Draft

Securing Florida's Blue Economy

Strategic Policy Plan for Florida's Oceans and Coasts

May 2020

Florida Ocean Alliance

TABLE OF CONTENTS

STRATEGIC POLICY PLAN TO SUPPORT FLORIDA'S BLUE ECONOMY

THE CRITICAL NEED FOR A STRATEGIC POLICY PLAN

Florida's Blue Economy, based on its ocean and coastal resources, is large, diversified, and connected to almost every aspect of the state's workforce and quality of life. Essential, valuable, and iconic natural resources and human-built infrastructure stretch along its 8,436 miles of coastline, the second longest coastline among U.S. states and territories (National Oceanic and Atmospheric Administration, 2019a). In combination, these assets represent the foundation for a sustainable and profitable economy in the state and are the key to a richer Blue Economy in the future.

Evidence of these crucial roles appears in a report on Florida's Blue Economy prepared by the Florida Ocean Alliance as part of developing this Strategic Policy Plan for Florida's Oceans and Coasts (referred to as the Strategic Policy Plan or Plan). Based on the most recent annual economic data available, the report highlights the impressive contributions of Florida's Blue Economy (Florida Ocean Alliance, 2020):

- Florida's coastal counties generated more than $797 billion of economic value or 77% of the state's more than $1 trillion economy.
- Direct and indirect use of ocean and coastal resources contributed $73.9 billion to the state's economy.
- More than one million jobs in Florida were directly and indirectly created by activities that used ocean and coastal resources.

While Florida's Blue Economy is essential to the state, it is increasingly threatened by damage to water quality, habitats, and the resilience of human-built and natural infrastructure. The threats occur at different spatial and temporal scales and can be characterized as shocks and stressors. Shocks are acute and rapidly developing events that require emergency response and recovery, such as hurricanes, storm events, floods, tornadoes, and pandemic disease. Stressors are the longer-term drivers that hinder the ability of a natural ecosystem or human community to handle or adapt to shock events and include aging and inadequate infrastructure, chronic pollution, poverty, climate change, and sea level rise.

This Strategic Policy Plan was undertaken by the Florida Ocean Alliance through a grant from the Florida Legislature, with considerable expert and public input, to provide a roadmap for Florida's leaders and policy-makers to protect, restore, and grow the state's Blue Economy. This Strategic Policy Plan is building on the efforts by citizens, state and local agencies, and legislators to improve our oceans and coasts. For example, the 2020 Florida Legislature took bold steps forward with the adoption of the Clean Waterways Act (Senate Bill 712) and Sea Level Impact Study for Coastal Construction (Senate Bill 178). Implementation of the Strategic Policy Plan recommendations will require this kind of forward thinking leadership and investment.

At no time in Florida's history have strategic actions been more important. The COVID-19 (coronavirus) pandemic that began affecting Florida in March 2020 has resulted in the tragic loss of life and significant direct and indirect economic losses to many citizens, communities, and businesses in the state, as well as those that depend on the state for commerce, tourism, or part-time residency. COVID-19 began as a shock event. As public and private health agencies move from emergency response to recovery, COVID-19 will transition to become a stressor that will require long-term investment and management. As we transition to a new normal for our lives and our economy, Florida has an opportunity to make strategic decisions and investments that will restore prosperity, improve resilience, and invest in Florida's Blue Economy.

While it is impossible to ignore the impact of the COVID-19 pandemic on Florida's economy and well-being, this Florida Ocean Alliance Strategic Policy Plan is not a reaction to the pandemic. Instead this Strategic Policy Plan recognizes that stressors, vulnerabilities, threats, and opportunities that existed

before the pandemic will persist. This Strategic Policy Plan considers the ocean and coastal priority issues along with related actions that were needed before the pandemic and offers recommendations that will protect Florida's ocean and coastal assets today and ensure their sustainable and profitable use into the future. Bold actions and investments that protect clean water, improve the health of ocean and coastal resources, and foster a vibrant Blue Economy are more important today than ever before. This Strategic Policy Plan provides a pathway to ensure that Florida's way of life and economic vitality are restored and sufficient to support thriving future generations.

THE PLAN'S RECOMMENDATIONS FOR FOUR KEY ISSUES

As Florida recovers from the impacts of the COVID-19, integrating the goals, strategies, and actions outlined in this Strategic Policy Plan will ensure a stronger Blue Economy and more secure future.

Several cross-cutting themes were identified as vital to success and implementation of this Strategic Policy Plan:

- **Transformational action** – To provide resilience for Florida's oceans and coasts and obtain the associated economic benefit will require transformational action by state and local governments, in partnership with industries and businesses, non-governmental organizations, universities and research institutions, and the public.

- **Innovation** – Bold, new approaches to planning, regulation, implementation, and technologies are needed to inspire and incentivize new ideas and deliver benefits effectively, efficiently, and at reduced costs.

- **Equity** – The future integrity and prosperity of Florida's Blue Economy hinge on leveraging the support of and benefits to all people and parts of the state. The actions should be implemented with consideration for equity across all socioeconomic categories and communities.

- **Coordination, collaboration, and integration** – Coordination is required throughout all levels of public and private planning in Florida. Public, private, and independent sectors must work together. A statewide organizational framework for action is needed.

- **Education and outreach** – Clear, coordinated, and fact-based messages must be communicated to the public to promote awareness and understanding of Florida's oceans and coastal issues. Information must be made accessible and be easily understood. Without public knowledge and active engagement, no progress will be made.

- **Funding** – A successful Blue Economy will require investment in key areas, including workforce development, aging infrastructure improvements, coastal community resilience, and clean technologies. Direct investments from all public and private partners are needed to leverage limited resources. Consistent and adequate funding is needed from multiple sources.

This Strategic Policy Plan focuses on four key and interrelated issues:

- Blue Economy
- Ocean and coastal resilience
- Human and natural infrastructure (water, wastewater, stormwater, and power infrastructure and natural habitats that support Florida's diverse and valuable living resources)
- Implementation, outreach, and financing

Details on each of these issues and the recommended goals, strategies, and actions are included in **Appendix A**. High-priority strategies and actions were identified that, if implemented as soon as possible, will improve the state's resilience and support its Blue Economy. These high-priority strategies and actions are summarized in **Table 1**.

Table 1. High-Priority Strategies and Actions

Issue	Strategy	Actions
Overall	Build a forward-thinking, innovative, statewide, public-private partnership.	Create a public-private partnership under the Chief Resilience Officer or other designated official to advise the Florida Governor and Florida Legislature on coordinated, statewide ocean and coastal policy, leadership, and investment.
Blue Economy	Understand, support, and expand Florida's Blue Economy.	Fund studies on events, such as COVID-19 and hurricanes, and risk-based vulnerabilities in ocean and coastal industries and supply chains to determine where key investments will stimulate the economy and increase resilience.
		Prepare a sustainable development blueprint for Florida's Blue Economy that focuses on resilience, innovation, and synergies between key sectors and the workforce.
Ocean and Coastal Resilience	Foster resilience to shocks and stressors.	Position Florida as a leader in identifying, developing, and using clean technologies to improve community health, ecotourism, and economic resilience.
		Prepare a statewide analysis of current and future risks and vulnerabilities in human-built and natural infrastructure and devise actions to ameliorate risks, including funding and incentives for implementation.
		Update design standards and permits for infrastructure to incorporate designs and practices that provide protection from the impacts of climate change.
Human and Natural Infrastructure	Ignite and sustain the Blue Economy by investing in 21st century approaches to restoring and protecting human and natural systems and increasing their resilience.	Prioritize replacement and upgrades to coastal human-built and natural infrastructure (wastewater, stormwater, potable water, bridges, roads, energy networks, living shorelines, beach nourishment) to improve water and air quality, treatment efficiencies, and resilience.
		Engage with state and federal funding to invest in ocean and coastal clean water and air infrastructure projects that advance the re-establishment of jobs.
		Protect, restore, and manage coastal and marine habitats and living resources that have a critical need for intervention by reducing pollution and other local stressors and mitigating climate change impacts.
Implementation, Outreach, and Financing	Develop partnerships that leverage resources to achieve goals.	Identify and secure consistent funding that will help leverage existing funds for ocean and coastal planning, restoration, and stewardship.
		Require accountability and transparency from all partners responsible for implementing actions.

THE PLAN'S VISION OF SUCCESS

As Florida, the nation, and the world recover from the COVID-19 outbreak, strategic planning, action, and investment will be imperative. Investment in Florida's Blue Economy can serve as one pathway to regain economic stability and growth. By integrating the high-priority actions of this Strategic Policy Plan and building on the actions taken by the 2020 Florida Legislature, we envision the following Florida of the future:

> In the year 2030, Florida has become an international leader in ocean and coastal issues by investing in innovative technologies to address resilience and sustainability, restoring clean coastal waters, improving air quality, and taking actions to deliver measurable ecological and economic value and returns to the state. Floridians recognize that Florida's oceans, coasts, bays, estuaries, and beaches are at the heart of the state's identity, quality of life, and economy, and support investments in sustainable actions.

This Florida Ocean Alliance Strategic Policy Plan highlights the importance of Florida's oceans and coasts and provides bold actions that can be implemented to improve the health of our resources and to expand Florida's Blue Economy. Accomplishing these goals will require the public, government, academia, and industry to work together.

Port Everglades

Appendix A. Four Key Issues

In recognition of the need to prevent and mitigate damage to Florida's ocean and coastal resources to advance the state's economy, the Florida Ocean Alliance Board of Directors requested a grant from the Florida Legislature. Seeing the urgency of the request, in July 2019, the Florida Legislature appropriated funds to the Florida Ocean Alliance to develop a Strategic Policy Plan for Florida's Oceans and Coasts. This Plan, referred to hereafter as the Strategic Policy Plan or Plan, also includes an updated economic report that highlights the key marine-based economic drivers of Florida's economy and feedback from a series of six stakeholder workshops conducted around the state.

The Florida Ocean Alliance Board of Directors created a Steering Committee to spearhead Plan development, which included members from federal, state, and local governments; non-governmental organizations; ocean and coastal industry and businesses; and education and academia. The Steering Committee met six times throughout the state and by teleconference, in addition to hosting focus group teleconferences to discuss specific portions of the Plan.

The Florida Ocean Alliance Board of Directors, Steering Committee, and stakeholders identified four key issues that are the focus of this Strategic Policy Plan:

- Blue Economy
- Ocean and coastal resilience
- Human and natural infrastructure (water quality and habitats)
- Implementation, outreach, and financing

These issues are closely linked. Improvements to the coastal and near-shore habitats cannot occur without improving water quality and reducing harmful algal blooms. Likewise, lack of ocean and coastal resilience will continue to adversely affect the viability of the state's economy without corrective actions.

Resilience means responding quickly after hazardous events such as hurricanes, coastal storms, flooding, and disease rather than simply reacting to impacts. Resilience is the ability to prevent a short-term hazard event from turning into a long-term community-wide disaster. Rebounding more quickly can reduce negative human health, environmental, and economic impact (adapted from the National Oceanic and Atmospheric Administration definition 2020a).

For the purpose of this Plan, the boundaries of Florida's oceans and coasts are defined as: (1) the ocean boundary is the Florida state waters designation from the shore to three nautical miles out on the Atlantic Ocean side and from the shore to nine nautical miles out on the Gulf of Mexico side and (2) the coastal boundary is all coastal counties (see **Figure 1**).

For each of the key issues, this Strategic Policy Plan includes summary information, goals, strategies, and actions. Each action also includes a list of potential partners for implementation, but these lists may not be all encompassing. The Plan supports and builds upon existing plans in the state that relate to the ocean and coastal issues.

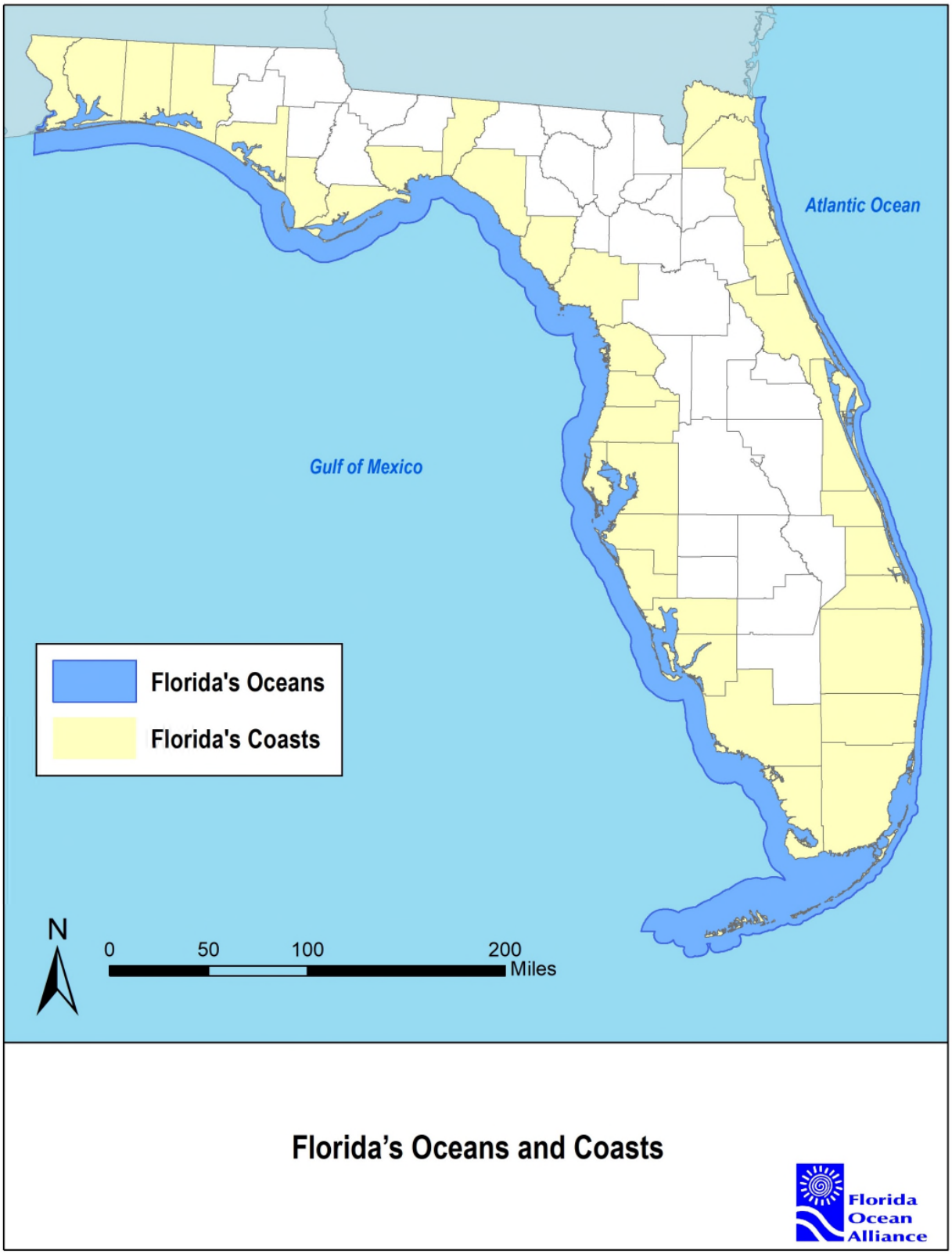

Figure 1. Ocean and Coastal Boundaries

A.1 BLUE ECONOMY

A.1.1 SUMMARY

Florida's Blue Economy (ocean and coastal resources) is large, diversified, and connected to almost every aspect of Florida's workforce and quality of life. The assets that support this economy span a coastline of 8,436 miles, the second longest coastline among the U.S. states and territories (National Oceanic and Atmospheric Administration, 2019a). In addition, Florida's shoreline counties are home to more than three-fourths of the state's population of more than 21 million people. These coastal counties host critical natural and human-built infrastructure, house millions of people, and drive huge economic activity.

In 2020, the Florida Ocean Alliance prepared a report on Florida's Blue Economy (*Florida's Oceans and Coasts: The Building Blocks of Florida's Economy*) (see **Appendix C**). Findings were based on the most recent available 2018 economic data. Florida's coastal counties contributed more than $797 billion to Florida's economy. Additionally, more than one million jobs in Florida were directly and indirectly created by activities that relied on ocean and coastal resources, with these uses contributing $73.9 billion to the state's economy.

The economic study identified 38 industries that were connected to ocean and coastal resources, and these industries were grouped into five traditional sectors:

1. **Ocean tourism** quantified as a portion of the outputs of lodging and eating places.
2. **Ocean transportation** based on passengers and freight, port and harbor operations, and a portion of the warehousing and storage industry.
3. **Marine industries** composed of ship and boat building/repair, boat dealers, and marinas.
4. **Ocean recreation** represented by scenic and sightseeing transportation, nature parks, and some recreational fishing.
5. **Living resources** described as aquaculture; fish and seafood product harvest, preparation, and packaging; and fish and seafood markets.

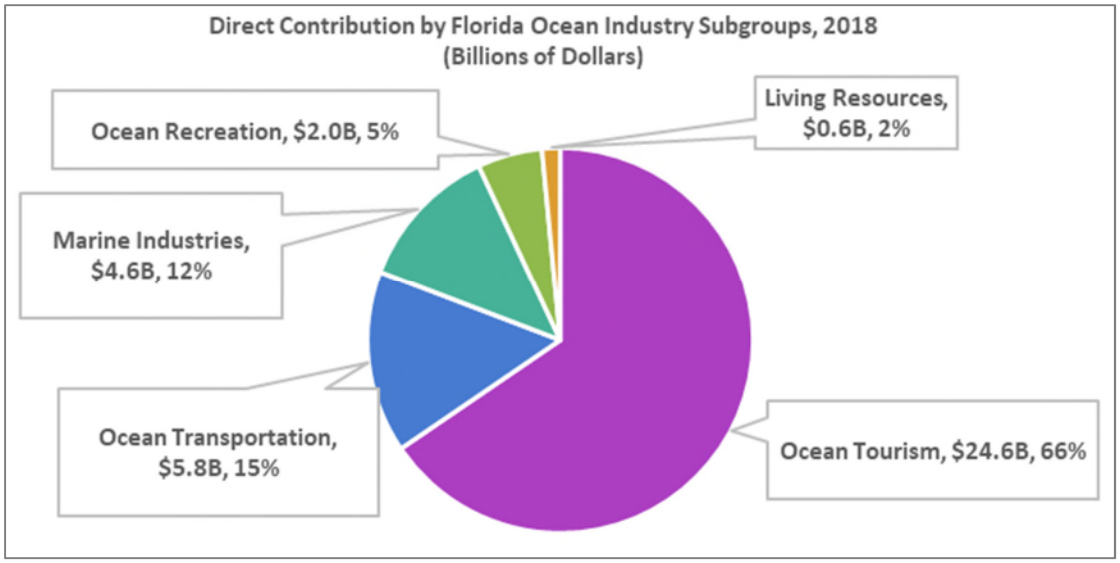

Figure 2. Direct Contribution of Florida Industry Subgroups

The Florida Ocean Alliance economic study was an update of information published by the Florida Ocean Alliance in 2013, with the 2020 study following a similar methodology designed to estimate the contribution of the ocean economy to the gross domestic product of Florida. This methodology was developed by a national team of economists in the mid-2010s, with participation from Florida

economists. The methodology was adopted by economists, who worked for the National Oceanic and Atmospheric Administration Office of Coastal Management in the mid-2000s, and there have been several updates since then. The latest National Oceanic and Atmospheric Administration report, published in 2019, used 2016 data and contained estimates for Florida that were similar to the 2018 estimates in the Florida Ocean Alliance economic report. The only substantial difference between the Florida Ocean Alliance economic report and the 2019 National Oceanic and Atmospheric Administration report methodologies is that the National Oceanic and Atmospheric Administration includes offshore mining in its estimates, and the Florida Ocean Alliance report does not. Therefore, for the comparisons between the Florida Ocean Alliance and National Oceanic and Atmospheric Administration estimates for Florida and other states, offshore mining is not included.

The advantage of following a national methodology is that comparisons can be made across the coastal states. Florida had the second highest ocean gross domestic product among the coastal states in 2016, behind top-ranked California, and ahead of New York, Washington, and New Jersey. Florida's ocean gross domestic product, at 3.4% of the state total, was ranked fifth among the coastal states (behind Hawaii, Alaska, Maine, and Rhode Island). This is impressive because these four coastal states have very small populations, whereas Florida is the only large, diversified economy whose ocean economy ranks in the top five in the country as a percentage of the total gross domestic product. This confirms the importance of the ocean economy not only for Florida, but also for the nation.

There are a number of economic impact studies on various individual parts of the Blue Economy that are covered in the spotlight. They use methodologies that differ from the approach used in the Florida Ocean Alliance economic report (2020). For example, a Florida Ports Council study (2017) found that the state's ports generate 900,000 direct and indirect jobs and contribute $117.6 billion in total economic value to the state. In another example, the Florida Department of Environmental Protection Division of Recreation and Parks published an Economic Impact Assessment of the Florida State Park System in 2019. They found that the 29.4 million visitors to the state park system in fiscal year 2018–2019 contributed $2.6 billion in direct economic impact and supported 37,000 jobs.

One valuable aspect of Florida's Blue Economy that is difficult to assess is the direct and indirect economic value contributed by Florida's robust ocean and coastal scientific research community. This source of knowledge and innovation comprises a diverse range of public and private scientific research and engineering organizations that have yet to be adequately inventoried and characterized. Florida Sea Grant (2020b) lists more than 50 marine and coastal institutions in Florida. These organizations represent hubs of activity that generate current and future economic value.

During the past decade, coastal communities, local governments, and states have begun to expand economic analyses to include ecosystem services, focusing on mitigation of economic risk associated with disasters. These represent critical areas for future study to fully understand their contributions to Florida's Blue Economy. Data for these items are included in the Economic Spotlight in **Appendix D**.

Given the recent events related to the COVID-19 pandemic, one area that must be reviewed as a part of resilience planning is the intersection of a major event and the economic impacts related to key Florida economic engines, including the Blue Economy. The pandemic may have long-lasting impacts on the Blue Economy through decreases in revenues for private industries and the public sector, as well as reduced funding for environmental improvements, infrastructure, and academic research for an extended period of time. However, with a strong economic foundation and valuable natural and human-built assets, Florida is uniquely positioned to advance leadership and growth in Florida's Blue Economy and become a global leader in ocean and coastal innovation and technology.

A.1.2 GOAL

Advance Florida into a recognized leader in sustainable and resilient expansion of a Blue Economy based on an evolving and flourishing workforce, forward-looking policy, mitigation of climate change

impacts, equitable treatment of underrepresented or vulnerable communities, and stewardship of natural resources.

A.1.3 Strategies and Actions

The Blue Economy goal will be achieved by two strategies and seven actions.

Strategy 1: Create a Framework that Ensures Connected Ocean and Coastal Leadership

Table 2. Actions for Blue Economy Strategy 1

Action	Partners
1. Create a public-private partnership under the Chief Resilience Officer or other designated official to advise the Florida Governor and Florida Legislature on coordinated, statewide ocean and coastal policy, leadership, and investment.	Florida Governor, Florida Legislature
2. Develop a sustainable economic development plan for Florida's Blue Economy that focuses on coastal resilience, tourism and recreation, food production (commercial fisheries and aquaculture), innovative ways to improve water quality, marine manufacturing, marinas, and synergies with the economies driven by space exploration, ports, and ocean transportation.	Florida Governor, Florida Department of Environmental Protection, Florida Ocean Alliance, Florida Department of Economic Opportunity, Florida Department of Agriculture and Consumer Services, Florida Fish and Wildlife Conservation Commission, Florida Department of Transportation, Florida Ports Council, local chambers of commerce, tourism groups
3. Quantify, interpret, and regularly publish data on the value and vulnerability of Florida's Blue Economy that include human-built and natural resources, standardized metrics, forecasts from ensembles of models, trends in economic growth/contraction, and economic losses following disasters.	Office of Economic & Demographic Research, Florida Legislature, Florida Department of Economic Opportunity, Florida Department of Environmental Protection, Florida Ocean Alliance, University of Florida Institute of Food and Agricultural Sciences, Florida Fish and Wildlife Conservation Commission, Florida Department of Agriculture and Consumer Services
4. Ensure Florida is prepared to address potential stressors and shocks to the Blue Economy by fostering and funding risk-based vulnerability assessments, risk-based mitigation plans, and emergency response and recovery plans that identify sources and distribution of funding for recovery.	Florida Department of Environmental Protection, Florida Ocean Alliance, Florida Ports Council, Florida Department of Transportation, Estuary Programs, National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency, Southeast & Caribbean Disaster Recovery Partnership, Florida Department of Economic Opportunity, Office of Economic & Demographic Research, VISIT FLORIDA

Strategy 2: Develop Workforces for Ocean and Coastal Sectors that Yield a High Return-on-investment

Table 3. Actions for Blue Economy Strategy 2

Action	Partners
1. Expand the inventory of ocean and coastal industries to improve understanding of current and emerging industries and assets and delineate cross-industry synergies.	Florida Department of Economic Opportunity, regional economic development councils, regional planning councils, CareerSource Florida
2. Identify key occupations that support Florida's current and emerging Blue Economy; determine the skills needed for these occupations; and implement curricula, internships, other steps to build and maintain talent within Florida.	Florida Department of Economic Opportunity, universities, research institutions, regional economic development councils, regional planning councils, local chambers of commerce, vocational training programs, Workforce One, CareerSource Florida
3. Update the Florida Ocean Alliance economic report every five years (or as needed) to identify changes in the ocean economy.	Florida Ocean Alliance, Office of Economic & Demographic Research, Florida Legislature

A.2 Ocean and Coastal Resilience

A.2.1 Summary


Wave attenuation devices

Florida is home to more than 21 million people, with the 2030 population is projected to top 24 million, and the 2040 prediction estimated at more than 26 million residents (Bureau of Economic and Business Research, 2020). Population growth leading to development, associated land use changes, and increased demand for freshwater will exacerbate historical alterations to drainage patterns and legacy loads of contaminants to place increasing pressure on Florida's ocean and coastal resources. In addition to these local stressors, climate change, including sea level rise and more extreme weather, amplifies concerns for these fragile resources and the health and well-being of communities. The Intergovernmental Panel on Climate Change established that global mean sea level is rising at an accelerating rate and anthropogenic drivers, including historical and recent development trends, have played key roles in increasing coastal community and ecosystem vulnerability (Intergovernmental Panel on Climate Change, 2019).

