

# The Economic Impact of Tybee Island Beach Renourishment on Georgia's Economy



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**November 2007**



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## Foreword

This study was produced by Michael Toma and Alexis Brewer of Armstrong Atlantic State University. The report was produced on behalf of the City of Tybee Island, GA and is intended for its use. The report could not have been completed without key support provided by employees of the City of Tybee Island, the Tybee Island Tourism Council and its members, and the Georgia Department of Revenue. We would like to especially thank State Representative Ron Stephens and Tybee Island City Manager, Diane Schleicher, for particularly helpful assistance with obtaining data. Cover photos from *Savannah Morning News*.

We would like to acknowledge support from Dr. Thomas Jones, Dr. Ellen Whitford, Dr. Ed Wheeler, and Dr. Yassaman Saadatmand of Armstrong Atlantic State University. The Armstrong Atlantic State University Public Service Center and its director, Dr. Michael Donahue, provided helpful administrative support that allowed the authors to focus on analytical rather than administrative details. The authors alone are responsible for content and any errors in methodology, execution, or reporting.

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November 2007

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## EXECUTIVE SUMMARY

This study documents the numerous and substantial state-level economic and fiscal impacts associated with beach renourishment on Tybee Island, Georgia. Note that this study is *not* an economic impact assessment of the entire tourism economy on Tybee Island. This analysis focuses on the *net impact* on Georgia's economy of beach renourishment. Thus, substantial effort has been expended to estimate the proportion of Tybee Island tourism activity that is attributable to 1) out-of-state residents who vacation at Tybee Island, and 2) the amount of tourism activity that would be "recaptured" for Georgia, provided that beach renourishment diverts some Georgia residents from vacationing in alternate out-of-state destinations, and thereby maintains the flow of in-state residents to Tybee Island.

The analysis is conducted within a general framework that assumes that the beach is not renourished with sand, that Tybee tourism erodes with the sand, and that the dissipation of tourism has impacts on the state economy that may be measured in terms of lost jobs, lost labor income, lost business revenue, and lost state sales tax and income tax revenue. Key findings are provided in the table below:

<b>Annual and Cumulative Economic and Fiscal Impact of Beach Renourishment on Georgia's Economy</b>				
	Employment	Business Revenue*	Labor Income*	State Tax Revenue*
Annual Impact	678	\$54,738,000	\$18,354,000	\$2,661,000
Cumulative Ten-Year Impact	678	\$218,952,000	\$73,416,000	\$10,644,000
Note: *Business Revenue, Labor Income, and Tax Revenue data are reported in 2007 dollars.				

On an annual basis, the state-level net economic impacts can be summarized as follows: A total of 678 jobs, \$18.4 million in labor income and benefits, and \$54.7 million in business revenue are estimated to be supported by beach renourishment. Also on an annual basis, a total of \$2.7 million in state sales tax and income tax revenue would be generated for state government provided that the beach is renourished.

An alternate assumption for the time-frame of the economic and fiscal impacts holds that tourism-related economic activity linearly declines at the same rate as the beach erodes over the seven-year renourishment cycle. After the seventh year, the annual cumulative impact is added to each subsequent year through the tenth year. Under this assumption, the ten-year state-level net economic impacts are as follows: 678 jobs, \$73.4 million in labor income and benefits, \$219 million in business revenue, and \$10.6 million in state sales tax and income tax revenue.

# The Economic Impact of Tybee Island Beach Renourishment on Georgia's Economy

## Table of Contents

Section		Page
1	Introduction	1
2	Measures of Economic Impact	1
3	Key Assumptions	2
4	Overview of the Economic Impacts	4
5	Detailed Economic Impacts	6
5-1	Employment Impact	7
5-2	Labor Income Impact	8
5-3	Business Revenue Impact	9
6	Fiscal Impact	10
7	Conclusion	11

## List of Tables

	Page
Table 1: Economic Impact of Beach Renourishment on Georgia's Economy, 2007	5
Table 2: Annual and Cumulative Economic Impact of Beach Renourishment on Georgia's Economy	6
Table 3: Total Employment Impact	7
Table 4: Direct Employment Impact	7
Table 5: Secondary Employment Impact	7
Table 6: Total Labor Income Impact	8
Table 7: Direct Labor Income Impact	8
Table 8: Secondary Labor Income Impact	8
Table 9: Total Business Revenue Impact	9
Table 10: Direct Business Revenue Impact	9
Table 11: Secondary Business Revenue Impact	9
Table 12: Annual and Cumulative Fiscal Impact of Beach Renourishment on Georgia's Economy	10

