government, education	438	$129	$29,523	$29,523	4	$129	1.000	$129
Maintenance and repair construction of non-residential structures	39	$3,236	$205,377	$50,103	16	$789	0.655	$2,119
Total		**$217,385**			**5,231**	**$214,938**		**$216,268**

[a] According to IMPLAN documentation, "Effects represent the Total Value Added and various Value Added subset dollars per $1,000,000 of production in the Industry" (IMPLAN, 2015).

Source: RTI estimates based on IMPLAN (2013).

Table 5-3. USVI: Selected IMPLAN Multipliers by Industry

Industry Description	IMPLAN Code	Total Employment Impact Multiplier	Total Employee Compensation Multiplier	Total Value Added Multiplier
State and local government, non-education	437	1.11	1.08	1.006
State and local government, education	438	1.08	1.08	1.006
Maintenance and repair construction of non-residential structures	39	1.27	1.17	1.029

Source: RTI estimates based on 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 5,784 employees, $231.2 million in employee compensation, and $217.7 million in GDP. These results are displayed in Table 5-4.

Table 5-4. USVI: Total Economic Impacts Using I/O Analysis (FY 2016)

Industry Description	IMPLAN Code	Total Employment Impact (# of workers)	Total Employee Compensation Impact ($'000; 2016$)	Total Value Added Impact ($'000; 2016$)
State and local government, non-education	437	5,759	230,133	$215,383
State and local government, education	438	5	138	$130
Maintenance and repair construction of non-residential structures	39	20	925	$2,181
Total		**5,784**	**$231,196**	**$217,693**

Source: RTI estimates based on 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 5-5. As this table illustrates, the 5,784 jobs directly and indirectly supported by OIA payments represent 15% of USVI's total employment. Similarly, $231.2 million of employee compensation associated with these employees accounts for approximately 17% of total employee compensation inside the region, and the $217.7 million of GDP associated with these employees represents 6% of total GDP produced by the insular area.

Table 5-5. USVI: Estimated Impact Relative to National Economy (FY 2016)

	Total Economic Impact for FY2016 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	5,784	38,454	15%
Employee compensation ($'000; 2016$)	231,196	1,364,580	17%
GDP ($'000; 2016$)	217,693	3,716,413	6%

Source: RTI estimates based on IMPLAN (2013).

6. FEDERATED STATES OF MICRONESIA (FSM)

6.1 FY 2016 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 $3,083 (2016$) in 2015. According to PITI-VITI (2016b), 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 2016 totaled $109.9 million. A detailed breakdown of these payments is presented in Table 6-1. The largest block of OIA payments to FSM, totaling $109.4 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 $0.5 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 2016)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Compact of Free Association		
Education	24,213	Education
Judicial Training	183	Government
Health	20,492	Health Care
Capacity Building	2,108	Government
Private Sector	1,209	Government
Environment	1,440	Government
Enhanced Reporting & Accountability	1,372	Government
Infrastructure	16,000	Construction
Balance	42,341	Government
Total, Compact of Free Association	109,359	

(continued)

Table 6-1. FSM: OIA Payments (FY 2016) (continued)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Assistance to Territories		
General technical assistance - Direct Grants	—	Government
General technical assistance - USDA Grad School PITI-VITI	14	Education
General technical assistance - Close-Up Foundation	2	Education
General technical assistance - Prior Service	2	Private
General technical assistance - NEPA review	3	Government
General technical assistance - Judicial Training	—	Government
Subtotal, General Technical Assistance	20	
Office of Insular Affairs	164	Government
Maintenance assistance	213	Government
Coral Reef Initiative	130	Government
Subtotal, Other	507	
Total, Assistance to Territories	527	
Total Spending Inside FSM	**109,885**	

Source: OIA, 2016b.

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 2015 Economic Review for FSM (PITI-VITI, 2016b), the employee compensation-to-employee ratio for private-sector workers in the education sector was $**5,063** in 2016 dollars. The Fiscal Year Economic Review for FSM (PITI-VITI, 2016b) did not include earnings data for education. In place of this earnings data for education, earnings from the Fiscal Year 2014 Economic Review for FSM (PITI-VITI 2016b) were inflated to Fiscal Year 2015 levels. Because information was not available for output associated with the education industry, the output-to-employee ratio for Commonwealth of North Marianna Islands was used ($39,089). CNMI 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

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2016).

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 2015 Economic Review for FSM (PITI-VITI, 2016b), the employee compensation-to-employee ratio for private-sector workers in the construction sector was $**6,088** in 2016 dollars. Because information was not available for output associated with the construction industry, the output-to-employee ratio for CNMI was used ($47,349).