Comprehensive planning for ocean and coastal resilience and its implementation are complicated by uncertainty about the rate and extent of sea level rise. Predicted levels in 2100 relative to 1986–2005 vary from 11 inches to 43 inches (Intergovernmental Panel on Climate Change, 2019). Compared to 1992, sea level in Florida is expected to rise by 6 to 12 inches in 2020, 14 to 34 inches in 2060, and by 31 to 81 inches in 2100 (Florida Sea Grant, 2020a).

The impacts of climate change and associated sea level rise are already visible in and around Florida. Miami Beach, Miami, Hollywood, and other coastal cities regularly experience routine flooding during lunar high tides, rain events, and periods of prolonged onshore winds (Florida Sea Grant, 2020a). Flooding intensity and frequency have increased in Cedar Key, and wells have experienced saltwater intrusion. The Town of Yankeetown has experienced substantial tree loss from saline soil conditions, and rising water levels are leading to a decrease in available habitat for migrating and nesting birds (Ocean Conservancy, 2020). Today, the 16 million Floridians living in the state's coastal zone risk being affected by tropical storms and hurricanes, and a further 2.1-million Floridians are living in homes predicted to be at risk by 2100 (Ocean Conservancy, 2020).

In 2017, Hurricane Irma caused $50 billion in damages along with extensive flooding, prolonged power outages, and sewage spills (National Oceanic and Atmospheric Administration, 2018; Ocean Conservancy, 2020). In 2018, Hurricane Michael caused about $18.4 billion in damages to property and infrastructure in Florida (National Oceanic and Atmospheric Administration, 2019b). Costs of hurricane damages are expected to rise with the projected increases in the intensity of hurricanes and their extreme impacts, further demonstrating the need for planning to reduce the financial burden on Florida's governments and citizens. The number of billion-dollar disasters has been increasing due to population growth and continuing coastal development, as well as climate change. The result is an increasing intensity and frequency of extreme weather events (National Oceanic and Atmospheric Administration, 2020b).

Protection, restoration, and management of healthy natural habitats (e.g., mangroves, oyster and coral reefs, and dunes), or "natural infrastructure," offer cost-effective options for coastal protection that can significantly reduce the damage to our coastlines. Florida's coral reefs provide flood protection to infrastructure valued at more than $600 million during a 10-year storm return interval and rises exponentially for longer storm return intervals (Storlazzi et al., 2019). Integrating natural with


Oyster farm

traditional grey infrastructure (e.g., seawalls) as hybrid solutions can accomplish multiple objectives and benefits, including shoreline protection and environmental and ecosystems services (Reguero et al., 2018).

During the next several decades, Florida's coastal communities will face the crucial need for committed planning efforts to address these vulnerabilities and to work for ocean and coastal resilience in the face of these pressures. Comprehensive resilience planning efforts must take place across Florida's coastal counties.

A.2.2 Goal

Strengthen and manage human and natural systems to be more resilient to the effects of climate change, including local stressors.

A.2.3 Strategies and Actions

The ocean and coastal resilience goal will be achieved by three strategies and seven actions.

Strategy 1: Plan for the Effects of Climate Change in Coastal Infrastructure Projects to Enhance Resilience

Table 4. Actions for Ocean and Coastal Resilience Strategy 1

Action	Partners
1. Provide funding and incentives that encourage local governments and industries to adopt adaptations and sustainability strategies within their comprehensive plans, land development codes, and operating procedures.	Federal agencies, state agencies, local governments, non-governmental organizations, ports, military facilities, businesses, Florida Ocean Alliance, Florida Association of Counties, Florida League of Cities, Federal Emergency Management Agency, U.S. Department of Housing and Urban Development
2. Work with local, state, and federal partners to update standards and permits for infrastructure that incorporate designs and practices providing protection from the impacts of climate change, including relocation away from the coast and use of natural materials to enhance resilience.	Federal agencies, state agencies, local governments, Florida Harbor Pilots Association, Florida Association of Counties, Florida League of Cities, Florida Department of Business and Professional Regulation, Florida Home Builders Association
3. Position Florida as a leader in identifying, developing, and using clean technologies to improve community health and economic resilience.	Florida Legislature, Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Services

Strategy 2: Manage and Mitigate Costs of Enhancing Resilience for Communities and Individuals

Table 5. Actions for Ocean and Coastal Resilience Strategy 2

Action	Partners
1. Develop, publicize, and implement a statewide program that provides grants and incentives to support planning for resilience, public education, resilient construction, and recovery from disasters, with consideration for equity of grant funding.	Florida Legislature, local governments, Florida Department of Environmental Protection, Resiliency Florida, Florida Association of Counties, Florida League of Cities
2. Begin planning for relocation and retreat where current and forecasted conditions indicate it is necessary and provide resources and funding to communities that are disproportionately affected.	Florida Legislature, state agencies, local governments, Florida Association of Counties, Florida League of Cities, Federal Emergency Management Agency

Strategy 3: Continue Research to Understand the Implications of Climate Change for Florida

Table 6. Actions for Ocean and Coastal Resilience Strategy 3

Action	Partners
1. Coordinate and implement a research program into the impacts of climate change on Florida's coastal infrastructure and natural resources that provides science-based approaches to mitigating impacts or to adapting to changes.	Florida Department of Environmental Protection, Florida Ocean Alliance, Florida Department of Transportation, universities, research institutions, non-governmental organizations
2. Foster innovation that enhances resilience and sustainability, with modifications to state and local regulations, permitting, funding, and other incentives, as needed.	Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Services, water management districts, Florida Legislature, local governments

A.3 Human and Natural Infrastructure

A.3.1 Summary

A.3.1.1 Water Quality


Algal bloom

Water quality degradation is a critically important issue facing Florida's oceans and coasts. Population growth, intensified land use, altered drainage patterns, stormwater runoff, wastewater and septic system discharges, agricultural and urban fertilization practices, air pollution, and discharges from ships contribute to degradation that manifests as harmful algal blooms, habitat loss, fisheries declines, and threats to human health.

Harmful algal blooms are defined as the proliferation of toxic or nuisance algae. These algae are normally present in the water column but, under ideal conditions, their populations can increase rapidly causing a "bloom." A bloom may lead to discoloration of the water, and depending on the species, the algae may produce toxins that can directly and indirectly impact wildlife and humans. Harmful algal blooms may kill birds, fish, and marine mammals, and they can make waters unsafe for swimming leading to loss of tourism. For example, using self-reported data from 12 coastal counties for the period of August to December 2018, the estimated costs of physical and economic damages from the 2018 red tide was approximately $130.6 million. The industries most impacted by the red tide were vacation home rentals, charter boat rentals, hotels, and restaurants, which led to a loss in employment and personal income (Tampa Bay Regional Planning Council, 2019).

Nutrient enrichment fosters the formation and persistence of harmful algal blooms. Those effects are expected to be exacerbated by regional changes in land use, associated alterations in hydrology, and climate change, specifically increases in temperature and pronounced variability in precipitation patterns (Blue-Green Algae Task Force, 2019). To prevent and minimize harmful algal blooms, especially cyanobacteria in freshwaters and dinoflagellates in brackish or marine waters, it is critical to reduce nutrient pollution, in particular nitrogen and phosphorus inputs due to human activities, and to re-establish healthy and more natural nitrogen and phosphorus proportions (Burkholder, 2019).

Billions of dollars have been spent to improve the state's wastewater infrastructure and implement measures to improve water quality. Extensive efforts have also been undertaken to monitor and assess factors that contribute to water quality degradation; however, much work and integration remain.

Great strides towards improving water quality were made by the 2020 Florida Legislature through the adoption of the Clean Waterways Act (Senate Bill 712). This act includes provisions to address urban stormwater, septic systems, wastewater collection systems and treatment facilities, reclaimed water, agricultural stormwater, and biosolids management. As the provisions of this act are implemented, nutrient reductions will occur from a variety of sources statewide. In addition, Governor DeSantis' formation of the Blue-Green Algae Task Force and Harmful Algal Bloom Task Force in 2019 was important to understanding and identifying water quality issues that lead to harmful algal blooms that affect Florida's economy. This Strategic Policy Plan supports the initial consensus documents produced by the Blue-Green Algae Task Force (2019) and Harmful Algal Bloom Task Force (2020), as well as their ongoing efforts.

A.3.1.2 HABITATS

Protection of Florida's habitats is a vital component in addressing threats from global climate change (including sea level rise), human development, disruption of historical flow patterns, and deterioration of water quality. Degradation of Florida's ocean and coastal habitats is costly not only from an economic perspective but also from ecological and quality of life perspectives. Restoration and conservation of these habitats is crucial to the long-term sustainability of Florida's commercial and recreational fisheries, as well as populations of many species of concern. Florida leads all other states in jobs and economic sales value of commercial and recreational fisheries combined (National Oceanic and Atmospheric Administration, 2018). Florida's oceans and coasts are home to numerous important yet sensitive ecological habitats, including seagrasses, wetlands, mangroves, beaches, mollusk reefs and beds, and coral reefs.

Seagrasses improve water clarity and quality by stabilizing sediments and absorbing nutrients from the surrounding water column that otherwise can fuel algal blooms. They decrease coastal erosion by dampening wave energy during storm events, buffer ocean acidification, and sequester carbon in their biomass and the sediments below (Yates, 2015). Seagrass beds also serve as a nursery for juvenile invertebrates and fish, and they provide feeding grounds for marine life (Ocean Conservancy, 2020). Florida is home to 2.2-million acres of seagrass (Florida Department of Environmental Protection, 2019b). Florida Bay and the areas stretching from Tarpon Springs on the west-central coast through the Nature Coast (eight counties) and into the eastern Panhandle in Apalachee Bay are home to some of the most extensive seagrass beds in North America (Ocean Conservancy, 2020). An acre of seagrass is capable of supporting as many as 40,000 fish and 50 million small invertebrates (Ocean Conservancy, 2020; Florida Department of Environmental Protection, 2019b). In fact, the Florida Department of Environmental Protection (2000) estimates that each acre of seagrass in Florida generates an annual economic value of approximately $20,500, which sums to $55.4 billion statewide (Indian River Lagoon National Estuary Program, 2019). Because seagrasses support such high biodiversity, and because of their sensitivity to changes in water quality, they are recognized as important indicator species that reflect the overall health of coastal ecosystems (Sherwood et al., 2017).


Mangroves

Like seagrasses, wetlands and mangroves provide storm protection and help maintain water quality and clarity. They stabilize shorelines, help protect erosion, and protect uplands from wind, waves, and flooding. Mangroves and coastal wetlands shelter critical life stages of important fishery species, such as juvenile redfish, snook, and blue crabs (Indian River Lagoon National Estuary Program, 2019). Globally, these habitats often were branded as impediments to development, and large areas were lost in recent decades. For example, Florida Bay has lost 44% of its mangrove and salt marsh acreage over the last century, and Lake Worth Lagoon has lost 87% of its mangrove acreage over the last 40 years (Ocean Conservancy, 2020; Florida Department of Environmental Protection, 2019a). Along the Indian River Lagoon, 86% of mangroves have been lost since 1940 (Florida Department of Environmental Protection, 2019a). Fortunately, attitudes are changing. For example, approximately 571,750 acres of mangroves currently exist in Florida (Radabaugh et al., 2017). These habitats are now recognized as being among the most important ecosystems in the world due to the array of ecosystem services they

provide, including provisioning (e.g., fisheries enhancement) and regulating (e.g., carbon storage and sequestration and coastal protection) (Spalding and Parrett, 2019).

Another of the state's most valuable natural resources are the beaches that extend along 825 miles of coastline. Beaches provide critical habitat for sea turtles, beach mice, other threatened and endangered species, and resident and migratory shorebirds use them for resting, nesting, and foraging. The beach and dune systems also act as buffers that protect development and coastal infrastructure from waves during large storm events. In addition, Florida's beaches are a major portion of Florida's Blue Economy because they attract tourists and residents (Florida Department of Environmental Protection, 2020a). Florida's beaches are impacted by erosion from sea level rise and coastal development. The Florida Beach and Shore Preservation Act was adopted to help protect and manage Florida's beaches, and many coastal communities have beach conservation and preservation plans (Florida Department of Environmental Protection, 2020a).

Mollusks also create valuable habitats, such as oyster reefs, clam beds, scallop reefs, or mussel beds, and these habitats provide critical ecosystem services that include improving water quality and clarity, preventing shoreline erosion, and supplying habitat and food to wildlife (Radabaugh et al., 2019). These habitats can be impacted by poor water quality, excessive sediment loads, overexploitation, and ocean acidification (Indian River Lagoon National Estuary Program Comprehensive Conservation and Management Plan, 2019). For instance, oysters are a commercially important resource; however, many of Florida's estuaries have lost 80–90% of their oyster reefs (Radabaugh et al., 2019). The loss of large bivalves from estuarine systems diminishes water column filtration, denitrification, and production of reef-associated species that support recreational and commercial fisheries (zu Ermgassen et al., 2016).


Coral reef

Coral reefs occur in a limited number of places but are one of the most biologically diverse ecosystems in the world. Unfortunately, approximately 75% of the world's coral reefs are rated as threatened by altered drainage patterns on land, sea level rise, ocean acidification, marine debris, marine vessel groundings, and water quality degradation (Burke et al., 2011). Florida's Coral Reef Tract, the largest reef in North America, stretches 360 miles from the tip of the Florida Keys to the Atlantic Coast to Martin County. This reef is the northernmost extension of living reefs in the United States (Biscayne National Park, 2015). In Florida, coral reefs generate $3 billion in local income, $6 billion in local sales, and 70,000 local jobs (Ocean Conservancy, 2020). Coral reefs also function like low-crested breakwaters, with hydrodynamic behavior well characterized by coastal engineering models. Furthermore, coral reefs attract tourists, support fisheries, and yield compounds used to fight human disease and illness. Since 2014, more than half of the Florida Reef Tract (more than 96,000 acres) has been affected by Stony Coral Tissue Loss Disease (Florida Department of Environmental Protection, 2020b). Protection and restoration remain vital to saving this scarce and important natural resource.

A.3.2 GOAL

Implement restoration and ecosystem-based management of habitats to ensure long-term sustainability and resilience of key species and their roles in supporting healthy people, sustainable

ecosystems, and a vibrant economy, which includes improving water quality and reducing the frequency, intensity, duration, and impacts of harmful algal blooms.

A.3.3 Strategies and Actions

The human and natural infrastructure goal will be achieved by four strategies and nine actions.

Strategy 1: Increase Integration of Current Efforts to Restore and Protect Water Quality

Table 7. Actions for Human and Natural Infrastructure Strategy 1

Action	Partners
1. Coordinate, fund, and implement efforts that address water quality and harmful algal blooms, including the initial and future recommendations from the Blue-Green Algae Task Force and Harmful Algal Bloom Task Force.	Florida Legislature, Florida Department of Environmental Protection, Florida Department of Health, Florida Fish and Wildlife Conservation Commission, Florida Department of Agriculture and Consumer Services, local governments, Estuary Programs
2. Provide resources to the Florida Department of Environmental Protection to build a comprehensive, statewide real-time water quality website that is publicly accessible.	Florida Department of Environmental Protection, local governments, Florida Legislature

Strategy 2: Maintain and Enhance Coastal Infrastructure to Protect Water Quality

Table 8. Actions for Human and Natural Infrastructure Strategy 2

Action	Partners
1. Prioritize human-built and natural coastal infrastructure upgrades (such as wastewater, stormwater, potable water, bridges, roads, energy networks, living shorelines, beach nourishment) to improve efficiency and resilience.	Florida Legislature, local governments, Florida Department of Environmental Protection, Florida Department of Transportation, water management districts, Federal Emergency Management Agency
2. Educate the public about actions they can take to help maintain infrastructure operational capacity.	Local governments, Florida Department of Environmental Protection, Florida Department of Transportation, water management districts

Strategy 3: Map and Document the Condition of Florida's Ocean and Coastal Habitats

Table 9. Actions for Human and Natural Infrastructure Strategy 3

Action	Partners
1. Build on efforts to inventory statewide maps of coastal and near-shore habitats to document their extent, assess their condition, inform restoration priorities, identify data gaps, and guide additional mapping and data collection.	Florida Fish and Wildlife Conservation Commission, Southeast Coastal Ocean Observing Regional Association, Gulf of Mexico Coastal Ocean and Observing System, U.S. Geological Survey, Florida Coastal Mapping Program, Gulf of Mexico Alliance, Florida Department of Environmental Protection, water management districts, Estuary Programs
2. Develop, implement, and publish ocean and coastal habitat metrics for the health of key habitats that are understood and accessible to the public, include evaluation of habitats, and contribute to economic evaluations.	Florida Sea Grant, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, Southeast Coastal Ocean Observing Regional Association, Gulf of Mexico Coastal Ocean and Observing System, Marine Biodiversity Observation Network, ROFFS™

Strategy 4: Restore, Protect, Manage, and Monitor Ocean and Coastal Habitats and Related Species

Table 10. Actions for Human and Natural Infrastructure Strategy 4

Action	Partners
1. Identify habitats and hotspots with a critical need for intervention due to severe threats or provision of highly valuable services and immediately develop and implement adaptive management to restore, protect, and manage them.	Florida Sea Grant, Marine Biodiversity Observation Network, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, Florida Keys National Marine Sanctuary, Southeast Florida Coral Reef Initiative, Florida Harbor Pilots Association, National Park Service, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service non-governmental organizations, universities
2. Improve effectiveness of fish habitat conservation, restoration, and management efforts by monitoring, identifying, and characterizing critical areas along the coast to inform fisheries management efforts.	Gulf and South Atlantic Fisheries Management Councils, Florida Fish and Wildlife Conservation Commission, sport and commercial fisherman, National Oceanic and Atmospheric Administration Southeast Fisheries Science Center, non-governmental organizations, ROFFS™
3. Implement and fund research into the use of aquaculture for ecosystem restoration, mitigation of nutrient loading, and sustainable food sources.	Florida Department of Agriculture and Consumer Services, Florida Department of Environmental Protection, Florida Sea Grant, University of Florida Institute of Food and Agricultural Sciences, Florida Ocean Alliance, universities, non-governmental organizations

A.4 Implementation, Outreach, and Financing

A.4.1 Summary

Public and political ownership of this Strategic Policy Plan is crucial to its successful implementation. All levels of government (federal, state, and local) will need to take ownership of actions within their jurisdiction to achieve Plan goals for a more resilient ocean and coastal system and Blue Economy. Private entities will need to be recruited into efficient and effective partnerships.


Oyster restoration project

Education of the public to generate buy-in is imperative to obtaining political support, which, in turn, generates funding to achieve the Plan goals. Increased and effective education and outreach efforts are vital to increasing the public's awareness of the importance of preserving and restoring Florida's ocean and coastal resources for generations to come. Education materials must synthesize information into messages that are easy to understand, consistent, and targeted to specific audiences. Examples could include a water quality database, automatically updated information services, brochure on the economic benefits to local economies, and detailed statewide maps of key ocean and coastal resources. Education and outreach programs cannot be a one-time effort; programs need to evolve over time to maintain the support and engagement of Florida's citizenry.

For this Strategic Policy Plan to be successful, there is a need for long-term, consistent funding. The issues described in this Plan that affect Florida's oceans and coasts cannot be adequately addressed with current resources or by any one organization. Given the scale and urgency of the key issues, funding will need to be combined from federal, state, and local governments; non-governmental organizations; and private entity partners. Funding is required to provide for restoration and increased resilience along Florida's oceans and coasts at the scale and timeline necessary to reduce potential economic impacts. Funding restoration and infrastructure improvements creates jobs and improves tourism, which provides a great return on investment. For instance, the East Central Florida Regional Planning Council and Treasure Coast Regional Planning Council (2016) found that for every $1 spent on achieving a sustainable Indian River Lagoon, there is a return of $33 in total economic value. A source of consistent annual funding will enable more effective implementation of Plan actions and a stronger Blue Economy.

A.4.2 Goal

Combine education and outreach, transformational thinking, integrated leadership, and sufficient and consistent funding to ensure that federal, state, and local governments, non-governmental organizations, private entities, and the public actively contribute to achieving the vision for Florida's Blue Economy.

A.4.3 Strategies and Actions

The implementation, outreach, and finance goal will be achieved by two strategies and three actions.

Strategy 1: Identify Consistent Funding to Implement Actions

Table 11. Actions for Implementation, Outreach, and Financing Strategy 1

Action	Partners
1. Coordinate with public and private partners to identify sources of consistent funding that will help to leverage existing funds.	Florida Ocean Alliance, Florida Legislature, federal agencies, state agencies, local governments, non-governmental organizations, private industry groups, other private entities

Strategy 2: Implement a Statewide Program for a Diverse Audience that Raises Awareness, Improves Understanding, and Changes Behavior

Table 12. Actions for Implementation, Outreach, and Financing Strategy 2

Action	Partners
1. Unite all relevant partners to create and deliver consistent messages to residents, tourists, decision-makers, students, educators, and the media regarding the importance of ocean resources, actions needed to restore and protect them, and what they can do to help.	Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, Florida Department of Agriculture and Consumer Services, Florida Department of Education, Florida Ocean Alliance, local governments, Estuary Programs, non-governmental organizations, universities, tourism groups, communication specialists, marketing and outreach experts
2. Partner with private industry to conduct classes, field trips, research, and other educational opportunities for students, the general public, and marine industry users and employees.	Private industry groups, trade associations, tourism groups, universities, non-governmental organizations

A.5 References and Credits

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A.5.2 PHOTOGRAPH CREDITS

Florida Atlantic University Harbor Branch: Section A.1.1.

Florida Fish and Wildlife Conservation Commission: Bottom left and bottom middle on cover.

Florida Ocean Alliance: Figure 1 and Figure 2.

Florida Ports Council: Top and bottom right on cover and end of Strategic Policy Plan.

John Moran: Section A.3.1.1.

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Appendix B. Acknowledgments

The Florida Ocean Alliance gratefully acknowledges the support of the Florida Governor and Legislature and the Florida Department of Environmental Protection for funding this Strategic Policy Plan for Florida's Oceans and Coasts (Plan). This Plan was funded in part through a grant agreement from the Florida Department of Environmental Protection. The views, statements, findings, conclusions, and recommendations expressed herein are those of the authors and do not necessarily reflect the views of the State of Florida or any of its sub-agencies.

The Board of Directors of the Florida Ocean Alliance guided the development and content of this Plan. The efforts of the Steering Committee were led by Marcy Frick and Katie Hallas with Tetra Tech, Inc. and Rafael Montalvo and Hal Beardall with the FCRC Consensus Center, in collaboration with the Steering Committee members and Dr. Lenore Alpert, Executive Director of the Florida Ocean Alliance.

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In honor of Dr. Karl E. Havens for his contributions to Florida aquatic ecosystems

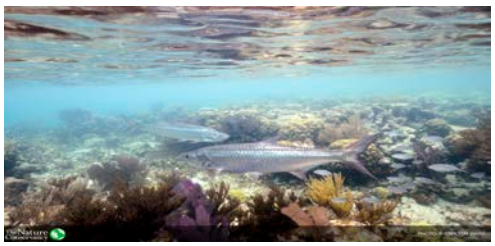
Karl E. Havens, director of the Florida Sea Grant program from 2007 until his passing in 2019 and a professor of aquatic ecology at the University of Florida, was a leading international expert on aquatic research, management, education, and outreach. As director of Florida Sea Grant, his achievements included the creation of the biennial Florida Sea Grant Coastal Science Symposium, formation of the program's first advisory council in 2009, and leadership of the university's oyster recovery team that addressed the collapse of the commercial oyster fishery in Apalachicola Bay. He also led the University of Florida Institute of Food and Agricultural Sciences Harmful Algal Bloom Task Force, an effort that applies the university's research and outreach expertise to the blue-green and red-tide algae blooms affecting nearly every waterbody in Florida.

"Karl was a visionary who could help others see as well. He often did it with photographs. He always did it with the excitement in his voice when he talked about science. His passion was a great contribution to science because he inspired others to discover, too."

Jack Payne, University of Florida Senior Vice President for Agriculture and Natural Resources

Appendix C. Florida Ocean Alliance 2020 Economic Report









FLORIDA'S OCEANS AND COASTS:

The Building Blocks of Florida's Economy

JANUARY 2020

Florida Ocean Alliance

Acknowledgments

The Florida Ocean Alliance gratefully acknowledges the support of the Florida Legislature and the Florida Department of Environmental Protection for funding this update to the 2013 report on the economic impact of Florida's ocean and coastal industries. This report was funded in part through a grant agreement from the Florida Department of Environmental Protection. The views, statements, findings, conclusions and recommendations expressed herein are those of the authors and do not necessarily reflect the views of the State of Florida or any of its sub-agencies.

The Board of Directors of the Florida Ocean Alliance has guided the development and content of this report. The research effort was led by Dr. William B. Stronge and Dr. Rupert Rhodd, who prepared the economic study, in collaboration with Dr. Lenore Alpert, Executive Director of the Florida Ocean Alliance. Key research assistance was provided by Angela Grooms and Misha Plis of Tetra Tech Inc.