## 1. Introduction

This study documents the economic impact of Tybee Island beach renourishment on the economy of the state of Georgia. The economic and fiscal impact estimates are based on a comprehensive economic model of the state economy secured from MIG, Incorporated. The vendor provided state-of-the-art software (Implan) that estimates economic impacts. Implan is an input-output model that tracks the flow of expenditures through the economy and provides a conventionally accepted method of assessing the economic effects of an event, business, or industry. The vendor's baseline data in the model were augmented with data made available to Armstrong Atlantic State University from the Georgia Department of Revenue by special arrangement, the U.S. Census Bureau, the City of Tybee Island, and the Tybee Island Tourism Council and its members.

The analysis is conducted within a general framework that assumes that the beach is not renourished with sand, that Tybee tourism erodes with the sand, and that the dissipation of tourism has impacts on the state economy that may be measured in terms of lost jobs, lost labor income, and lost business revenue. Of equally important consideration is the potential impact of lost state sales tax revenue and income tax revenue for the state of Georgia provided that beach renourishment does not take place.

This study documents the numerous and substantial state level economic and fiscal impacts associated with beach renourishment on Tybee Island, Georgia. Note that this study is *not* an economic impact assessment of the entire tourism economy on Tybee Island. This analysis focuses on the *net impact* on Georgia's economy of beach renourishment. Thus, substantial effort has been expended to estimate the proportion of Tybee Island tourism activity that is attributable to 1) out-of-state residents who vacation at Tybee Island, and 2) the amount of tourism activity that would be "recaptured" for Georgia, provided that beach renourishment diverts some Georgia residents from vacationing in alternate out-of-state destinations, and thereby maintains the flow of in-state residents to Tybee Island.

The following quotation (with added emphasis) from the *Savannah Morning News* highlights the basic premise underlying the analysis:

"[Kristy Rahn] and her entourage drove from Springfield to enjoy Mother's Day in the sun. Like others around them, they began the day on the sand, but by midafternoon they were being squeezed between the tide and the boulders. 'We're going home,' Rahn said. ***"Without a beach, what's the point?"***"<sup>1</sup>

## 2. Measures of Economic Impact

The economic impact of beach renourishment on Georgia's economy was estimated using an input-output model that tracks the flow of dollars and economic activity in an area. In this case, dollars are initially injected into the state's economy through the expenditures of tourists in Tybee Island business establishments. These businesses employ workers and purchase some

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<sup>1</sup>Savannah Morning News, created 5/13/07. <http://savannahnow.com/node/284193>.

portion of the required inputs through their supply chain from other businesses located on Tybee Island and elsewhere in Georgia. This induces a cycle of subsequent rounds of economic activity.

Firms in the supply chain of the tourism-related Tybee firms (and their workers) spend a portion of their income purchasing goods and services from other Georgia businesses, triggering further rounds of economic activity. Each subsequent round of spending results in a smaller impact compared to the previous round because a portion of the spending “leaks out” of the state economy through the purchase of goods and services from businesses located outside of Georgia.<sup>2</sup> An input-output model tracks each of these waves of spending and yields an economic multiplier that can be applied to the initial dollar infusion to estimate the total impact of tourism affected by beach renourishment, or the potential lack thereof.

Economic activity associated with Tybee Island tourism produces both direct and secondary impacts on Georgia’s economy. Direct impacts are the results of tourism expenditures directly in the businesses that cater to the tourist trade on Tybee Island and include hotels, vacation rental properties, restaurants, recreational equipment rentals, gift shops, and other typical tourism enterprises. Secondary impacts are commonly referred to as ‘ripple effects,’ and can be both indirect and induced. Indirect impacts arise from supply chain links to tourism-related enterprises. The indirect impact arises as Georgia companies supply inputs to tourism-related Tybee Island business establishments, and as these suppliers buy their own inputs from other Georgia businesses.

