The Economic Contribution of the National Estuarine Research Reserves: A Pilot Study

Final Report

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NOAA's Office for Coastal Management

"Coastal management" is the term used by communities and organizations striving to keep the nation's coasts safe from storms, rich in natural resources, and economically strong. The national lead for these efforts is NOAA's Office for Coastal Management, an organization devoted to partnerships, science, and good policy. This agency, housed within the National Ocean Service, oversees major initiatives that include the National Coastal Zone Management Program, Coral Reef Conservation Program, Digital Coast, and National Estuarine Research Reserve System.

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Executive Summary

Project objectives: ERG implemented pilot economic contribution analyses at four National Estuarine Research Reserves—Rookery Bay, Guana Tolomato Matanzas, and Apalachicola in Florida; and South Slough in Oregon—to better understand and communicate their economic contributions to their surrounding economies. Great Bay in New Hampshire participated in this pilot study but had larger data gaps, and we did not include it in this report.

This report focuses on the economic contributions for those four pilot sites, which only represent part of the Reserves' total economic value. In a separate report, ERG has outlined communications recommendations for presenting economic contribution and economic benefit data to various audiences and has developed recommendations and considerations for potentially implementing economic contribution analyses more broadly across the Reserves.

Methods: ERG met with staff from the five pilot Reserve sites to collect the best available data for:

- Reserve operational spending
- Visitation to the Reserve
- Employees and visitation to Reserve partner facilities

In this context, Reserve partners included only partners whose activities rely on a Reserve's existence and cause economic contributions to flow from the partner to the surrounding economy (e.g., an ecotourism company that brings customers to the Reserve).

While some data were readily available, we often relied on conservative best guesses to fill data gaps or excluded estimates altogether. ERG used existing visitor spending studies to estimate the overall expenditure of visitors to the study areas for each of the pilot Reserves.

ERG input spending from this data-gathering into IMPLAN to generate estimates of jobs, revenue, and income supported in counties surrounding the Reserves.

Results: The results below present the total economic contribution from direct spending by operational spending from the Reserve, spending by Reserve visitors, employment and spending of Reserve partners, and spending by visitors of Reserve partners.

- **Guana Tolomato Matanzas, Florida:** This Reserve, its partners, and their visitors contribute approximately **521 jobs** and **$57.6 million** in revenue annually to Duval, St. Johns, and Flagler Counties in Florida.
- **Rookery Bay, Florida:** This Reserve, its partners, and their visitors contribute over **512 jobs** and **$55 million** in revenue annually to Collier and Lee Counties in Florida.
- **South Slough, Oregon:** This Reserve, its partners, and their visitors contribute over **65 jobs** and **$6.1 million** in revenue annually to Coos County, Oregon.
- **Apalachicola, Florida:** This Reserve, its partners, and their visitors contribute over **664 jobs** and **$46.4 million** in revenue annually to Franklin County, Florida.

Important Considerations

- These are conservative underestimates of the overall impact, as some visitor data are missing or conservatively estimated. These may be larger underestimates for some Reserves compared to others.
- They do not reflect the total economic value of each Reserve. The economic contributions do not include the many economic benefits, such as ecosystem service values, that result from the Reserves carrying out their mission. Incorporating these benefits would result in a much higher total economic value.
- The funding levels and size of each Reserve can vary dramatically.
- Some Reserves are in more tourist-driven, accessible areas and others are in more remote locations.
- This is a redacted version of an internal NOAA report that was peer-reviewed by the external reviewers noted in the acknowledgement section. The unredacted version contained sensitive information about Reserve partners and Reserve budgets.

While these results can be used to tell part of the economic story, they should never be used to compare Reserves directly—they only tell a small part of each Reserve's story.

1. Introduction

1.1 Background

The Coastal Zone Management Act (CZMA) of 1972 authorized the creation of the National Estuarine Research Reserve System (NERRS). The NERRS is currently a set of 29 sites established with communities, collectively protecting more than 1.3 million acres, located in estuaries around the United States (including Puerto Rico and Hawaii) that provide stewardship, research, training, and education to local stakeholders. NERRS public lands and waterways, as well as their activities and programs, use public funds that generate economic contributions and economic benefits that can be difficult to measure. In FY19, NOAA, through congressional appropriations, invested more than $27 million in the NERRS sites, with state and university partners adding in $9.5 million in matching funds.[1] Given the large public investment in the system, it is important for federal, state, and local elected and appointed officials and stakeholders to better understand both the resulting economic contributions and the economic benefits of these investments.

The 29 Reserves engage in a diverse range of activities that generate both **economic contributions**[2] and **economic benefits**. Though these two terms are often used interchangeably, there is an important distinction between them.

- Economic contributions represent the gross changes in economic activity in a region (employment, revenue, value added, and labor income). The gross change in a region accounts for all economic activity in the region relating to the Reserves, whether or not the economic activity would have been spent in the region in the absence of the Reserve.
- Economic benefits (or impacts) represent only economic activity that would not have otherwise occurred in the region if the Reserves did not exist.

For example, if NERRS funding supports 10 jobs at a Reserve, these jobs are an economic contribution of the Reserve. These employees may spend money in the regional economy, causing a ripple effect that multiplies the economic contribution. Economic benefits, on the other hand, represent the net increase in total social welfare and include market and non-market values. For example, restoring 10 acres of coastal salt marsh will generate monetizable economic benefits such as improved coastal protection and increased commercial fishery productivity—as well as other benefits that are valued by society, such as the preservation of these places. It is important to understand that Reserves have both economic contributions and benefits, the latter of which align with the mission of the Reserves. These two measures make up the total economic value of the Reserves, but this report is focused only on the economic contribution component.

1.2 Objectives of this Project and Report

In this project, we conducted economic contribution analyses of four sites: Guana Tolomato Matanzas (GTM), Rookery Bay, South Slough, and Apalachicola. Specifically, we sought to:

[1] NOAA Office for Coastal Management. n.d. *NOAA's National Estuarine Research Reserve System: Funding Summary 2019.* https://coast.noaa.gov/data/docs/nerrs/funding-summary.pdf

[2] This report draws on the definition of "economic contribution" used in Watson, P., Wilson, J., Thilmany, D., & Winter, S. (2007). Determining Economic Contributions and Impacts: What Is the Difference and Why Do We Care? *Journal of Regional Analysis & Policy*, *37*(2), 140–146.

- Identify existing data for all Reserves to better understand what data are readily available for use in economic contribution analyses.
- Identify common data gaps across Reserves that prevent or undermine robust economic contribution analyses.
- Understand the level of effort necessary to collect robust data for economic contribution analyses.
- Carry out the analyses themselves.
- Make recommendations to NOAA and the Reserves for future data collection related to economic contribution analyses.

This report will help NOAA and the Reserves better understand, identify, and estimate the economic contribution of Reserves. As part of this project, ERG is also developing a second report featuring lessons learned and recommendations for implementing this process at additional Reserves, as well as ways to best communicate these economic contribution results alongside benefits from ecosystem service values.

We conducted this research in two phases. Phase I dealt with the overall methodology as well as the analyses at the GTM and Rookery Bay Reserves. In Phase II we slightly changed the data sources (such as the visitor expenditure survey we were using) and conducted the analyses at South Slough, and Apalachicola.

1.3 Organization of This Report

- **Section 1** presents an introduction, background, objectives, and organization of the report.
- **Section 2** describes the economic analysis methodology used at the pilot sites.
- **Section 3** presents the data and results from GTM (Florida).
- **Section 4** presents the data and results from Rookery Bay (Florida).
- **Section 5** presents the data and results from South Slough (Oregon).
- **Section 6** presents the data and results from Apalachicola (Florida).
- **Section 7** describes the limitations of the analysis.
- **Section 8** presents lessons learned and recommendations for implementing and improving economic contribution analyses at the Reserves.
- **Section 9** is a glossary of technical terms. (These terms have been written in **bold** within the report and are linked to the glossary.)

2. Methodology

2.1 Overview of Economic Contribution Analysis

Introduction to economic contribution analysis: An economic contribution analysis studies the gross change in economic activity (i.e., how money ripples through the economy) in a defined geographic region. This type of analysis is composed of three measures: direct contributions, indirect contributions, and induced contributions. For example, if a Reserve constructs a new visitor center, it will likely hire a construction company to do the work (a **direct contribution**). The money that the construction company spends on supplies and labor will generate increased revenue and help create jobs for the suppliers of the construction company (e.g., wood manufacturers) (an **indirect contribution**). The construction company workers then spend their earned income in the local economy (an **induced contribution**) at places like restaurants, grocery stores, hotels, retail, transportation, etc. An economic contribution analysis of the new visitor center would look at these three contributions to study how the Reserve's spending ripples[3] through the economy. The total economic contribution to the region is simply the sum of the direct, indirect, and induced contributions.

Difference between economic contribution and impact analyses: There are many similarities between an economic contribution analysis and an **economic impact** analysis. They are both types of **economic activity analysis**, measuring change in economic activity in a region; however, an economic impact analysis measures *net* change and an economic contribution analysis measures *gross* change. Both use the same tools (e.g., IMPLAN) and measure economic activity within a region. Much of the economic activity described and quantified in this report would also be considered economic impacts, as we can defensibly claim the Reserve is bringing in or keeping economic activity within a region; however, we cannot definitively state that residents' spending at Reserves would otherwise happen outside the region in the absence of a Reserve. Accordingly, this report uses the broader term "economic contribution."

Tools for performing economic contribution analyses: Economic contribution analyses use **input-output (I-O) models**, which calculate the resulting contributions to a regional economy based on expenditures within it. These models use **multipliers**, sets of numbers representing the contribution that money spent in one industry has on another industry, to estimate how economic activity or an event (for example, a Reserve constructing a new visitor center) ripples through other industries in an economy.

Though there are several tools for economic contribution analyses,[4] we chose IMPLAN for its flexibility, supplemental outputs, and user-friendly interface. As this is a pilot study, IMPLAN's flexibility to define multiple geographies by just purchasing the I-O data for one state allowed us to define multiple study regions across Florida (one county or any combination of counties) cost-effectively. Many other tools charge per region, which would have restricted the depth of our analysis. IMPLAN also generates outputs, like industry-level contributions and tax contributions, that are not available using some other I-O modeling systems. Finally, IMPLAN is regarded for its user-friendly, web-based interface that clearly organizes inputs and outputs to streamline quality control/quality assurance processes and ensure accurate results.

[3] IMPLAN has a helpful primer about the different types of effects: https://implanhelp.zendesk.com/hc/en-us/articles/115009505707-General-Information-About-Multipliers

[4] These tools (most prominently) include IMPLAN, BEA RIMS II, and REMI. Each tool has slightly different functionality and outputs. For example, IMPLAN and BEA RIMS II are static and REMI is dynamic (measuring contributions across time). Another example is that IMPLAN is the only tool to offer tax contributions. All of these tools generate three basic outputs: direct, indirect, and induced contributions.

IMPLAN is a tool to estimate the total economic contributions (e.g., direct, indirect, and induced contributions) of a Reserve on the surrounding economy. It does not estimate economic benefits, so outputs should not be communicated as the "total economic value of the Reserves" or the "total return on investment generated by the Reserves." Rather, the results of this work should be clearly communicated as the Reserve's economic contributions to the surrounding economy, which is only a portion of its value. Clear and intentional communication is critical for enhancing the defensibility and communication value of these results.

2.2 Overview of IMPLAN

We estimated the economic contributions of each pilot Reserve using IMPLAN, a web-based I-O modeling application. IMPLAN inputs can take many forms, such as expenditures in an industry or a number of new jobs entering the area. In this effort, our inputs were visitor expenditures and expenditures by Reserves and their partners. These expenditures cover a variety of industries (e.g., sightseeing transportation, hotels, food, automobile rental) that generate economic contributions to the study region.

The outputs of IMPLAN come in the form of dollars (**revenue**, **value added**, and **labor income)**, and jobs (**employment**). Revenue is the total value of goods and services involved in transactions (often also referred to as "output"). Value added is the revenue minus the cost of the intermediate goods used as inputs. Employment is the number of new jobs added through this economic activity. Labor income is the amount of salary paid to these employees.

These metrics are also broken down by **direct contributions**, **indirect contributions**, and **induced contributions**. I-O analysis measures all three contributions within the study region. For each of these Reserves, we estimate the direct spending by the Reserve visitors, spending of the Reserve itself, employment and spending of Reserve partners, and spending by those visiting Reserve partners.[5] IMPLAN then calculates the indirect and induced contributions associated with the direct spending that we estimated.

2.3 Economic Contribution Analysis Steps

Step 1: We developed and hosted three 1.5-hour webinars with Reserve staff to introduce the project, introduce the team, and present the goals of the project. These webinars also helped us determine the types of spending information we needed to collect via web-based survey: spending by the Reserve on employees and other operations, spending by visitors to the Reserve, spending by visitors to Reserve partners, and both spending and employment by Reserve partners.

Step 2: We surveyed all 29 Reserves to learn about their spending, partners, and estimated number of visitors. We used the survey results to inform and scope out approximate spending "bins." Example bins:

- For Reserves, "appliances and electronics (televisions, computers, equipment)," "auto and boat repair and maintenance services," and "building and land rent or purchase."
- For partners, "cost of educational activities," "research activities," and "grant money for resilience projects."
- For visitors, "hiking," "boating," and "attending educational activities."