Preface

The Florida Ocean Alliance is a nonpartisan organization dedicated to bringing together the private sector, academia, and nonprofit research organizations in Florida to protect and enhance Florida‘s coastal and ocean resources for continued social and economic benefits. Recognizing the interconnection of Florida to its neighbors in the Caribbean Basin, along the Gulf of Mexico, and the Atlantic Coast, the Florida Ocean Alliance is committed to positioning Florida as an international leader to integrate ocean conservation, education, and responsible economic development. Private sector members include representatives from ocean-related industries in tourism, ports, shipping, cruising, recreational and commercial fishing, and recreational boating. Other members include representatives from nonprofit research organizations, academia, the ocean research community, and public interest groups.

The Alliance serves as a clearinghouse for information on key ocean and coastal issues facing Florida. It monitors and publicizes actions related to the oceans and coasts. The Alliance focuses on outreach and educational activities for the public and policymakers, including conferences, papers on ocean and coastal policies, economic studies, and testimony to national or state agencies and commissions concerned with ocean or coastal policy. Each year the Alliance sponsors Florida Oceans Day in the State Capitol in Tallahassee.

The Alliance was formed in late 1999 and evolved from the members participating in the Florida Governor's Ocean Committee. The Florida Ports Council provided an initial seed grant for the organization. Additional information on the Florida Ocean Alliance is available online at www.floridaoceanalliance.org.

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Florida Atlantic University-
Harbor Branch Oceanographic Institute

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Roffer's Ocean Fishing Forecasting Service, Inc.

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Glenn Wiltshire
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Rob Zeiger
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Lenore Alpert, Ph.D. (Executive Director)
Florida Ocean Alliance

Table of Contents

List of Figures

List of Maps

List of Tables

Florida Ocean Alliance

FLORIDA'S OCEANS AND COASTS:
The Building Blocks of Florida's Economy

Executive Summary

- Coastal counties contributed over $797 billion to Florida's Economy in 2018.
- In 2018, more than 1,000,000 jobs in Florida were directly and indirectly created by activities that used ocean resources.
- Florida's ocean economy contributed $73.9 billion in 2018 to the state's economy from the direct and indirect use of its ocean resources.

This economic study and cluster analysis highlights the vital connection between the state's economy and its coasts and oceans. The work complements and adds to previous analyses done in 2008 and 2013.

Florida has the second longest coastline, some 8,436 miles, among the US states and territories, second only to Alaska (National Oceanic and Atmospheric Administration or NOAA). Shoreline counties are home to more than three-fourths of the state's population of more than 21 million people. As such, Florida's coasts host critical infrastructure, house millions of people, drive huge economic activity, and as this report showcases, are inherently linked to Florida's thriving economy.

In 2018, Florida's economy exceeded more than $1 trillion dollars, 77 percent of which was contributed by activities in coastal counties. In fact, the GDP of Florida's coastline exceeds the GDP of 45 of the nation's 50 states. Florida's coastal economy is also a major part of the national economy.

Total employment in the state amounted to about 12.5 million jobs in 2018, including 77 percent or 9.6 million in coastal counties.

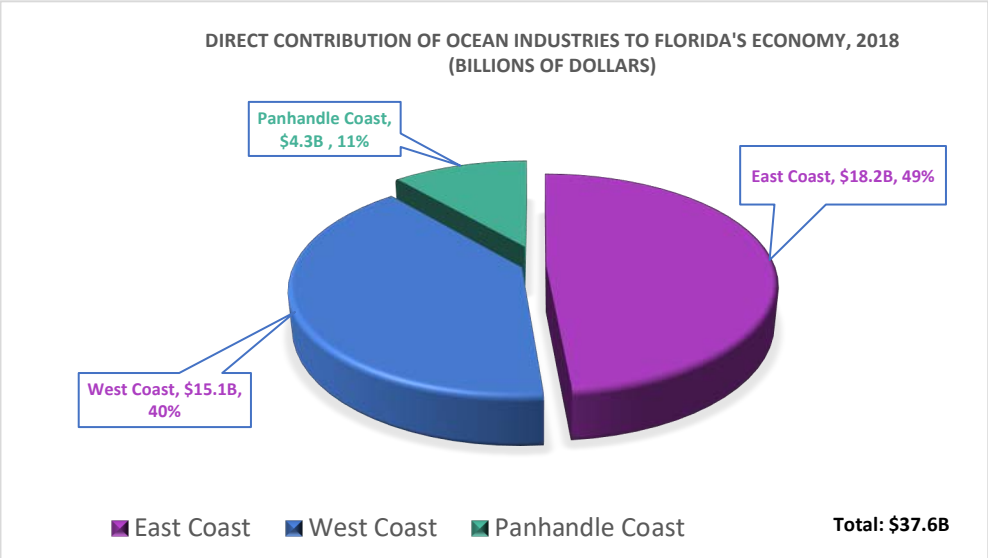
FLORIDA'S OCEAN ECONOMY

- Ocean-related industries include ocean tourism, ocean transportation, marine industries, ocean recreation, and living resources.

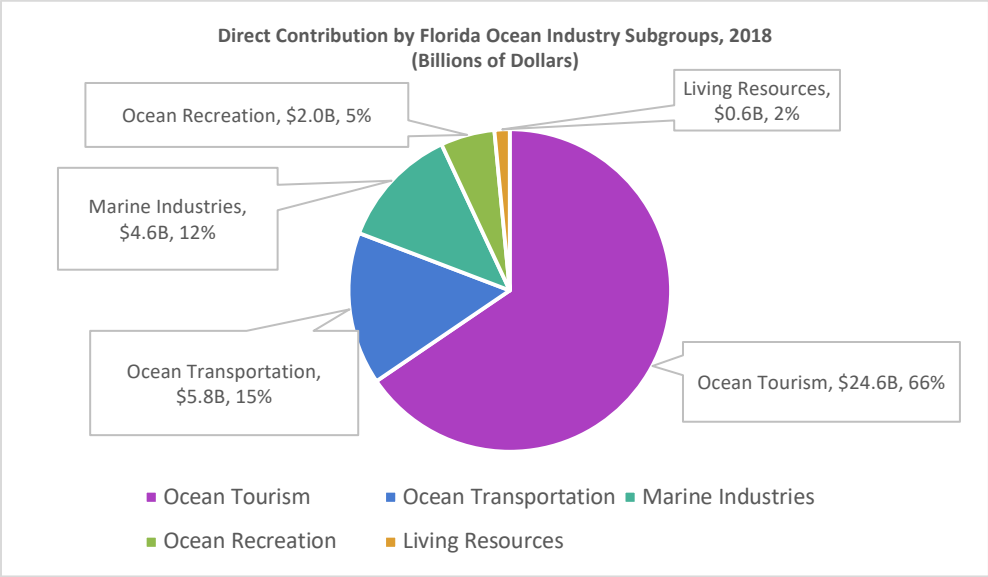
Thirty-eight Florida industries were used to represent the parts of the coastal county economies that make significant use of ocean resources. Collectively, these are called the Ocean Economy and their aggregate gross domestic product is called the Ocean GDP.

Florida's Ocean GDP was $37.6 billion in 2018. When indirect impacts are taken into account, this amount doubles to $73.9 billion. Indirect impacts include the activity of Florida suppliers with regard to ocean-related industries and the production of Florida consumer goods as a result of the consumer expenditures by employees of the directly and indirectly affected industries.

Florida's East Coast accounts for about 49 percent of the Ocean Economy, the West Coast about 40 percent, and the Panhandle Coast about 11 percent of the total.



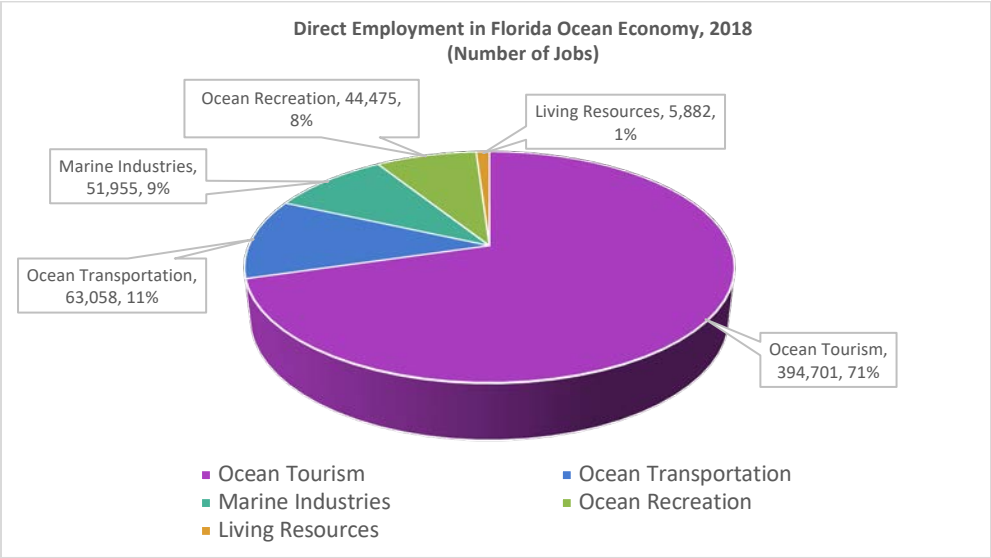
As in the 2013 study by the Florida Ocean Alliance, ocean industries were divided into five sub-groups: ocean tourism, ocean transportation, marine industries, ocean recreation, and living resources (see full text for composition of each group).



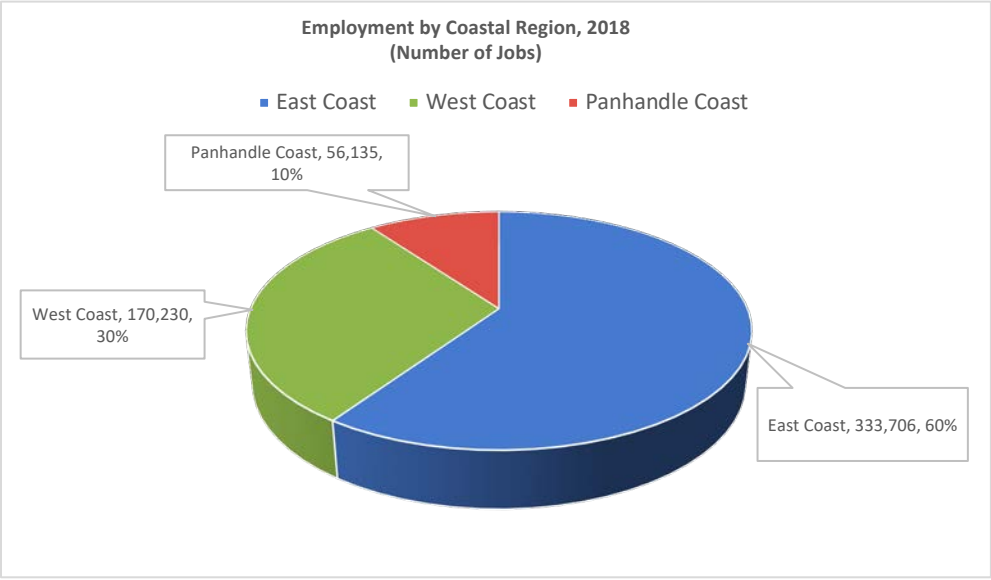
In 2018, Florida's ocean resources directly created economic activity amounting to $37.6 billion. Of this, $24.6 billion was created by out-of-state ocean-oriented tourism, $5.8 billion was created by ocean transportation and its supporting activities, $4.6 billion was created by the marine industries, $2.0 billion was created by ocean-oriented recreation, and $0.6 billion was created by the harvest, processing and distribution of the ocean's living resources. The state's ocean resources also directly provided Floridians approximately 560,071 jobs in 2018.

Florida's port system is thriving. However, because of the rich diversity of Florida's 15 deepwater ports and the limitations of the 2013 study, this analysis could not capture the full extent of the economic impact of Florida's ports. According to the Florida Ports Council, the state's ports generate 900,000 direct and indirect jobs and contribute $117.7 billion in economic value to the state.

Ocean tourism accounts for a significant amount number of the 560,071 jobs directly created by Florida's Ocean Economy, about 71 percent (394,701). This is assuming that 50 percent of the jobs in food services and drinking places and 75 percent of the jobs in accommodations are ocean-related. These assumptions are made to allow for non-ocean tourist use of hotels and restaurants. There are also other expenditures made by ocean tourists beyond hotels and restaurants. Ocean transportation accounts for 11 percent of the jobs in the ocean economy (63,058), the marine industries account for 9 percent (51,955), ocean recreation accounts for 8 percent (44,475), and living resources accounts for 1 percent (5,882).

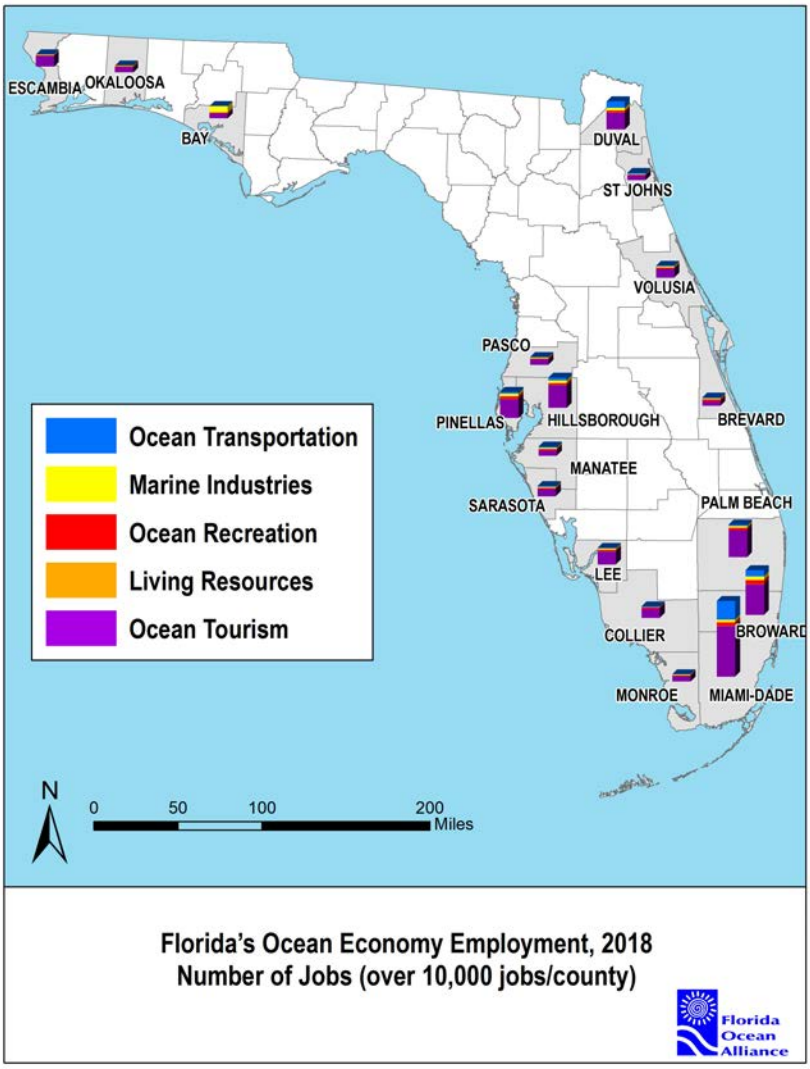


Of the jobs in Florida's Ocean Economy, about 60 percent (333,706) are in the coastal counties along the East Coast, about 30 percent (170,230) the West Coast, and about 10 percent (56,135) along the Panhandle Coast. Ocean tourism accounts for 73.6 percent of the jobs on the West Coast and for 69.5 percent on the East Coast. It accounts for 66.5 percent on the Panhandle Coast. Coastal transportation is the second largest source of ocean economy jobs along the state's East Coast, which contains the three largest cruise ports in the world. The marine industries are the second largest source of employment on the state's West and Panhandle coasts.



In Florida's 35 coastal counties, 17 have ocean employment of at least 10,000 jobs. The state's metropolitan coastal counties all have substantial ocean employment because of their important tourism

industries. The counties with the largest employment have substantial tourism and important ports: Miami-Dade (107,411 jobs), Broward (63,564), Palm Beach (45,913), Hillsborough (42,835), Duval (39,877). Bay County (Panama City) on the Panhandle Coast has the state's largest marine industries because of the large number of jobs in ship building and repairing (8,941). Broward County also has more than 5,000 jobs in its marine industries.



Florida's Ocean Economy provides an important source of individual earning as well. Annual labor earnings from the average job in Florida's Ocean Economy was $35,171 in 2018 (see full report for how earnings are defined). Labor earnings were relatively high in the marine industries ($52,540), living resources ($50,584) and ocean transportation ($49,621). Earnings in these three industries were similar to average earnings across all industries in the state. Average earnings per job were relatively low in ocean tourism ($31,808) and ocean recreation ($21,717) though these industries may have relatively large numbers of part-time and seasonal workers.

As this economic analysis shows, Florida's coastal counties and Ocean Economy are critical to the state's economy and well-being by providing millions of jobs and billions in economic revenue. The full report provides additional data, in depth analyses, definitions, charts, maps, and explanation of the methods used. But the tale being told remains the same, the vitality of Florida's oceans and coasts are inherently linked to its people and economic stability.

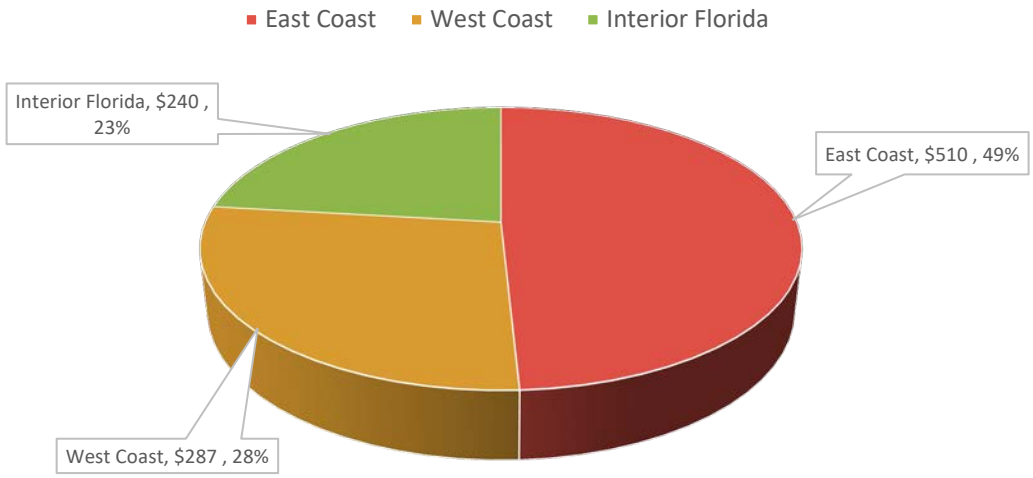
I. Economic Contribution of Florida's Oceans to Gross Domestic Product (GDP)

The Importance of Florida's Coastal Counties

The National Oceanic and Atmospheric Administration (NOAA) ranks Florida as having the second longest coastline among the U.S. states and territories, second only to Alaska. In 2016, NOAA estimated the length of Florida's coastline at 8,436 miles.[1] Florida's Atlantic coastline is 3,341 miles and the Gulf of Mexico shoreline is 5,095 miles in length. The counties along the shoreline are home to more than three-fourths of the state's population of more than 21 million persons.[2]

Florida's economy exceeded more than 1 trillion dollars in 2018, and the coastal counties contributed $797 billion, which accounted for 76.9 percent of the total. The counties on the Atlantic shoreline contributed $510 billion and the counties on the Gulf shoreline $287 billion. The GDP of Florida's coastline exceeds the GDP of 45 of the nation's 50 states. (See Figure 1 & Table 1)

Figure 1
Coastal Area Contribution to Florida's Gross Domestic Product, 2018
Billions of Dollars (Current Prices)

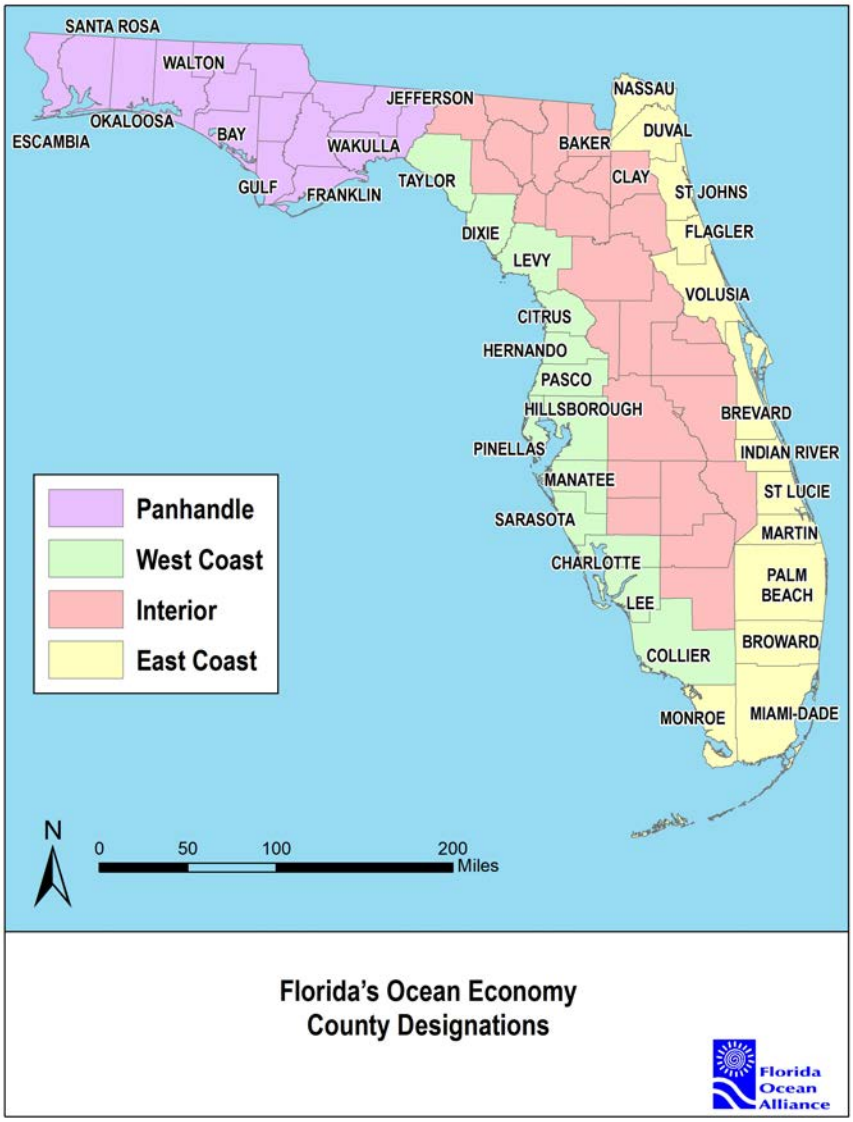


[1] The NOAA measurement includes the coastline of tidal inlets. https://en.wikipedia.org/wiki/List_of_U.S._states_and_territories_by_coastline The data can also be found on the NOAA website at https://coast.noaa.gov/data/docs/states/shorelines.pdf.
[2] https://www.bebr.ufl.edu/population. Florida Estimates of Population April 1, 2019.

TABLE 1 Coastal Area Contribution to Florida GDP, 2018 (Billions of Dollars)		
	Gross Domestic Product	% of State
Florida Total	$1,036	100.0%
Total Coasts	$797	76.9%
East Coast	$510	49.2%
West Coast	$287	27.7%
Interior Florida	$240	23.1%

Total employment in the coastal counties amounted to 9.6 million jobs in 2018, which was about 77 percent of the state's total of 12.5 million jobs.[3] Economic activity in the state's coastal economy provided jobs and incomes to millions of Florida residents, and the strength of the economy is of major importance to the people of the state.

Map 1



[3] https://www.bea.gov/. Total Full-Time and Part-Time Employment by NAICS Industry. CAEMP25N.

Florida's Ocean Economy

Many of the industries in the economy of Florida's coastal counties make substantial use of Florida's ocean resources. This study uses 38 industries to represent the parts of the coastal county economies that make significant use of ocean resources.[4] Collectively these are called the Ocean Economy, and their aggregate gross domestic product is called Ocean GDP. Some of these industries sell goods and services to other parts of the ocean economy, and it is not possible to exclude the non-ocean parts of their output. To balance this, other industries that are not included make some use of the state's ocean resources. The industries in the Ocean Economy, therefore, should be regarded as the "leading indicators" of the health of the state's ocean resources. Their outputs do not add to an exact total of the size of the Ocean Economy.