- **Government:** According to the Fiscal Year 2015 Economic Review for FSM (PITI-VITI 2016b), the government of Micronesia received approximately $207.9 million in revenue and employed approximately 6,074 individuals in 2015. Adjusting for inflation, this implies an output-to-employee ratio of **$34,228**. Similarly, according to information presented in the same report, these workers received approximately $21.5 million in employee compensation in 2015. This implies an employee compensation-to-employee ratio of **$3,581**.

- **Health care:** Based on employment and gross wage data provided in Fiscal Year 2015 Economic Review for FSM (PITI-VITI, 2016b), the employee compensation-to-employee ratio for private-sector workers in the health care sector was $**10,469** in 2016 dollars. Because information was not available for output associated with the health care industry, the output-to-employee ratio for CNMI was used ($59,551).

- **Private:** Based on employment and gross wage data provided in Fiscal Year 2015 Economic Review for FSM (PITI-VITI, 2016b), the average wage for a private-sector worker was $**4,995** in 2016 dollars. Because information was not available for output associated with the private sector, the output-to-employee ratio for CNMI was used ($97,234).

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.

6.3 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using 2015 employment and gross wage data from the Micronesia Fiscal Year 2015 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,

Table 6-2. FSM: Estimated Direct Economic Impacts Using EBA (FY 2016)

Industry	FY 2016 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)
Education	24,229	39,089	5,063	620	3,138
Construction	16,000	47,349	6,088	338	2,057
Government	49,162	34,620	3,581	1,420	5,085
Health care	20,492	59,551	10,469	344	3,603
Private	2	97,234	4,995	0	0
Total	**109,885**			**2,722**	**13,883**

Sources: RTI estimates based on PITI-VITI (2016b), Census (2016a), and OIA (2016b). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

Table 6-3. FSM: Employment and Employee Compensation by Industry (2015 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2016$)
Economic Base Industries		
Agriculture, hunting, and forestry	44	139
Mining and quarrying	0	0
Fishing	209	1,356
Extra-territorial organizations	63	0
Government (public administration)[a]	6,080	21,770
Manufacturing	140	557
Tourism—Hotels and restaurants	740	2,904
Non-economic Base Industries	0	0
Construction	834	5,077
Education	818	4,142
Electricity, gas, and water supply	377	1,504
Financial intermediation	260	3,563
Health and social work	115	1,204
Other services	509	3,470
Private households with employed persons	33	68
Real estate, renting, and business activities	387	2,457

(continued)

Table 6-3. FSM: Employment and Employee Compensation by Industry (2015 estimates) (continued)

Industry	Employment (#)	Employee Compensation ($'000, 2016$)
Transport, storage, and communications	978	6,321
Wholesale and retail trade and repairs	3,221	13,113
Total	14,808	67,646

[a] Because 61% of FSM's budget comes from external sources, it was assumed that only 61% 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 non-base 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 (2016b).

part of the economic base.[2] This is likely a conservative approach because, to the extent that this approximation over represents 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 61% of public administration was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2016a). 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 4,905 employees out of a total of 14,808. Dividing total employment by base employment yields a multiplier of **3.02**, meaning that for every base employment position supported by OIA funding, an estimated 2.02 additional jobs are formed elsewhere in the economy.
- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $18.2 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **3.71**, meaning that every dollar of employee compensation supported by the FY 2015 spending will create an additional $2.71 in employee compensation.

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

Multiplying the direct employment and employee compensation impacts in Table 6-2 by these multipliers yields a total employment impact of 8,218 employees and $51.5 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 September 2016, PITI-VITI released updated FY 2015 economic reports for the Freely Associated States, which included estimates of GDP by 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 $322 million in 2015 (World Bank, 2016a). Dividing this by the total number of employees estimated to be working in FSM (14,808) implies a GDP-to-employee ratio of $21,746. Multiplying this ratio by the direct employment impact in the private sector (1,302 employees) yields a direct private-sector GDP impact of $28.3 million. This private-sector impact is then added to the $49.2 million of OIA payments spent in the public sector to produce an estimate of approximately $77.5 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 non-economic base industries.

Based on these assumptions and the data in Table 6-4, base GDP was calculated to be $111.1 million. Dividing total GDP by base GDP yields a multiplier of **2.90**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 1.90 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 $224.5 million.