[5] Reserve partners include public/private colleges and universities; nonprofit organizations; federal, state, and local government entities; private businesses; and any other entity that interacts regularly with or is primarily or completely dependent on the existence of the Reserve.

Understanding and organizing the various types of Reserve, partner, and visitor spending helped us prepare data for IMPLAN and identify gaps we needed to fill before feeding the data into IMPLAN.

Step 3: We chose five Reserves for analysis, then visited them: full-day in-person visits for GTM and Rookery Bay and virtual visits (over two sessions each, with some email follow-up) for Apalachicola, Great Bay, and South Slough because of COVID-19-related concerns. Though we went through this process with Great Bay for a proof-of-concept, they ultimately had too little data to be included in this report. During the in-person and virtual meetings, we spoke with managers, coastal training program coordinators, education coordinators, research coordinators, stewardship coordinators, and others involved in Reserve activities and data collection efforts. We used these meetings to discuss Reserve partners, data collection and availability, and visitor counts. The meetings provided data to fill many of the gaps from the survey and context on our spending bins. We also discussed the most applicable local counties/geography to include in our contribution analysis. The study region was chosen in collaboration with Reserve managers. Since we were choosing an economic region, we stressed that the area where most Reserve employees live and most Reserve purchases are made would serve as a good benchmark.

Step 4: During the site visits we refined each Reserve's list of partners from the survey and contacted partners to hold brief 30-minute discussions about the project. We considered two types of potential partners:

- Collaborative partners, such as state agencies that exist based on the presence of the Reserve.
- Businesses, such as ecotourism companies that rely on the Reserve or exist because of the Reserve.

These discussions provided insight on partner spending (e.g., equipment and employees), partners' connection to or level of dependency on the Reserve, partner visitor counts, and partner locations. For example, an eco-tour company may be next to or within a Reserve, with kayak tours through Reserve waters as its entire business model; it would depend on the Reserve for its resulting revenue and job creation. Since we used visitor counts from both the Reserve and partners of the Reserve, it is possible that we may have double-counted visitors who visited both a partner and the Reserve or two partners in the same day. However, we used conservative estimates throughout the analysis, and we think our overall results represent a conservative underestimate of the overall economic contribution.

Step 5: We performed a literature review to identify spending data to fill the remaining gaps. These gaps primarily existed for visitor expenditures (see subsection below). For example, we investigated relevant visitor spending studies to gain insight on the best available visitor spending estimates for things like hotels, restaurants, gas, etc. Note that we did not have the resources to develop site-specific visitor spending profiles; these could be an important source of information moving forward, as suggested in Section 9.

Step 6: We input our spending data into IMPLAN and it calculated the indirect and induced contributions to generate the outputs for our economic contribution analysis. We organized and prepared our data from the surveys, in-person site visits, and relevant literature.

2.4 Literature Review: Visitor Expenditure Surveys

As noted above in Step 5, since conducting an original expenditure survey was outside the purview of this project, we reviewed spending profiles in existing studies to identify ones that best applied to Reserve visitors.

We first searched for expenditure surveys in studies that estimated spending at other Reserves. However, the only study that valued visitation to a Reserve used the travel cost method and only valued bird watching

opportunities. There is an ongoing study at the Lake Superior Reserve (expected to be complete by the end of 2019, but was delayed), but none of its results were available.

We then searched for expenditure profiles at NOAA's National Marine Sanctuaries and their surrounding areas. The NERRS and National Marine Sanctuaries are both under the NOAA umbrella and often share many of the same types of visitor activities such as wildlife viewing, beachgoing, hiking, boating, and fishing. Table 2-1 shows the reported overall expenditures found in our literature review. Adjusted expenditures were put into 2020 US$ using a GDP deflator based on the first two quarters of 2020.[6]

Table 2-1. Breakdown of Expenditure Studies

Expenditure Study Literature Review
Greater Farallones and the northern portion of Monterey Bay, 2015[7]
Adjusted expenditure: $35.90 per person-day **Resident status:** Not specified **Region:** North Central California **Details:** This study includes expenditures in 2014 for three California recreational areas. This expenditure profile includes expenditures by recreational visitors in the North Central California region. Expenditures are broken down by food, lodging, transportation, and various other recreation opportunities (bike rental, kayak rental, museums, lessons, etc.). The sample includes people within a likely day visit.
Adjusted expenditure: $36.29 per person-day **Resident status:** Not specified **Region:** Greater Farallones National Marine Sanctuary (GFNMS) Region **Details:** This expenditure profile includes the GFNMS region. GFNMS expenditures are higher for aquatic activities. The sample includes people within a likely day visit.
Adjusted expenditure: $30.76 per person-day **Resident status:** Not specified **Region:** Northern portion of Monterey Bay National Marine Sanctuary (MBNMS) **Details:** This expenditure profile looks at the northern portion of the MBNMS. MBNMS expenditures are lower in general. Otherwise, it is similar to the other two profiles. The sample includes people within a likely day visit.
Outer coast of Washington, 2016[8]

[6] GDP deflator calculation based on https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=3&isuri=1&nipa_table_list=13

[7] Leeworthy, V., Schwarzmann, D., & Reyes Saade, D. (2015). *A Socioeconomic Profile of Recreation Users of the California Northern Central Coast Region, Greater Farallones National Marine Sanctuary and the Northern Portion of Monterey Bay National Marine Sanctuary, 2011.* Marine Sanctuaries Conservation Series ONMS-15-11. National Oceanic and Atmospheric Administration. https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/science/socioeconomic/pdfs/ncc-recreation-report.pdf

[8] Leeworthy, V., Schwarzmann, D., Reyes Saade, D., Goedeke, T.L., Gonyo, S., & Bauer, L. (2016). *Market Economic Impacts and Contributions of Recreating Visitors to the Outer Coast of Washington and the Olympic Coast National Marine Sanctuary: Volume 2, 2014.* Marine Sanctuaries Conservation Series ONMS-16-03. National Oceanic and Atmospheric Administration. https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/science/socioeconomic/olympiccoast/pdfs/rec-impacts.pdf

Expenditure Study Literature Review
Adjusted expenditure: $24.69 per person-day **Resident status:** Residents **Region:** Outer coast of Washington **Details:** These expenditures are broken down by both person-trip and person-day. They focus on marine recreation, food, lodging, and transportation. They are also separated by resident status. The study area is the entire "outer coast." Per-trip and non-resident expenditures are higher, whereas lower ones come from residents taking day trips. The sample includes people in Washington.
Adjusted expenditure: $50.86 per person-day **Resident status:** Not specified **Region:** Outer Coast National Marine Sanctuary (OCNMS) **Detail:** This expenditure profile looks at the legal definition of the OCNMS boundary. It, and the other two sub-study areas, are not broken down by resident types. This study area has the most recreation expenditures, as opposed to lodging and food. The OCNMS + 2 km buffer is less recreation-focused, and Port Angeles has the lowest recreation expenditures. The sample includes people in Washington.
Adjusted expenditure: $52.84 per person-day **Resident status:** Not specified **Region:** OCNMS + 2 km buffer **Details:** This expenditure profile adds 2 kilometers to the boundary of the sanctuary. The sample includes people in Washington.
Adjusted expenditure: $160.20 per person-trip **Resident status:** Not specified **Region:** Port Angeles **Details:** Port Angeles is described as the "area near the shoreline where the OCNMS Headquarters and Visitor Center and the Fiero Life Center are located and a possible site for a new visitor Center." The sample includes people in Washington. This value is only included as a reference: a mistake in the report led to only a portion of each of the per person-day expenses being reported.
Adjusted expenditure: $63.59 per person-day **Resident status:** Not specified **Region:** Port Angeles **Details:** This number is the reported total per person-day expenditures, though adding up the individual expenses reveals a clear error. The sample includes people in Washington.
National marine angler expenditure survey, 2013[9]
Adjusted expenditure: $448.30 per person-trip **Resident status:** All anglers **Region:** West Florida **Details:** This value represents person-trip expenditures on for-hire trips. For-hire trips are often more expensive and are often found in tourist-heavy areas. These expenditures and others from the National Marine Angler Expenditure Survey are also available by resident status. This and the next two expenditures are from the 2011 report.

[9] Lovell, S. J., Steinback, S. R., & Hilger, J. R. (2013). *The Economic Contribution of Marine Angler Expenditures in the United States, 2011.* https://repository.library.noaa.gov/view/noaa/4600

Expenditure Study Literature Review
Adjusted Expenditure: $45.53 per person-trip **Resident Status:** All anglers **Region:** West Florida **Details:** This value represents trip expenditures for private boat trips. Private boat trips and shore trips are the likely common trips taken at the Reserves.
Adjusted Expenditure: $28.89 per person-trip **Resident Status:** All anglers **Region:** West Florida **Details:** This value represents trip expenditures for fishing from the shore.
Adjusted Expenditure: $2,598.09 per person (annual) **Resident Status:** All anglers **Region:** Florida **Details:** These values represent seasonal durable expenditures. They come from the 2011 study, which only measured durable expenditures**.**
National survey of fishing, hunting, and wildlife-associated recreation, 2011[10]
Adjusted expenditure: $432.32, $1,036.42, and $1,177.07 annually per wildlife viewer, fisherman, and hunter, respectively **Resident status:** All wildlife viewers, fisherman, and hunters in New Hampshire regardless of residency **Region:** New Hampshire **Details:** This study reported annual expenses per participant for each of the three activities for people in Florida as well as per-spender for wildlife viewing. The values above are based on total annual expenses (Table 31 for wildlife viewing; Table 16 for hunting and fishing). The study also reports the average number of days per year that individuals participate, allowing us to use per person-day.
Adjusted expenditure: $1,311.95 annually per wildlife viewing participant **Resident status:** All wildlife viewing participants in Oregon regardless of residency **Region:** Oregon **Details:** This report shows annual expenses per participant for people viewing wildlife in Oregon. The value above is total annual expenses (Table 31). The study also reports the average number of days per year that individuals participate, allowing us to use per person-day.
Adjusted expenditure: $770.11, $1,706.23, $3,255.67, and $940.73 annually per wildlife viewer, fisherman, hunter, and wildlife viewing spender, respectively **Resident status:** All wildlife viewers, fisherman, and hunters in Florida regardless of residency **Region:** Florida **Details:** This study reported annual expenses per participant for each of the three activities for individuals in Florida as well as per-spender for wildlife viewing. The value above is based on total annual expenses (Table 31 for wildlife viewing; Table 16 for hunting and fishing). The study also reports the average number of days per year that individuals participate, allowing us to use per person-day.

[10] U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, & U.S. Census Bureau. (2014). *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.* https://www.census.gov/prod/2013pubs/fhw11-or.pdf; https://www.census.gov/prod/2013pubs/fhw11-fl.pdf; https://www.census.gov/prod/2013pubs/fhw11-nh.pdf

Expenditure Study Literature Review
Visitor study for 1995–1996 vs. 2007–2008 in Florida, 2010[11]
Adjusted expenditure: $173.91 per person-day for visitors in 2007–2008 **Resident status:** Visitors to the Florida Keys **Region:** Florida Keys/Monroe County **Details:** This study also measured per person-trip. The study did not take multiple trips to the Florida Keys into account, so these data operate under the assumption that individuals only visit the keys once per year.
Economic benefits of wildlife viewing in Florida, 2011[12]
Adjusted expenditure: $140.65, $106.06, and $99.15 (average per participant-day for nonresidential activities, nonresidential activities minus equipment possibly used for nonresidential activities, and travel expenses only, respectively) **Resident Status:** Nonresidents of Florida **Region:** Florida **Details:** These data are based on retail sales for activities, equipment, travel, and real estate while visiting Florida.

During phase I, we ultimately found the spending profiles from the California studies (top three rows of Table 2-1) to be the most representative of visitor spending for our pilot sites because the activity breakdown of visitors was the best match with our pilot sites. It would have been preferable to choose an expenditure profile within Florida because of the variation in regional consumer prices. However, the expenditure studies conducted on the Florida Keys National Marine Sanctuary (FKNMS) only included spending profiles for out-of-county visitors (who are likely to have a much higher spending profile), and the visitor counts we have for this project do not differentiate from the type of visitor (local or out-of-region). Additionally, the FKNMS profile is less representative of the activities offered and the visitors to the two pilot sites, as it is very boater- and diver-heavy. The *Marine Angler Expenditures in the United States* studies (third section of Table 2-1) estimate recreational fishing spending in each state and are updated every few years; however, fishing is only a small part of the spending profile of the two pilot sites, so this was not representative for our project.

During phase II, we sought a survey that was more geographically representative of our study area. Reserve visitors may be similar to those visiting National Marine Sanctuaries, though people make and spend money differently around the country. To capture the geographic differences, we used the *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.* This national study is broken down by state. As well, it breaks down expenses by activity and different types of spending (per participant and per spender). We used this study for the phase II sites because it better captured visitor expenditures. While the studies in both phase I and II fit the needs of our research, other studies should seek expenditure surveys that align with their research goals: we are not recommending a single expenditure study that could be used across all Reserves at this time.