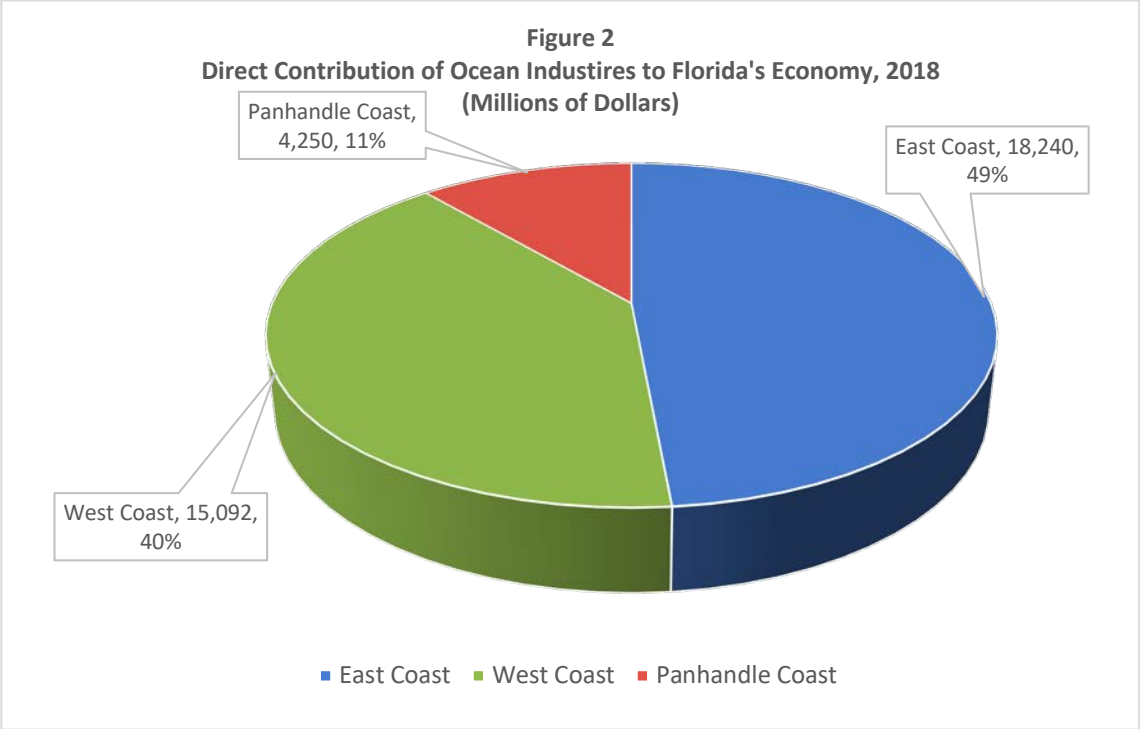
The industries that make up the Ocean Economy are grouped into five groupings: ocean tourism is measured by a portion of the outputs of lodging and eating places; ocean transportation includes passengers and freight, port and harbor operations, and a portion of the warehousing and storage industry; marine industries include ship and boat building, and boat dealers. Ocean recreation includes scenic and sightseeing transportation and nature parks; living resources includes aquaculture, fishing, fish and seafood product preparation and packaging, and fish and seafood markets. Living resources include commercial fishing and not recreational fishing. Recreational fishing is included elsewhere in the ocean industries, especially in ocean recreation. (See Table 2)

[4] The industries are identified by NAICS Codes, the standard classification used by government economic statisticians. The industries were first selected in a 2010 report by NOAA economists. The 38 industries included in this study are an update of the industries used in the 2013 study, Florida Ocean Alliance, "Florida's Oceans and Coasts: An Economic and Coastal Analysis," May 2013. Four industries have been added since 2013: Other Aquaculture, Other Marine Fishing, Ocean and Coastal Freight Transportation. NOAA has also added these industries in its recent reports. The biggest difference between this study and NOAA is their inclusion of Offshore Mining.

Table 2 Ocean Industries in Florida		
Industry Subgroup	**NAICS Code**	**Industry**
Ocean Tourism	721110	Hotels
	721191	Bed & Breakfasts
	722511	Full-Service Restaurants
	722513	Limited Service Restaurants
	722514	Cafeterias
	722515	Snack Bars
Ocean Transportation	483111	Deep Sea Freight Transportation
	483112	Deep Sea Passenger Transportation
	483113	Coastal Freight Transportation
	483114	Coastal Passenger Transportation
	488310	Port & Harbor Operations
	488320	Marine Cargo Handling
	488330	Navigation Services to Shipping
	488390	Other Support Activities for Water Transportation
	334511	Navigation Systems & Instruments Manufacturing
	4931	Warehousing & Storage
Marine Industries	237990	Marine-related construction
	336611	Ship Building & Repairing
	336612	Boat Building
	441222	Boat Dealers
	713930	Marinas
Ocean Recreation	487210	Scenic & Sightseeing Transportation on Water[5]
	487990	Scenic & Sightseeing Transportation except on Land or Water
	532284	Recreational Goods Rental
	339920	Athletics & Sporting Goods Manufacturing
	611620	Sporting & Recreation Instruction
	712130	Zoos & Botanical Gardens
	712190	Nature Parks & Similar Institutions
	713990	Other Recreational & Amusements Services
	721211	RV Parks and Campgrounds
Living Resources[6]	112511	Finfish Farming & Fish Hatcheries
	112512	Shellfish Farming
	112519	Other Aquaculture
	114111	Finfish Fishing
	114112	Shellfish Fishing
	114119	Other Marine Fishing
	311710	Fish & Seafood Product Preparation and Packaging
	445220	Fish and Seafood Markets

[5] NAICS Code 487210 - Sightseeing on water includes charter fishing boats. Recreational fishing is a consumption activity rather than a production industry. NAICS code 487210, "Sightseeing Transportation on Water," includes charter fishing boats. If fishers rent a boat or equipment, it will show up in NAICS code 532284, "Recreational Goods Rental." If they use their own or a friend's boat, the only industry we have is NAICS code 336612, "Boat Building." Fuel costs, food consumed on the boat, etc. are not included in the industries. The value of recreational fishing is probably included in the data, but it is located in several places and not in one NAICS code.

[6] Living Resources only includes commercial fishing. The product is the living fish.



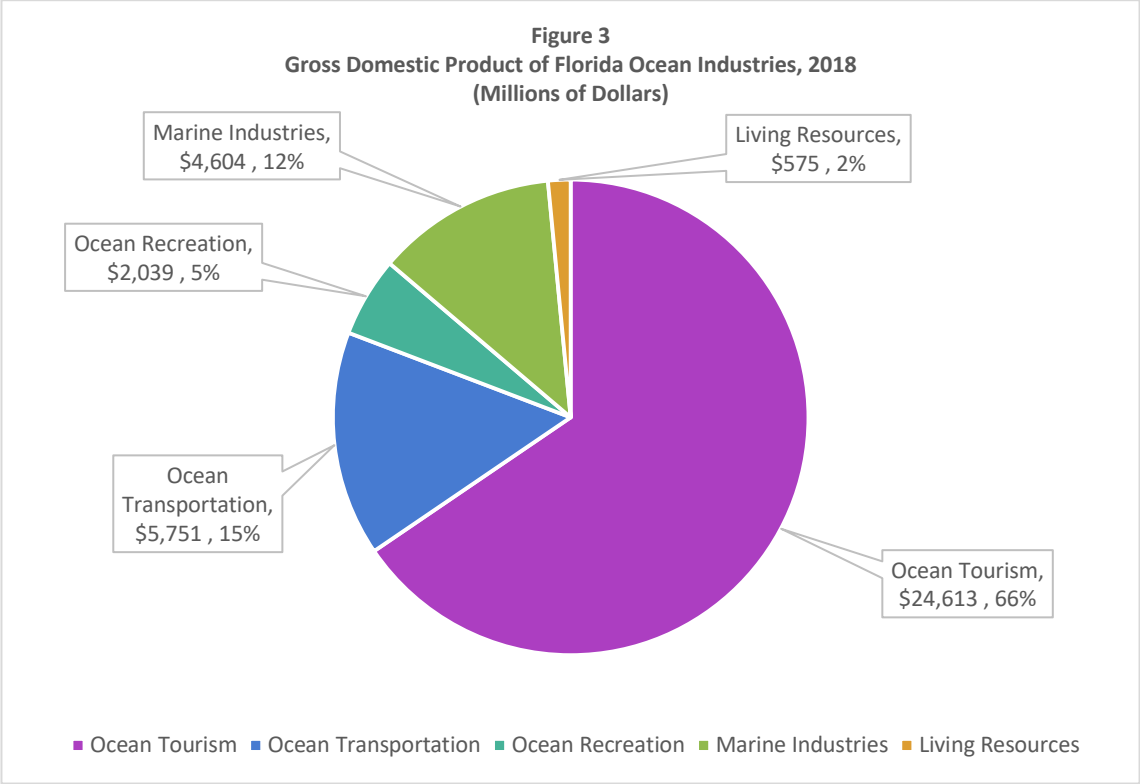
Gross Domestic Product

Florida's Ocean GDP was $37.6 billion in 2018 which was about 4 percent of the state's total. These are direct impacts – indirect impacts would double the direct impact. As shown in Figure 2, 49 percent of the Ocean Economy was on the East Coast, and 40 percent was on the West Coast. The Ocean GDP along the Panhandle Coast was about 11 percent of the total.

TABLE 3
Direct Contribution of Florida Ocean Industries to the Florida Gross Domestic Product, 2018
(Millions of Dollars)

	Ocean Tourism	Ocean Transportation	Marine Industries	Ocean Recreation	Living Resources	Total	Percent
East Coast	$10,524	$4,192	$2,269	$1,071	$184	$18,240	48.5%
West Coast	$11,244	$1,513	$1,391	$723	$221	$15,092	40.2%
Panhandle Coast	$2,845	$46	$945	$245	$170	$4,250	11.3%
Total	$24,613	$5,751	$4,604	$2,039	$575	$37,582	100.0%
Percent	65.5%	15.3%	12.3%	5.4%	1.5%	100.0%	

The distribution of Ocean GDP by industry sub-group is given in Table 3 and Figure 3. Ocean tourism GDP was the largest among the industry subgroups. It accounted for $24.6 billion (65.5 percent). The other industry subgroups were much smaller. Ocean transportation had a GDP of $5.8 billion (15.3 percent), marine industries had a GDP of $4.6 billion (12.3 percent), ocean recreation had a GDP of $2.0 billion (5.4 percent), and living resources had a GDP of $0.56 (1.5 percent).

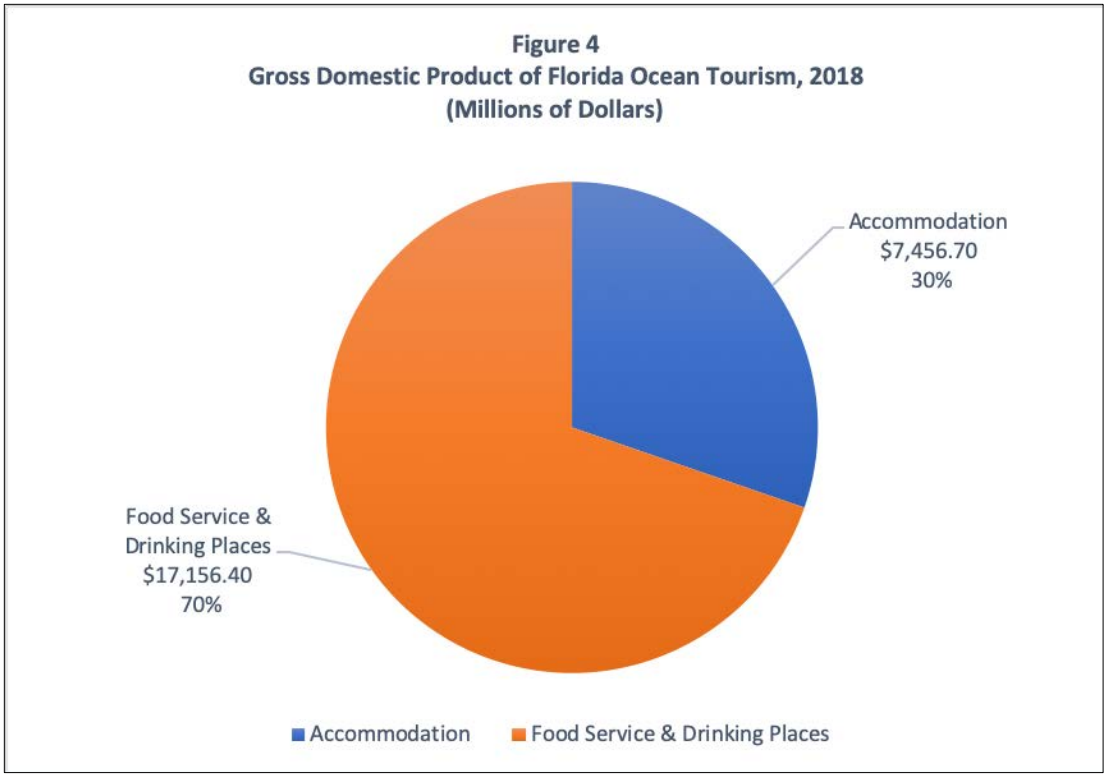


Ocean Tourism

Ocean-oriented tourism accounted for the largest contribution by Florida's ocean industries to the state economy, amounting to $24.6 billion in 2018 (See Table 4 and Figure 4). Food service and drinking places accounted for the largest portion of this ($17.2 billion or 69.7 percent of the total), and accommodation accounted for $7.4 billion (30.3 percent). Only the contribution of these industries in the coastal counties is included. Additionally, only a portion of the GDP of these industries is included because non-ocean parts of the economy also use these industries.

TABLE 4
Gross Domestic Product of Ocean Tourism, 2018
(Millions of Dollars)

Industry	Amount	Percent
Food Service & Drinking Places	$ 17,156.4	69.7%
Accommodation	$ 7,456.7	30.3%
Total	$ 24,613.1	100.0%

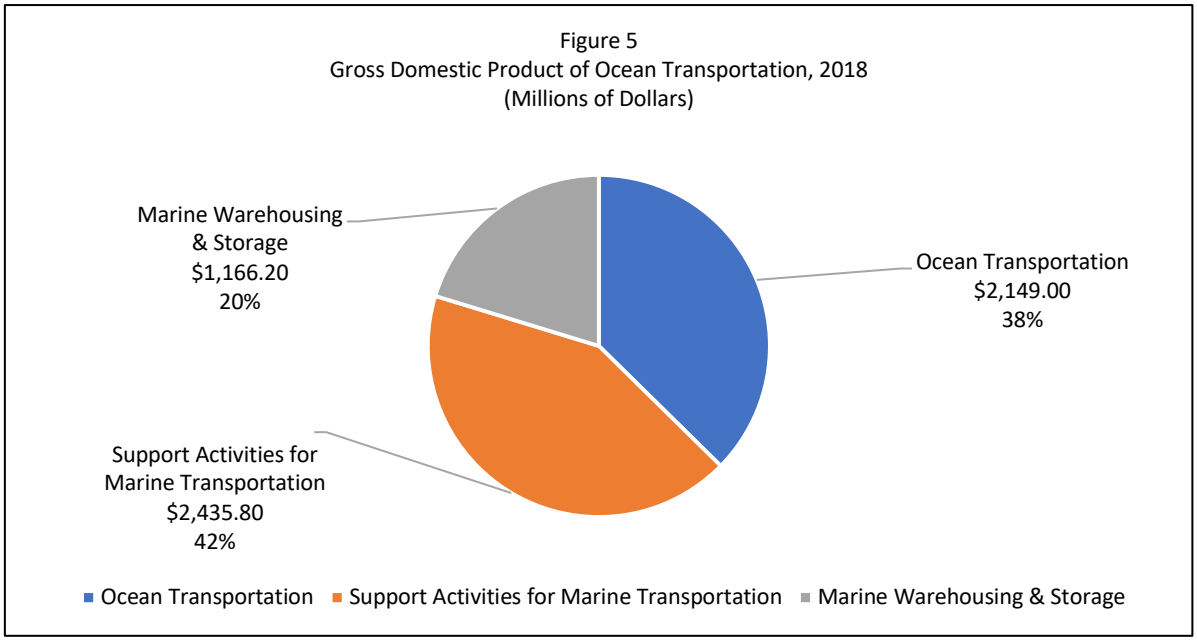


Ocean Transportation

Ocean transportation made the second largest contribution to Florida GDP in 2018. The contribution amounted to $5.8 billion.

Table 5 Gross Domestic Product of Ocean Transportation, 2018 (Millions of Dollars)		
Industry	**Amount**	**Percent**
Support Activities for Marine Transportation	$2,435.80	42.45%
Ocean Transportation	$2,149.00	37.4%
Marine Warehousing & Storage	$1,166.20	20.35%
Total	$5,751.00	100%

Ocean transportation itself includes transportation on the deep seas and transportation along the coast (i.e., the coastal trade). Transportation of passengers and of freight are included. Supporting activities for ocean transportation include port and harbor operations, marine cargo handling, and navigation services to shipping. Warehousing is used in connection with ocean transportation, although it is also used by other parts of the economy. A portion of warehousing in Florida's coastal counties is included in the ocean transportation industry. The subgroup distribution is shown in Table 5 and Figure 5.



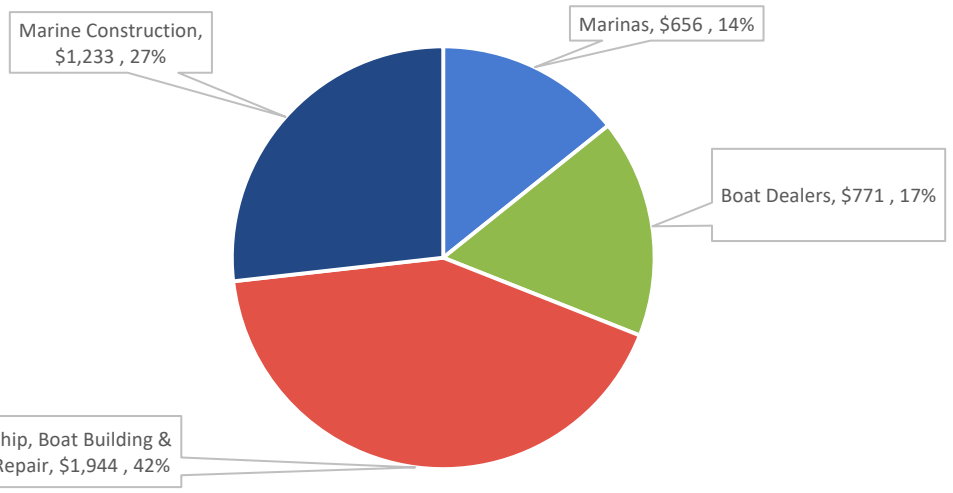
Marine Industries

Marine industries made the third largest contribution to Florida GDP in 2018. The contribution amounted to $4.6 billion (See Table 6 and Figure 6). Ship and boat building and repairing comprised the largest part of the marine industry, $1.9 billion (42.2 percent), and marine construction contributed $1.2 billion (26.8 percent). Boat dealers accounted for $771 million (16.7 percent), and marinas accounted for $656 million (14.3 percent).

Table 6
Gross Domestic Product of Marine Industries, 2018
(Millions of Dollars)

Industry	Amount	Percent
Ship, Boat Building & Repairing	$1,944	42.2%
Marine Construction	$1,233	26.85%
Boat Dealers	$771	16.75%
Marinas	$656	14.3%
Total	$4,605	100%

Figure 6
Gross Domestic Product of Marine Industries, 2018
(Millions of Dollars)

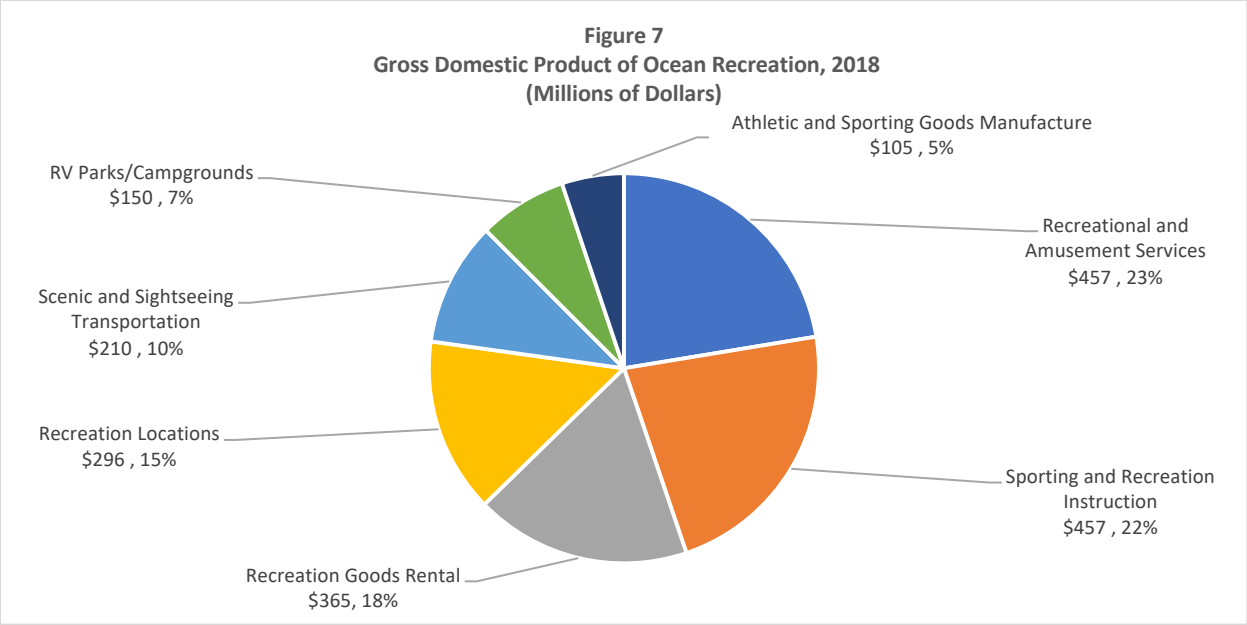


Ocean Recreation

Ocean-oriented recreation contributed $2.0 billion to the state's gross domestic product in 2018 (See Table 7 and Figure 7). Recreation and amusement services and sporting and recreational instruction each contributed $457 million (22.4 percent) to this total. Recreational goods rentals contributed $365 million (17.9 percent); production at recreational locations, such as nature parks, zoos and botanical gardens, contributed $296 million (14.5 percent). The scenic and sightseeing Industry produced $210 million (10.3 percent), RV parks/campgrounds contributed $150 million (7.4 percent), and athletic and sporting goods contributed $105 million (5.1 percent).

TABLE 7
Gross Domestic Product of Ocean Recreation, 2018
(Millions of Dollars)

Industry	Amount	Percent
Recreational and Amusement Services	$457	22.4%
Sporting and Recreation Instruction	$457	22.4%
Recreation Goods Rental	$365	17.9%
Recreation Locations	$296	14.5%
Scenic and Sightseeing Transportation	$210	10.3%
RV Parks/Campgrounds	$150	7.4%
Athletic and Sporting Goods Manufacture	$105	5.1%
Total	$2,039	100.0%



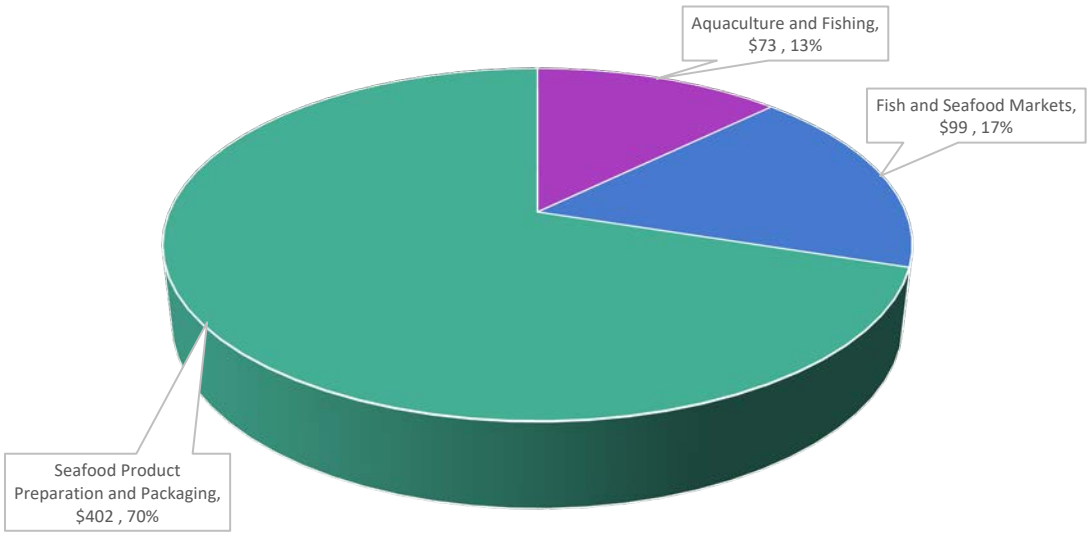
Living Resources

The industries in the Living Resources subgroup constitute the smallest part of Florida's Ocean Economy ($574.6 million). As shown in Table 8 and Figure 8, most of this contribution came from seafood product preparation and packaging, $402 million (70 percent of the total). Fish and seafood markets in the retail sector accounted for $99 million (17.3 percent), and aquaculture and fishing accounted for $73 million (12.8 percent).

TABLE 8
Gross Domestic Product of Living Resources, 2018
(Millions of Dollars)

Industry	Amount	Percent
Seafood product preparation and packaging	$402.0	70.0%
Fish and Seafood Markets	$99.2	17.3%
Aquaculture & Fishing	$73.4	12.8%
Total	$574.6	100.0%

Figure 8
Gross Domestic Product of Living Resources, 2018
(Millions of Dollars)



Total Contribution: Direct Contribution, Indirect and Induced Effects

The direct contribution of the Ocean Economy is supplemented by the production of the industries that supply them with materials and other inputs and by the additional suppliers back along the supply chain. These are known as the indirect effects of the ocean industries. There is an additional effect as the employees in the ocean industries and the industries in the various supply chains expend their earnings, and consumer goods industries expand their production. These are referred to as the induced effects of the ocean economy.