Table 6-4. FSM: GDP by Industry (2015)

Industry	GDP (in millions of 2016$)
Economic Base Industries	
Agriculture, hunting, and forestry	49.3
Mining and quarrying	-
Fishing	33.9
Government (public administration) a	34.1
Manufacturing	1.3
Tourism—Hotels and restaurants	5.9
Non-economic Base Industries	0.0
Construction	8.4
Education	34.1
Electricity, gas, and water supply	9.7
Financial intermediation	12.2
Health and social work	15.2
Other services	318.6
Real estate, renting, and business activities	35.1
Transport, storage, and communications	17.4
Wholesale and retail trade and repairs	37.8
Total at Basic Prices	612.9
Taxes on products less subsidies	24.2
Total at Purchasers Prices	637.1

[a] Because 61% of FSM's budget comes from external sources, it was assumed that only 61% 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 non-base sector.

Sources: RTI estimates based on PITI-VITI (2016b).

6.5 EBA Economic Impact Estimate

In summary, the $109.9 million spent by OIA inside FSM directly supports 2,722 jobs, $13.9 million in employee compensation, and $77.5 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 8,218 jobs, $51.5 million in employee compensation, and $224.5 million in GDP. This information is summarized in Table 6-5.

Table 6-5. FSM: Total Estimated Economic Impact Using EBA (FY 2016)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	2,722	5,496	8,218
Employee compensation ($'000; 2016$)	13,883	37,614	51,497
GDP ($'000; 2016$)	77,474	147,054	224,528

Sources: RTI estimates based on OIA (2016b), PITI-VITI (2016a, 2016b), and Census (2016b). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

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 8,218 jobs directly and indirectly supported by OIA payments represent 55% of FSM's total employment in 2015. Similarly, $51.5 million of employee compensation associated with these employees' accounts for approximately 76% of total employee compensation inside the region, and the $224.5 million of GDP associated with these employees represents 70% of the $322 million of total GDP produced by the region.

Table 6-6. FSM: Estimated Impact Relative to National Economy Using EBA (FY2016)

	Total Economic Impact for FY 2016, OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	8,218	14,808	55%
Employee compensation ($'000; 2016$)	51,497	67,646	76%
GDP ($'000; 2016$)	224,528	322,022	70%

Sources: RTI estimates based on OIA (2015b), PITI-VITI (2016a, 2016b), and Census (2015a). All data were adjusted to 2015 dollars using the consumer price index (BLS, 2015).

7. REPUBLIC OF THE MARSHALL ISLANDS (RMI)

7.1 FY 2016 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 $3,568 ($2016) in 2015. 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, 2016c).

OIA payments to RMI in 2016 totaled $77.6 million. A detailed breakdown of these payments is presented in Table 7-1. The largest block of OIA payments, totaling $77.4 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, 2014b). Assistance to Territories payments totaled $2.3 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 2016)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Compact of Free Association		
Enewetak	500	69% Government, 31% Transfer
Judicial Training	183	Government
Education	11,177	Education
Health	7,230	Healthcare
ESN Capital	50	Construction
Environment	321	Government
Ebeye Special Needs—Education	2,698	Education
Kwajalein Environmental Impact	236	Government
RMI Trust Fund	15,323	Government

(continued)

Table 7-1. RMI: OIA Payments (FY 2016) (continued)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Kwajalein landowner payments	21,217	Government
Disaster Assistance Emergency Fund	236	Government
RMI Single Audit	500	Government
Kwajalein Impact Fund	2,240	Government
Enewetak Ag and Food	1,583	Government
ESN Health	1,958	Healthcare
RMI Compact Payment Accounts	9,831	Government
Balance	0	Government
Total Compact of Free Association	74,781	
Assistance to Territories		
General technical assistance - Direct Grants	627	Government
General technical assistance - NEPA review	35	Government
General technical assistance - USDA Grad School PITI-VITI	97	Education
General technical assistance - Close-Up Foundation	39	Education
General technical assistance - Prior Service	38	Private
General technical assistance - 4 Atoll Health Care Program	1,200	Health Care
General technical assistance - Judicial Training	0	Government
Subtotal, General Technical Assistance	2,036	
Coral Reef Initiative	125	Government
Maintenance assistance	0	Government
Office of Insular Affairs	129	Government
Subtotal, Other	254	
Total, Assistance to Territories	2,290	
Total Payments	77,570	
Spending Outside RMI	155	
Total Spending Inside RMI	77,415	

Source: RTI estimates based on OIA (2016b).

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 $77.4 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 2015 employment and wage cost data provided in the Fiscal Year 2015 Economic Review for RMI (released in September 2016), the employee compensation-to-employee ratio for private-sector workers in the education sector was **$12,956** in 2015 (PITI-VITI, 2016c). Because information was not available for output associated with the education industry, the output-to-employee ratio for American Samoa was used ($74,519). 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 2015 Economic Review for RMI, the employee compensation-to-employee ratio for private-sector workers in the construction sector was estimated to be **$8,600** in 2015 (PITI-VITI, 2016c). Because information was not available for output associated with the construction industry, the output-to-employee ratio for American Samoa was used ($75,901).