Induced impacts result from the expenditures of individuals who are employed by Tybee Island tourist establishments and firms in their supply chain. These companies hire workers who spend a portion of their income in non-tourism businesses and thereby induce additional economic activity. This increased spending flows through the state economy, further stimulating business activity and increasing employment, labor income, and revenue. The total economic impact of beach renourishment on the state of Georgia is the sum of its direct and secondary (indirect and induced) impacts on the state economy.

### **3. Key Assumptions**

A number of assumptions serve as the foundation for the estimated economic and fiscal impact. A key assumption is that tourism, and thereby, the economic and fiscal impact, is proportionally related to the usable area of beach on Tybee Island. As the area of usable beach erodes as a result of wave and storm activity, beach-goers find themselves crowded more tightly in the remaining area of usable beach. It is assumed that there is an optimal amount of space a beach-going party desires and that as the space compresses around the beach blanket, the overall tourist experience begins to lose its appeal. Eventually, tourist activity is driven off by crowded beach conditions that are no longer tolerable to tourists. One assumed intent of beach renourishment is to prevent over-crowding that otherwise would reduce tourist activity on Tybee Island. In other words, one important aspect of beach renourishment is to maintain a pleasant and desirable tourist experience and keep the tourists coming to Tybee Island.

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<sup>2</sup>This is one reason why ‘buy local’ business advertising campaigns are an important facet of local and regional economic development initiatives. The purchase of inputs from other local businesses prevents the leakage of business revenue and income out of the regional economy.

Another important facet of the impact analysis has to do with the point of origin of Tybee Island tourists. In order for tourist activity to inject dollars into the state economy, the expenditures must be attributed to travelers who reside outside of Georgia. For example, the vacationer from Atlanta injects no dollars into the state economy from a vacation on Tybee Island, Georgia. That type of expenditure simply moves the leisure and travel-related spending from one end of the state to the other, with *no net impact* on the Georgian economy. However, travelers from South Carolina, Ohio, and Virginia, for example, clearly inject dollars into the Georgia's economy when they rent hotel rooms, purchase meals, and buy gifts and souvenirs on Tybee Island.

Thus, the point of origin for Tybee Island vacationers is clearly an important aspect of the *net impact* of beach renourishment on the state's economy. In the absence of survey data collected directly from tourists on Tybee Island, a variety of data provided by the Georgia Department of Revenue, the City of Tybee Island, tourist related enterprises on the island, and the 2002 Economic Census were reviewed. Tax receipt data from the Georgia Department of Revenue (DOR) were used to estimate the volume of taxable sales activity on Tybee Island. The implied figure from the DOR data is approximately \$62 million, based on 2006 and year-to-date 2007 tax remittance data. The DOR data for taxable sales activity on Tybee Island was benchmarked against data from the 2002 Economic Census conducted by the U.S. Census Bureau to assess the share of overall sales activity that may be attributed to Tybee Island's population of approximately 3,700 persons. Fifty percent of the remaining portion (87 percent of \$62 million, or \$54 million) of non-local taxable sales activity is assumed to be generated by out-of-state visitors.<sup>3</sup> To the extent that some out-of-state vacationers might select a different beach or non-beach destination in Georgia as an alternate to Tybee Island, this assumption creates a downward bias in the overall estimation of the economic and fiscal impact of beach renourishment on Georgia's economy.

Another issue related to the point of origin of Tybee tourists has to do with the "recapture" of Georgian point-of-origin tourist dollars that would otherwise leave the state if Tybee Island no longer provided a desirable oceanfront experience as a result of beach erosion. For example, Georgia residents seeking a beach vacation may instead choose to visit a beach in South Carolina, Florida, or elsewhere. Beach renourishment on Tybee Island is assumed to divert the tourist activity from non-Georgia alternate destinations and "recapture" the tourist expenditure and economic activity for Georgia.