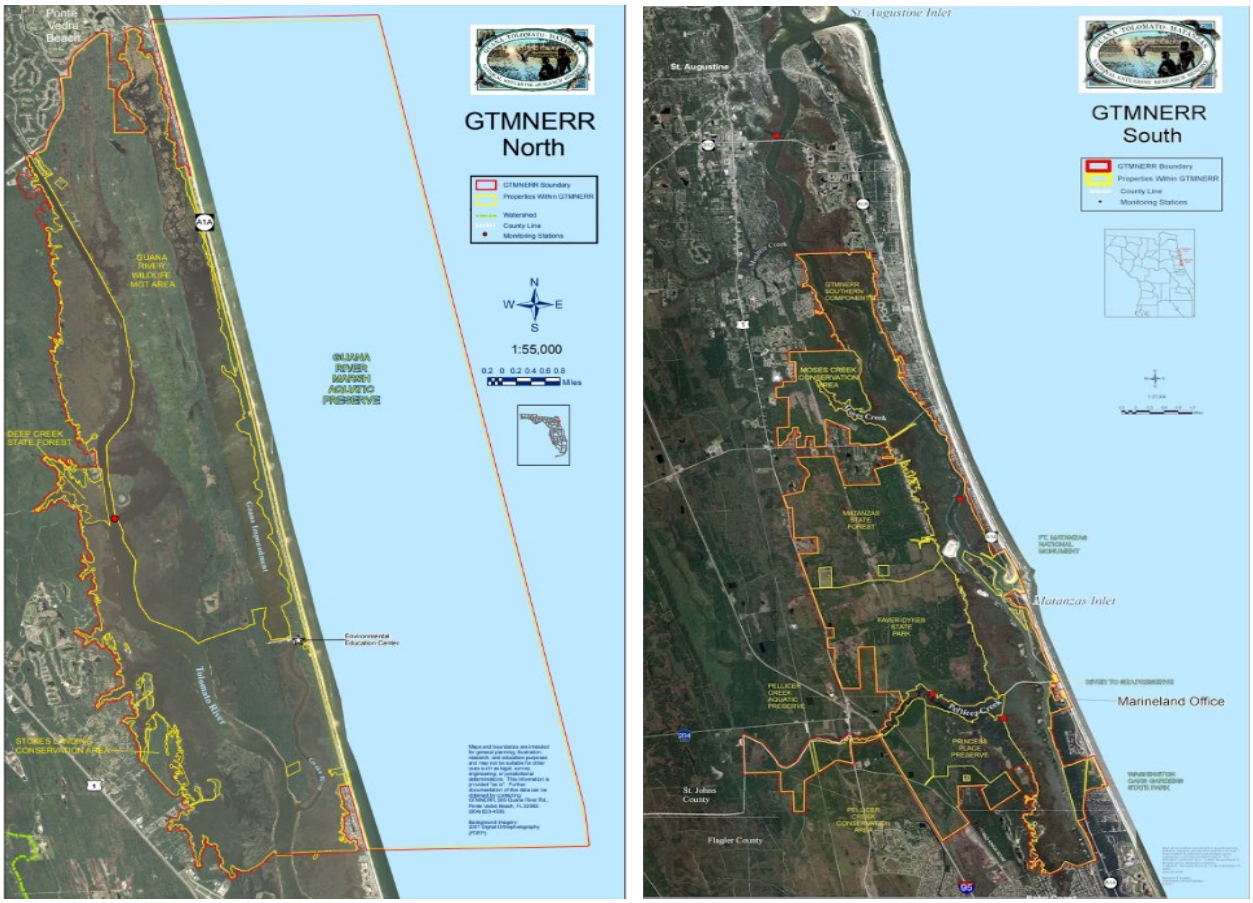
[11] Leeworthy, V. R. (2010). *Visitor Study: Selected Comparisons 1995-06 and 2007-08.* https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/science/socioeconomic/floridakeys/pdfs/comparisons_9596_0708.pdf

[12] Florida Fish and Wildlife Commission. (2013). *The 2011 Economic Benefits of Wildlife Viewing in Florida.* http://protectpaynesprairie.org/protectpp/uploads/2015/08/2011-economics-benefits.pdf

3. GTM Economic Contribution Analysis

3.1 Description of the Reserve

The GTM Reserve covers about 73,000 acres along the northeast coast of Florida and is split into two distinct parts, GTM North and GTM South.[13, 14] GTM stretches from Ponte Vedra Beach to Palm Coast and is home to different habitats such as mangroves and salt marshes—it even provides calving ground for right whales.[15] Its primary mission is the "conservation of natural biodiversity and cultural resources through research and monitoring to guide science-based stewardship and education strategies."[16] Figure 3-1 presents maps of GTM North and South.



GTM North **GTM South**

Figure 3-1. Maps of GTM North and South

[13] GTM Research Reserve. (n.d.). *GTMNERR North & South.* https://gtmnerr.org/gtmnerrmapicon/

[14] NOAA Office for Coastal Management. (2021). *Guana Tolomato Matanzas National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/gtm.html

[15] NOAA Office for Coastal Management. (2021). *Guana Tolomato Matanzas National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/gtm.html

[16] Florida Department of Environmental Protection. (2021). *National Estuarine Research Reserves—Guana—Tolomato—Matanzas.* https://floridadep.gov/rcp/nerr-gtm

Reserve Spending and Operations

GTM pays employees (direct contribution) who then spend their money in the local economy (induced contribution). GTM also spends money on fuel, property, equipment, etc., which benefits those companies (direct contribution) as well as the entities that supply inputs to those companies—e.g., the steel and electric component manufacturer that supplies a company that makes a machine that GTM purchases (indirect contribution). Additionally, Friends of the GTM Reserve spends money to support the Reserve.

Spending by Visitors and Visiting Researchers

GTM hosts many recreational visitors who participate in activities like hiking, viewing wildlife, taking eco-tours, kayaking, swimming, fishing, and more. The costs associated with these activities generate economic contributions in the local economy. For example, local or out-of-area visitors who travel to the Reserve to fish may need to rent a boat, pay for gas, and rent fishing equipment. Out-of-area visitors may stay for several days and pay for a hotel, rent a car, and go to restaurants.

GTM brings in scientists who conduct Reserve-sponsored research and monitoring projects. It also hosts visiting scientists, students, interns, and volunteers who can help Reserve scientists or conduct independent (sponsored by an entity other than GTM) research.[17] Visiting scientists or researchers likely stay in hotels, visit restaurants, and take other actions that require them to spend money in the local economy. GTM also offers a variety of educational programs including coastal training programs, summer camps, teacher/student programs, and additional activities that bring visitors who spend money at the Reserve and in the local economy.[18, 19]

Partner Spending and Operations

GTM partners with local government, non-governmental organizations, and businesses in a number of ways. Businesses such as ecotourism companies, as well as non-government and government entities, operate within the boundaries of the Reserve and depend on the wildlife and aesthetics of the Reserve to operate. Thus, the Reserve helps the businesses and other partners thrive and helps create or support jobs in the local economy as those entities are directly employing personnel. For example, the Reserve provides education and training that local ecotourism companies can attend, and then use in their marketing to increase business.

Spending by Visitors of Partners

The health of the Reserve is critical to the entities mentioned above (local government, non-government, and businesses), bringing in visitors who spend money in the local economy.

Other Spending

GTM also helps bring in grant money through research, which can support workers in the local economy.

The sections below qualitatively characterize how the Reserve creates economic contributions in the study area based on Reserve spending, the number of visitors, and their partners (where applicable).

[17] GTM Research Reserve. (2020). *Visiting Scientists.* https://gtmnerr.org/research/visiting-scientists/

[18] GTM Research Reserve. (2020). *Coastal Training Program.* https://gtmnerr.org/education/workshops-training-and-resources/

[19] GTM Research Reserve. (2020). *K–16 Education and Outreach Programs.* https://gtmnerr.org/k-16-education-and-outreach-programs/

3.1.2 Reserve Operations Data

One way in which GTM contributes to the local economy is through its operations spending (employees, equipment, etc.). We collected spending data directly from the Reserve during an in-person site visit. When possible, the Reserve managers also estimated the percentages of expenditures that occurred within the study area. To get the input for our analysis we multiplied the entire budget category by the percentage that was spent locally (within Duval, Flagler, or St. Johns Counties).

We also included the Friends of the GTM Reserve budget in this analysis and performed the same local analysis methods as above. The Friends of GTM is a nonprofit support organization that provides dedicated support to the Reserve through community partnerships, volunteering, and outreach, but also through fundraising and financial support. Part of the friends group focus is on fundraising to provide more funding for graduate students at the Reserve, whose spending further generates local economic contributions.

3.1.3 Reserve Visitor Data

GTM offers hiking, wildlife viewing, kayaking, fishing, hunting, horseback riding, beachgoing, and boating as well as educational events, coastal training program events, and other special events. The GTM beaches see roughly 128,795 visitors annually. Meanwhile, 84,166 total visitors partake in activities such as hiking, wildlife viewing, kayaking, fishing, and horseback riding. (These activities were grouped because the Reserve had a good estimate for them in combination; teasing out the individual visitors for each would have been more difficult.) The educational events bring in around 7,000 visitors annually. Table 3-1 shows GTM visitor estimates, by activity, using the Reserve's best available data.

Table 3-1 GTM Visitors by Activity (Annual)

Activity	Visitors
Beachgoing	128,795
Hiking, wildlife viewing, kayaking, fishing, and horseback riding	84,166
Citizen science events and educational events	7,000
Attending other Reserve events	1,000
Hunting	1,000
Research	400
Total	222,361

When visiting the Reserve, visitors might spend money on various recreational activities (kayaking, equipment rental, hiking, boating, etc.) and in other areas of the local economy (restaurants, hotels, fuel, etc.). To translate these visitation numbers into expenditures that could then be applied to the study area, we identified a visitor expenditure survey that closely reflected the spending patterns of visitors to GTM: the expenditure profile from the northern portion of MBNMS. (See "Literature Review: Visitor Expenditure Surveys" above for more information.) Ultimately, spending at National Marine Sanctuaries is comparable to spending at Reserves and the activities that are measured in the two areas are similar. This study provides better insight on spending than studies of other entities that are closer geographically to the pilot Reserves because National Marine Sanctuaries are more similar to the Reserves than, say, a National Park in Florida. Ultimately, we were limited by existing literature and had to use available information that best represented the Reserves. Table 3-2 details the expenditure profile of the average MBNMS visitor. These expenditures are average values, so the low average spending on lodging means that most visitors did not stay overnight.

Table 3-2. Expenditures Profile of Visitors to MBNMS (Per Person-Day).

Expenditure Category (e.g., Lodging, Food, Gas)	Dollar Value	Adjusted Price[20]	IMPLAN Sector
Food and beverages at a restaurant or bar	$8.56	$9.87	501, 502
Lodging	$5.52	$6.36	499
Food and beverages from a store	$3.46	$3.99	400
Souvenirs (t-shirts, posters, gifts, etc.)	$1.64	$1.89	405
Parking	$0.94	$1.08	526
Museum, aquarium, or other entrance fee	$1.45	$1.67	526
Car rental	$0.33	$0.38	442
Sundries (sunscreen, surf wax, motion sickness)	$0.74	$0.85	404
Boat rental	$0.37	$0.43	443
Charter fee	$0.74	$0.85	414
Bike rental	$0.36	$0.41	443
Lessons, clinics, camps	$0.70	$0.81	526
Kayak rental	$0.66	$0.76	443
Boat fuel	$0.44	$0.51	402
Surfboard or body board rental	$0.64	$0.74	443
Ramp fees	$0.02	$0.02	526
Total		**$30.62**	

We used these expenditures to model GTM visitor spending contributions.[21] As noted above we chose this spending profile based on similarities to the types of activities performed at GTM. This spending profile is predominantly residents and visitors within a "day trip," so it may underestimate visitor spending if more visitors are staying overnight. We assumed that the 222,361 visitors spent an average of $30.62, resulting in an IMPLAN input of about $6.8 million.

3.1.4 Other Spending Generated by the Reserve

Some other sources of spending generated by GTM include individuals and local and state entities spending money on weddings, dredging, transportation, and oyster harvesting. Weddings are arranged through Friends of the GTM Reserve, and the revenue they raise is reflected in the economic contributions of the nonprofit. We did account for additional spending on weddings (event planning, food, decorations). This spending does not go to GTM, but rather the local economy. Dredging, the process of digging out sediment to maintain water passage depth, generates economic contributions because local businesses are contracted to do the work. GTM's existence also supports the oyster fishery. GTM's natural habitat allows the oysters to reproduce and survive and helps sustain a commercial oyster harvesting industry. There are also additional costs for transportation to and from education events for school-aged children. We added these additional categories to our analysis by using either annual inputs or averaging them over the past five years.

[20] Adjusted price was calculated using the GDP deflator method and GDP data from the U.S. Bureau of Economic Analysis. Adjusted price is in 2020 U.S. dollars.

[21] The original study referenced "hang gliding" at $0.12. We decided to remove that and adjust the total spending from $30.74 to $30.62.