- **Government:** Based on data provided in the Fiscal Year 2015 Economic Review for RMI, the RMI government received approximately $105.1 million in revenue and employed approximately 3,604 individuals in 2015 (PITI-VITI, 2016c). Adjusting for inflation, this implies an output-to-employee ratio of **$29,509** in 2016 dollars. Similarly, 3,604 government workers received $43.8 million in employee compensation in 2015. This implies an employee compensation-to-employee ratio of **$12,299**.

- **Health care:** Based on employment and wage cost data provided in the Fiscal Year 2015 Economic Review for RMI, the employee compensation-to-employee ratio for private-sector workers in the health care sector was estimated to be **$9,860** in 2016 dollars (PITI-VITI, 2016c). Because information was not available for output associated with the health care industry, the output-to-employee ratio for American Samoa was used ($15,841). 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, 2016).

- **Private:** According to the Fiscal Year 2015 Economic Review for RMI, the average wage for a private worker in RMI was estimated to be **$5,594** in 2015 (PITI-VITI, 2016c). Because information was not available for output associated with the private industry, the output-to-employee ratio for American Samoa was used ($170,377). 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.

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 2016)

Industry	FY 2016 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)
Education	136	74,519	12,956	2	24
Construction	50	75,901	8,600	1	6
Government	52,930	29,509	12,299	1,794	22,060
Health care	1,200	15,841	9,860	76	747
Wholesale	0	1,135,571	5,379	0	0
Private	38	170,377	5,594	0	1
Total	**54,353**			**1,872**	**$22,838**

Sources: RTI estimates based on OIA (2016b), PITI-VITI (2016c), and Census (2016b). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

Employment and Employee Compensation Base Multipliers. The employment and employee compensation multipliers were developed for 2015 using data from the RMI Fiscal Year 2015 Economic Review performed by researchers at PITI-VITI (Table 7-3).

Table 7-3. RMI: Employment and Employee Compensation by Industry (2016 estimates)

Industry	Employment (#)	Employee Compensation ($'000, 2016$)
Economic Base Industries		
Agriculture, hunting, and forestry	17	76
Fishing	820	3,568
Extra-territorial organizations	962	17,669
Government (public administration)a	3,604	44,325
Manufacturing	113	935
Tourism—Hotels and restaurants	245	1,433
Non-economic Base Industries	0	0
Community, social & personal service activities	270	1,921
Construction	354	3,044
Education	534	6,918
Electricity, gas and water supply	358	4,744
Financial intermediation	253	4,340
Health and social work	203	2,002
Private households with employed person	15	27
Real estate, renting, and business activities	234	1,928
Transport, storage, and communications	718	6,984
Wholesale and retail trade	1,876	10,090
Total	10,576	110,004

[a] Because 63.9% of RMI's budget comes from external sources, we assumed that only 63.9% 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 non-base 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 (2016d).

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 over represents 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 63.9% of RMI's government revenue comes from external sources, 63.9% of public administration was also included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2016b). Based on these assumptions and the data in Table 7-3, we calculated the following multipliers:

- **Base employment multiplier:** Base employment was calculated to include 4,460 employees out of a total of 10,576. Dividing total employment by base employment yields a multiplier of **2.37**, meaning that for every base employment position supported by OIA funding, an estimated 1.37 additional jobs are formed elsewhere in the economy.
- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $52 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **2.12**, meaning that every dollar of employee compensation supported by the FY 2016 spending will create an additional $1.12 in employee compensation.

Multiplying the direct employment and employee compensation impacts in Table 7-2 by these multipliers yields a total employment impact of 3,303 employees and $29.3 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 $189.1 million in 2015 (World Bank, 2016a). Dividing this by the total number of employees estimated to be working in RMI (10,576) implies a GDP-to-employee ratio of $17,876. Multiplying this ratio by the direct employment impact in the private sector (1,124 employees) yields a direct private-sector GDP impact of $21.9 million. This private-sector impact is then added to the nearly $5 million of OIA payments spent in the public sector to produce an estimate of approximately $26.9 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

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

terms of GDP), using a GDP base multiplier from the PITI-VITI FY 2015 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 **2.12** 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 $105.8 million.

7.4 EBA Economic Impact Estimate

In summary, the $77.4 million spent by OIA inside RMI directly supports 1,872 jobs, $22.8 million in employee compensation, and $54.3 million in GDP. Accounting for secondary effects, we estimate that OIA spending supports a total of 4,439 jobs, $48.3 million in employee compensation, and $119.5 million in GDP. This information is summarized in Table 7-4.