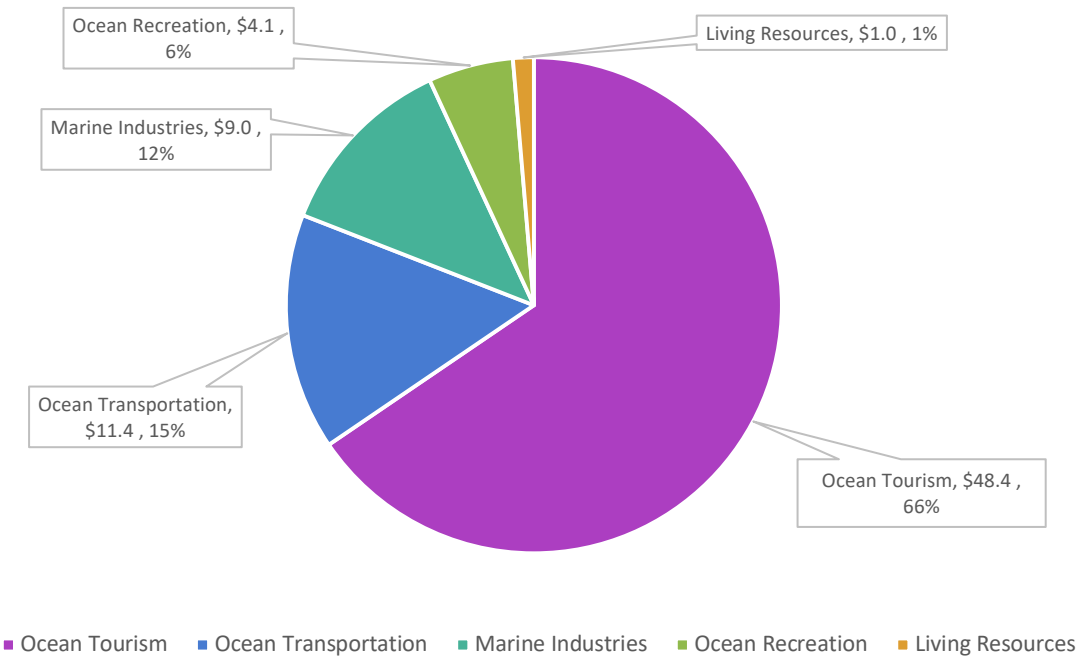
TABLE 9
Total Contribution of Ocean Economy to Florida Gross Domestic Product, 2018
(Millions of Dollars)

	Direct Contribution	Indirect & Induced	Total	Percent	Multipliers (Total/Direct)
Ocean Tourism	$24,613	$23,775	$48,388	65.5%	1.9659
Ocean Transportation	$5,751	$5,651	$11,402	15.4%	1.9826
Marine Industries	$4,604	$4,392	$8,996	12.2%	1.9538
Ocean Recreation	$2,039	$2,037	$4,076	5.5%	1.9992
Living Resources	$575	$472	$1,046	1.4%	1.8211
Total	$37,582	$36,326	$73,908	100.0%	1.9666

Source: US Bureau of Economic Analysis, RIMS II Model of the Florida Economy

Table 9 and Figure 9 show the total contribution of the ocean industries to Florida GDP, including the direct, indirect and induced effects. The total and indirect and induced effects were estimated using "multipliers" obtained from The RIMS II Model of Florida produced by the US Bureau of Economic Analysis. The RIMS II Model was based on the national input-output model, based on 2007 benchmark data scaled to Florida conditions using 2016 Florida data.

Figure 9
Total Contribution of Ocean Economy to the Gross Domestic Product, 2018
(Billions of Dollars)



The Ocean Economy made a total contribution of more than $73 billion in 2018. This amounted to 7.1 percent of the state's GDP. The total contribution was almost evenly divided between the direct contribution of $37.6 billion and the indirect plus induced contribution of $36.3 billion. The tourism industry was the largest contributor, followed by marine transportation. The multipliers for the various industries were similar in size (close to 2.00), except for living resources, which had a multiplier of 1.8211. Ocean recreation and transportation had the largest multipliers (1.9992 and 1.9826, respectively), and the tourism and marine industries had the smallest multipliers (1.9695 and 1.9538, respectively), other than living resources.

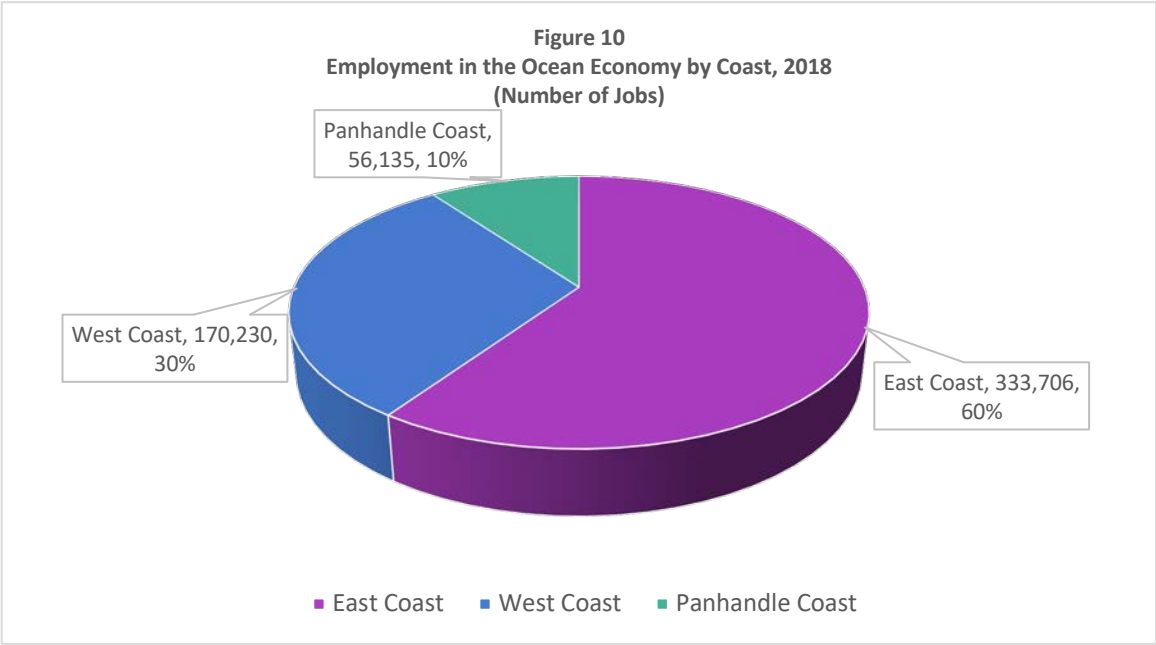
Employment and Earnings in the Florida Ocean Economy

In 2018, Floridians directly held 560,070 jobs in the Ocean Economy that were directly created by the state's ocean resources. These jobs represent employees covered by the state's unemployment compensation law, as well as independent contractors or self-employed persons. Because individuals may hold more than one job, the 560,071 figure is probably a little larger than the number of job holders.

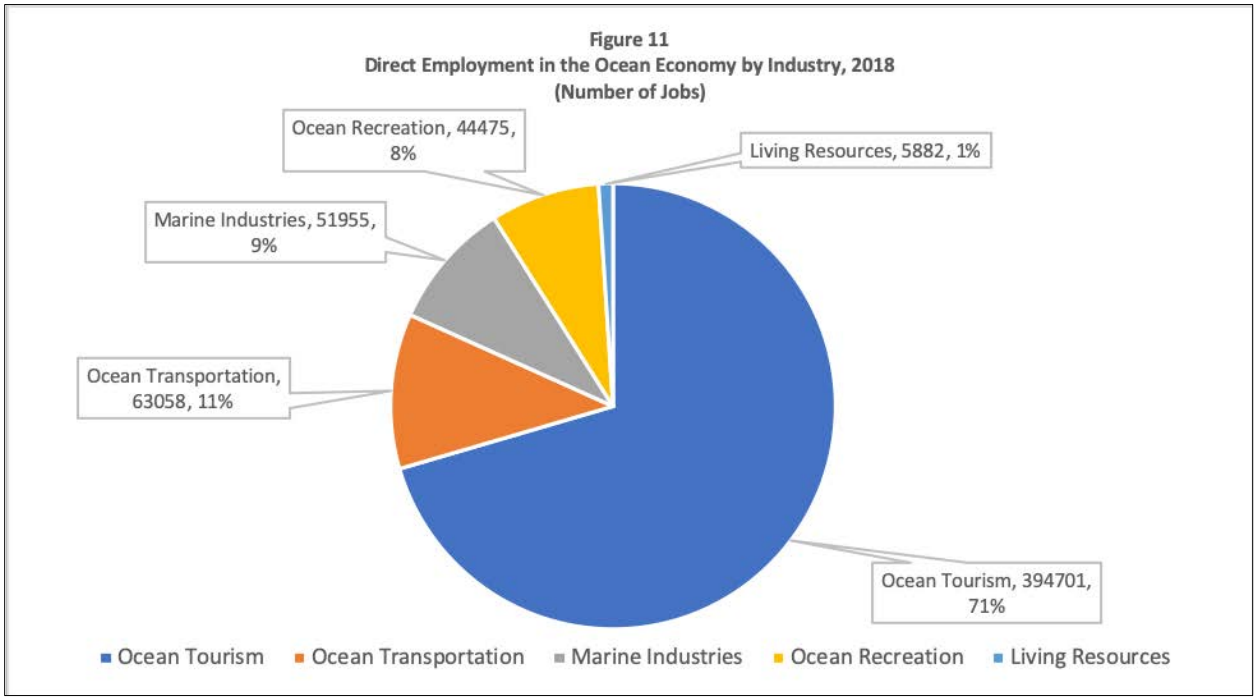
About 60 percent of the jobs in the ocean economy (333,706) are in the coastal counties along the state's East Coast. This is the same as its share of the state's coastal population. About 30 percent (170,230) are on the West Coast, compared to its 34 percent coastal population share, and 10 percent (56,135) are along the Panhandle Coast (much more than its 6 percent share of the coastal population). This may reflect the large ship and boat building industry in Bay County (Panama City). (See Table 10 and Figure 10)

TABLE 10
Direct Employment in Florida's Ocean Economy, 2018
(Number of Jobs)

	Ocean Tourism	Ocean Transportation	Marine Industries	Ocean Recreation	Living Resources	Total	Percent
East Coast	231,991	50,589	25,007	23,921	2,198	333,706	59.6%
West Coast	125,366	11,793	15,608	15,013	2,450	170,230	30.4%
Panhandle Coast	37,344	676	11,340	5,541	1,234	56,135	10.0%
Total	394,701	63,058	51,955	44,475	5,882	560,071	100%
Percent	70.5%	11.3%	9.3%	7.9%	1.1%	100.0%	



About 71 percent of the jobs in the Ocean Economy (394,701) are in ocean tourism, defined as accommodations and food services and drinking places. (See Table 10 and Figure 11). This analysis assumes that 50 percent of the jobs in food services and drinking places and 75 percent of the jobs in accommodations are ocean-related. Ocean transportation accounts for 11 percent of the jobs in the Ocean Economy (63,058), and the marine industries account for 9 percent (51,955). Living resources accounts for one percent (5,882).



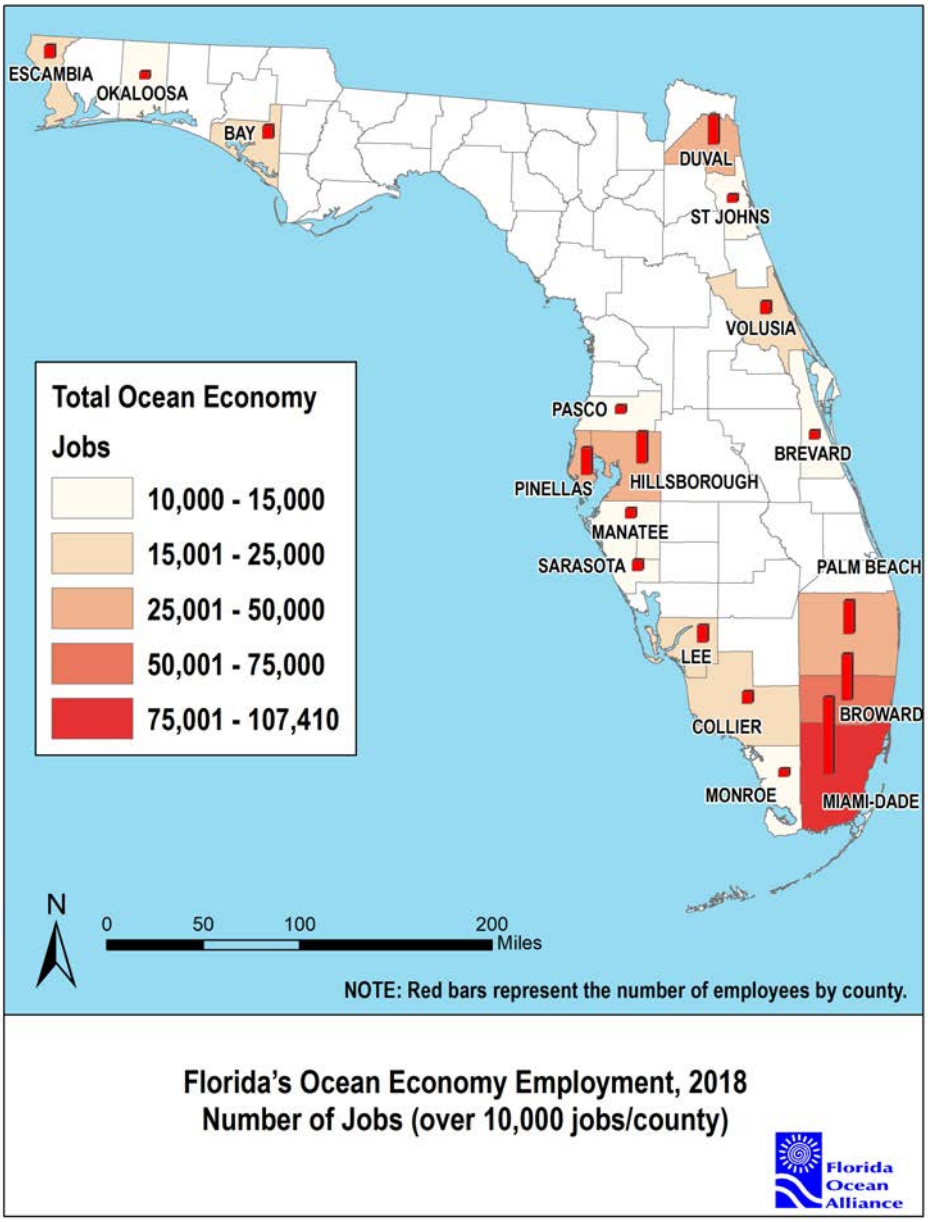
Employment by Industry Subgroup

There are 17 Florida coastal counties with ocean employment of at least 10,000 jobs.[7] (See Map 2). The state's metropolitan coastal counties all have substantial ocean employment because of their important tourism industries.

The ten counties in Florida with the largest number of ocean industry jobs are Miami-Dade (107,410 jobs), Broward (63,564), Palm Beach (45,913), Hillsborough (42,835), Duval (39,878), Pinellas (37,288), Lee (23,562), Bay (17,422), Escambia (17,182) and Volusia (16,834). Bay County (Panama City) on the Panhandle Coast has the state's largest marine industries because of its large number of jobs in shipbuilding and repairing (8,941). Broward County also has more than 5,000 jobs in its marine industries.

[7] Okaloosa County is included in the map because it has 9,724 jobs.

MAP 2



The ranking of these counties in each of the five industry subgroups is given in Table 11. The counties are arrayed in the table by their ranking in terms of total ocean employment. The table gives their employment in each of the industry sub-groups and their corresponding ranking in the subgroup. If a county is not ranked in the top 10 in the industry subgroup, its ranking and employment are replaced by an asterisk.

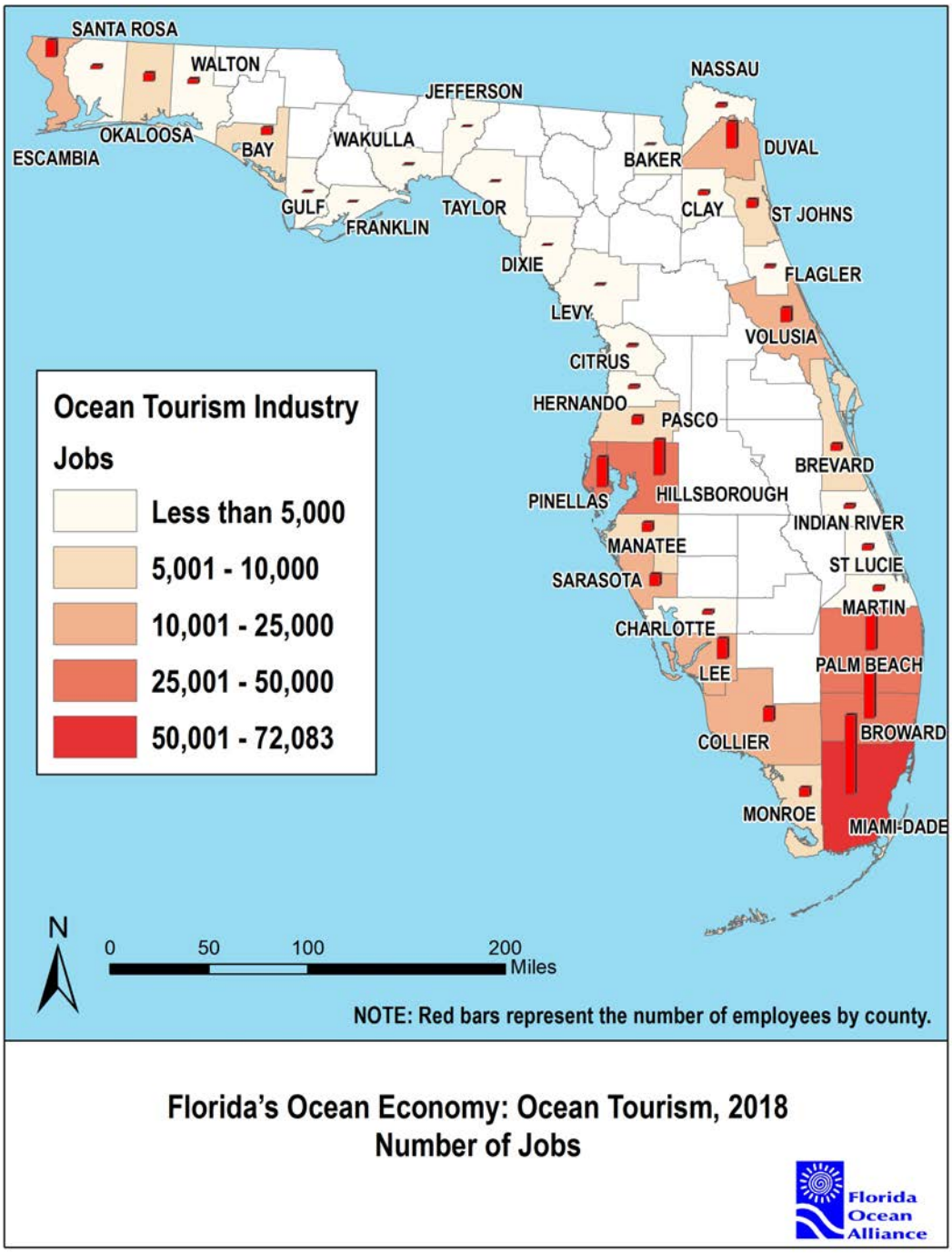
Table 11 Ocean Employment in Florida Counties with Largest Ocean Employment, 2018 (Number of Jobs)										
	Ocean Tourism		Ocean Transportation		Marine Industries		Ocean Recreation		Living Resources	
Counties	Rank #	Jobs	Rank #	Jobs	Rank #	Jobs	Rank #	Jobs	Rank #	Jobs
Miami-Dade	1	72,083	1	26,411	3	3,886	2	4,606	6	425
Broward	2	43,362	3	8,820	2	5,389	1	5,823	*	*
Palm Beach	3	38,297	6	1,776	7	2,639	4	3,077	*	*
Hillsborough	4	32,176	4	3,834	4	3,883	7	2,157	1	785
Duval	6	23,860	2	9,248	5	3,784	6	2,495	2	490
Pinellas	5	27,112	5	2,796	6	3,465	3	3,443	3	473
Lee	7	18,601	*	*	9	1,775	9	1,775	4	463
Bay	*	*	*	*	1	8,941	*	*	8	226
Escambia	8	15,143	*	*	*	*	*	*	5	454
Volusia	10	12,769	*	*	8	1,994	*	*	*	*

Notes: * denotes that the county is not ranked in the top 10 in the industry subgroup.

The data in Table 11 show that the top six counties (ranked by total ocean employment) are also ranked in the top six for almost all industry subgroups, although they trade places within the ranking from subgroup to subgroup. The exceptions are Bay County, which is ranked No. 1 in the marine industries, and Brevard County, which is No. 5 in ocean recreation. Lee County and Escambia County replace Broward and Palm Beach in the living resources subgroup.

As noted previously, ocean tourism is the largest industry subgroup. Map 3 shows the location of ocean tourism jobs. Miami-Dade with 72,083 jobs is the only county in the largest size category of 50,000+ jobs. Broward, Palm Beach, Hillsborough and Pinellas counties are in the 25,001– 50,000 jobs class. The East Coast counties of Duval and Volusia are joined by Collier, Lee and Sarasota from the West Coast and Escambia from the Panhandle Coast In the 10,001–25,000 categories. The category of 1001–10,000 contains 18 counties, which account for the bulk of the remaining counties on Florida's coasts. Seven counties have at least 5,000 jobs (Monroe, St. Johns and Brevard on the East Coast; Manatee and Pasco on the West Coast; Okaloosa and Bay in the Panhandle Coast).

MAP 3

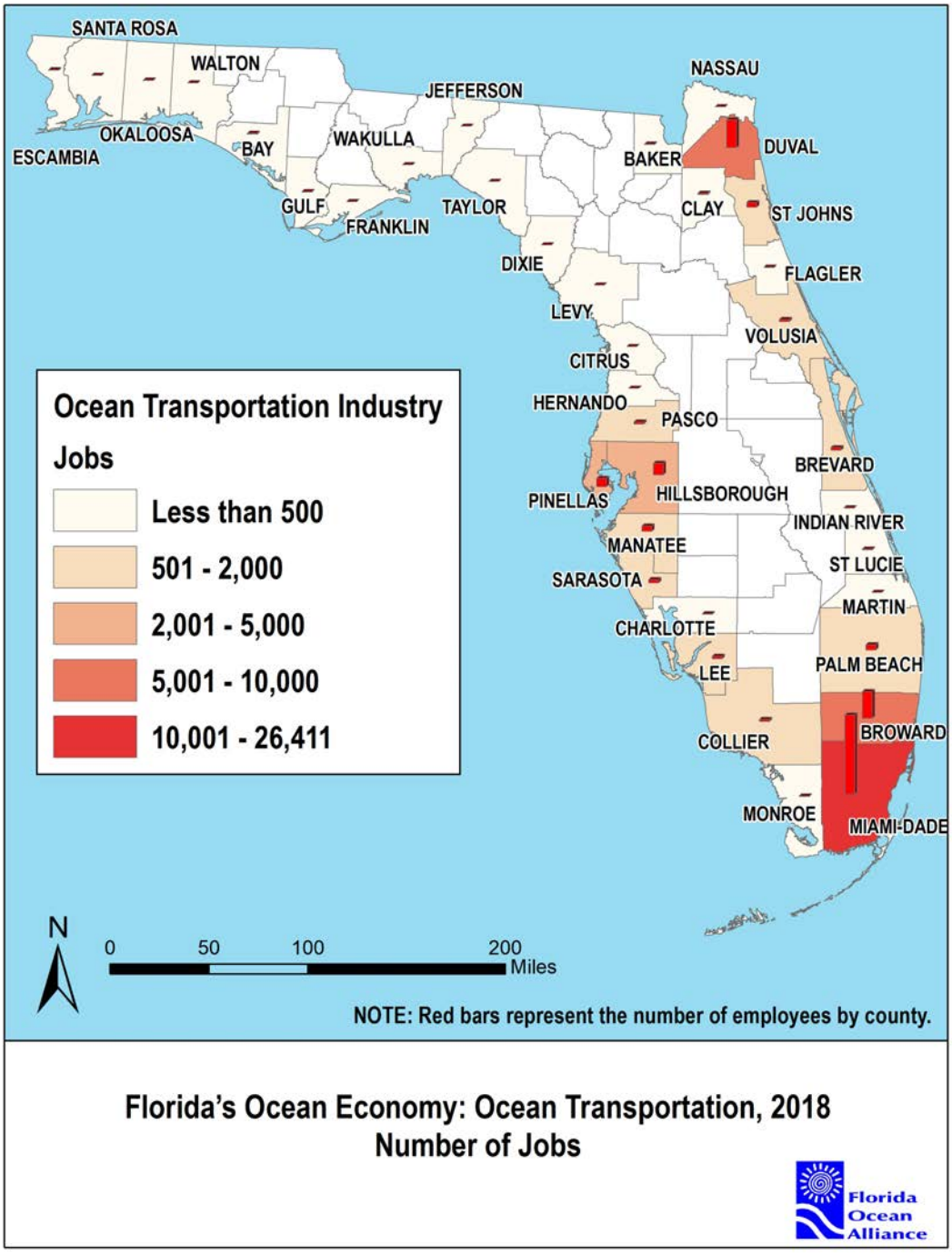


Florida's Ocean Economy: Ocean Tourism, 2018
Number of Jobs

Florida Ocean Alliance

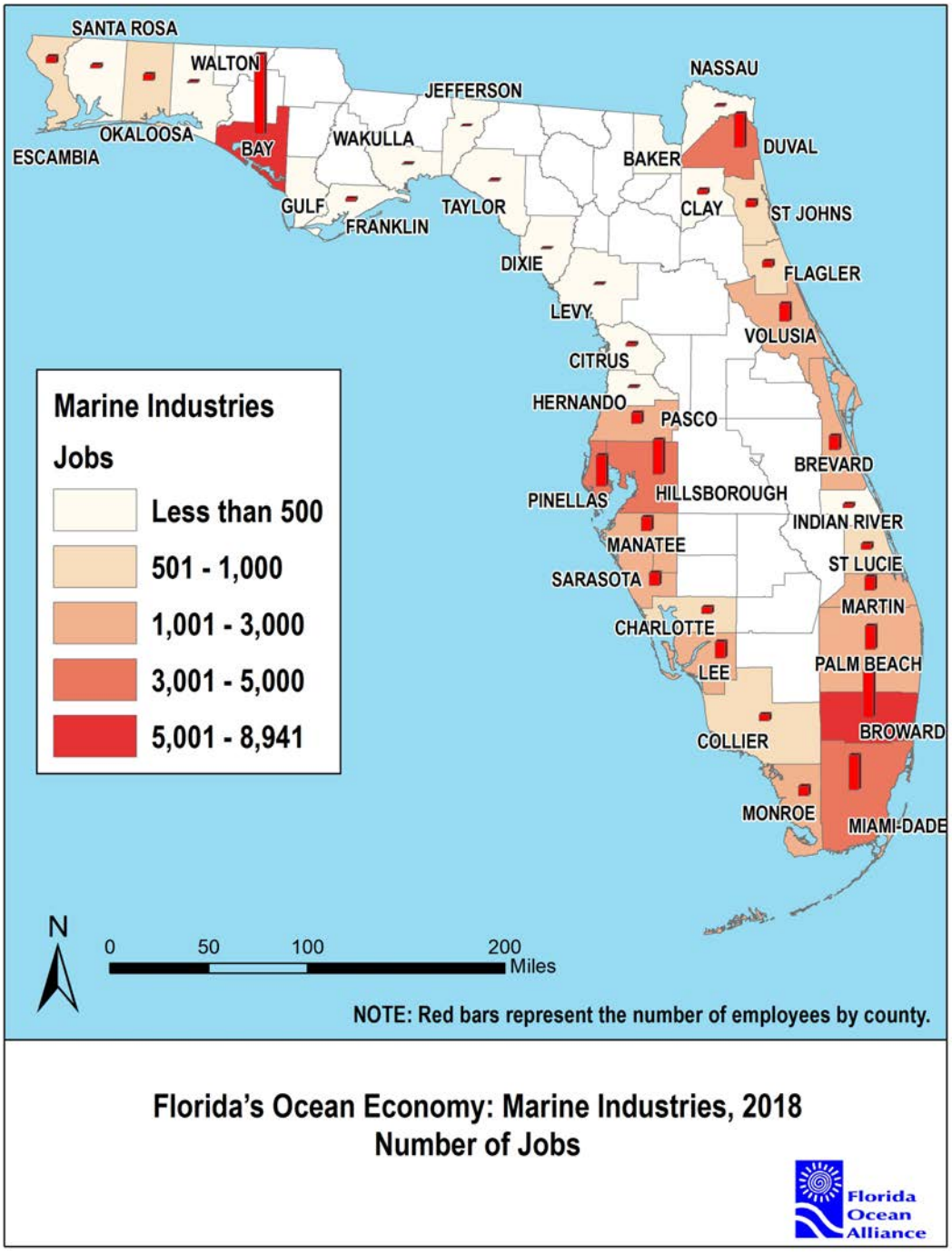
Map 4 shows the location of Florida's ocean transportation along the state's coastline. Miami-Dade again occupies the largest size category of 10,000+ jobs on its own. Broward and Duval are in the second highest category of 5,001 -10,000 jobs. The third category of 1,001-5,000 jobs is occupied by Palm Beach and St. Johns counties on the East Coast and Hillsborough, Pinellas, Manatee and Sarasota on the West Coast. Employment is less than 1,000 in all other coastal counties.