3.1.5 Reserve Partner Spending Data

Several local, state, and federal agencies; private organizations; and non-governmental organizations operate partly or entirely within the boundaries of GTM. Most private businesses included as partners in this analysis are ecotourism operations that depend on GTM's natural environment and wildlife to flourish and attract visitors and clients. These agencies and businesses hire employees who reside in the defined study region and spend money in the local economy. We calculated employees by dividing the number of part-time employees by two and adding the result to the number of full-time employees.[22,23] The partners had 42 full-time employees and 10 part-time, so we used 47 total employees for our analysis.

3.1.6 Reserve Partner Visitor Data

Many of the Reserve partners have visitors who also spend money in the local economy.[24] As noted in the section above, these partners depend on the Reserve to flourish to help bring visitors into the region. We collected visitation numbers for each of these place-based partners, and we applied the same expenditure profile for these visitors that we used for visitors of GTM. Across all partners we estimated a total of 760,611 visitors annually to the partners surrounding or within the Reserve.

3.2 Results

We used IMPLAN to estimate economic contributions that Reserve operations, Reserve visitors, partner operations, and visitors of partners infused into Duval, St. Johns, and Flagler Counties. In 2018, the GTM Reserve contributed to these counties an estimated (in 2020 US$):

- $57 million of revenue
- 521 jobs
- $20 million of labor income
- $33 million in value added

Table A-1 in Appendix A breaks down these four indicators by direct, indirect, and induced contributions.

For GTM and its partners, the bulk of their contribution comes through visits rather than their direct operational spending (on employees, equipment, etc.). The text box below sums up how the Reserve generates these economic contributions and the economic contribution to Duval, St. Johns, and Flagler Counties. As emphasized above, partner spending—and thus the economic contributions generated by partners—are substantially or wholly reliant on the Reserve to support a flourishing natural environment so these partners can operate and draw visitors.

[22] Ideally we would capture operations costs other than payment to employees, so this an underestimate of the operations cost. The money to employees should, however, represent the majority of the operations cost inserted into the local economy.

[23] Total Employee = [full-time employees + (part-time/seasonal employees ÷ 2)]

[24] We were not able to remove double counting for visitors to multiple partners within a single visit.

Key Contributions from GTM

Altogether, the spending by the Reserve, its partners, and visitors of both contributes **521 jobs** and **$57.6 million i**n revenue to the counties of Duval, St. Johns and Flagler.

GTM brings thousands of people to the region, who come to enjoy a variety of activities including hiking, fishing, and boating. These visitors spend money in the local economy on food, lodging, transportation, and other recreation-related needs. Their spending supports **90 jobs** and contributes **$9.9 million** in revenue to the local economy.

The Reserve supports staff and purchases goods and services from the local economy for its operations. These local business and staff then spend their money in the local economy, supporting additional businesses. This Reserve operational spending supports **48 jobs** and contributes **$5.6 million** in revenue to Duval, St. Johns, and Flagler Counties.

The Reserve works with many partners who rely on it to thrive. These collaborations support partners' salaries and bring additional visitors to the region. Partner spending supports **75 jobs** and adds **$8.2 million** of revenue to the region.

Visitors brought by Reserve partners spend money in the same way Reserve visitors do. Their spending supports **308 jobs** and contribute **$33.9 million** in revenue to the economies of Duval, St. Johns, and Flagler Counties.

4. Rookery Bay Economic Contribution Analysis

4.1 Description of the Reserve

The Rookery Bay Reserve covers about 110,000 acres in southwest Florida, stretching across most of the northern Ten Thousand Islands region. The Reserve's primary mission is "to provide a basis for informed stewardship of estuaries in Southwest Florida through research and education."[25]

Rookery Bay hosts a large variety of educational programs, tours, and events, as well as professional training workshops, scientific research opportunities, and several volunteer programs to enhance the preservation, restoration, and management of the Reserve. (In fact, volunteers for the Reserve contribute over 18,000 hours of work per year.[26]) These educational opportunities, professional training events, scientific research opportunities, and volunteer activities generate a variety of economic contributions to the surrounding economy. We have described these contributions below in various spending categories.

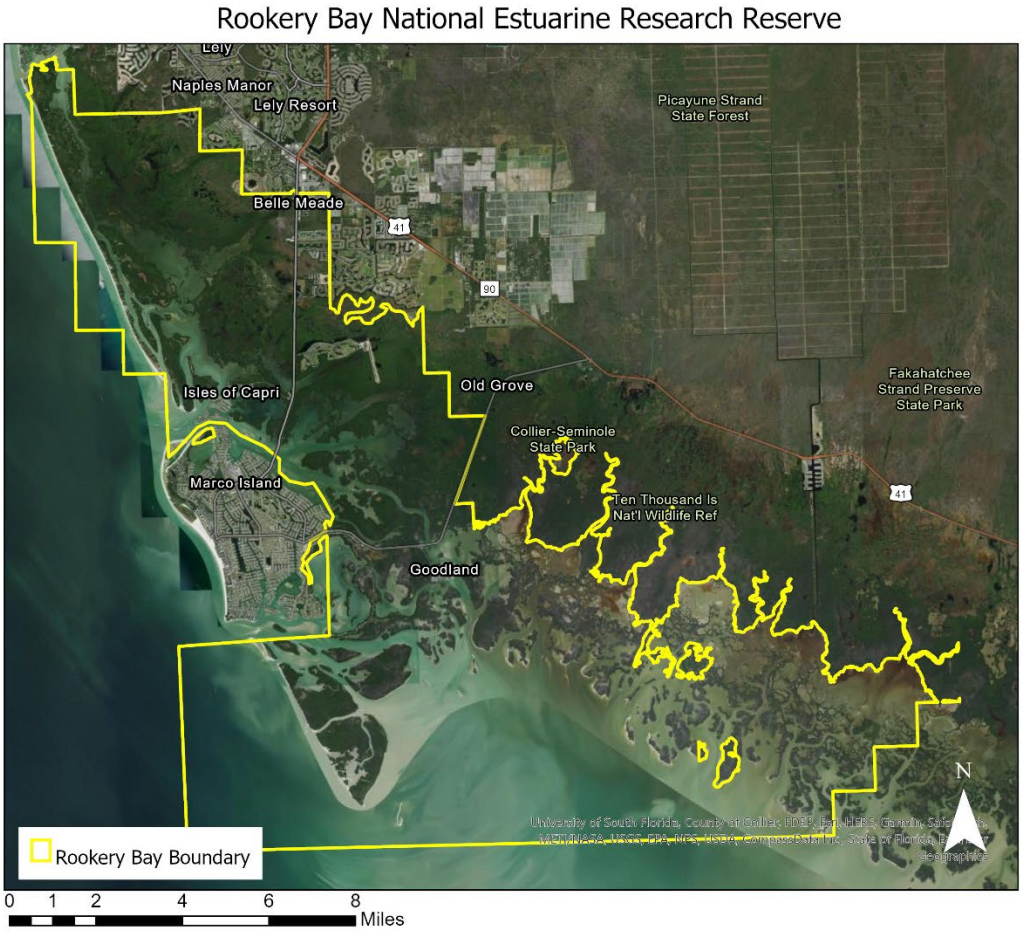


Figure 4-1. Map of Rookery Bay

[25] Florida Department of Environmental Protection. (2013). *Rookery Bay National Estuarine Research Reserve: Management Plan.* https://rookerybay.org/wp-content/uploads/Rookery-Bay-NERR-Management-Plan-1.pdf

[26] Friends of Rookery Bay. (n.d.). *Volunteer.* https://rookerybay.org/support/volunteering.html

Reserve Spending and Operations

Rookery Bay pays employees (direct contribution) who then spend their money in the local economy (induced contribution). Rookery Bay also spends money on fuel, property, equipment, etc., which benefits those companies (direct contribution) as well as the entities that supply inputs to those companies (e.g., the steel and electric component manufacturer that supplies a company that makes a machine that Rookery Bay purchases) (indirect contribution). Additionally, Friends of Rookery Bay spends money to support the Reserve.

Spending by Visitors

Rookery Bay hosts many recreational visitors who participate in activities like boat and kayak tours, hiking, viewing wildlife, fishing, and more. The visitors that engage in these activities pay for both activities and other goods and services in the local economy. For example, local or out-of-area visitors who travel to the Reserve to birdwatch, may buy binoculars at a nearby store, pay for gas to travel to the Reserve, or eat lunch at a local restaurant. Out-of-area visitors may also stay for several days and pay for a hotel or rent a car. If the Reserve did not exist, these local and out-of-area visitors would not spend money to rent a boat, pay for gas, rent fishing equipment, rent a car, pay for a hotel, go to restaurants, etc.

Partner Spending and Operations

Rookery Bay draws a number of ecotourism businesses that are primarily or wholly dependent on the Reserve. These businesses often operate mainly or entirely within the boundaries of the Reserve and depend on its wildlife and aesthetics to operate. Thus, the Reserve helps businesses thrive and helps create or support jobs in the local economy, as those entities directly employ personnel. In addition, the Reserve hosts training and educational events that can allow local ecotourism businesses to gain certifications of knowledge. These businesses can then use these trainings in their marketing.

Spending by Visitors of Partners

The health of the Reserve is critical to the businesses above, which bring in visitors who spend money in the local economy.

External Grant Spending

Rookery Bay also helps bring in grant money through research, which sometimes supports workers in the local economy.

The sections below qualitatively characterize how the Reserve creates spending in each of these data categories, then quantify the number of visitors (when applicable) and various spending by the Reserve, its partners, and visitors.

4.1.2 Reserve Operations Data

One way Rookery Bay contributes to the local economy is through its spending (employees, equipment, etc.). We collected spending data directly from the Reserve during an in-person site visit. When possible, the Reserve managers also estimated the percentages of local expenditures that occurred within the study area. For example, if Rookery Bay estimated that they spent half of a certain budget category within Lee and Collier Counties (the defined study area), we would only apply half of that budget category to the analysis.

The Friends of Rookery Bay is a nonprofit support organization that provides dedicated support to the Reserve through community partnerships, volunteering, and outreach, but also through fundraising and financial

support. Part of the reason that the friend's group focuses on fundraising is to provide more funding for graduate students at the Reserve, whose spending further generates local economic contributions.

4.1.3 Reserve Visitor Data

Rookery Bay offers wildlife viewing, camping, boat and kayak tours, educational opportunities, and many other recreational activities. Each year, the Reserve sees around 20,000 hikers and wildlife viewers. During 2019, 261,119 boaters visited the bay. An additional 750 canoers and kayakers visit the Reserve waters, annually. The educational events bring in 2,700 visitors, and other events bring in another 300 visitors per year. Table 4-1 shows Rookery Bay visitor estimates, by activity, using the Reserve's best available data.

Table 4-1. Rookery Bay Visitors by Activity.

Activity	Visitors
Hiking and wildlife viewing	20,000
Camping	500
Canoeing/kayaking	750
Attending education events	2,700
Boating	261,119
Other Reserve events	300
Total	**285,369**

When visiting the Reserve, visitors might spend money on various recreational activities (kayaking and canoeing, boat tours, hiking, etc.) and in other areas of the local economy (restaurants, hotels, fuel, etc.). To translate these visitation numbers into expenditures that could then be applied to the study area, we identified a visitor expenditure survey that closely reflected the spending patterns of visitors to Rookery Bay: the expenditure profile from the northern portion of MBNMS. (See "Literature Review: Visitor Expenditure Surveys" above for more information.) Ultimately, spending at National Marine Sanctuaries is comparable to spending at Reserves and the activities that are measured in the two areas are similar. Table 4-2 details the expenditure profile of the average MBNMS visitor. These expenditures are average values, so the low average spending on lodging means that most visitors did not stay overnight.

Table 4-2. Expenditures Profile of Visitors to MBNMS (Per Person-Day)

Expenditure Category (e.g., Lodging, Food, Gas)	Dollar Value	Adjusted Price[27]	IMPLAN Sector
Food and beverages at a restaurant or bar	$8.56	$9.87	501, 502
Lodging	$5.52	$6.36	499
Food and beverages from a store	$3.46	$3.99	400
Souvenirs (t-shirts, posters, gifts, etc.)	$1.64	$1.89	405
Parking	$0.94	$1.08	526
Museum, aquarium, or other entrance fee	$1.45	$1.67	526
Car rental	$0.33	$0.38	442

[27] Adjusted price was calculated using the GDP deflator method and GDP data from the U.S. Bureau of Economic Analysis. Adjusted price is in 2020 US dollars.

Expenditure Category (e.g., Lodging, Food, Gas)	Dollar Value	Adjusted Price[27]	IMPLAN Sector
Sundries (sunscreen, surf wax, motion sickness)	$0.74	$0.85	404
Boat rental	$0.37	$0.43	443
Charter fee	$0.74	$0.85	414
Bike rental	$0.36	$0.41	443
Lessons, clinics, camps	$0.70	$0.81	526
Kayak rental	$0.66	$0.76	443
Boat fuel	$0.44	$0.51	402
Surfboard or body board rental	$0.64	$0.74	443
Ramp fees	$0.02	$0.02	526
Total		**$30.62**	

We used these expenditures to model Rookery Bay visitor spending contributions.[28] As noted in Section 2 above, we chose this spending profile based on similarities to the types of activities performed at Rookery Bay. This spending profile is predominantly residents and visitors within a "day trip," so it may underestimate lodging and costs associated with overnight stays. We assumed that the 285,369 visitors spent an average of $30.62, resulting in an IMPLAN input of about $8,737,999.