Table 7-4. RMI: Total Estimated Economic Impact Using EBA (FY 2016)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	1,872	2,567	4,439
Employee compensation ($'000; 2016$)	22,838	25,470	48,308
GDP ($'000; 2016$)	54,332	65,199	119,531

Sources: RTI estimates based on OIA (2016b), PITI-VITI (2016a, 2016c), and Census (2016a). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

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 4,439 jobs directly and indirectly supported by OIA payments represent 42% of RMI's total employment in 2016. Similarly, $48.3 million of employee compensation associated with these employees' accounts for approximately 44% of total employee compensation inside the region, and the $119.5 million of GDP associated with these employees represents 63% of total GDP produced by the insular area.

Table 7-5. RMI: Estimated Impacts Relative to National Economy Using EBA (FY2016)

	Total Economic Impact for FY 2016 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	4,439	10,576	42%
Employee compensation ($'000; 2016$)	48,308	110,004	44%
GDP ($'000; 2016$)	119,531	189,061	63%

Sources: RTI estimates based on OIA (2016b), PITI-VITI (2016a, 2016c), and Census (2016b). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

8. REPUBLIC OF PALAU

8.1 FY 2016 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 2015 was $13,653 (2016$) as compared with the GDP per capita of the United States, which was $56,759 (World Bank, 2016a). 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, 2016b). These payments, which are dispersed through OIA, were enacted in FY 2012. OIA payments made to Palau in 2016 totaled $14.4 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 $13.7 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, 2016a). 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 2016)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
Compact of Free Association		
Federal Services Assistance	550	Transfer
Program Grant Assistance	2,000	Government
Infrastructure Project	6,000	Construction
Economic assistance	5,147	Government
Total, Compact of Free Association	13,697	
Assistance to Territories		
General technical assistance—USDA Grad School PITI-VITI	184	Education
General technical assistance—Close-Up Foundation	44	Education

(continued)

Table 8-1. Palau: Grant Spending by Appropriation (FY 2016) (continued)

Appropriation	Spending ($'000, 2016$)	Impact Treatment
General technical assistance—NEPA review	36	Government
General technical assistance—Prior Service	39	Private
General technical assistance—Direct Grant	403	Government
General technical assistance—Judicial Training	-	Government
Subtotal, General Technical Assistance	706	
Coral Reef Initiative	-	Government
Total, Assistance to Territories	706	
Total Payments	**14,403**	
Spending Outside Palau	550	
Total Spending Inside Palau	**13,853**	

Source: RTI estimates based on OIA (2016b).

Assistance to Territories payments totaled $0.9 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 $14.1 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 2016 Economic Review for Palau, the employee compensation-to-employee ratio in the education sector in 2016 was $12,793 (PITI-VITI, 2016d). Because information was not available for output associated with the education sector, the output-per-employee ratio for American Samoa was used ($74,519). 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.

[1] All adjustments for inflation were made using the U.S. Consumer Price Index for All Urban Consumers (BLS, 2016).

- **Construction:** According to the PITI-VITI (2016c) economic review, in 2015 807 workers were located in the construction sector who received $6.6 million in employee compensation in 2015. This implies an average employee compensation-to-employee ratio of **$8,154** in 2016 dollars. Because information was not available for output associated with the construction sector, the output-to-employee ratio for American Samoa was used ($75,901).

- **Government**: Based on data reports by the Asian Development Bank, the government of Palau received nearly $118 million in revenue in Fiscal Year 2015 and employed approximately 3,056 people that year (ADB, 2016; PITI-VITI, 2016d). This implies the ratio of government revenue to government employees was $39,047 in 2016. Similarly, based on 2015 average wage estimates from the PITI-VITI (2016d) Fiscal Year 2015 Economic Review, the employee compensation-to-employee ratio for government workers was estimated to be $14,654 in 2016.

- **Private:** Based on quarterly employment and gross wage/salary reports from PITI-VITI, 7,966 workers were located in the private sector who received $68.8 million in employee compensation in 2015. This implies an average employee compensation-to-employee ratio of **$8,742** in 2016 dollars. Because information was not available for output associated with the private sector, the output-to-employee ratio for American Samoa was used ($170,377).