MAP 4



Map 5 shows the location of Florida's marine industries along the state's coastline. Bay County on the Panhandle Coast and Broward County on the East Coast occupy the largest size category of 5,000+ jobs. Miami-Dade and Duval on the East Coast, as well as Hillsborough and Pinellas on the West Coast, occupy the second highest category of between 3,001 and 5,000 jobs. All other counties have fewer than 3,000 jobs.

MAP 5

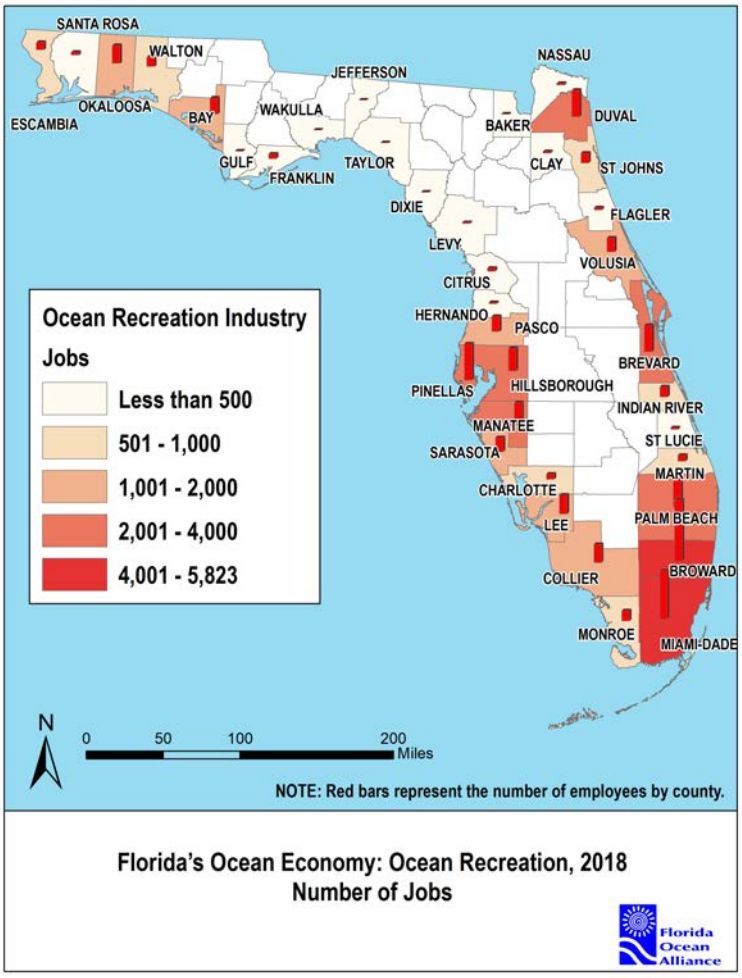


Because of the rich diversity of Florida's 15 deepwater ports and the limitations of the 2013 study, this study cannot capture the full extent of the economic impact of Florida's thriving port system. According to the Florida Ports Council, the state's ports generate 900,000 direct and indirect jobs and contribute $117.7 billion in economic value to the state.

It should be noted that on Florida's Treasure Coast, two major recreational boat manufacturers in Ft. Pierce have announced plans for massive expansions. The former Indian River Terminal is being transformed by owner St. Lucie County into a state-of-the-art facility for the maintenance, refit, and overhaul of megayachts. This project in the Port of Ft. Pierce is projected to create nearly 900 jobs. This project is now underway and an example of the potential for job growth in the ocean economy that can benefit both the local and state economy.

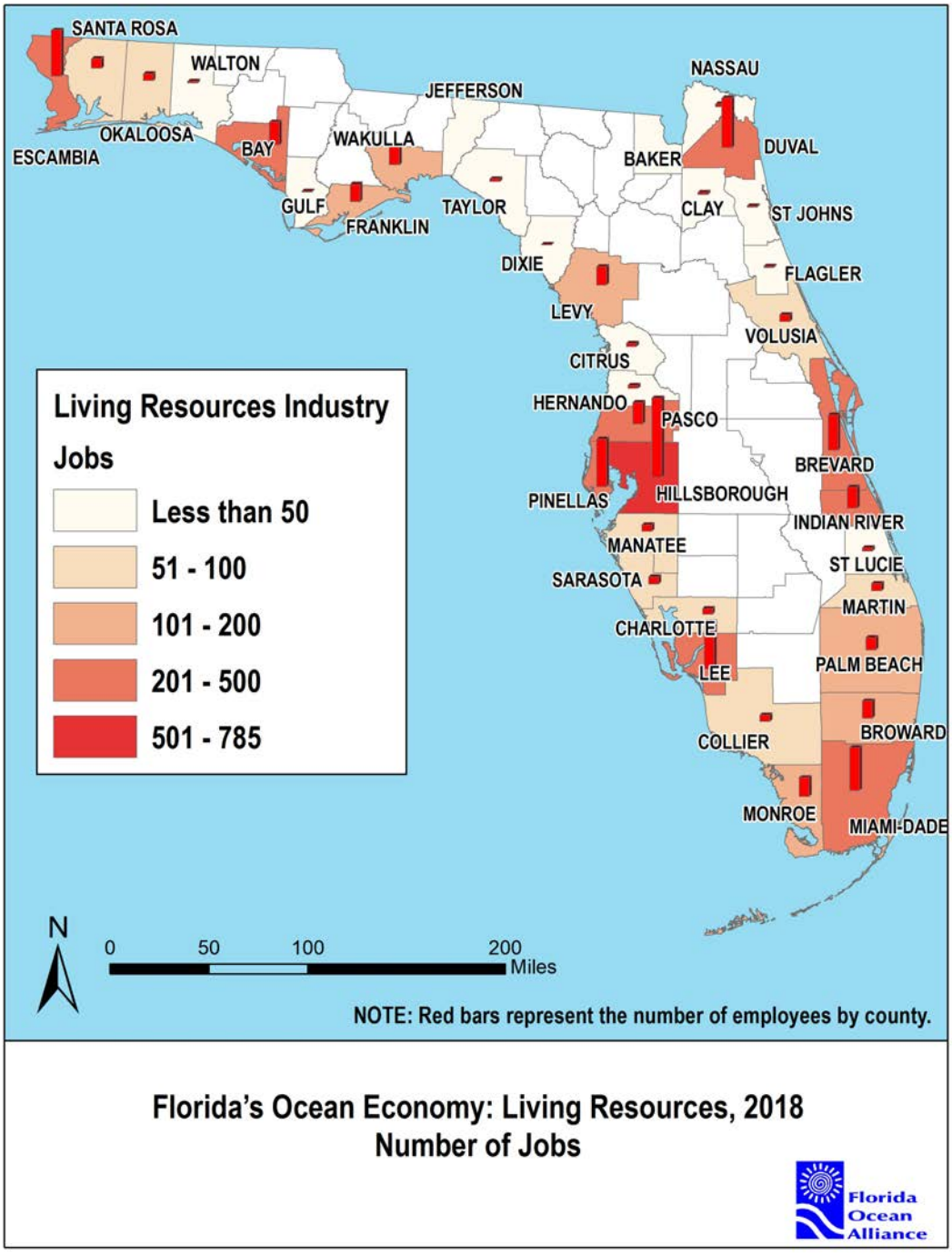
Ocean recreation is a relatively small industry. Map 6 shows the location of Florida's ocean recreation jobs. The largest size category is 4,000+ jobs. Two counties occupy this category --Broward and Miami-Dade. There are six counties in the second category of 2,001 to 4,000 jobs. These are Palm Beach, Brevard, and Duval from the East Coast and Pinellas, Hillsborough and Manatee from the West Coast.

MAP 6



The smallest ocean industry subgroup is living resources. Map 7 shows the location of living resource jobs. Hillsborough County is the sole occupant of the highest size category of 500+ jobs. There are nine counties in the second highest category of 201-500 jobs. These include Duval, Brevard, Miami-Dade and Indian River on the East Coast, followed by Pinellas, Lee, and Pasco on the West Coast and Escambia and Bay on the Panhandle Coast.

MAP 7



We can conclude that there are active ocean industries on all three Florida coasts. The section where the Peninsula moves southward from North Florida is often referred to as the Big Bend and has relatively little ocean industry activity.[8] There are no barrier islands and the coastline (depicted in blue on the map) is generally marshy. The adjacent coastal counties generally have low populations.

[8] The author of the map is Donald Albury and I obtained it from the Wikipedia article on the Big Bend. By Donald Albury - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=37283695

Total Contribution: Direct Contribution, Indirect and Induced Effects

The direct contribution of the industries to employment in the ocean economy is supplemented by the increased employment in the industries that supply them with materials and other inputs and by the additional suppliers back along the supply chain. These are known as the indirect effects of the ocean industries. There is an additional effect as the employees in the ocean industries and the industries in the various supply chains expend their earnings, causing consumer goods industries to expand their employment. These are referred to as the induced effects of the ocean economy.

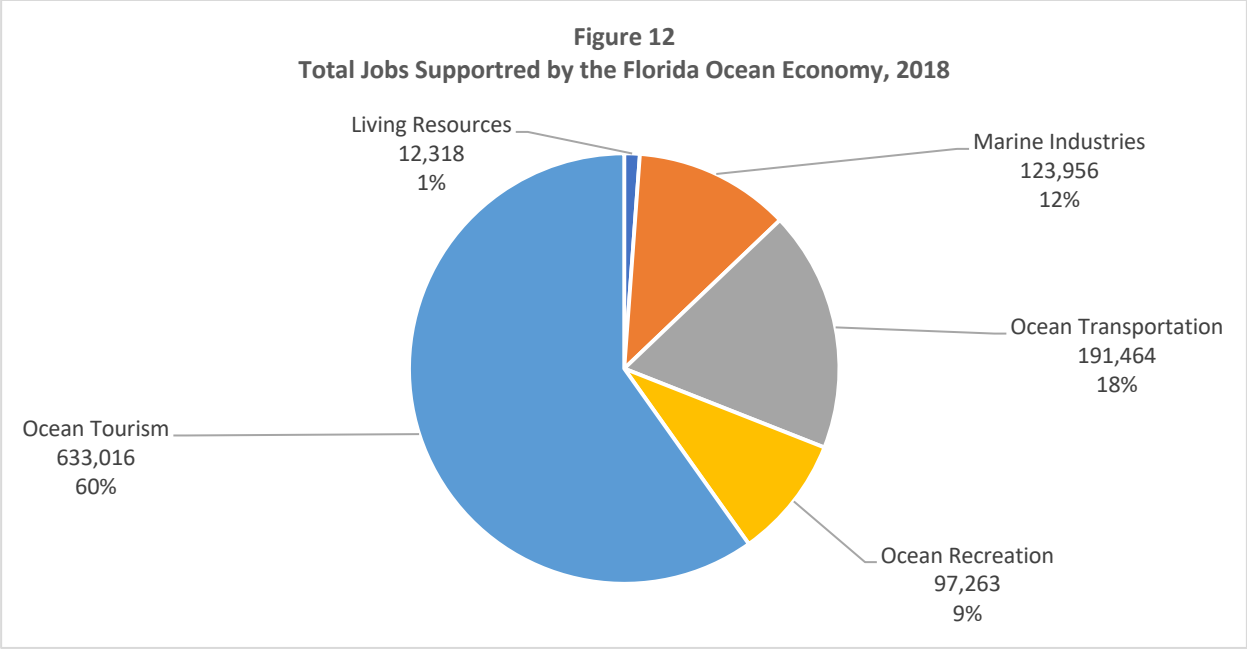
Table 12 shows the total contribution of the ocean industries to Florida employment, including the direct, indirect and induced effects. The total and indirect and induced effects were estimated using "multipliers" obtained from The RIMS II Model of Florida produced by the US Bureau of Economic Analysis. The RIMS II Model is based on the 2007 national input-output model, scaled down to Florida conditions using 2016 Florida data.

Table 12
Total Jobs Supported by the Florida Ocean Economy, 2018

	Direct Contribution	Indirect & Induced	Total	Percent	Multipliers (Total/Direct)
Ocean Tourism	394,701	238,315	633,016	59.8%	1.6038
Ocean Transportation	63,058	128,406	191,464	18.1%	3.0363
Marine Industries	51,955	72,001	123,956	11.7%	2.3858
Ocean Recreation	44,475	52,788	97,263	9.2%	2.1869
Living Resources	5,882	6,436	12,318	1.2%	2.0943
Total	560,071	497,946	1,058,017	100.0%	1.8891

Source: US Bureau of Economic Analysis, RIMS II Model of the Florida Economy

The Ocean Economy made a total contribution to Florida jobs of more than 1 million in 2018 (See Figure 12). Ocean employment amounted to 8.5 percent of the state's total jobs (one in 12). The total contribution was almost evenly divided between the direct contribution of 560,071 and the indirect plus induced contribution of 497,946. The ocean tourism industry was the largest contributor (633,016), followed by ocean transportation (191,464) and the marine industries (123,956). The multipliers for the various industries were similar in size (close to 2.00), except for ocean transportation, which had a multiplier of more than 3, and ocean tourism, which had a multiplier of 1.6.



Earnings in the Ocean Economy

Earnings are the reward paid to labor for participating in production. They include the wages paid to workers, as well the wage supplements (fringe benefits) paid by their employers. These include employer social security and any payments paid on behalf of workers, such as health insurance and retirement. They also include proprietor's income, the income of the self-employed.

Earnings in the Florida Ocean Economy in 2018 were $19.5 billion in 2018 (See Table 13 and Figure 13). More than 62 percent of these were paid in the counties on the East Coast, 30 percent were paid on the West Coast, and more than 8 percent were paid on the Panhandle Coast.

TABLE 13
Earnings in the Ocean Economy, 2018
(Millions of Dollars)

	Ocean Tourism	Ocean Transportation	Marine Industries	Ocean Recreation	Living Resources	Total	Percent
East Coast	$7,700	$2,340	$1,424	$518	$104	$12,086	62.1%
West Coast	$3,658	$813	$851	$338	$112	$5,772	29.7%
Panhandle Coast	$925	$23	$457	$100	$87	$1,592	8.2%
Total	$12,283	$3,176	$2,732	$956	$304	$19,450	100.0%
Percent	63.2%	16.3%	14.0%	4.9%	1.6%	100.0%	

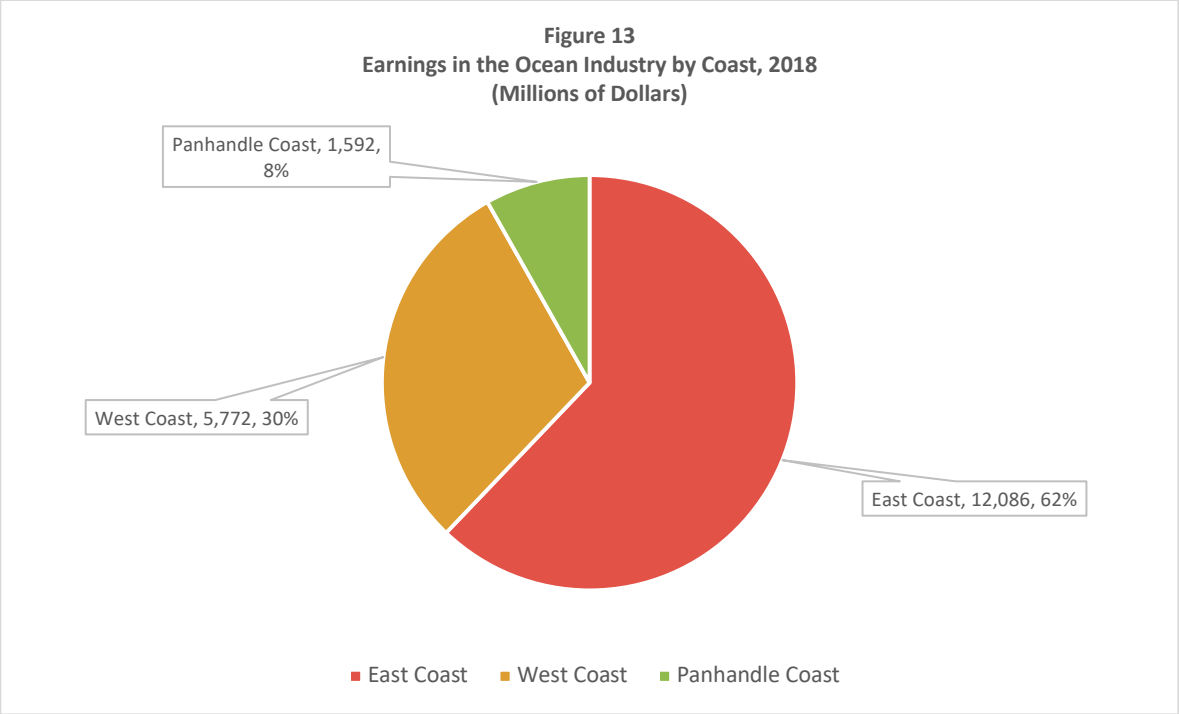
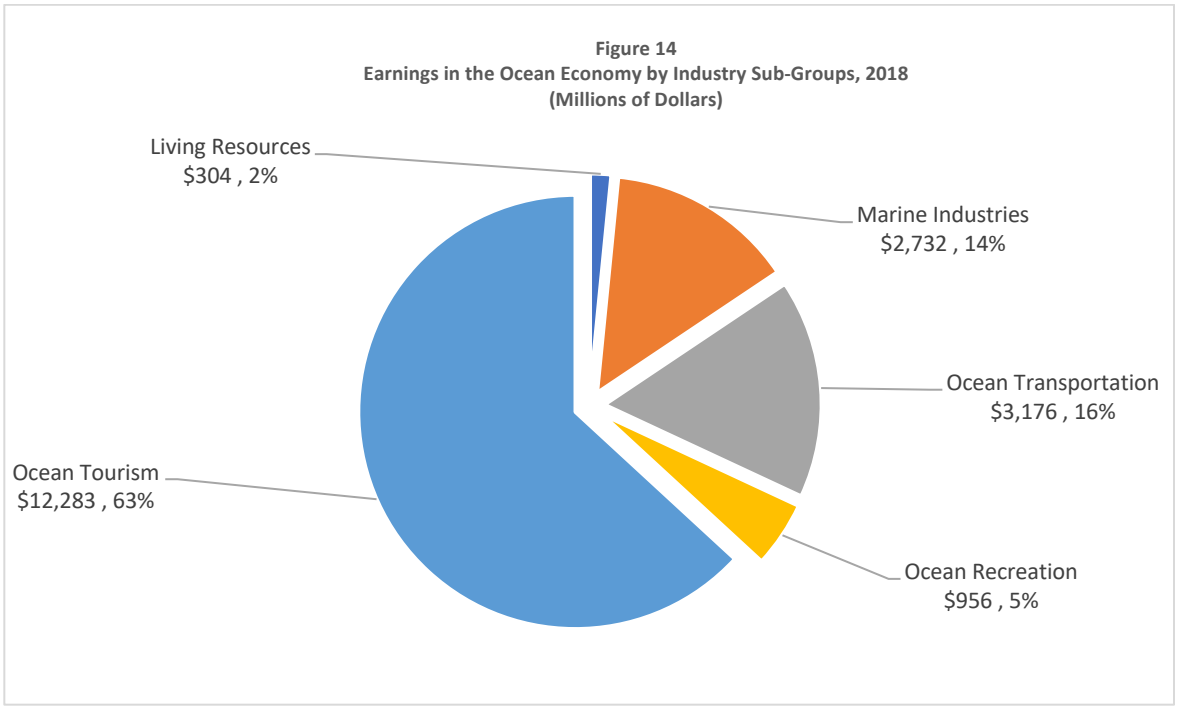


Figure 14 shows that the largest portion of earnings was in ocean tourism (63.2 percent), followed by ocean transportation (16.3 percent) and the marine industries (14.0 percent). These three industries accounted for close to 95 percent of Ocean Economy earnings.



In 2018, earnings amounted to 60.8 percent of US GDP, the largest component of GDP when measured from the "income side." Earnings in Florida amounted to 61.2 percent, about the same as the national percentage. However, earnings in the Ocean Economy were 51.6 percent of Ocean GDP. This suggests that wage supplements are lower in the Ocean Economy, perhaps because of a greater number of part-time and seasonal workers. A greater share of the revenue of ocean industries is paid as rent, interest and profits and indirect taxes (e.g. sales taxes). This is likely because of the importance of ocean tourism and ocean recreation.

Annual labor earnings from the average job in Florida's Ocean Economy was $35,000 in 2018. These earnings were composed of wages and wage supplements, including any employer payments for health insurance, social security and pensions. Jobs may be part-time or full time, and workers may hold more than one job at the same time. Labor earnings in the ocean economy were relatively high in the marine industries ($52,585), living resources ($51,599) and ocean transportation ($50,362). They were lower in ocean tourism ($31,463) and ocean recreation ($21,486). These industries may have relatively large numbers of part-time and seasonal workers.

The Future Economic Development of Florida's Coastline

The coastline of Florida's peninsula has attracted new residents and tourists because of its year-round mild climate, beautiful beaches and relatively calm seas, except for occasional hurricanes that are of short duration and have relatively localized impacts. The East Coast of Florida led the development of the tourism industry in the last half of the 19th and early 20th century. Jacksonville was the major point of entry into Florida, especially after the Civil War. Jacksonville had Florida's first major port and it became connected to the national rail network in the 1880s.

Many of the earliest Florida visitors were "invalids" seeking relief from 19th century diseases, especially tuberculosis (called "consumption" at the time.) Ralph Waldo Emerson, facing the early symptoms of tuberculosis, wintered St. Augustine in 1826-27.[9] In 1854, Henry Bradley Plant, who would later be one of the developers of Florida's rail network, brought his sick wife to Jacksonville in 1854. He established the rail connection in 1883 between Jacksonville and Tampa (population of 800 in 1880). He also established the port of Tampa. Plant continued to develop his railroad system, which eventually became the modern CSX Railroad. In 1878, Henry Flagler (a partner of John D. Rockefeller) brought his sick wife to Florida. Flagler returned to Florida in the winter of 1884 on a honeymoon with his second wife. Observing the lack of first class hotels in Jacksonville and St Augustine, he decided to build hotels in St Augustine in order to establish the city as a winter resort for wealthy northerners. He bought small local railroads to facilitate his plans but ultimately pushed his Florida East Coast Railroad down the East Coast as far as Palm Beach, Miami, and Key West.