There was a limited amount of point-of-origin Tybee Island tourist expenditure and activity data available on a zip code basis. For the data that was available, Georgia zip codes were assigned a recapture rate based on highway infrastructure and proximity of competing beaches outside of Georgia. The recapture rate was weighted by the volume of Tybee tourist activity originating in the Georgia zip code, and an overall recapture rate of thirty percent was obtained. This does not mean that seventy percent of Tybee's tourists from Georgia will go out of state if Tybee no longer provided a desirable beach experience, but that seventy percent of Tybee's visitors from within the state probably would have selected another destination in Georgia, and thus, the tourist expenditures would not have been lost to the state. The thirty percent "recapture" rate

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<sup>3</sup>The data used to categorize taxable sales activity as either emanating from in-state or out-of-state was the point or origin for guests in Tybee hotel and rental property sales, visitor center sign-in data, group visitation to the Marine Science Center, and Tybee Island Police traffic citation and arrest data.

assumes that thirty percent of Tybee's visitors from other locations in Georgia might have vacationed outside of Georgia, and that beach renourishment prevents the "leakage" of this tourism activity from Georgia.

Another very important assumption affecting the estimated economic and fiscal impact is the rate at which beach erosion takes place. Given that tourist activity on Tybee Island is assumed to be proportional to the amount of usable beach area, the assumed rate of beach decay (or erosion) affects the estimated economic and fiscal impact. A recently released Army Corps of Engineers study estimated that between seventy and eighty percent of the erosion can be attributed to the Port of Savannah shipping channel that captures sand that would normally migrate south to Tybee Island from beaches in South Carolina. Because the natural process of renourishment is inhibited by the shipping channel, Tybee Island has been on a man-made seven-year renourishment cycle to counter the effects of the erosion of approximately 200,000 cubic yards of sand per year. The last major renourishment of the beach occurred in 2000. In that year, approximately 1.3 million cubic yards were pumped onto the beach in a process, that by its end, added approximately 124 feet to the beach on Tybee Island.

The economic and fiscal impacts are presented in consideration of two time frames. The first of which assumes that a proportional erosion cycle lasting seven years takes place. This implies that fourteen percent (100% divided by 7 years) of the beach erodes each year, and accordingly, that tourism activity on Tybee Island diminishes annually in the same manner – a loss of fourteen percent per year. However, because the seven year erosion cycle can be substantially accelerated by the passage of a strong hurricane or tropical storm, an annual impact is provided as well. This figure can be used to characterize the immediate annual effect on the state's economy if a powerful storm stripped away nearly all the sand in a very short period of time.

#### **4. Overview of the Economic Impacts**

This section provides an overview of the net economic impact of beach renourishment on the Georgia economy. Using data from 2006 and 2007, the economic impacts are estimated for employment, business revenue and labor income and reported in terms of 2007 dollars. In the following sections, additional detail is provided about each of these three impacts and the nature of the impact itself (direct or secondary). Also, the potential loss of state retail sales and income tax revenue is estimated based on the projected decrease in beach related tourism on Tybee Island in the absence of renourishment.

The estimated economic and fiscal impacts are predicated on several key assumptions, with two of the more important assumptions recalled next. First, approximately one-half of the tourist trade on Tybee Island is assumed to be attributable to out-of-state residents who travel to Georgia for their vacation. Second, the impacts include the "recapture" of the expenditures of Georgia's residents who might otherwise vacation out of state in the absence of beach renourishment. These assumptions allow the estimation of the *net impact* on Georgia's economy that may be attributed to beach renourishment on Tybee Island. The erosion of the beach would set a process in motion that would undermine and reduce the volume of tourist trade on Tybee Island, and thereby, have an impact on the state's economy.

In Table 1, summary data regarding the *net annual* economic impact of beach renourishment on the state's economy are presented. The net impact on Georgia's employment is 678 workers. The direct employment impact is 495 jobs, while the secondary employment impact, or the economic ripple effect is 183 jobs. These arise from supply chain linkages and from the re-spending of tourism related payroll in the state's economy. The employment multiplier is 1.4 which indicates that every ten jobs in establishments catering to the tourist trade support fourteen other jobs in the state.

The total amount of labor income, including benefits, potentially affected by the absence of beach renourishment in the state is \$18.3 million on an annual basis. Earnings (and benefits) in firms not directly catering to the tourist trade, yet supported by it through supply chain links, and the re-spending of worker earnings are \$7.4 million. The labor income multiplier is 1.7 which means that for every \$1 earned by workers in sectors dependent on tourism trade, an additional 70 cents was earned by other workers in the state.