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 2016)

Industry	FY 2016 Payments ($'000, 2016$)	Output-to-Employee Ratio ($/employee)	Employee Compensation-to-Employee Ratio ($/employee)	Direct Employment Impact (#)	Direct Employee Compensation Impact ($'000, 2016$)
Education	$228	74,519	12,793	3	$39
Construction	$6,000	75,901	8,154	79	$645
Government	$7,587	39,047	14,654	194	$2,847
Private	$39	170,377	8,742	0	$2
Total	**$13,853**			**277**	**$3,533**

Sources: RTI estimates based on OIA (2016b), ADB (2016), Census (2016b), and PITI-VITI (2016d). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

8.3 Employment and Employee Compensation Base Multipliers

The employment and employee compensation multipliers were developed using data from the PITI-VITI 2015 Economic Review of Palau (Table 8-3).

Table 8-3. Palau: Estimated Employment and Employee Compensation by Industry (2016)

Industry	Employment (#)	Employee Compensation ($'000, 2016$)
Economic Base Industries		
Agriculture, hunting, and forestry	107	466
Fishing	95	514
Extra-territorial organizations	20	285
Government (public administration)a	3,055	43,566
Mining and quarrying	79	732
Manufacturing	175	1,200
Tourism—Hotels and restaurants	1,660	13,746
Non-economic Base Industries		
Construction	801	5,600
Education	431	4,770
Financial intermediation	109	1,874
Health and social work	72	867
Other service activities	331	2,021
Private households with employed person	531	1,085
Real estate, renting, and business activities	193	1,334
Transport, storage, and communications	816	7,712
Wholesale and retail trade; repair of motorcycles; personal and household goods	1,611	12,397
Total	**10,086**	**98,169**

[a] Note that because 39% of Palau's budget comes from external sources, it was assumed that only 39% 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 non-base sector.

Source: RTI estimates based on PITI-VITI (2016d). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

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 over represents 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 39% of Palau's government revenue comes from external sources, 39% of public administration was included in the base employment for the purpose of calculating base multipliers (PITI-VITI, 2016d). 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 3,385 employees out of a total of 10,146. Dividing total employment by base employment yields a multiplier of **3.00**, meaning that for every base employment position supported by OIA spending, an estimated 2.00 additional jobs are formed elsewhere in the economy.

- **Employee compensation multiplier:** Employee compensation associated with base employment was estimated to be $36,932 million. Dividing total employee compensation by base employee compensation yields a base multiplier of **2.81**, meaning that every dollar of employee compensation supported by the FY 2015 spending will create an additional $1.81 in employee compensation.

Multiplying the direct employment and employee compensation impacts in Table 8-2 by these multipliers yields a total employment impact of 829 employees and $9.9 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 2014, PITI-VITI released updated FY 2013 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 $290.7 million in 2015 (World Bank, 2016a). Dividing this by the total number of employees estimated to be working in Palau (10,146) implies a GDP-to-employee ratio of $28,651. Multiplying this ratio by the direct employment impact in the private sector (82 employees) yields a direct private-sector GDP impact of $2.4 million. This private-sector impact is then added to the $7.6 million of OIA payments spent in the public sector to produce an estimate of approximately $10.0 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

(2016a). 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 39% of the territorial government. The remaining territorial government and other private sectors were included in the non-economic base industries.

Table 8-4. Palau: GDP by Industry (2016)

Industry	GDP (in millions of 2016$)
Economic Base Industries	
Agriculture	8.9
Mining	1.1
Manufacturing	2.8
Trade	38.9
Government (public administration)a	40.1
Non-economic Base Industries	0.0
Electricity, gas, and water	4.3
Construction	12.5
Transport and communications	27.9
Finance	6.9
Other services	109.4
Total at Basic Prices	**253.0**
Taxes on imports less imputed bank service charges	34.8
Total at Purchasers Prices	**287.8**

[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 non-base sector.

Source: RTI estimates based on PITI-VITI (2016d).

Based on these assumptions and the data in Table 8-4, base GDP was calculated to be $67.4 million. Dividing total GDP by base GDP yields a multiplier of **4.31**, meaning that for every dollar of base GDP supported by OIA funding, an estimated 3.31 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 $42.9 million.

8.5 EBA Economic Impact Estimate

In summary, the $13.9 million spent by OIA inside Palau directly supports 277 jobs, $3.5 million in employee compensation, and nearly $10 million in GDP. Accounting for secondary

effects, we estimate that OIA spending supports a total of 829 jobs, $9.9 million in employee compensation, and $42.9 million in GDP. 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 2016)

	Direct Economic Impact	Indirect/Induced Economic Impact	Total Economic Impact
Employment (#)	277	553	829
Employee compensation ($'000; 2016$)	3,533	6,404	9,937
GDP ($'000; 2016$)	9,946	32,944	42,890

Sources: RTI estimates based on OIA (2016b), PITI-VITI (2016d), PITI-VITI (2016a), Census (2016b), ADB (2016), and World Bank (2016a). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

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 829 jobs directly and indirectly supported by OIA payments represent 8% of Palau's total employment. Similarly, $9.9 million of employee compensation associated with these employees accounts for approximately 10% of total employee compensation inside the region, and the $42.9 million of GDP associated with these employees represents 15% of total GDP produced by the insular area.