[9] William B Stronge, The Sunshine Economy, An Economic History of Florida since the Civil War, Gainesville, Florida: University Press of Florida,2008, p. 77.

In the post-Civil War period, particularly after the railroad boom of the 1880s, there was a substantial increase in the production of Florida agricultural products for shipment to the northern states.[10] The initial product that attracted investors was citrus. It took about 30 years before the citrus industry moved sufficiently south in the peninsula to reduce the catastrophic impacts of periodic freezes. By the early part of the 20th century, citrus grown in the coastal counties from Volusia county south to Palm Beach County was marketed as "Indian River" fruit because of the large Indian River Lagoon that dominated the eastern sections of the coastal counties. Fruit grown in this area is more protected from freezes than are other (more western) areas of Florida because of an eastward "bulge" that moves the coast of Florida closer to the warming temperatures of the Gulf Stream.[11] The region is flat and adjacent to abundant water resources that enable growers to flood their groves when a cold front is on the way. The soil formation of the land (the Anastasia Formation) provide an excellent source of minerals and nutrients during the growing cycle. Finally, a high-water table ensures adequate water supplies for the trees.

The second new industry developed in Florida toward the end of the 19th century was fresh winter vegetables. Florida gradually developed the capacity to supply northern markets with vegetables earlier in the year than any other production region in the nation. Freezes had a less catastrophic impact on vegetable production. A single crop might be lost, but a second crop could be quickly planted to reduce losses. Citrus trees can take several years between the time of planting and the time the first crop is produced. On the hand, vegetables required irrigation and abundant sources of water. In the early 20th century, there was tremendous excitement about the potential use of land south of Lake Okeechobee for vegetable production. The "muck" soil of the area (also found in other parts of the state) had to be drained, and a lack of rainfall could lead to substantial soil erosion. Nevertheless, even today, the Everglades economic area south of Lake Okeechobee remains a significant producer of winter vegetables.

The Future Economic Development of the East Coast

The East Coast of Florida has two large population centers: Jacksonville in the north and the Greater Miami area in the south. Over the last 50 years, these population centers have extended themselves – Jacksonville to the south and the Miami area to the north. There have been independent centers between these extending areas, especially in Brevard county, as a result of the development of the Space Industry centered at Cape Kennedy. The growth of Disney World in Orlando has impacted the coastal areas. Some tourists visiting the theme parks also desire a beach-oriented vacation. However, the Disney Company established Disney's Vero Beach Resort in Indian River County, and initiatives from other growing theme parks may lead to further coastal development in the future. Disney also built a cruise terminal at Port Canaveral in Brevard county in the 1990s. By the turn of the century, the "Big Three" U.S.-based cruise lines were running cruises from Port Canaveral and made it the second largest cruise port in the world (based on number of passengers, behind Port Miami and followed by

[10] William B Stronge, The Sunshine Economy, An Economic History of Florida since the Civil War, Gainesville, Florida: University Press of Florida,2008, chapter 4.
[11] ircitrusleague.org/history/

Port Everglades). In the future, there will be a growing cruise business along Florida's East Coast.

Megayacht retrofitting has long been an important industry in southeast Florida. It began in Miami-Dade County but expanded into Broward County, Palm Beach County and now has reached St. Lucie County. Retrofitting needs to be near a relatively deepwater port because of the large yacht size. There is limited land available adjacent to the existing large ports and It is likely that the industry will continue to expand northward in the years ahead. Florida's warm winter may attract yachts from northern climates for retrofitting at a time when the owners tend to take fewer cruises because of cold weather and rough seas. Part of the economic impact of the yacht retrofitting industry is the large tourist-type expenditures made by crew members while waiting for the retrofitting to be completed.

The Future Economic Development of the West Coast

The economic geography of Florida's West Coast is different from the geography of Florida's East Coast because of their different histories. The West Coast has a single large population center in Tampa-St. Petersburg that is expanding northward and southward. Southwest Florida was relatively slow to develop because the railroad was relatively late in reaching Naples. The road network was also relatively slow to develop in part because population development lagged behind southeast Florida. The airports of southwest Florida were smaller and fewer in number than those in the southeast.

By the end of the 20th century, southwest Florida had emerged with a similar economy to Southeast Florida, albeit smaller in scale. The principal industries were tourism, construction driven by a large inflow of retirees from northern states, especially midwestern states, and agriculture, especially winter vegetables. In the future, southwestern Florida will expand and become relatively larger. The ultimate population size of the region will be determined primarily by decisions made at the local level.

The Tampa-St. Petersburg area has expanded northward from Pinellas County to Hernando and Pasco counties. Citrus County, which is the next county to the north, is one of Florida's recently created Metropolitan Statistical Areas (called Homosassa Springs). In an economic sense, it is part of the Tampa-St. Petersburg economic region. These northern counties will have growing tourism retirement industries, along with some agriculture. This will likely end the expansion of the strong tourism retirement industry from Pinellas County northwards because the lack of barrier Islands results in a marshy coastline.

There is major economic development along Highway I-4 which begins in Tampa, passes through Orlando and ends in Daytona Beach on the East Coast. This is the first major engine of development between the coasts of Florida. As development continues to expand along I-4, there will be impacts on both of the peninsular coasts of the state.

The Future Economic Development of the Panhandle Coast

Pensacola, the city located at the western end of the Panhandle, was the second city of Florida (after St. Augustine) in Spanish times. St. Augustine was founded in the 16th century to facilitate the movement of the Spanish silver fleets from Havana to Spain. Pensacola was established at the end of the 17th century to protect Spanish Florida from incursions by the French from Louisiana (Mobile was founded in 1702).

When Florida became part of the United States the United States developed the port facilities and built several forts. There was little economic development of the western Panhandle, except for independent military operations, before Florida became a state in 1845. Pensacola developed a lumber industry because of its proximity to forested land and the ease with which the lumber could be shipped from the port.

The eastern end of the Panhandle was centered at Tallahassee which became the capital city of the Florida territory because it was halfway on the Old Spanish Trail that linked Pensacola to St. Augustine. It remained the capital after statehood and also became the center of an extension of the slave-based Georgia cotton economy that spilled over into the northernmost counties of the eastern Panhandle. After the Civil War, the rate of population growth in the eastern Panhandle slowed substantially for a century.

Beginning in the 1940s, federal military employment expanded significantly in the western Panhandle. Air Force installations were established around the state because it had good year-round weather. Eglin Air Force was established in Okaloosa County to test weapons, and the base remains in use today. Tyndall Air Force Base was also established and was in use until severe damage was inflicted by Hurricane Michael in 2018; it is currently under repair. There is a Naval Base in Pensacola and a number of installations nearby.

A number of military personnel from the Federal Defense bases remain in the area when they retire. A significant ship building industry in the Panama City area has benefitted from military contracts, especially with the U.S. Coast Guard.

A significant ocean tourism industry developed, especially in Pensacola, the Fort Walton Beach-Destin area, and Panama City Beach. The peak tourism season is in the summer months, and a large number of the tourists are from the neighboring states of Georgia and Alabama, but some tourists come from as far away as New Orleans. This ocean tourism industry will likely expand in the years ahead, especially since there is better air transportation in the Panama City area. It is likely that retirement will expand for the same reason.

Conclusions on Ocean Economy Job Growth

Table 10 discussed earlier showed that ocean tourism accounted for 70.5 percent of all jobs directly created in Florida's ocean industries in 2018. This industry will continue to account for the largest amount of Ocean Economy job growth in the years ahead. On the demand side, international visitors may be more important, and on the supply side, there is more than an

adequate supply of land adjacent to the state's coasts. On the East Coast, ocean tourism will experience substantial growth in the central coast in Brevard and Indian River counties. Orlando International Airport will be a gateway for a growing number of ocean-oriented tourists. Ocean tourism in southwest Florida is also likely to experience considerable growth because development in this region lagged behind the southeast coast. A new airport in south Fort Myers was opened towards the end of the twentieth century, and a major expansion was completed in 2005. The West Coast of Florida historically attracted a large number of tourists and retirees from the midwestern states. Expanded air connections with the northeast states from the new airport have led to an inflow of tourists and retirees from the northeast. This will continue to generate job growth in the years ahead. The Panhandle Coast also added a new airport northwest of Panama City in 2010. The airport remains small, but Delta Airlines has five flights per day to and from Atlanta. This ties the airport effectively into the national air network. The airport is located on land originally owned by the St. Joe Company. There is a large amount of buildable land in the region, and it is likely that the local retirement industry will be expanded, along with tourism, in the years ahead. The result will be significant ocean tourism job growth east and west of the new airport.

The second largest industry in the Ocean Economy is ocean transportation. This industry tends to be located near Florida's ports. There is likely to be growth in jobs connected with this industry near some of the smaller ports in the state. On the East Coast, there will be growth near the ports of Palm Beach and Fort Pierce, and on the West Coast there will be growth near Port Manatee. The cruise industry will probably expand significantly from ports on the East and West Coasts of the state.

Marine industries are the third largest driver of the Ocean Economy, and ocean recreation is the fourth. Population growth in the coastal counties, resulting from the growth of tourism and retirement and their suppliers, will result in job growth in these industry subgroups. To the extent that the increased population growth occurs directly on the coast, local communities will need to prevent the new development from negatively impacting living marine resources. As the population grows, there will be increased jobs in the boat building industry as new residents buy boats for recreational use. Employment in boat dealerships will also expand, and there will be a need for increased capacity in marinas. Increased recreational boating may lead to reduced fish stocks if overfishing occurs, and this may have a negative impact on commercial fishing. It may be that the main job growth in the living resources industry will be in fish and seafood markets. There may be some increased aquaculture in the eastern Panhandle and Big Bend areas.

II. Methodology

The Florida Ocean Alliance highlights the connection between the health of the state's economy and the oceans by completing this economic study and cluster analysis of the industries linked to the oceans and coasts. In doing so, the Florida Ocean Alliance is updating and expanding sections of earlier economic studies of Florida's ocean assets in 2008 and 2013. This study is, essentially, an update of the study completed for the Florida Ocean Alliance in 2013 entitled "Florida's Oceans and Coasts: An Economic and Cluster Analysis." The methodology for this update largely follows the methodology used in the 2013 Report. [12]

The 2013 Report estimated the gross domestic product, employment and wages of Florida's Ocean Economy. The Ocean Economy consists of a collection of industries in the coastal counties that use significant amounts of ocean resources. The particular industries had been originally selected by a national team of economists from the coastal states and NOAA as part of the National Ocean Economics Program (NOEP). These industries were selected to track the influence of the health of the oceans on the American coastline. Dr. Stronge and Dr. Alpert participated in the NOEP for Florida. The 2013 report followed the NOEP methodology as does the current update.

Many of the industries in the economy of Florida's coastal counties make substantial use of Florida's ocean resources. These industries collectively are called Florida's Ocean Economy. Some of these industries sell goods and services to other parts of the ocean economy, and some industries that are not included make some use of the state's ocean resources. The industries in the Ocean Economy, therefore, should be regarded as the "leading indicators" of the health of the state's ocean resources.

This study uses 38 industries to represent the parts of the coastal county economies that make significant use of ocean resources. The industries were selected based on North American Industrial Classification System (NAICS) codes that is the standard classification system used by business and government to categorize the economic activity of businesses. The focus was on five industry subgroups: ocean tourism, ocean transportation, marine industries, ocean recreation and living resources. These subgroups were the same as those used in the 2013 study and are used by NOAA and other economists to track the Ocean Economy, shown in Table 2 on the next page that was discussed earlier in this report.

Ocean tourism includes hotels and other lodging places and restaurants and other eating places. Ocean transportation includes passenger and freight transportation, marine cargo handling, navigation services and other support activities. Marine industries include ship and boat building and repairing, marine construction, boat dealers and marinas. Ocean recreation includes scenic and sightseeing, recreational goods rentals, sporting and recreational instruction, nature parks and other amusement services. Living resources include aquaculture and fishing, fish and seafood preparation and packaging, and fish and seafood markets. Living resources include commercial fishing and not recreational fishing. Recreational fishing is

[12] Florida Ocean Alliance, "Florida's Oceans and Coasts: An Economic and Coastal Analysis," May 2013. .Florida Oceans and Coastal Council, "Florida's Ocean and Coastal Economies Report," Prepared by Dr. Judith Kildow at Monterey Bay Aquarium Research Institute, June 2008.

included elsewhere in the ocean industries, especially in ocean recreation. Several industries engage in activities that are not related to either ocean resources or ocean resource-related activities. In some cases, only a portion of the industries output and employment is included in Ocean GDP.

Table 2 Ocean Industries in Florida

Industry Subgroup	NAICS Code	Industry
Ocean Tourism	721110	Hotels
	721191	Bed & Breakfasts
	722511	Full-Service Restaurants
	722513	Limited Service Restaurants
	722514	Cafeterias
	722515	Snack Bars
Ocean Transportation	483111	Deep Sea Freight Transpiration
	483112	Deep Sea Passenger Transportation
	483113	Coastal Freight Transportation
	483114	Coastal Passenger Transportation
	488310	Port & Harbor Operations
	488320	Marine Cargo Handling
	488330	Navigation Services to Shipping
	488390	Other Support Activities for Water Transportation
	334511	Navigation Systems & Instruments Manufacturing
	4931	Warehousing & Storage
Marine Industries	237990	Marine-related construction
	336611	Ship Building & Repairing
	336612	Boat Building
	441222	Boat Dealers
	713930	Marinas
Ocean Recreation	487210	Scenic & Sightseeing Transportation on Water[13]
	487990	Scenic & Sightseeing Transportation except on Land or Water
	532284	Recreational Goods Rental
	339920	Athletics & Sporting Goods Manufacturing
	611620	Sporting & Recreation Instruction
	712130	Zoos & Botanical Gardens
	712190	Nature Parks & Similar Institutions
	713990	Other Recreational & Amusements Services
	721211	RV Parks and Campgrounds
Living Resources[14]	112511	Finfish Farming & Fish Hatcheries
	112512	Shellfish Farming
	112519	Other Aquaculture
	114111	Finfish Fishing
	114112	Shellfish Fishing
	114119	Other Marine Fishing
	311710	Fish & Seafood Product Preparation and Packaging
	445220	Fish and Seafood Markets

[13] Recreational fishing is a consumption activity rather than a production industry. NAICS code 487210, "Sightseeing Transportation on Water," includes charter fishing boats. If fishers rent a boat or equipment, it will show up in NAICS code 532284, "Recreational Goods Rental." If they use their own or a friend's boat, the only industry we have is NAICS code 336612, "Boat Building." Fuel costs, food consumed on the boat, etc. are not included in the industries. The value of recreational fishing is probably included in the data, but it is located in several places and not in one NAICS code.

[14] Living Resources only includes commercial fishing. The product is the living fish.

Ocean Tourism contains five industries: two lodging industries, namely, hotels and bed and breakfasts; and four eating and drinking places namely, full-service restaurants, limited service restaurants, cafeterias, and snack bars. All of these industries serve significant numbers of non-ocean tourists as well as ocean tourists. This study includes 75% of the lodging places and 50% of the eating and drinking places. These percentages may seem high, but there are two points to be made. First, there are many tourists who come from out-of-state to enjoy beach vacations who do not stay in hotels and bed and breakfasts. For decades, many beach tourists stayed in one of the many condominiums on or near the beach that accommodate short-term rentals, as well as single family properties. In recent years, especially since the advent of the internet, there has been a big increase in the use of vacation rentals by beach visitors. The lodging places in this update study are only a fraction of the lodging places available to beach visitors. The eating and drinking places included in the study also need to be supplemented by food stores which supply groceries to tourists occupying vacation rentals.

The second point is that the industries included in ocean tourism treat tourists as people who only spend money to sleep and eat. But there are many other expenses that tourists incur besides these two. Some of the other expenses are included in ocean recreation, but others, such as expenditures on local transportation (rental cars and gasoline) and general shopping, are not. Shopping and beaches are on top of the activities given by tourists for visiting Florida.

The size of the adjustments made to hotels and restaurants are based on the author's extensive long experience studying Florida tourism. Warehousing and Storage (NAICS 4931) is another industry that the authors adjusted downward for the Ocean Economy based on personal judgement in the ocean transportation subgroup. Within this industry, there are four sub-industries: General Warehousing and Storage (49311); Refrigerated Warehousing and Storage (49312); Farm Product Warehousing (49313); and Other Warehousing and Storage (49319). This last sub-industry includes Bulk Petroleum storage, Lumber Storage Terminals, Document Storage and Warehousing, and Whiskey Warehousing.[15] There is no sub-industry that assembles all ocean-related Warehousing and Storage. In this study, 60% of the industry aggregate (NAICS 4931) is included.[16]

This report contains estimates of the 2018 Economic Aggregates of Florida's Ocean Economy, namely gross domestic product (GDP), total employment, and average and total earnings. The foundation for the development of the estimates is the US Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) dataset for 2018.[17] QCEW's data comes from quarterly tax reports filed by employers' subject to unemployment tax and covers about 97% of all civilian wage and salary workers in the country. Each report submitted to the (state) Unemployment Insurance Agency refers to a single establishment (business location).[18] The submitted report includes the number of employees and their wages.

[15] https://classcodes.com/lookup/naics-5-digit-industry-49319/.
[16] This industry is located in the coastal counties and does not include self-storage units.
[17] https://www.bls.gov/cew/questions-and-answers.htm#Q01. The program originated in the 1930s and was known as the ES-202 program until 2003 when the current QCEW name was adopted. The QCEW program tabulates employment and wages of establishments by NAICS Code by county. Employment covered by these UI programs represents about 97% of all wage and salary civilian employment in the country.
[18] An establishment is commonly understood as a single economic unit, such as a farm, a mine, a factory, or a store, that produces goods or services. Establishments are typically at one physical location and engaged in one, or predominantly one, type of economic activity for which a single industrial classification may be applied. A firm, or a company, is a business and may consist of one or more establishments, where each establishment may participate in different predominant economic activity.

The Bureau of Labor Statistics aggregates the number of employees and wages across the reporting establishments in each industry (identified by NAICS code) for which quarterly reports have been received and the results are published by county. Data are published on all the industries in each county for which quarterly reports have been received. Data for Industry aggregations are also published. The QCEW only reports employees and wages in the ocean industries that are subject to unemployment requirements and therefore underreports actual jobs and self-employed employees. Because the QCEW is a report on jobs, it does not refer to persons, since one person may work two or more jobs.

Much of the county by industry data is withheld from publication so as to protect the identifiable information of respondents. The BLS policy is stated as follows: "BLS withholds the publication of UI-covered employment and wage data for any industry level when necessary to protect the identity of employers. Totals at the industry level for the states and the nation include the undisclosed data suppressed within the detailed tables without revealing those data." [19] These cases where data are withheld arise most often in small counties and in small industries; publication of estimates there might enable one or more competitors to obtain specific data about a particular business establishment.

Dealing with Missing Values in the QCEW data

There is an alternative source for obtaining data on county employment and payrolls by industry, namely, County Business Patterns (CBP), a publication available from the U.S. Census Bureau. In the words of the Census Bureau, "County Business Patterns has been produced as a consistent, annual series since 1964, and ZIP Code Business Patterns since 1994. Printed reports were published annually through 2004 and at irregular intervals dating back to 1946. Printed volumes in major depository libraries are the only forms in which data are available prior to 1986."[20] The CBP data are annual as contrasted with the QCEW, and they are published after a longer time lag than the QCEW. CBP Data are available at the zip code level. CBP covers most NAICS industries, excluding crop and animal production; rail transportation; National Postal Service; pension, health, welfare, and vacation funds; trusts, estates, and agency accounts; private households; and public administration. CBP also excludes most establishments reporting government employees.[21] The CBP data are compiled from various annual surveys undertaken by the Census Bureau including the Survey of Manufacturers, Current Business Surveys, and the Annual Company Organization Survey. The Bureau also uses data collected for the Economic Census conducted each decade in years ending in 2 or 7. Finally, the Census Bureau uses administrative record sources.

In this study annual data are what are needed, and the CBP is used to supplement the QCEW rather than to replace it. The CBP is not as timely and is based on surveys which have sampling errors, rather than a full census. An important difference between the CBP and QCEW is the treatment of Data Disclosure for Confidentiality. The Census Bureau uses "noise infusion methodology" to protect data on individual business establishments from being disclosed. "Noise infusion is a method of disclosure avoidance in which values for each establishment are

[19] https://www.bls.gov/opub/hom/cew/calculation.htm#confidentiality.
[20] https://www.census.gov/programs-surveys/cbp/data.html.
[21] https://www.census.gov/programs-surveys/cbp/about.html.

perturbed prior to table creation by applying a random noise multiplier to the magnitude data (i.e., characteristics such as first-quarter payroll, annual payroll, and number of employees) for each company. Disclosure protection is accomplished in a manner that results in a relatively small change in the vast majority of cell values. Each published cell value has an associated noise flag indicating the relative amount of distortion in the cell value resulting from the perturbation of the data contributing to the cell."[22]

CBP and QCEW do not consider the number of establishments in a county-industry to be subject to confidentiality concerns. Data tend to be withheld or perturbed for payroll and employment data. The CBP provides data on the size distribution of employment in a particular county-industry including which size category may have been subject to noise infusion. This enables an estimate of total employment to be derived by using the midpoints of the size categories. An estimate of the average number of employees per establishment can be derived in the CBP dataset that will lead to an estimate of the missing employment number in the QCEW file. An average payroll per employee can then be derived from the CBP file, and this will enable an estimate of wages in the QCEW to be made.

In cases where the CBP cannot be used to estimate missing values in the QCEW data, estimates per establishment from similar industries in the same county or from the same industry in a neighboring county were used.

Estimates of GDP

The QCEW estimate of wages for each county-industry was converted into an estimate of the contribution to GDP by the county-industry in two steps. First, the wage estimates were used to estimate earnings for the county-industry. Earnings consist of wages plus wage supplements, such as employer social security contributions and employer contributions to health insurance and pensions and proprietor's income (the income of the self-employed). Second, the earnings data were converted into GDP estimates using the ratios of GDP to earnings.

These two steps drew on tables on Earnings and GDP by industry that are produced by the U.S. Bureau of Economic Analysis (BEA). The earnings data were at the 2-digit NAICS level and referred to the year 2017.[23] 2-digit estimates of wages by county were derived from the 2017 QCEW and ratios of earnings by county to QCEW wages by 2-digit industry were developed. 2-digit industries are broad industry groups such as construction, retail trade, transportation and warehousing, arts, entertainment and recreation, accommodation and food services. These ratios were applied to the 6-digit county-industry wages in order to get estimates of earnings by county-industry for the Ocean Economy. Since the wage data for 6-digit county-industries were from the 2018 QCEW, the resulting earnings estimates refer to 2018.

[22] https://www.census.gov/programs-surveys/susb/technical-documentation/methodology.html.
[23] The earnings by county data can be downloaded at https://apps.bea.gov/regional/downloadzip.cfm. The name of the file is CAINC5N. It needs to be downloaded for all the counties of Florida.

The county-industry Earnings estimates in turn were converted to estimates of GDP by calculating 2-digit ratios of GDP to Earnings. At the time of the Economic Update Study (Fall 2019), the only figures for GDP available at the sub-state level were for Metropolitan Areas (MSAs).[24] A listing of the coastal MSAs in Florida and their member counties is provided in Table 14.

Metropolitan Statistical Areas (MSAs) have at least one urbanized area of 50,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties. [25] In most states, including Florida, the MSAs are collections of one or more counties.

The GDP-Earnings ratios reflect the addition of nonlabor income (rent + interest + profits), indirect taxes less subsidies, and consumption of fixed capital (depreciation + losses of capital due to weather, earthquakes, fires etc.). The GDP-Earnings ratio for the United States as a whole, across all industries, was 1.88 in 2018. Appropriate 2-digit GDP ratios from the MSA were used to convert the 6-digit county-industry earnings to GDP for its member counties in order to get estimates of GDP by county-industry for the Ocean Economy. Appropriate ratios from a nearby MSA were used to estimate GDP by industry for the non-metro counties.

[24] GDP for all counties in the United States were first published on December 12, 2019. Aggregate nominal GDP are available plus the percentage contribution to growth by 2-digit industry. The data will simplify the methodology for the next Economic Update.

[25] https://www.whitehouse.gov/wp-content/uploads/2018/09/Bulletin-18-04.pdf. MSAs are established by the Federal Office of Management and Budget. The latest revision the to the boundaries of the MSAs was published in September 2018. The purpose of MSAs to provide nationally consistent delineations for collecting, tabulating, and publishing Federal statistics for a set of geographic areas. These statistics play a role on Federal funding of many Federal programs.

Table 14 Metropolitan Statistical Areas: County Members		
Coast	**Metropolitan Statistical Area (MSA)**	**Counties**
East Coast	Jacksonville MSA	Baker, Clay, Duval, Nassau, St. Johns
	Deltona-Daytona Beach MSA	Flagler, Volusia
	Palm Bay-Melbourne MSA	Brevard
	Sebastian-Vero Beach MSA	Indian River
	Port St Lucie MSA	Martin, Stuart
	Miami MSA	Broward, Miami-Dade, Palm Beach
	Non-Metro	Monroe
West Coast	Cape Coral-Ft Myers	Lee
	Homosassa Springs	Citrus
	Naples	Collier
	Punta Gorda	Charlotte
	North Port-Sarasota-Bradenton	Manatee, Sarasota
	Tampa-St Petersburg	Hernando, Hillsborough, Pasco, Pinellas
	Non-Metro	Dixie, Taylor
	Non-Coastal Metro	Levy (1)
Panhandle Coast	Pensacola	Escambia, Santa Rosa
	Crestview-Ft Walton Beach-Destin	Okaloosa, Walton
	Panama City	Bay, Gulf
	Non-Metro	Franklin
	Non-Coastal Metro	Jefferson, Wakulla (2)

Notes:
(1) Levy county is in the Gainesville MSA. GDP ratios for the Gainesville MSA were not used for Levy because the economic engine of the Gainesville MSA is not coastal.
(2) Jefferson and Wakulla counties are in the Tallahassee MSA. GDP ratios for the Tallahassee MSA were not used for Jefferson and Wakulla because the economic engine of the Tallahassee MSA is not coastal.