The total net impact on state business revenue that is associated with each renourishment is \$54.7 million. The direct effect is \$31 million while the effect associated with supply chain links and re-spending of worker income is \$23.7 million. The multiplier for business revenue is 1.8. This implies that for every \$1 in sales related to beach renourishment, an additional 80 cents in revenue was generated for other businesses in Georgia.

<b>Table 1</b>				
<b>Economic Impact of Beach Renourishment on Georgia's Economy, 2007</b>				
	Direct Impact	Secondary Impact	Total Impact	Multiplier
Employment	495	183	678	1.4
Business Revenue*	\$31,045,000	\$23,693,000	\$54,738,000	1.8
Labor Income*	\$10,947,000	\$ 7,407,000	\$18,354,000	1.7

Notes: \*Business Revenue and Labor Income are reported in 2007 dollars.  
 Labor Income includes salaries, wages, benefits, and proprietor's income.  
 Secondary impact includes indirect and induced impacts.

An additional key assumption regarding the economic impacts has to do with the timing of the impacts. The summary data in Table 1 provides the estimated annual economic impact. However, an alternate assumption about the timing implies that tourist activity related to beach renourishment declines at a linear rate of fourteen percent per year. This assumption was made based on the seven-year cycle that currently governs Tybee Island beach renourishment. Table 2 on the following page provides the annual net economic impact in the top row of the table.

Cumulative annual estimates over a ten year period are provided in the rows of Table 2 below the annual impact. In each year after the seventh year, the cumulative total increases by the annual impact provided in the top row of the table. For example, in Year 8 for business revenue, \$54.7 million is added to the figure from Year 7 (\$54.7 million) to obtain the Year 8 figure of

\$109.5 million, and so on through Year 10. This applies to labor income as well. The same technique is *not* applied to employment because the probability of data mis-interpretation is fairly high. The employment data should be viewed as the number of jobs (678) supported for a single ‘worker-year.’ There would not be an additional 678 workers hired in subsequent years, but rather the *same* 678 positions would continue to be supported in subsequent years.

<b>Table 2</b>			
<b>Annual and Cumulative Economic Impact of Beach Renourishment on Georgia’s Economy</b>			
	Employment	Business Revenue*	Labor Income*
Annual Impact	678	\$54,738,000	\$18,354,000
Cumulative Impact			
Year 1	95	7,663,000	2,570,000
Year 2	190	15,327,000	5,139,000
Year 3	285	22,990,000	7,709,000
Year 4	380	30,653,000	10,278,000
Year 5	475	38,317,000	12,848,000
Year 6	570	45,980,000	15,417,000
Year 7	678	54,738,000	18,354,000
Year 8	678	109,476,000	36,708,000
Year 9	678	164,214,000	55,062,000
Year 10	678	218,952,000	73,416,000
Notes: *Business Revenue and Labor Income are reported in 2007 dollars. Labor Income includes salaries, wages, benefits, and proprietor’s income.			

## 5. Detailed Economic Impacts

This section provides a detailed analysis of the annual state-level economic impacts associated with beach renourishment on Tybee Island. Recall that these are estimates of the potential loss of economic activity in Georgia as tourism activity on Tybee Island declines with the erosion of the beach. Note these data *are not* estimates of the size of the tourism economy on Tybee Island. The data *do* reflect economic activity associated with out-of-state visitors vacationing at the island and the “recapture” of resident Georgian vacationers who are diverted from going to a destination outside of Georgia by beach renourishment on Tybee Island.

The relationship between total, direct and secondary economic impacts is reviewed next. The total impact is the sum of direct and secondary impacts. Given that the direct impact is the largest component of the total impact, it is not surprising to see a high degree of correlation across these two types of impacts.

The direct impacts are those impacts that are readily visible to the casual observer; a meal purchased in a restaurant, a hotel room rented, a boat rental, or a gift or souvenir purchased, to name a few. These activities generate business revenue, support employment, and yield income

and benefits to employees in the firms that cater directly to the tourist clientele. There are two components of secondary impacts. First, there are impacts associated with the supply chain linkages of the firms “on the front line” directly servicing the needs of tourists. Supplier firms buy their own inputs while meeting the needs of the “front line” tourist firms on Tybee Island. Second, workers holding jobs supported by the tourism activity spend a portion of their income and thereby support jobs in other sectors not necessarily directly related to tourism.