4.1.4 Reserve Partner Operations Data

Rookery Bay supports a number of businesses that operate within its boundaries.[29] Most private businesses included as partners in this analysis are ecotourism operations that depend on a flourishing natural environment in Rookery Bay. These businesses then hire employees who reside in the defined study region and who spend money in the local economy. Through conversations with the Reserve and the Reserve's partners, we estimated that there were 147 full-time employees and 24 part-time employees for a total of 159 employees.[30]

4.1.5 Reserve Partner Visitor Data

Many of the Reserve partners have visitors who also spend money in the local economy.[31, 32] As noted in the section above, these partners depend on the Reserve to flourish to help bring visitors into the region. We

[28] The original study referenced "hang gliding" at $0.12. We decided to remove that and adjust the total spending from $30.74 to $30.62.

[29] Reserve partners include public/private colleges and universities, nonprofit organizations, federal, state, and local-government entities, private businesses, and any other entity that interacts regularly with or relies completely on the existence of the Reserve.

[30] Total employee = [full-time employees + (part-time/seasonal employees ÷ 2)]

[31] Reserve partners include public/private colleges and universities, nonprofit organizations, federal, state, and local-government entities, private businesses, and any other entity that interacts regularly with or relies completely on the existence of the Reserve.

[32] We were not able to remove double counting for visitors to multiple partners within a single visit.

collected available visitation numbers for these businesses and partners. We estimated that there are 381,825 visitors to the Reserve partners annually.

4.2 Results

We used IMPLAN to estimate economic contributions that Reserve operations, Reserve visitors, partner operations, and visitors of partners infused into Lee and Collier Counties. In 2018, the Rookery Bay Reserve contributed to these counties an estimated:

- $55 million of revenue
- 512 jobs
- $19 million of labor income
- $30 million in value added

Table B-1 in Appendix B breaks down these four indicators by direct, indirect, and induced contributions.

For Rookery Bay and its partners, the bulk of their contribution comes through visits rather than direct spending (on employees, equipment, etc.). The text box below sums up how the Reserve generates these economic contributions and the economic contribution to Lee and Collier Counties. As emphasized above, partner spending—and thus the economic contributions generated by partners—are substantially or wholly reliant on the Reserve to support a flourishing natural environment so these partners can operate and draw visitors.

Key Contributions from Rookery Bay

Rookery Bay's existence generates spending by the Reserve and its partners and attracts visitors to the region. Altogether this spending contributes to **$55 million** in revenue and supports **512 jobs** in Collier and Lee Counties.

The Reserve and its friends group spend money locally on staff, equipment, transportation, and other expenses relating to daily operations. This spending supports nearly **28 jobs** and **$4.4 million** in revenue in the region.

Visitors to Rookery Bay spend money in the region on food, lodging, transportation, and other needs. Their spending supports **104 employees** and generates **$11.5 million** in revenue to the region.

The Reserve works with groups who depend on the Reserve's existence. They spend money locally on staff, goods, and services for their operations, generating **$23.6 million** in revenue and supporting nearly **239 jobs** in Collier and Lee Counties.

Reserve partners attract additional visitors, who spend money in the same way Reserve visitors do. Their spending supports an additional **140 jobs** and **$15.4 million** in revenue to the local economy.

5. South Slough Economic Contribution Analysis

5.1 Description of the Reserve

The South Slough NERR covers nearly 5,000 acres in southwest Oregon.[33] The Reserve consists of uplands with conifer forests and freshwater streams that flow into the estuary, as well as lowlands containing wetlands and ponds, high- and low-salt marshes, mud flats, and eelgrass beds.[34] These habitats support populations of salmon, herons, bald eagles, elk, and crabs.[35]

Visitors come to enjoy an assortment of recreational opportunities provided by the Reserve, including hiking, kayaking, and hunting. Reserve events for the public, teachers, and students attract additional visitors. Programs for students include summer camps and one-day and multi-day field trips. Additionally, the Reserve educates local decision-makers through the Coastal Training Program.

South Slough is a key part of the local community. The Reserve has a robust program for volunteers, who spend more than 3,000 hours a year helping with education and research. South Slough also rents out the auditorium and hosts community events. The protected natural habitat in South Slough supports commercial oyster growers in the estuary and provides important nursery habitat for fisheries in Coos Bay. Research by Reserve staff and visiting researchers improves knowledge about the estuary and local ecology, helping inform coastal zone and watershed management in the region. Figure 5-1 shows a map of the South Slough Reserve.

[33] NOAA Office for Coastal Management. (2021). *South Slough National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/south-slough.html

[34] NOAA Office for Coastal Management. (2021). *South Slough National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/south-slough.html

[35] NOAA Office for Coastal Management. (2021). *South Slough National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/south-slough.html

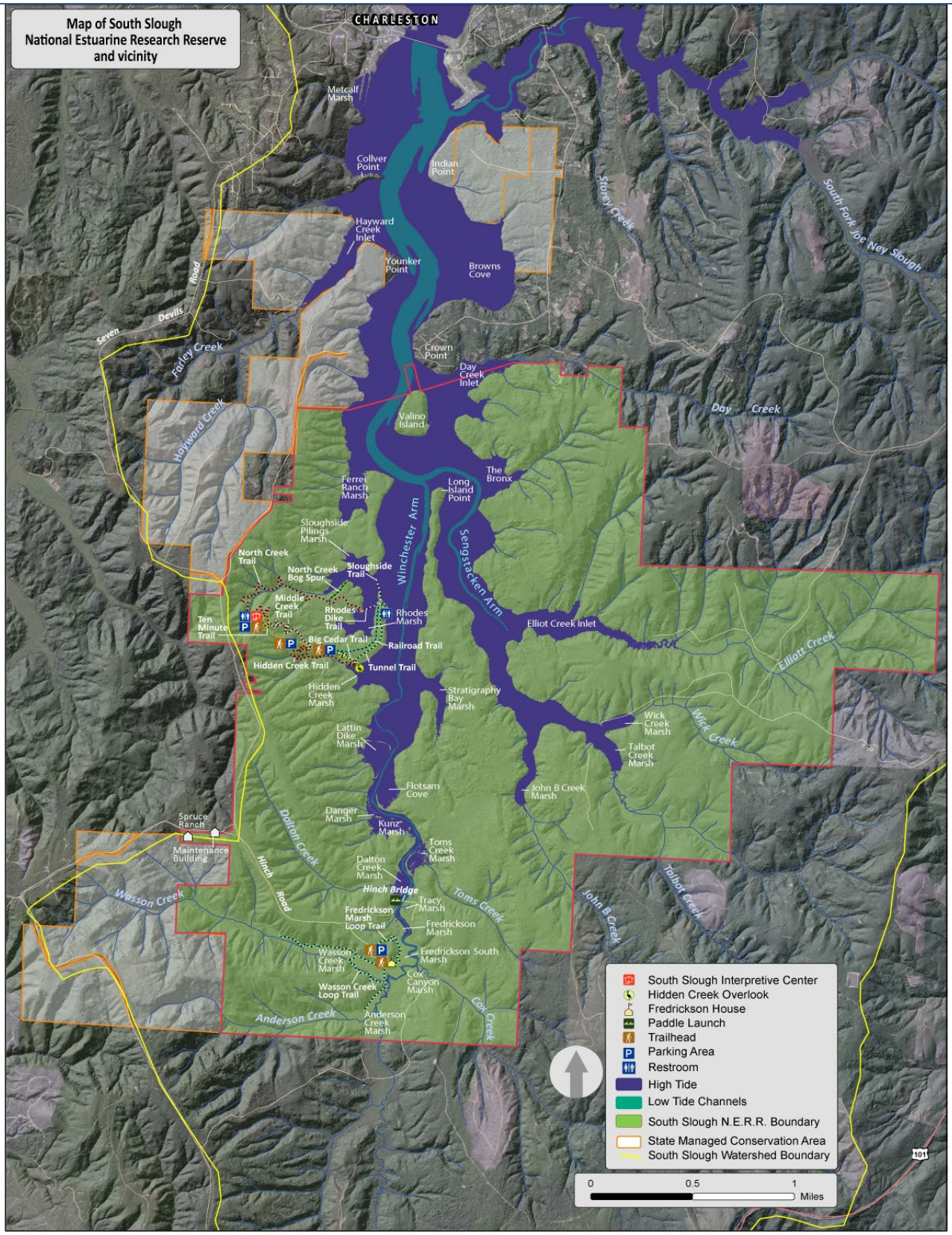


Figure 5-1. Map of South Slough

Reserve Spending and Operations

South Slough pays employees (direct contribution) who then spend their money in the local economy (induced contribution). The majority of Reserve staff live within Coos County and can spend their income locally, creating induced contributions to the local economy. The Reserve spends money locally on supplies and services, including utilities, food, boat maintenance and repairs, and construction. This spending provides direct contributions to the local economy. The businesses hired by the Reserve spend money buying supplies from manufacturers and other businesses to provide these services, providing induced contributions. Friends of South Slough supplements some of the Reserve's spending by providing educational supplies, supporting interns, and hiring consultants. Its spending also creates direct and indirect contributions in Coos County.

South Slough brings in a large portion of its annual spending through grants every year. Many of these grants are put towards operations, while several are brought in for specific projects, such as construction or acquisition of land. Construction or acquisition projects do not occur every year, but even when the total amount from grants is averaged over the past five year. In total, the Reserve brings in nearly 70 percent of the Reserve's annual spending through grants.

Spending by Visitors and Visiting Researchers

South Slough is in a remote area, removed from large population centers. Visitors often come to view wildlife, hike, and kayak. They may spend money locally on food or renting kayaks, paddleboards, or canoes. The Reserve attracts additional visitors by putting on community education events such as bird watching and mushroom foraging classes. Schools come to South Slough for day trips and participate in interactive lessons put on by Reserve staff. Schools located further away often come to the area for overnight trips and combine Reserve programs with other educational opportunities in the area. Students also come to the Reserve to attend summer camp. While children are not likely to spend money in the local economy, schools that come for overnights spend money locally on food and lodging.

South Slough hosts visiting researchers from universities and state agencies. Most researchers spend multiple days working at the Reserve. They provide direct and indirect contributions during their stay by spending money on food and transportation.

5.1.2 Reserve Operations Data

The Reserve provided a very detailed, categorized budget that included the percentage to the nearest 1 percent of what was spent within the study area. We chose Coos County as the study area because it contains the Reserve and the majority of employees and purchasing occurred there; however, we also ran a statewide analysis to examine the budget allocated outside Coos County but still in Oregon. The Reserve spends money in sectors like construction, building and land maintenance, and appliances and electronics. Paying for these products and services is a direct contribution. These suppliers can then buy materials from other companies, an indirect contribution. We calculated the total amount spent in a sector by multiplying the budget category by the percentage spent locally for that category. We conducted the same analysis on the friends group budget.

5.1.3 Reserve Visitor Data

Table 5-1 presents estimated visitation to the South Slough Reserve in 2018 and 2019. South Slough counts visitors to the Reserve's visitor center, educational event attendees, visiting researchers, and other visitors and event attendees. For every activity in Table 5-1 except hiking and wildlife viewing, the Reserve provided us with data on the visitation and we took the average of the past two years. For coastal training programs, we averaged the past five years. For hiking and wildlife viewing, the Reserve could not provide an estimate over the past two years. The Reserve did, however, conduct direct counting surveys of cars parking at the visitor center while it

was closed in the summer of 2020; it counted 221 cars across 36 days, and we estimated that cars would visit the Reserve at the same rate for eight months out of the year to get 1,498 total vehicles. Though this number is not an estimate of people visiting the Reserve, we can still attribute expenditures through methods described below.

Table 5-1 Annual Visitors to the South Slough Reserve by Activity

Activity	Estimated Annual Visitation
Visitor center	4,691
Attending education events	2,280
Other visitors	784
Visiting researchers	184
Other Reserve events	2,008
Total	**9,947**

To estimate spending, we used the *2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* for Oregon.[36] Since we did not have accurate estimates of hunting and fishing in the Reserve, we focused on visitor spending for wildlife viewing. For all activity categories except hiking and wildlife viewing, we used per-participation data from the survey to estimate the average spent per day. This came out to $82.49 (in 2020 US$) per person-day. For hiking and wildlife viewing, we used per-spender data since we had groups of visitors compared to individual visitor data. Table 5-2 presents the expenditure profile we used in our analysis, broken down by spending category.

Table 5-2 Visitor Expenditure for the South Slough Reserve by Activity (Per Person-Day)

Category	Wildlife Viewing	IMPLAN Sector
Food	$12.17	509/510/511
Lodging	$16.08	507/508
Transportation	$14.26	418/420/408
Equipment	$38.93	504
Other costs	$1.05	404/405/410
Total	**$82.49**	

5.2 Results

We used IMPLAN to estimate the 2019 economic contribution of South Slough from Reserve operations spending and Reserve visitors to Coos County. The results:

[36] U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, & U.S. Census Bureau. (2014). *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Oregon.* https://www.census.gov/prod/2013pubs/fhw11-or.pdf

- Over $6.1 million in economic revenue
- Over 65 jobs
- Nearly $2.3 million in labor income
- Over $3.1 million in value added

Tables C-1 through C-3 in Appendix C show these estimates in detail by different levels of contribution: direct, indirect, and induced.