Table 8-6. Palau: Estimated Impacts Relative to National Economy Using EBA (FY 2016)

	Total Economic Impact for FY 2016 OIA Payments	National Data	Impact as Percentage of Total Economy
Employment (#)	829	10,146	8%
Employee compensation ($'000; 2016$)	9,937	103,874	10%
GDP ($'000; 2016$)	42,890	290,690	15%

Sources: RTI estimates based on OIA (2016b), PITI-VITI (2016d), POPS (2008), Census (2016b), ADB (2013), and World Bank (2016a). All data were adjusted to 2016 dollars using the consumer price index (BLS, 2016).

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 2016 budget for OIA operations and the Coral Reef Initiative in Washington, DC, was $6.3 million, which falls within the IMPLAN industry code 535: 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

- 38 employees,
- $5.7 million in employee compensation, and
- $7.1 million in GDP.

9.2 Economic Impact Assessment of OIA Operations in Hawaii

The FY 2016 budget for OIA operations in Hawaii was $21.4 million. The details of these payments and the IMPLAN codes to which they were assigned are reported in Table 9-2.

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.

[1] To estimate the total economic impact associated with this funding, we used 2013 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 536 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 2016)

	Employment (# of employees)	Employee Compensation ($'000, 2016)	Output ($'000, 2016)
Direct Economic Impact			
OIA operations	31	$5,245	$6,325
Indirect and Induced Economic Impacts			
Multiplier	1.21	1.08	1.11
Total Economic Impact	**38**	**5,665**	**7,050**

Sources: RTI estimates based on OIA (2016b) and IMPLAN.

Table 9-2. 2016 OIA Operations in Hawaii and Corresponding IMPLAN Codes

Funding Description	Funding Amount ($2016)	Industry Description	IMPLAN Code
Compact of Free Association			
Compact Impact	12,762	Healthcare	482
Total, Compact of Free Association	12,762		
Assistance to Territories	0		
General technical assistance—USDA Grad School PITI VITI	316	Education	472
General technical assistance—Pacific Basin Development Center	0	Government	531
General technical assistance - Direct Grant	2,745	Government	531
General technical assistance - Close-Up Foundation	51	Education	472
General technical assistance - NEPA review	41	Government	531
General technical assistance - Judicial Training	0	Government	531
Subtotal, General Technical Assistance	3,153		
Coral Reef Initiative	40	Government	531
Brown Tree Snake Control	1,935	Government	531
Office of Insular Affairs	2,250	Government	531
Compact of Free Association			

(continued)

Table 9-2. 2016 OIA Operations in Hawaii and Corresponding IMPLAN Codes (continued)

Funding Description	Funding Amount ($2016)	Industry Description	IMPLAN Code
Compact Impact Discretionary	1,276	Education	472
Maintenance Assistance	0	Government	531
Subtotal Other	5,501		
Total, Assistance to Territories	8,654		
Total Spending Inside Hawaii	**21,416**		

Sources: RTI estimates based on OIA (2016b) and IMPLAN.

Table 9-3. Direct Economic Impacts of OIA Operations in Hawaii (FY 2016)

Industry Description	IMPLAN Code	Employment (# of employees)	Employee Compensation ($'000, 2016)	Direct Total Value Added Impact ($'000, 2016)
Hospitals	482	81	$6,823	$7,820
Education	472	30	$1,137	$1,223
State Gov't—non-education	531	70	$5,994	$7,011
Total		**181**	**$13,955**	**$16,054**

Sources: RTI estimates based on OIA (2016b) 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 Value Added Multiplier
Hospitals	482	1.82	1.43	1.65
Education	472	1.28	1.30	1.54
State Gov't—non-education	531	1.40	1.20	1.31

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

- 284 employees,
- $18.5 million in employee compensation, and
- $24 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 ($'000, 2016)	Total Value Added Impact ($'000, 2016)
Hospitals	482	147	$9,766	$12,871
Education	472	39	$1,480	$1,887
State gov't—non-education	531	99	$7,215	$9,214
Total[a]		**284**	**$18,461**	**$23,971**

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

Sources: RTI estimates based on OIA (2016b) and IMPLAN.