### 5-1. Employment Impact

The employment impacts associated with beach renourishment are reported in detail in this section. As can be observed in Table 3, a total of 677 jobs in the Georgia economy are potentially affected by beach renourishment. Not surprisingly, the two sectors most affected are Restaurants and Bars with 251 jobs, and Hotels and Motels with 150 jobs. These two sectors alone account for 60 percent of total employment impact. Another 10 percent of the impact is accounted for by Food and Beverage Stores and Miscellaneous Retail Trade. These sectors are consistent with what one normally associates with firms on the “front line” of the tourism economy.

The direct and secondary employment impacts are reported in Tables 4 and 5. While a total of 677 workers have jobs that could be affected by beach renourishment, only 495 are considered to be a ‘direct’ impact. The direct and total effects are similar, an unsurprising result, given that the direct effect is an element of the total effect. Seventy-seven percent of the direct effect is in Restaurants and Bars and Hotels and Motels.

Table 5 reports the secondary employment impact associated with beach renourishment. This employment is supported as a result of supplier linkages to tourist trade (indirect effect) and as

tourism related labor income recycles through the state economy (induced effect). Secondary employment totals 183, primarily in Restaurants and Bars and among Real Estate Professionals.

<b>Table 3 Total Employment Impact</b>		
	<b>Employment</b>	<b>Percent of Total</b>
Restaurants and Bars	251	38%
Hotels and Motels	150	22%
Food and Beverage Stores	43	6%
Miscellaneous Retail Trade	30	4%
Other	203	30%
<b>Total</b>	<b>677</b>	<b>100%</b>

<b>Table 4 Direct Employment Impact</b>		
	<b>Employment</b>	<b>Percent of Total</b>
Restaurants and Bars	236	47%
Hotels and Motels	147	30%
Food and Beverage Stores	39	8%
Miscellaneous Retail Trade	28	6%
Other	45	9%
<b>Total Direct</b>	<b>495</b>	<b>100%</b>

<b>Table 5 Secondary* Employment Impact</b>		
	<b>Secondary Employment</b>	<b>Percent of Total</b>
Restaurants and Bars	14	9%
Real Estate Professionals	11	6%
Wholesale Trade	8	4%
Employment Services	7	3%
Other	143	78%
<b>Total Secondary</b>	<b>183</b>	<b>100%</b>

\*Note: Supported as a result of supplier linkages to tourism and the recycling of labor income through the state economy.

## 5-2. Labor Income Impact

Table 6 provides data regarding the labor income impacts. A total of \$18.4 million in labor income (and benefits) for Georgian workers is associated with beach renourishment. Not surprisingly, the two sectors most affected are Hotels and Motels, with \$4.5 million in labor income and Restaurants and Bars with \$4.2 million in labor income. These two sectors represent 48 percent of the total labor income impact. Another 9 percent of the impact is accounted for by Food and Beverage Stores and Wholesale Trade

<b>Table 6 Total Labor Income Impact</b>		
	<b>Labor Income</b>	<b>Percent of Total</b>
Hotels and Motels	\$4,511,000	25%
Restaurants and Bars	4,249,000	23%
Food and Beverage Stores	1,041,000	6%
Wholesale Trade	604,000	3%
Other	7,948,000	43%
<b>Total</b>	<b>18,353,000</b>	<b>100%</b>

Note: Impact computed in 2007 dollars.

Differences in employment versus labor income rankings are attributable to differences in relative compensation rates across the sectors. For example, while Miscellaneous Retail Trade ranks fourth in terms of total and direct employment impact, it is surpassed by Wholesale Trade in terms of total labor income because of relatively lower rates of compensation in Miscellaneous Retail Trade establishments.