South Slough's contribution to Coos County is largely based on its operations, which contribute over $5.3 million in revenue and 56 jobs (compared to nearly $850,000 in revenue and 9.6 jobs from visitation). These different contributions are broken down in Tables C-2 and C-3, while Tables C-4 and C-5 list the top industries affected in terms of employment and revenue. Tables C-6, C-7, and C-8 show the results of our statewide analysis.

Key Contributions from South Slough

Altogether, the spending by the Reserve and its visitors supports over **66 jobs** and infuses the economy of Coos County with over **$6.2 million** in revenue.

The Reserve pays staff and spends money locally purchasing equipment, on boat and auto maintenance, and in other categories related to its operations. This spending supports over **56 jobs** and contributes to **$5.3 million** in revenue to the region.

Visitors come to South Slough to go hiking, view wildlife, kayak, and enjoy other recreational activities. They spend money locally on food, transportation, and recreational equipment. This generates around **$850,000** in revenue and supports an additional **10 jobs** in the area.

6. Apalachicola Economic Contribution Analysis

6.1 Description of the Reserve

The Apalachicola NERR is a unique Reserve in the panhandle of Florida, occupying nearly 235,000[37] acres across Franklin, Gulf, and Calhoun Counties. Historically, the Reserve supports a fishery worth $14–16 million annually.[38] Designated by the United Nations as a world biosphere reserve, Apalachicola is a hotspot of biodiversity and home to many threatened and endangered species.[39] It also serves as a foraging area for trans-gulf migratory bird species.[40]

Apalachicola attracts visitors by providing programming centered on "scientific research, natural resource management and environmental education and stewardship for many audiences."[41] The Reserve's Nature Center contains interactive and live exhibits and hosts educational programs for students of all ages. The Reserve attracts visitors who come to view wildlife, hike, camp, fish, and enjoy the beach. A paddling trail system spanning more than 100 miles provides many options for visitors who come to kayak and canoe.[42] Figure 6-1presents a map of the Apalachicola Reserve.

[37] NOAA Office for Coastal Management. (2021). *Apalachicola National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/apalachicola-bay.html
[38] NOAA Office for Coastal Management. (2021). *Apalachicola National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/apalachicola-bay.html
[39] NOAA Office for Coastal Management. (n.d.). *Apalachicola National Estuarine Research Reserve.* https://coast.noaa.gov/data/docs/nerrs/Handout-Apalachicola.pdf
[40] NOAA Office for Coastal Management. (2021). *Apalachicola National Estuarine Research Reserve.* https://coast.noaa.gov/nerrs/reserves/apalachicola-bay.html
[41] Friends of the Reserve. (2021). *Apalachicola National Estuarine Research Reserve.* https://www.apalachicolareserve.com/anerr/
[42] NOAA Office for Coastal Management. (n.d.). *Apalachicola National Estuarine Research Reserve.* https://coast.noaa.gov/data/docs/nerrs/Handout-Apalachicola.pdf

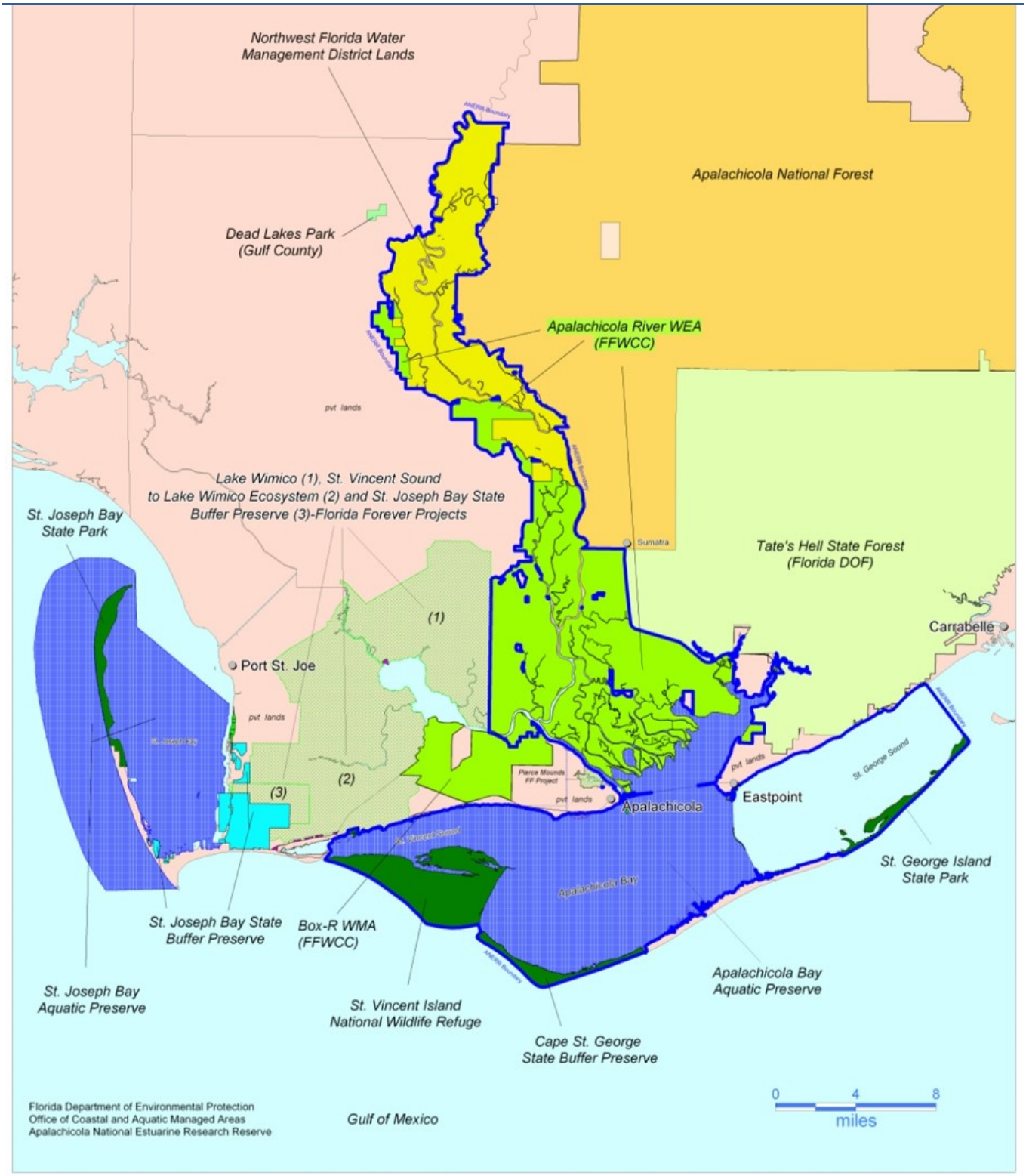


Figure 6-1 Map of Apalachicola

Reserve Spending and Operations

Apalachicola spends money across a range of categories, from appliances to waste services. The bulk of the Reserve's budget goes towards employee salaries and the majority of spending is local, within Franklin County, which is the study area. One of the larger categories of spending is ground supplies. This includes garden and

landscaping equipment as well as building maintenance. Spending money on the supplies in the regional economy is a direct contribution. The stores and companies that provide these items for sale are spending money in the economy on parts and supplies to create these products, constituting an indirect contribution. In addition, the employees at this store are being paid a salary that will partially be spent in the regional economy, an induced contribution.

In addition to the Reserve's operational spending, Apalachicola's friends group supplements the overall budget, providing funds for building maintenance, funding for educational supplies, stipends for internships, and scholarships for local students. Again, the majority of these funds are spent in the local economy.

Spending by Visitors and Visiting Researchers

The Reserve and the surrounding area offer many activities. The most common activities are going to the beach, hiking, and boating and fishing. The full estimated annual visitors by activity are outlined in Table 6-1 . Due to the variety of activities offered by the Reserve, the visitors likely spend money in different ways. A family going to the beach may go out to lunch, while someone going fishing may stop at a local sporting goods store to pick up some tackle. Visiting researchers likely spend in similar ways, though they are likely also spending money staying at local hotels more often than a typical visitor. The Reserve hosts several visiting researchers each year. It also provides a host of educational programs. On average, the Reserve gets between 1,000 to 2,500 visitors for public education events. In addition to these, the Reserve hosts Estuaries Day (included as "other Reserve events" in Table 6-1), a public event with booths demonstrating the ecosystem benefits that estuaries provide, as well as plenty of hands-on demonstrations for kids. Estuaries Day attracts around 1,000 people every year.

Partner Spending and Operations

The Apalachicola Reserve identified one partner that fit into our partner definition and we included in this analysis. This partner has visitors throughout the year that will spend money in the local economy by getting a meal in the area or going to the beach during their trip to the area. It also supported an employee that could spend wages in the area.

Other Spending

The Reserve also brings in money through large-scale restoration projects. These projects tend to last multiple years with large funding sources. To capture an average year, we averaged the annual spending for each project carried out over the last five years.

6.1.2 Reserve Operations Data

ERG hosted several virtual site visits with staff at the Apalachicola Reserve to go over the different aspects of this project. During the first of these visits, we collected information on the Reserve's budget. We broke the overall budget into categories that we input into IMPLAN as different sectors based on the amount that was spent in the local economy. For example, if the Reserve only spent 50% of the auto maintenance category within the study region, we only applied half of that category to this analysis. We also applied this same method to the friends group budget. We chose Franklin County as the study area because the majority of purchases take place within this county and the majority of employees live within this county. While the Reserve lies within three counties, the portions in Gulf and Calhoun Counties provide few, if any, access points and do not have local economies.

We also included the funding from the Reserve's friend group as they help to supplement funding for certain categories, such as contract employees, building or land maintenance, and the website and advertising for the Reserve.

6.1.3 Reserve Visitor Data

As stated earlier, the Reserve offers a range of activities and draws in visitors for many reasons. Table 6-1 presents the Reserves estimated number of annual visitors. Due to the vast area and the many access points, the Reserve has a hard time estimating visitors for several activities. Canoeing, boating, and fishing are particularly difficult because there are many public boat ramps. The beach on St. George Island is a popular tourist destination. There is also a state park on the island that counts visitors at the entrance. Though this is a conservative estimate, we used the number of individuals visiting the state park to estimate annual beachgoers. For campers in the area, we multiplied the average capacity of RV trailer parks by the number of slips to get the annual number of RVs—that is, the number of groups of campers rather than individual campers. (This method changed how we calculated visitor expenditure, as explained below.) For the other activities with ranges, the low end of the range is a conservative estimate, while the high end is what the Reserve estimates actual visitation to be. This means the overall range should not be thought of as the annual range of visitors, but rather as the range between a minimum and a more likely estimate.

Table 6-1. Annual Visitors to the Apalachicola Reserve

Activity	Estimated Annual Visitation
Visitor center	25,000–30,000
Hiking and wildlife viewing	50,000
Canoeing/kayaking	25,000–50,000
Camping[43]	22,776–28,470
Beachgoing	300,000
Boating and fishing	50,000–100,000
Hunting	1,000
Attending education events	1,000–2,500
Visiting researchers	24
Other Reserve events	1,277
Total	**476,077–563,271**

We used the Florida volume of the *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* for activity expenditures for Apalachicola.[44] Table 6-2 shows the expenditures for different activities from this study. This provided us with per participant-day expenditures of $70.43, $75.22, and $102.63 for wildlife viewing, hunting, and fishing, respectively. We multiplied the per participant-day expenditures by the number of annual visitors to get the total expenditures of visitors. We used the hunting data only for hunters, the fishing data for fishers and boaters, and the wildlife viewing expenditures for all other activity categories except camping. For camping, since we only had the number of vehicles, we applied the expenditure survey's per

[43] This number represents the number of RVs that stayed overnight in the Reserve (based on data provided by the Reserve), not the number of individual campers.

[44] U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, & U.S. Census Bureau. (2014). *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Florida.* https://www.census.gov/prod/2013pubs/fhw11-fl.pdf

spender-day data for wildlife viewers—which added up to $90.67— to every vehicle, under the assumption that there was a single spender per vehicle.

Table 6-2. Visitor Expenditure for the Apalachicola Reserve (per Person-Day)

Category	Wildlife Viewing	Fishing	Hunting	Camping	IMPLAN Sector
Food	$15.42	$12.80	$16.45	$13.36	509/510/511
Lodging	$16.09	$4.85	$0.00	$37.14	507/508
Transportation	$20.34	$11.04	$26.77	$16.72	418/420/408
Equipment	$10.71	$20.26	$42.28	$14.76	504
Other costs	$7.88	$26.27	$17.13	$8.69	404/405/410
Total	**$70.43**	**$75.22**	**$102.63**	**$90.67**	

6.1.4 Other Spending Generated by the Reserve

Apalachicola brings additional money to the area through large restoration projects. These projects contribute to the regional economy in several ways. Money from these projects is used to pay workers and buy supplies. In addition, the people working on the project will spend their money in the local economy. We averaged the employment and funding over the past five years to include in our analysis.

6.1.5 Partner Employment and Visitation

Reserve staff identified partners in the area that had 16,000 visitors annually and employed one full-time staff.