10. 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 10-1. Estimated Employment Impact of OIA Payments (FY 2016)

	Direct Employment Impact (#)	Indirect/Induced Employment Impact (#)	Total Employment Impact (#)	Percentage of National Employment Supported by OIA Payments (%)
American Samoa	1,022	119	1,140	8%
Guam	3,384	138	3,522	6%
Northern Mariana Islands	685	128	812	3%
U.S. Virgin Islands	5,231	553	5,784	15%
Micronesia	2,722	5,770	8,492	57%
Marshall Islands	1,393	2,029	3,422	32%
Palau	277	497	774	8%

Source: RTI estimates.

Table 10-2. Estimated Employee Compensation Impact of OIA Payments (FY 2016)

	Direct Employee Compensation Impact (`000, 2016$)	Indirect/ Induced Employee Compensation Impact (`000, 2016$)	Total Employee Compensation Impact (`000, 2016$)	Percentage of National Employee Compensation Supported by OIA Payments (%)
American Samoa	27,822	2,034	29,855	15%
Guam	100,130	2,864	102,994	7%
Northern Mariana Islands	13,774	1,874	15,648	3%
U.S. Virgin Islands	214,938	16,258	231,196	17%
Micronesia	13,883	39,264	53,147	79%
Marshall Islands	13,835	16,543	30,378	28%
Palau	3,533	6,404	9,937	10%

Source: RTI estimates.

Table 10-3. Estimated GDP Impact of OIA Payments (FY 2016)

	Direct GDP Impact (`000, 2016$)	Indirect/Induced GDP Impact (`000, 2016$)	Total GDP Impact (`000, 2016$)	Percentage of National GDP Supported by OIA Payments (%)
American Samoa	32,007	96	32,104	5%
Guam	101,772	167	101,939	2%
Northern Mariana Islands	15,227	70	15,297	2%
U.S. Virgin Islands	216,268	1,425	217,693	6%
Micronesia	77,474	147,054	224,528	70%
Marshall Islands	54,332	65,199	119,531	63%
Palau	9,946	32,944	42,890	15%

Source: RTI estimates.

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APPENDIX A:
ALLOCATION OF FY 2016 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 FY2016 payments we relied on two sources to determine payments to the insular areas. First we used the 2016 Congressional Report as the most recent estimate of FY2016 funding, we then used the 2017 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 a solver analysis through excel to distribute the funds based on the sub-totals from the congressional report, and the grant totals in the budget justification document.
- USDA Graduate School PITI-VITI: A total of $2.5 million was allocated to this program for FY 2015. Because the PITI-VITI serves all seven insular areas, this $2.5 million was distributed across all seven areas and Hawaii (where the PITI-VITI offices are located) based the solver program used earlier.
- Close Up Foundation: A total of $1.1 million was allocated to this program for FY 2015. 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 $1.1 million was divided across all seven insular areas.
- Prior Service Benefits Program: A total of $800,000 was allocated to this program split between Guam, Federated States of Micronesia, Marshall Islands, and Palau
- 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, 2012a). We assumed this distribution was similar for FY2016. 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.

Table A-1. Estimation of FY 2015 General Technical Assistance by Area

	Treatment	American Samoa	Guam	CNMI	U.S. Virgin Islands	Federated States of Micronesia	Republic of Marshall Islands	Republic of Palau	Hawaii	Other	Total
Direct Grants To Insular Areas	Government	$1,259,726	$-	$466,016	$1,432,861	$-	$627,236	$403,405	$2,744,756	$1,905,000	$8,839,000
USDA Grad School PITI VITI	Education	$205,506	$1,454,302	$149,911	$79,171	$14,158	$96,943	$184,038	$315,971	$-	$2,500,000
U.S. Bureau of Commerce, BEA (for GDP data)	Government	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Close-up Foundation	Education	$36,195	$10,633	$868,193	$49,599	$1,609	$38,864	$43,555	$51,351	$-	$1,100,000
Junior Statesmen	Other	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Pacific Basin Development Center	Government	$-	$-	$-	$-	$-	$-	$-	$-	$365,000	$365,000
Prior Service Benefits Program	Prior Service Benefits Program	$-	$-	$722,204	$-	$1,636	$37,524	$38,636	$-	$-	$800,000
NEPA review and compliance	Education	$39,573	$13,065	$107,675	$39,369	$2,597	$35,433	$36,366	$40,922	$-	$315,000
Atoll	Health care	$0	$0	$0	$0	$0	$1,200,000	$0	$0	$-	$1,200,000
Other	Other	$0	$0	$0	$0	$0	$0	$0	$0	$-	$0
Total		$1,541,000	$1,478,000	$2,314,000	$1,601,000	$20,000	$2,036,000	$706,000	$3,153,000	$2,270,000	$15,119,000