<b>Table 7 Direct Labor Income Impact</b>		
	<b>Labor Income</b>	<b>Percent of Total</b>
Hotels and Motels	\$4,428,000	40%
Restaurants and Bars	4,006,000	36%
Food and Beverage Stores	936,000	9%
Miscellaneous Retail Trade	537,000	5%
Other	1,040,000	10%
<b>Total Direct</b>	<b>10,947,000</b>	<b>100%</b>

The secondary labor income impacts are widely dispersed among many sectors as indicated in Table 8. Given the huge volume of tourism-related retail trade on Tybee Island, it is not surprising that Wholesale Trade ranks highly in terms of secondary labor income impact. The other sectors present in the table primarily reflect the expenditure of worker income, real estate activity, and the management of tourism related businesses. The dispersion of secondary income is highlighted by the fact that the top four sectors account for only 20 percent of total secondary labor income.

<b>Table 8 Secondary Labor Income Impact</b>		
	<b>Labor Income</b>	<b>Percent of Total</b>
Wholesale Trade	\$604,000	9%
Offices of Physicians & Dentists	378,000	5%
Real Estate Professionals	320,000	4%
Management Consulting	306,000	4%
Other	5,799,000	78%
<b>Total Secondary</b>	<b>7,407,000</b>	<b>100%</b>

The remaining 80 percent is widely scattered among various sectors and reflects the diversity of consumer expenditures.

### 5-3. Business Revenue Impact

The business revenue impacts associated with beach renourishment are reported in detail next. As indicated in Table 9, approximately \$54.7 million in total business revenue in Georgia is potentially affected by beach renourishment. The two sectors most affected are Restaurants and Bars with \$12.6 million in revenue, and Hotels and Motels with \$12.4 million in revenue. These two sectors account for 45 percent of total business revenue impact. Another 7 percent of the impact was accounted for by Food and Beverage Stores and Wholesale Trade.

Differences in total versus direct business revenue impacts can be explained in a fairly straightforward manner. While business revenue is greater for Hotels as compared to Restaurants, the re-spending of worker income (the secondary impact) accounts for the switch in the position of these two sectors in the ranking by total impact. Also, Other Accommodations outpaces Wholesale trade in terms of direct impact but is surpassed by it in terms of total impact.

Hotels and Motels along with Restaurants and Bars account for 78 percent of the direct expenditures likely to be affected by beach renourishment, while they account for 45 percent of the total impact. This highlights the powerful role of these two sectors in the tourism economy, but also highlights the importance of secondary economic impacts that may be overlooked by focusing solely on more easily observed direct tourism business activity. Table 11 provides detail about commercial enterprises that indirectly benefit from the tourist related economic activity related to beach renourishment. In general, the secondary impacts are widely dispersed, as expected.

<b>Table 9 Business Revenue: Total Impact</b>		
	<b>Business Revenue</b>	<b>Percent Of Total</b>
Restaurants and Bars	\$12,643,000	23%
Hotels and Motels	12,414,000	22%
Food and Beverage Stores	2,414,000	4%
Wholesale Trade	1,595,000	3%
Other	25,672,000	48%
<b>Total</b>	<b>54,738,000</b>	<b>100%</b>

Note: Impact computed in 2007 dollars.

<b>Table 10 Direct Business Revenue Impact</b>		
	<b>Business Revenue</b>	<b>Percent of Total</b>
Hotels and Motels	\$12,187,000	40%
Restaurants and Bars	11,920,000	38%
Food and Beverage Stores	2,171,000	7%
Other Accommodations	1,332,000	4%
Other	3,435,000	11%
<b>Total Direct</b>	<b>31,045,000</b>	<b>100%</b>

<b>Table 11 Secondary Business Revenue Impact</b>		
	<b>Business Revenue</b>	<b>Percent of Total</b>
Real Estate Professionals	\$1,925,000	9%
Wholesale Trade	1,595,000	7%
Power Generation and Supply	824,000	3%
Restaurants and Bars	723,000	3%
Other	18,626,000	78%
<b>Total Secondary</b>	<b>23,693,000</b>	<b>100%</b>

## 6. Fiscal Impact

This section considers the fiscal impact of beach renourishment on state government finances. In general, when businesses and individuals go about their economic lives, they generate taxable transactions. Two readily identifiable state taxes are sales taxes and income taxes. When an economic activity generates approximately \$54.7 in business revenue and supports nearly 680 jobs on a statewide basis, the effect on state government tax revenue will be substantial.