6.2 Results

We used IMPLAN to estimate the 2019 economic contribution of Apalachicola from Reserve operations spending and Reserve visitors to Franklin County. The results:

- Over $46.4 million in economic revenue
- 664 jobs
- $15.1 million in labor income
- Over $23 million in value added

Tables D-1 through D-5 in Appendix D show these estimates in detail by different levels of contribution: direct, indirect, and induced.

Apalachicola's contribution to Franklin County depends heavily on visitation, which contributes nearly $42 million in revenue, compared to $2.9 million from the Reserve's operational spending. Tables D-6 and D-7 show the breakdown of top industries affected through employment or revenue, respectively, based on the Reserve's contribution to the economy. Tables D-8 and D-9 show the results of our updated visitation estimates. These results show what the Reserve staff considered more accurate estimates than the conservative estimates shown in Tables D-1 through D-5. Since we did not change any operations data, these results will still be the same as Table D-2 and the partner's contributions will also remain the same as in Table D-4 and D-5.

Key Contributions from Apalachicola

Apalachicola and its partner pay local staff and spend money locally for many of their day-to-day operations. Visitors of both spend money on food, transportation, and recreation. Altogether, this spending generates **$46.4 million** in revenue and supports around **664 jobs** in Franklin.

The Reserve spends money locally on operations including fuel, boat, and auto repairs, as well as supplies for ground maintenance. It also pays staff, who live and spend money locally. This spending infuses **$2.9 million** into the local economy and supports **28 jobs**.

The Reserve attracts thousands of visitors, who spend money in the region on food, lodging, transportation, and recreational equipment. Visitor spending contributes **615 jobs** and close to **$42 million** in revenue to the region.

The Reserve partner depends on the Reserve to function. It spends money locally on operations, contributing **one additional job** and over **$133,000** in revenue.

The partner attracts additional visitors who spend in similar ways to Reserve visitors, generating **$1.4 million** in revenue and **20 jobs**.

7. Limitations of the Analyses

Expenditure survey limitations: Phase I of this economic contribution analysis used visitor expenditure profiles from a study conducted in a different region of the country from our study area, with different users and study populations. Although we chose the literature that would best approximate spending across the two phase I pilot Reserves (GTM and Rookery Bay) based on similar activities at the sites, using these data introduces unknown bias. Differences in geography and type of site can create problems—though, again, we chose the visitor expenditure profile that represented the Reserve pilot sites due to the similarity in ecosystems, recreational and scientific opportunities, and partners. The difference in consumer prices between the MBNMS in California and the Reserve pilot sites in Florida is another, smaller limitation. Another limitation is that the MBNMS study sampled visitors who were close enough for day trips, so it likely underestimated lodging costs among others. Ultimately, the development of Reserve-specific expenditure profiles will be necessary to enhance the defensibility and communication value of these economic contribution estimates.

Relatedly, better data from the pilot sites on the split between study area residents and visitors from outside the area would increase the accuracy of the results. Out-of-region visitors typically have larger spending profiles than residents.

In phase II, we addressed some of these limitations by using expenditure surveys that were geographically close to the Reserves with different expenditures based on the activity. The main limitation of the new expenditure study was how it reported expenditures. While the phase I study reported specific purchases, such as small restaurants, fuel, boat charters, the phase II study binned them into categories like “lodging” and “equipment.”

Missing partner data for Rookery Bay: For Rookery Bay in particular, we identified a number of private business partners that depended on the Reserve. At times, these businesses were harder to engage than government agencies (also partners) within or around the Reserve. Even when they engaged with us, they were often wary of providing potentially confidential or sensitive business information (e.g., revenues, spending, number of employees) to the public.

Visitor data: Reserves across the NERRS, including the five we studied, face challenges in gathering robust and defensible visitor data. This is often due to the vastness of Reserves, and the numerous access points, and the large variety of activities that visitors engage in. As more defensible methods are developed to gather increasingly robust visitor data, Reserves will be able to better estimate the economic contribution of their visitors.

8. Lessons Learned and Recommendations

- **Expenditure studies will help improve the accuracy of the results**: In phase I, we used the visitor expenditure profile for MBNMS, which provided the best available data to apply to GTM and Rookery Bay. A study to develop visitor expenditure profiles for GTM and/or Rookery Bay would generate much more precise visitor spending data. Indeed, a visitor spending study for any Reserve in the NERRS likely would have generated a more applicable visitor expenditure profile. Lake Superior NERR is currently implementing an expenditure survey. Though that survey covers a Reserve in the Great Lakes, its results may be more applicable than the National Marine Sanctuary expenditure profile we used to estimate visitor spending. Great Bay NERR may be implementing a similar type of survey in New Hampshire. During phase II, we used the *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation,*[45] which offered state- and activity-specific data on expenditures.
- **Leverage existing contacts to engage partners**. Developing ways to better engage Reserve partners (both public and private entities) will yield better partner visitor and spending data. We found that having Reserve managers or staff connect us directly with partners generated the most fruitful data, especially compared to "cold-emailing" or cold-calling.
- **The Reserve's economic contribution to the surrounding economy is often tied to the region's visitation and tourism.** This was the case for GTM and Rookery Bay, but it may not be true across the entire Reserve System. Robust regional visitation and tourism data would only support economic contribution analyses across the NERRS.
- **Large-scale spending projects also play a large role in the Reserves' contribution.** While visitation is important, phase II focused on two Reserves with few annual visitors. The funds brought in and spent outside of the Reserve's typical budget, such as large dredging, or construction projects that do not occur annually, can play a large role in the economic contribution to the region. This was especially true in South Slough, where the Reserve brings in over $1 million a year through grants. The Apalachicola Reserve also had several restoration projects that brought in large funds.
- **Implement methods for counting visitors to improve the accuracy of the results:** Getting accurate visitor counts for Reserves is often challenging, due to the many access points across vast areas and the diversity of activities visitors engage in. Current methods rely on direct counting, whose main limitations are high labor costs and the need to use passive methods like trail counters. Trail counters are often vandalized and need to be calibrated to get accurate results. For these reasons, we often had to use best professional judgment for visitor counts. The defensibility of economic contribution analyses will improve, though, as methods for estimating Reserve visitors improve. As part of this recommendation, we advise that visitor counts distinguish between study area residents and visitors from outside the study area: we could then apply different spending profiles to each count. We may also be able to update our Rookery Bay visitor activity numbers using a University of Florida estimate of boaters at Rookery Bay (this study was supposed to be released in spring 2020, but has been delayed indefinitely). Meanwhile, NOAA National Marine Sanctuaries are working with Robert Burns of West Virginia University to estimate visitors at Gray's Reef and Florida Keys National Marine Sanctuaries. We should continue to coordinate to strengthen the approach in the process of collecting data, analyzing data, and communicating results. This should strengthen the credibility of this type of work and present a strong

[45] U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, & U.S. Census Bureau. (2014). *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.* https://www.census.gov/prod/2013pubs/fhw11-or.pdf; https://www.census.gov/prod/2013pubs/fhw11-fl.pdf; https://www.census.gov/prod/2013pubs/fhw11-nh.pdf

message to those looking at results. Note also that, while getting visitor counts for specific activities like hiking and camping was difficult, some approaches allowed us to work around estimating the individual-level data. For Apalachicola, we used the number of cars and the per spender-day expenditures compared to per participant-day expenditures for camping. Similarly, South Slough counted cars for several days over the summer in 2020 when the Reserve was closed and when other methods were not appropriate. Though we did not include these data due to concerns of double counting, they could serve as a low-effort proxy to get estimates for Reserves in the future.

- **Develop consistent, broadly applicable, and intentional methods to communicate results:** Economic contribution analyses and ecosystem service valuation reveal two very different and complementary ways the Reserves provide value. We should explore what terms resonate (e.g., “direct,” “indirect,” “induced contributions,” “revenues,” “value added”). We need to explore how to roll these results out given some of the limitations in the visitor count estimations and absence of important data. Regardless, it will be important to use language that is broadly applicable and consistent across the NERRS.

9. Glossary

Background on economic activity analysis:[46]

- **Economic activity analysis:** An analysis that tracks the flow of dollars spent within a region (market values). Both economic impact and economic contribution analysis are types of economic activity analysis.
- **Economic impact:** The net changes in new economic activity associated with an industry, event, or policy in an existing regional economy.
- **Economic contribution:** The gross change in economic activity associated with an industry, event, or policy in an existing regional economy.
- **Economic benefit:** A net increase in total social welfare. Economic benefits include both market and nonmarket values.
- **Input-output (I-O) analysis:** A method of economic evaluation in which expenditures are entered into a program, and the multiplied effects of the spending are given as outputs. When money is spent in an economy, it has three effects: the direct effect of the money being spent and going to businesses, the indirect effects of the business making business-to-business transactions to serve their customers, and the induced effect of the employees having more household income and spending more on goods and services. I-O analysis measures all three of these effects, based on the study area, and aggregates them to give the total effect of a dollar being spent.
- **Multiplier:** The effect of a dollar being spent in an economy. If a dollar spent at a restaurant results in 50 cents being spent on ingredients and operations and 30 cents being added to employees' compensation, then that sector has a multiplier of 1.8, since $1 of spending results in $1.80 of revenue.

Types of contributions in I-O analysis:

- **Direct contributions**: The immediate contribution of an expenditure. The direct effect of spending $200 on groceries is that the local grocery store has $200.
- **Indirect contributions:** The secondary effects of the expenditure, which is that businesses spend more money on inputs to serve their customers. The indirect effect of spending $200 on groceries is the grocer spends $50 on produce from local farmers.
- **Induced contributions:** The tertiary effects of an expenditure, which is employees spending more money in the local economy. The indirect effect of spending $200 on groceries is that the grocer's employees receive some portion of that (e.g., $40), which they then spend in the local economy.

Metrics to present results of I-O analysis:

- **Output:** The total amount spent on the production of goods and services; comparable to the revenue generated. In more technical terms, revenue is equal to the sum of all intermediate inputs plus value added. This is often also referred to as "output" in economic impact or contribution analyses.

[46] The terms "economic activity analysis," "economic contribution," "economic impact," and "economic benefit" are directly quoted from Watson, P., Wilson, J., Thilmany, D., & Winter, S. (2007). Determining Economic Contributions and Impacts: What Is the Difference and Why Do We care? *Journal of Regional Analysis & Policy*, *37*(2), 140–146.

- **Value added:** What a sector adds to the economy by buying up labor and resources and producing finished goods and services. In technical terms, value added is total revenue minus intermediate expenditures. For example, if you buy $20 worth of steel, create a tool from it, and sell for $30, you have generated $10 of value added.
- **Labor income:** The wages paid as a result of economic activity.
- **Employment:** The number of full-time jobs created by economic activity.

Appendix A — GTM Economic Contribution Analysis Results

Table A-1. Total Economic Contribution of GTM to Duval, Flagler, and St. Johns Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	345.35	$11,210,351.16	$17,902,453.81	$31,232,169.62
Indirect	76.44	$4,274,305.05	$7,134,942.52	$12,245,907.43
Induced	99.42	$4,640,825.48	$8,305,209.34	$14,149,314.45
Total	521.21	$20,125,481.69	$33,342,605.67	$57,627,391.50

Table A-2. Contribution of GTM Spending to Duval, Flagler, and St. Johns Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	25.45	$784,644.29	$1,265,355.32	$2,250,708.57
Indirect	3.76	$216,758.63	$352,462.67	$605,248.06
Induced	18.85	$882,319.94	$1,583,127.38	$2,696,863.85
Total	48.06	$1,883,722.86	$3,200,945.37	$5,552,820.48

Table A-3. Contribution of GTM Visitor Spending to Duval, Flagler, and St. Johns Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	61.73	$1,982,130.63	$3,355,075.90	$5,657,112.88
Indirect	13.11	$748,140.12	$1,206,809.34	$2,097,786.77
Induced	15.19	$708,446.95	$1,267,088.93	$2,158,705.96
Total	90.03	$3,438,717.70	$5,828,974.17	$9,913,605.61

Table A-4. Contribution of Partner Spending to Duval, Flagler, and St. Johns Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	47	$1,663,188.54	$1,805,122.43	$3,972,738.33
Indirect	14.72	$750,200.59	$1,447,468.74	$2,366,853.33
Induced	13.43	$626,633.57	$1,120,589.41	$1,909,335.63
Total	75.15	$3,040,022.70	$4,373,180.58	$8,248,927.29

Table A-5. Contribution of Partner Visitor Spending to Duval, Flagler, and St. Johns Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	211.17	$6,780,387.70	$11,476,900.16	$19,351,609.84
Indirect	44.85	$2,559,205.72	$4,128,201.78	$7,176,019.27
Induced	51.95	$2,423,425.02	$4,334,403.62	$7,384,409.02
Total	307.97	$11,763,018.44	$19,939,505.56	$33,912,038.13

GTM's support through visitation is shown in its top five affected industries by revenue and employment. Hotels and restaurants, whose contribution is derived through visitation, make up three of the five sectors in both these tables. The other shared sector is IMPLAN code 493 (museums, historical sites, zoos, and parks), showing the extent to which the Reserve attracts visitors. Tables A-6 and A-7 show the five most affected sectors by employment and revenue for the GTM Reserve.