Estimates of state government tax revenue generated by beach renourishment on Tybee Island are presented in Table 12. Note these net tax revenue estimates reflect the decline in state tax revenue associated with a failure to renourish the beach. As tourist activity erodes with the beach, so would state tax revenue generated by that tourist activity.

The annual estimate of foregone state tax revenue is approximately \$2.7 million. This is a scenario in which visitation to the beach by out-of-state residents and other non-local Georgia residents effectively ends with a substantial loss of sand that eliminates desirable and usable beach area.

	State Sales Tax Revenue	State Income Tax Revenue	Total State Tax Revenue
Annual Impact	\$2,190,000	\$471,000	\$2,661,000
Cumulative Impact			
Year 1	\$307,000	\$66,000	\$373,000
Year 2	614,000	132,000	746,000
Year 3	921,000	198,000	1,119,000
Year 4	1,228,000	264,000	1,492,000
Year 5	1,535,000	330,000	1,865,000
Year 6	1,842,000	396,000	2,238,000
Year 7	2,190,000	471,000	2,661,000
Year 8	4,380,000	942,000	5,322,000
Year 9	6,570,000	1,413,000	7,983,000
Year 10	8,760,000	1,884,000	10,644,000
Note: Fiscal impacts reported in 2007 dollars.			

Cumulative annual estimates over a ten year period are provided in the rows of Table 12 below the annual impact in the section denoted "Cumulative Impact." These estimates assume that there is a linear reduction in the amount of desirable and usable beach area that proportionally undermines the attractiveness of the beach as a tourist destination. Given a seven-year beach renourishment cycle, the annual erosion rate (of both sand and tourist activity) is assumed to be fourteen percent (100% divided by 7 years). In each year after the seventh year, the cumulative total increases by the annual impact provided in the top row of the table. For example, in Year 8 for state sales tax revenue, \$2.19 million is added to the figure from Year 7 (\$2.19 million) to obtain the Year 8 figure of \$4.8 million, and so on through Year 10. The cumulative ten-year fiscal impact equals \$10.6 million.

Even though tourism activity on Tybee Island has trended up for the previous several years, these fiscal impacts may still be considered estimates of foregone state tax revenue had the beach not

eroded during this time. Additional beach area is an attractive attribute and plausibly would attract additional vacationers who would be more satisfied with the amount of ‘personal space’ and lack of crowding around their beach blankets and towels.

## 7. Conclusion

This study documents the numerous and substantial state-level economic and fiscal impacts associated with beach renourishment on Tybee Island, Georgia. These impact assessments may be considered state-level estimates of lost jobs, lost worker income, lost business revenue, and lost state tax revenue resulting from a failure to renourish the beach at Tybee Island. Note that this study is *not* an economic impact assessment of the entire tourism economy on Tybee Island. This analysis focuses on the *net impact* on Georgia’s economy of beach renourishment. Thus, substantial effort has been expended to estimate the proportion of Tybee Island tourism activity that is attributable to 1) out-of-state residents who vacation at Tybee Island, and 2) the amount of tourism activity that would be “recaptured” for Georgia provided that beach renourishment diverts some Georgia residents from vacationing in alternate out-of-state destinations and maintains the flow of in-state residents to Tybee Island.

On an annual basis, the state-level net economic impacts can be summarized as follows: A total of 678 jobs, \$18.4 million in labor income and benefits, and \$54.7 million in business revenue are estimated to be supported by beach renourishment. Also on an annual basis, a total of \$2.7 million in state sales tax and income tax revenue would be generated for state government provided that the beach is renourished.

An alternate assumption for the time-frame of the economic and fiscal impacts holds that tourism-related economic activity linearly declines at the same rate as the beach erodes over the seven-year renourishment cycle. Under this assumption, the annual economic and fiscal impacts are fourteen percent of the figures cited in the previous paragraph, with the *cumulative impact* over the seven-year cycle exactly equal to the data cited in the previous paragraph. The cumulative ten-year economic impact under this assumption is summarized as follows: 678 jobs, \$73 million in labor income and benefits, and \$219 million in business revenue are estimated to be supported by beach renourishment. The ten-year cumulative fiscal impact is \$10.6 million in sales tax revenue and income tax revenue for state government.