Table A-6. Top Five Affected Industries by Revenue

	Industry	Direct	Indirect	Induced	Total
1	499: hotels and motels, including casino hotels	$6,251,905	$14,670	$8,527	$6,275,103
2	502: limited-service restaurants	$4,856,040	$70,705	$515,182	$5,441,926
3	501: full-service restaurants	$4,856,040	$76,681	$318,065	$5,250,786
4	493: museums, historical sites, zoos, and parks	$3,972,738	$0	$5,561	$3,978,300
5	526: other local government enterprises	$3,519,154	$31,107	$34,205	$3,584,466

Table A-7. Top Five Affected Industries by Employment

	Industry	Direct	Indirect	Induced	Total
1	501: full-service restaurants	93.7	1.5	6.1	101.3
2	502: limited-service restaurants	55.1	0.8	5.9	61.8
3	499: hotels and motels, including casino hotels	58.2	0.1	0.1	58.4
4	493: museums, historical sites, zoos, and parks	47.0	0.0	0.1	47.1
5	400: retail—food and beverage stores	16.8	0.1	3.2	20.0

Appendix B — Rookery Bay Economic Contribution Analysis Results

Table B-1. Total Contribution of Rookery Bay to Lee and Collier Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	344.8	$11,421,312.31	$16,577,451.52	$31,249,658.53
Indirect	90.77	$4,290,416.62	$7,615,654.97	$13,188,427.95
Induced	77.18	$3,335,303.07	$6,231,980.28	$10,600,375.71
Total	512.75	$19,047,032.00	$30,425,086.77	$55,038,462.19

Table B-2. Contribution of Rookery Bay Spending to Lee and Collier Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	10.51	$507,969.58	$1,041,217.18	$1,930,305.43
Indirect	6.7	$291,161.94	$406,187.47	$955,700.47
Induced	11.52	$495,625.59	$926,024.21	$1,577,182.76
Total	28.73	$1,294,757.11	$2,373,428.86	$4,463,188.66

Table B-3. Contribution of Rookery Bay Visitation to Lee and Collier Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	74.97	$2,722,645.33	$4,501,492.86	$7,260,106.97
Indirect	14.65	$753,856.78	$1,240,857.37	$2,177,657.77
Induced	15.19	$657,036.19	$1,228,206.14	$2,087,352.95
Total	104.81	$4,133,538.30	$6,970,556.37	$11,525,117.69

Table B-4. Contribution of Partner Employment to Lee and Collier Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	159	$4,547,785.76	$5,011,723.88	$12,345,190.48
Indirect	49.82	$2,236,734.15	$4,308,337.40	$7,141,353.87
Induced	30.14	$1,303,523.94	$2,434,404.62	$4,142,952.40
Total	238.96	$8,088,043.85	$11,754,465.90	$23,629,496.75

Table B-5. Contribution of Partner Visitation to Lee and Collier Counties (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	100.31	$3,642,911.64	$6,023,017.60	$9,714,055.64

Contribution	Employment	Labor Income	Value Added	Output
Indirect	19.61	$1,008,663.75	$1,660,272.72	$2,913,715.85
Induced	20.33	$879,117.36	$1,643,345.32	$2,792,887.60
Total	140.25	$5,530,692.75	$9,326,635.64	$15,420,659.09

Rookery Bay's support through visitation is shown in its top five affected industries by revenue and employment. Hotels and restaurants, whose contribution is derived through visitation, make up three of the five sectors in both these tables. The top affected industry for both employment and revenue was 493 (museums, historical sites, zoos, and parks), showing the extent to which the Reserve attracts visitors. Tables B-6 and B-7 show the five most affected sectors by employment and revenue for the Rookery Bay Reserve.

Table B-6. Top Five Affected Industries by Employment

	Industry	Direct	Indirect	Induced	Total
1	493: museums, historical sites, zoos, and parks	159.0	0.0	0.1	159.1
2	501: full-service restaurants	59.9	1.9	5.6	67.3
3	502: limited-service restaurants	34.3	0.5	3.8	38.6
4	499: hotels and motels, including casino hotels	35.3	0.3	0.1	35.7
5	440: real estate	0.0	26.4	6.9	33.3

Table B-7. Top Five Affected Industries by Revenue

	Industry	Direct	Indirect	Induced	Total
1	493: museums, historical sites, zoos, and parks	$12,345,190	$0	$4,350	$12,349,541
2	440: real estate	$0	$3,899,342	$1,027,199	$4,926,541
3	499: hotels and motels, including casino hotels	$4,243,354	$30,887	$9,567	$4,283,808
4	502: limited-service restaurants	$3,295,938	$47,932	$367,339	$3,711,210
5	501: full-service restaurants	$3,295,938	$104,385	$306,139	$3,706,463

Appendix C — South Slough Economic Contribution Analysis Results

Table C-1. Total Contribution of South Slough to Coos County (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	49.39	$1,633,058.61	$1,949,135.63	$3,787,285.15
Indirect	9.29	$368,753.34	$618,997.55	$1,428,093.51
Induced	7	$288,685.08	$537,674.59	$937,276.26
Total	65.68	$2,290,497.03	$3,105,807.77	$6,152,654.92

Table C-2. Contribution of South Slough Spending to Coos County (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	41.82	$1,378,907.98	$1,616,651.07	$3,226,006.78
Indirect	8.3	$326,692.11	$552,647.04	$1,282,598.44
Induced	5.95	$245,384.34	$456,968.76	$796,622.94
Total	56.07	$1,950,984.43	$2,626,266.87	$5,305,228.16

Table C-3. Contribution of South Slough Visitation to Coos County (Annual)

Contribution	Employment	Labor Income	Value Added	Output
Direct	7.57	$254,150.63	$332,484.56	$561,278.36
Indirect	0.99	$42,061.24	$66,350.51	$145,495.07
Induced	1.05	$43,300.74	$80,705.82	$140,653.32
Total	9.61	$339,512.61	$479,540.89	$847,426.75

Tables C-4 and C-5 show the top industries affected by the contribution from the South Slough Reserve. Note that these include construction and local government, which were not in the top industries affected by other Reserves.

Table C-4. Top Five Affected Industries by Employment

	Industry	Direct	Indirect	Induced	Total
1	501: museums, historical sites, zoos, and parks	40.0	0.0	0.0	40.0
2	447: other real estate	0.0	3.0	0.2	3.2
3	56: construction of other new nonresidential structures	1.5	0.0	0.0	1.5
4	410: retail—sporting goods, hobby, musical instrument and bookstores	1.3	0.0	0.1	1.4

	Industry	Direct	Indirect	Induced	Total
5	509: full-service restaurants	0.6	0.3	0.4	1.3

Table C-5. Top Five Affected Industries by Revenue

	Industry	Direct	Indirect	Induced	Total
1	501: museums, historical sites, zoos, and parks	$3,057,745	$0	$1,028	$3,058,773
2	447: other real estate	$0	$510,826	$36,676	$547,503
3	534: other local government enterprises	$0	$160,779	$43,737	$204,516
4	449: owner-occupied dwellings	$0	$0	$184,025	$184,025
5	56: construction of other new nonresidential structures	$121,837	$0	$0	$121,837

Tables C-6 through C-8 show the results from our statewide analysis. While most of the spending in the Reserve stays within the county, spending in some categories happens outside the county but still within the state. Table C-6 shows the overall contribution of the South Slough Reserve to the state. Table C-7 shows the Reserve's operations spending contribution to the state and Table C-8 shows the contribution from Reserve visitation to the state.

Table C-6. Overall Contribution of the South Slough Reserve to the State of Oregon

Contribution	Employment	Labor Income	Value Added	Output
Direct	41.58	$1,682,439.31	$1,999,555.57	$3,580,054.67
Indirect	10.45	$557,434.79	$932,101.22	$1,838,853.32
Induced	11.72	$601,111.95	$1,064,246.92	$1,802,579.65
Total	63.75	$2,840,986.05	$3,995,903.71	$7,221,487.64

Table C-7. Contribution of South Slough Reserve Operations Spending to State of Oregon

Contribution	Employment	Labor Income	Value Added	Output
Direct	34.34	$1,420,826.43	$1,656,543.78	$3,018,776.31
Indirect	9.1	$478,015.60	$810,180.77	$1,610,525.09
Induced	9.92	$508,931.50	$901,097.55	$1,526,227.96
Total	53.36	$2,407,773.53	$3,367,822.10	$6,155,529.36

Table C-8. Contribution of South Slough Reserve Visitation to the State of Oregon

Contribution	Employment	Labor Income	Value Added	Output
Direct	7.24	$261,612.88	$343,011.79	$561,278.36
Indirect	1.35	$79,419.19	$121,920.46	$228,328.23
Induced	1.8	$92,180.45	$163,149.37	$276,351.70

Contribution	Employment	Labor Income	Value Added	Output
Total	10.39	$433,212.52	$628,081.62	$1,065,958.29

Appendix D — Apalachicola Economic Contribution Analysis Results

Table D-1. Total Contribution of Apalachicola to Franklin County (Annual)

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	554.94	$11,920,647.30	$16,730,455.36	$31,620,557.98
Indirect	68.95	$1,975,490.09	$3,593,004.55	$9,277,626.79
Induced	40.44	$1,206,506.11	$3,050,622.00	$5,510,303.29
Total	664.33	$15,102,643.50	$23,374,081.91	$46,408,488.06

Table D-2. Contribution of Apalachicola Spending to Franklin County (Annual)

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	20.67	$734,409.28	$955,937.81	$1,886,313.87
Indirect	4.81	$134,959.37	$271,282.66	$698,244.82
Induced	2.47	$73,805.00	$186,715.98	$337,105.15
Total	27.95	$943,173.65	$1,413,936.45	$2,921,663.84

Table D-3. Contribution of Apalachicola Visitation to Franklin County (Annual)

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	516.16	$10,800,035.24	$15,230,976.21	$28,705,557.45
Indirect	61.85	$1,774,888.04	$3,202,857.38	$8,271,735.60
Induced	36.66	$1,093,455.41	$2,764,675.02	$4,993,957.08
Total	614.67	$13,668,378.69	$21,198,508.61	$41,971,250.13

Table D-4. Contribution of Partner Employment to Franklin County (Annual)

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	1	$35,248.55	$43,957.21	$81,898.47
Indirect	0.24	$6,533.00	$13,186.16	$34,851.54
Induced	0.12	$3,488.26	$8,828.36	$15,933.59
Total	1.36	$45,269.81	$65,971.73	$132,683.60

Table D-5. Contribution of Partner Visitation to Franklin County (Annual)

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	17.11	$350,954.22	$499,584.14	$946,788.19
Indirect	2.04	$59,109.68	$105,678.35	$272,794.83
Induced	1.2	$35,757.43	$90,402.64	$163,307.47
Total	20.35	$445,821.33	$695,665.13	$1,382,890.49

Tables D-6 and D-7 show the top industries affected by the contribution from the Apalachicola Reserve. Accommodations and service are highly affected compared to other industries, especially due to the large volume of visitors, as shown in Table D-3. The highest-revenue industries are those involving service and tourism, such as sightseeing and amusement.

Table D-6. Top Five Affected Industries by Employment

	Industry	Direct	Indirect	Induced	Total
1	418: transit and ground passenger transportation	173.3	0.9	1.0	175.2
2	504: other amusement and recreation industries	95.1	0.1	0.4	95.6
3	508: other accommodations	66.2	0.0	0.0	66.2
4	511: all other food and drinking places	39.2	5.6	1.8	46.6
5	507: hotels and motels, including casino hotels	39.8	0.0	0.0	39.8

Table D-7. Top Five Affected Industries by Revenue

	Industry	Direct	Indirect	Induced	Total
1	504: other amusement and recreation industries	$4,824,765	$6,495	$20,099	$4,851,360
2	508: other accommodations	$3,915,363	$0	$3	$3,915,367
3	507: hotels and motels, including casino hotels	$3,915,063	$5	$10	$3,915,079
4	420: scenic and sightseeing transportation and support activities for transportation	$3,155,863	$700,233	$26,446	$3,882,541
5	418: transit and ground passenger transportation	$3,166,113	$17,074	$17,847	$3,201,035

Table D-8 and D-9 represent the alternative analysis, in which we used better estimates of visitation to the Reserve. Table D-8 shows the Reserve's overall contribution to Franklin County and Table D-9 shows the Reserve's contribution from the new estimates of visitation alone.

Table D-8. Overall Contribution of the Reserve to Franklin County with Updated Visitation Estimates

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	651.11	$14,065,955.07	$19,605,772.38	$36,979,199.59

Contribution	Employment	Labor Income	Value Added	Revenue
Indirect	80.46	$2,295,049.38	$4,195,280.28	$10,843,535.00
Induced	47.56	$1,418,783.98	$3,587,459.83	$6,479,834.91
Total	779.13	$17,779,788.43	$27,388,512.49	$54,302,569.50

Table D-9. Contribution of the Reserve's Visitation to Franklin County with Updated Visitation Estimates

Contribution	Employment	Labor Income	Value Added	Revenue
Direct	612.33	$12,945,343.01	$18,106,293.23	$34,064,199.07
Indirect	73.36	$2,094,447.34	$3,805,133.11	$9,837,643.80
Induced	43.77	$1,305,733.28	$3,301,512.86	$5,963,488.71
Total	729.46	$16,345,523.63	$25,212,939.20	$49,865,331.58