Employment Estimates

The procedure for estimating employment in the 38 county-industries was similar to the derivation of earnings discussed above. The starting point was the number of employees from the QCEW file with estimates for the missing data cases. The estimates were primarily obtained from the County Business Patterns data. In some cases, missing data were estimated using a similar industry in the county, or by using the same industry in a nearby county. These data were available for each of the county-industries.

The number of employees was increased in order to account for self-employed workers who are not subject to the unemployment law. Ratios between BEA 2017 employment by 2 industry codes and 2-digit 2017 QCEW employment were obtained. [26] These ratios were applied to the 2018 county-industries to estimate employment (including self-employed workers) in the county-industries. Hence the jobs reported here represent employees covered by the state's

[26] The employment by county data can be downloaded at https://apps.bea.gov/regional/downloadzip.cfm. The name of the file is CAINC25N. It needs to be downloaded for all the counties of Florida.

unemployment compensation law as well as independent contractors or self-employed persons. Because individuals may hold more than one job, the 560,071 figure is probably a little larger than the number of job holders.

Direct and Total Estimates of County GDP by Ocean Industry

Estimates of the total contribution of the ocean industries were obtained using a special run of the RIMS II Model of the Florida economy by the U.S. Bureau of Economic Analysis. The model used 2007 data for the national technical coefficients scaled to Florida using Florida and national data for 2016.[27] The total contributions were estimated using final demand multipliers for the various industries, and the employment estimates were derived using the direct effects multipliers. The result of this estimating procedure is to include expansion in the interior counties along with the coastal counties in the indirect and induced ("ripple") effects.

NOAA Study

The latest state profile of Florida's ocean economy was published by NOAA in 2019.[28] Florida's ocean GDP in 2016 (excluding Offshore Mineral Extraction) was $31 billion. This was the second highest among the 24 states along the nation's coast. It was behind top ranked California, which had an ocean GDP of $43 billion, and was followed by New York with $27.7 billion, Washington with $13.5 billion and New Jersey with $9.4 billion. We can also rank the states by the percent share of their ocean GDP in their state total GDP. Florida (whose ocean GDP was 3.4 percent of the state total) was ranked no. 5 among the 24 coastal states. The top 4 states were Hawaii (10.2 percent), Alaska (5.3 percent), Maine (4.9) and Rhode Island (4,9 percent).

[27] https://apps.bea.gov/regional/rims/rimsii/ A version of the model using more recent data became available after work commenced on this study. It uses the 2012 national benchmark data and 2017 Florida and national data. Long experience in using RIMS II models for the state has shown that multipliers for a large economy such as the state of Florida change relatively little across "adjacent" versions.

[28] State profiles of the ocean economy are available in https://coast.noaa.gov/data/digitalcoast/pdf/econ-report-regional-state.pdf. This report was published in 2019 using 2016 data.

Appendix D. Economic Spotlight

DRAFT

FLORIDA OCEANS AND COASTS: SPOTLIGHT ON FLORIDA'S OCEAN INDUSTRIES

2020

Table of Contents

The Economic Report above is based on the datasets available from federal sources outlined in the Methodology Section. In addition, there is also valuable information available from industry members and other reports relevant to the ocean and coastal economy. These are summarized in the next section to help complete the overview of Florida's ocean and coastal industries.

I. Ocean Industries and Related Topics

1. Tourism

Florida is touted as the leading tourist destination in the world.[1] Although tourism may suffer in 2020 from the coronavirus pandemic, there is no doubt that it will recover, as it has in the past. The sunshine state attracts visitors with its endless summers, world class beaches, exciting theme parks, and diverse state parks, as well as premier boating and fishing. The state's 825 miles of sandy coastline beckon visitors from near and far, making waves for Florida's economy. In a recent report, the state's beaches were given accolades as the "most important feature of Florida's brand, accounting for 25.5% of the state's attractiveness to visitors."[2]

Table 1
Features of Florida that Attract Tourists

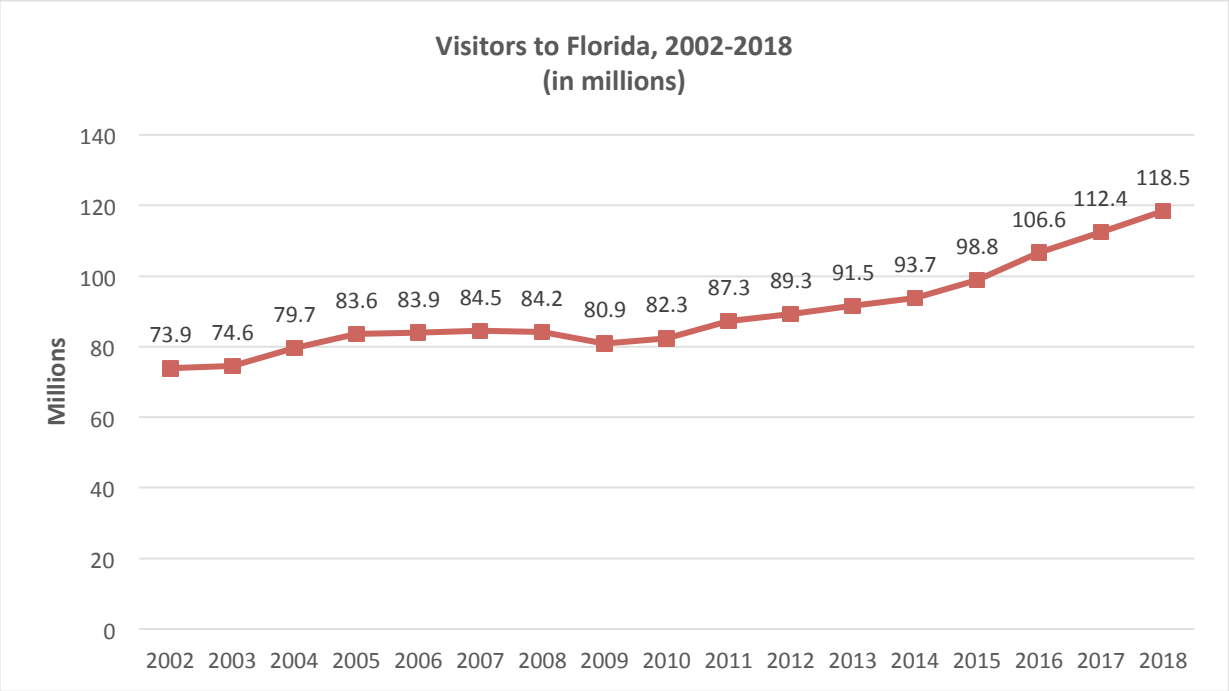
Feature	Portion of State Brand
Beaches	**25.5%**
Theme Park	**24.3%**
Retail/Dining/Nightlife	**21.8%**
Outdoor Recreation	**7.1%**
Access to International Ports or Airports	**6.7%**
Sports	**6.0%**
Festivals	**4.3%**
Parks/Natural Site	**2.7%**
Historical Significance	**1.6%**

Source: EDR Analysis of Self-conducted survey results. The Florida Legislature Office of Economic and Demographic Research, "Economic Evaluation of Florida's Investment in Beaches," January, 2015, pg. 9.

Tourists visit coastal areas. The state's tourism market has been in recovery mode after the economic downturn of 2008 but will likely experience negative effects from the coronavirus and its impact on visitors. The latest numbers from Visit Florida indicate that 130 million tourists visited Florida in 2019, a 7% increase from 2018.[3] After the 2008 recovery, there has been an upward trend in visitors to the state.

[1] James Houston, The Economic Value of America's Beaches, *Shore and Beach,* Journal of the American Shore and Beach Preservation Association, 2018.
[2] The Florida Legislature Office of Economic and Demographic Research, "Economic Evaluation of Florida's Investment in Beaches," January, 2015, p. 1.
[3] Visit Florida Research, 2018, accessed at www.visitflorida.org.

Figure 1



Source: Visit Florida Research, 2018, accessed at www.visitflorida.org

Tourism is a critical part of Florida's economy. That is important for the state's economy, which relies on the sales tax revenues from tourism and the jobs it creates in the hospitality industry. In 2018, Visit Florida reported that tourists spent $111.7 billion in Florida, contributed $11.6 billion to the sales tax coffers of the state, and employed over a million in the tourism industry. This represents nearly a quarter of the state sales tax revenue. Because this part of sales tax is paid by visitors, it does not burden Floridians with additional taxes. Visit Florida also reports that every $1 spent on tourism results in $2.15 in tourism spending and $15 in new sales tax collections.[4]

Visitors generated $88 billion, or roughly 10 percent, of Florida's total Gross Domestic Product (GDP). Tourism now accounts for a record-high 13.4 percent of overall revenues in the state.[5] Figures 2 and 3 track the economic impact of increasing numbers of visitors to Florida since 2002, resulting in an upward trend of tourism spending since 2009, accompanied by increased employment in the tourism industry.

[4] Visit Florida Research, 2018, accessed at www.visitflorida.org.
[5] Visit Florida Research, 2018, accessed at www.visitflorida.org.

Figure 2

Source: Visit Florida Research, 2018, accessed at www.visitflorida.org

Figure 3

Source: Visit Florida Research, 2018, accessed at www.visitflorida.org

2. Marine Transportation

a. Cargo

A recent Florida Ports Council Economic Analysis has shown that maritime cargo and cruise activities at Florida ports support nearly 900,000 well-paying direct and indirect jobs and generate nearly $117.6 billion in total economic activity. These activities contribute more than $4.3 billion in state and local tax revenues. Florida's waterborne international and domestic cargo for 2018 remained stable at 110 million tons. Waterborne international trade moving through these seaports was valued at $87.3 billion in 2018. This $87.3 billion represented 55.6 percent of Florida's $156.9 billion total international trade.[6]

Map 1
Florida Seaports

Source: Florida Ports Council, www.flaports.org

[6] Florida Ports Council, "The Florida Seaports Fast Facts, (currently as of January 1, 2020)." http://www.flaports.org.

Table 2
Economic Impact of Florida's Ports

Seaport	# of Jobs	Economic Impact
Port Canaveral	32,000	$3,900,000,000
Port Everglades	224,000	$30,000,000,000
JAXPORT	26,000	$31,100,000,000
Port Manatee	24,000	$2,300,000,000
PortMiami	334,500	$41,400,000,000
Port of Palm Beach	2,400	$260,000,000
Port Panama City	1,024	$1,400,000,000
Port Tampa Bay	85,000	$17,200,000,000
Total	**728,924**	**$127,560,000,000**

The Maritime Executive, Study: Port Canaveral Generates $3.9B in Economic Activity, 2018, https://www.maritime-executive.com/article/study-port-canaveral-generates-3-9b-in-economic-activity.
Port Everglades, Economic Impact, 2018, https://www.porteverglades.net/our-community-role/economic-impact/.
JaxPort, Economic Impact, 2018, https://www.jaxport.com/corporate/jobs/economic-impact/.
Florida Ports Council, Port Manatee, 2018, https://flaports.org/ports/port-manatee/.
Miami Dade, The Local And Regional Economic Impacts Of Port Miami, 2016, https://www.miamidade.gov/portmiami/library/reports/2016-economic-impact-full-story.pdf.
Florida Ports Council, Port of Palm Beach, 2018, https://www.flaports.org/ports/port-of-palm-beach/.
Panama City Port Authority, The Local and Regional Economic Impacts of Port Panama City, 2016, http://www.panamacityportauthority.com/assets/panama-city-2015-impact-report---final.pdf.
Port Tampa Bay, 2018 State of the Port Review, https://frontrunner-bucket.s3.amazonaws.com/F8DC7194-5056-907D-8D13-FD1C2D46C864.pdf.

Table 3
Comparison of Cargo and Cruise Employment in Florida Ports

Florida Ports Total	# of Jobs	Economic Impact $Billions
Cargo Only	**761,614**	**$105,009,300**
Cruise Only	**138,300**	**$7,167,274**
Total	**899,914**	**$112,176,574**

Sources: Florida Seaport Transportation and Economic Development Council, December 2016, The Statewide Economic Impacts of Florida Seaports, 2016, by Martin Associates.

b. Cruise Lines

The official trade organization of the North American cruise industry is headquartered in Florida and the state is home to the corporate and administrative offices of all of the top cruise lines. Overall, the cruise industry is responsible for more than 149,020 jobs in Florida. The cruise industry generates significant economic activity through its Florida-based operations, accounting for almost two-thirds of all U.S. cruise embarkations. In FY 2019 alone, 18.3 million passengers embarked and disembarked from Florida seaports. Port Everglades, PortMiami and Port Canaveral are the top three multi-day cruise ports in the world. Cruises at JAXPORT, Port Tampa Bay and the Port of Palm Beach-- as well as port-of-call visits at the Port of Key West -- reinforce the statewide economic benefits of cruise tourism generated at Florida's seaports.[7]

Table 4
Economic Impact of the Cruise Industry in Florida

Direct Economic Impacts	$Billions
Direct Cruise Industry Expenditures ($Billions)	$7.97
Employment	149,020
Wages and Salaries ($Billions)	$7.10

Source: Cruise Lines International Association (CLIA), The Contribution of the North American Cruise Industry to the United States Economy in 2016, prepared by Business Research and Economic Advisors.

3. Marine Industry

a. The Economic Impact of Recreational Boating Activity

According to a recent study by the Marine Industries Association of South Florida, the tri-county area of Miami-Dade, Broward, and Palm Beach counties contributed 141,787 jobs to the state's economy in fiscal year 2018, with wage income over $4.2 billion and over $12 billion in total output. Gross retail sales of boat and motor products was $6.7 billion statewide, with the tri-county area accounting for 44.4% of those sales.[8]

[7] Florida Ports Council, "The Florida Seaports Fast Facts, (currently as of January 1, 2020)." http://www.flaports.org.
[8] Marine Industries Association of South Florida, Economic Impact of the Recreational Marine Industry—Broward, Dade, and Palm Beach Counties, Florida—2018.

Table 5
Economic Impact of Marine Industry in Miami-Dade, Broward, and Palm Beach Counties (FY2018)

	Total Jobs	Wage Income	Total Output
Broward County	111,398	$3,112,754,532	$8,928,182,647
Miami-Dade County	9,252	$331,125,744	$914,259,581
Palm Beach County	21,135	$791,325,342	$2,184,900,415
Total Tri-County Areas	141,787	$4,235,205,620	$12,027,342,643

Source: Marine Industries Association of South Florida, Economic Impact of the Recreational Marine Industry—Broward, Dade, and Palm Beach Counties, Florida – 2018.

4. Recreation

Outdoor recreation is big business in Florida. An estimated 118.5 million visitors visited the state in 2018. The overwhelming reason for tourists visiting Florida is the appeal of recreation and leisure options that the state offers through its oceans, beaches, and parks. The state's tourism industry generated $111.7 billion of expenditures in 2018 and more than 1.4 million jobs.[9] Out-of-state tourists spent $112 billion in 2016, supporting one out of every six jobs, making tourism Florida's largest employer and consistently adding jobs faster than growth of the state economy.[10] International beach tourists alone spend $12.4 billion annually in Florida. Moreover, tourists generated $11.6 billion in local and state taxes to help fund Florida's government and services.[11] The state's beach tourism generates $6.4 billion in federal taxes.[12]

The array of coastal activities includes saltwater beaches, saltwater fishing, saltwater boat ramps, wildlife viewing and nature study. In addition to beaches attracting tourists, there is a direct economic impact by the state's park system, contributing $2.6 billion to local economies in fiscal year 2017/2018 and 37,119 jobs. This economic impact also included $176 million in state sales taxes.[13] Nature-based tourism is also an important part of Florida's economy. Wildlife viewing, hunting, boating and fishing generate more than 252,889 jobs statewide, with an economic impact of $25.2 billion.[14]

[9] Visit Florida Research, 2018, accessed at www.visitflorida.org.
[10] Tourism Economics, 2016, "The Economic Impact of Out-of-State Visitor Spending in Florida," https://www.visitflorida.org/media/30679/florida-visitor-economic-impact-study.pdf. cited by James Houston, 2018.
[11] Oxford Economics, 2018, "The Economic Impact of Out-of-State Visitors in Florida," https://www.visitflorida.org/media/30679/florida-visitor-economic-impact-study.pdf, cited by James Houston, 2018 Visit Florida Research, 2018, accessed at www.visitflorida.org.
[12] James Houston, The Economic Value of America's Beaches, *Shore and Beach*, Journal of the American Shore and Beach Preservation Association, 2018. Visit Florida Research, 2018, accessed at www.visitflorida.org.
[13] Florida State Park Economic Impact Assessment, Fiscal Year 2018-2019.
[14] Florida Fish and Wildlife Conservation Commission (FWC), 2011, 2013, 2015 accessed at https://myfwc.com/about/overview/economics/.

Table 6.
Economic Impact of Florida Tourism, 2018

	Visitors	Total Jobs	Total Economic Impact
Tourism	118.5 Million	1.4 Million	$111.7 Billion*
State Parks	175	37,119	$2.6 Billion

*Expenditures only, not total economic impact
Source: Visit Florida Research, 2018, accessed at www.visitflorida.org and Florida State Park Economic Impact Assessment, Fiscal Year 2018-2019.

The 175 state parks and trails and miles of beaches provide an economic boost to Florida's economy. Outdoor recreation attracts both Florida residents and out-of-state visitors, estimated at 15 million Floridians in 2016 (3/4 of the state's population) and 102 million visitors. Visitors report spending an average of $683 individually on outdoor recreation in 2016, and residents report spending $1,351. These expenditures generated about $70 billion in visitor spending, and $20 billion in resident spending for the state, of which roughly $6 billion occurred in parks and public lands. This outdoor recreation supported 1.2 million jobs in Florida and produced $10 billion in tax revenue impacts.[15]

Key activities enjoyed by residents and visitors alike include visiting beaches, walking/jogging, picnicking, bicycle riding, hiking and golfing. As shown in the Table 7, beach activities top the list for visitors, but walking and jogging were favored by residents.

Table 7.
Spending on Outdoor Recreation by Florida Visitors and Residents, 2016

Activity	Visitors $ millions	Residents $ millions
Saltwater Beach	$7.9	$3.0
Outdoor Fitness Walks/Jogs	$6.0	$7.2
Picnicking	$6.0	--
Bicycling	--	$2.4
Hiking	$5.5	$1.2
Golfing	$4.7	$1.1

Source: Economic Analysis of Outdoor Recreation Activities in Florida," Final Report, August, 2017, The Balmoral Group, p. 3.

[15] "Economic Analysis of Outdoor Recreation Activities in Florida," Final Report, August, 2017, The Balmoral Group, p. 2.

5. Fishing Industry

a. Recreational Fishing

Florida's bounty flows from its oceans and its 2,276 miles of tidal shoreline. Fishing continues to be a major industry in Florida. The state is known as the "Fishing Capital of the World" because of its record fish catches.[16] In 2018, the Florida Fish & Wildlife Conservation reported that there are over 4 million freshwater and saltwater recreational fishermen licensed in the state of Florida. Saltwater fishermen spent $9.2 billion and freshwater fishermen spent $2.3 billion in 2018 while fishing in Florida. In total, the economic impact reached $11.5 billion and supported over 106 thousand jobs.[17] (See Table 8)

Table 8
Economic Impact of Saltwater and Freshwater Fishing in Florida 2018

	Economic Output (in $ Billion)	Jobs
Saltwater Fishing	$9.2	88,501
Freshwater Fishing	$2.3	17,499
Total	$11.5	106,000

Source: Florida Fish & Wildlife Conservation: https://myfwc.com/conservation/value/saltwater-fishing/.

Economic impact has been analyzed for congressional districts, which demonstrates the widespread economic impact of recreational fishing across Florida in 2016. (See Table 9 and Table 10)

Table 9
Coastal Area Contribution to Florida's Recreational Fishing Industry Economic Impacts

	Economic Output	Jobs
East Coast	$1.862 Billion	978,981
Interior	$1.597 Billion	840,121
West Coast	$1.440 Billion	757,054
Panhandle	$462 Million	243,000
Total	$5.361 Billion	2,819,156

Source: American Sports Fishing Association, Economic Impacts of Recreational Fishing – Florida, 2016, https://asafishing.org/state-reports/economic-impacts-of-recreational-fishing-florida/.

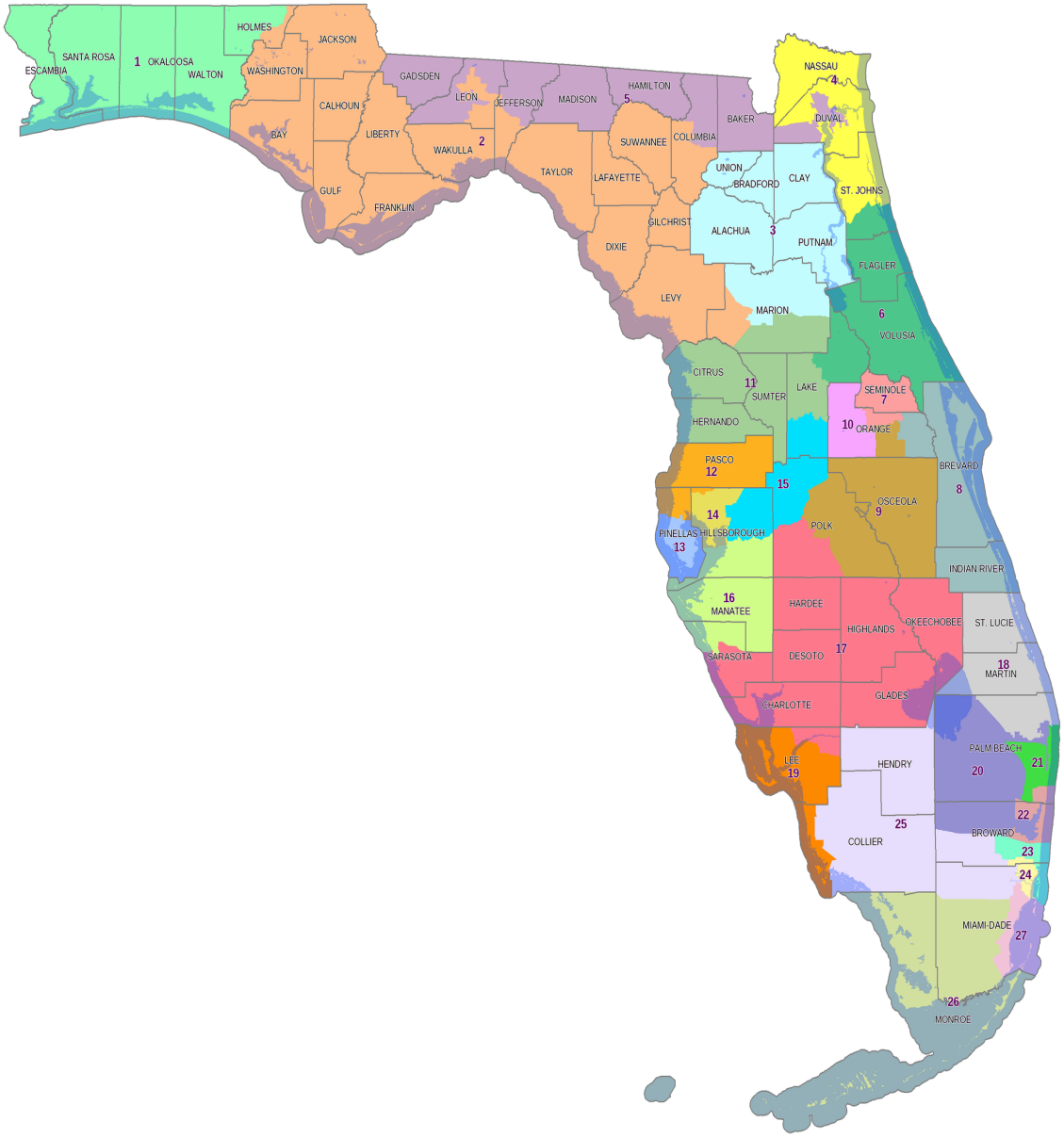
[16] Visit Florida, https://www.visitflorida.com/en-us/travel-ideas/10-florida-facts.html.
[17] American Sportfishing Association and Southwick Associates, based on USFWS 2011 survey data updated to 2018 using FWC-OLP's license trend data plus inflation data, https://myfwc.com/conservation/value/saltwater-fishing/.

Table 10
Economic Output of Florida's Recreational Fishing Industry by Congressional District

Congressional District	Economic Output (in $ Million)	Jobs
1	$225	118,301
2	$237	124,699
3	$226	118,830
4	$222	116,722
5	$190	99,819
6	$239	125,810
7	$196	103,018
8	$223	117,148
9	$208	109,227
10	$181	95,429
11	$242	127,132
12	$230	121,011
13	$199	104,740
14	$184	96,530
15	$215	113,122
16	$224	118,042
17	$236	124,289
18	$203	106,885
19	$223	117,285
20	$145	76,387
21	$177	93,066
22	$184	96,443
23	$191	100,616
24	$126	66,290
25	$138	72,314
26	$161	84,418
27	$136	71,583
Total	**$5,361 Billion**	**2,819,156**

Source: American Sports Fishing Association, Economic Impacts of Recreational Fishing – Florida, 2016, https://asafishing.org/state-reports/economic-impacts-of-recreational-fishing-florida/.

Map 2
Congressional Districts in Florida

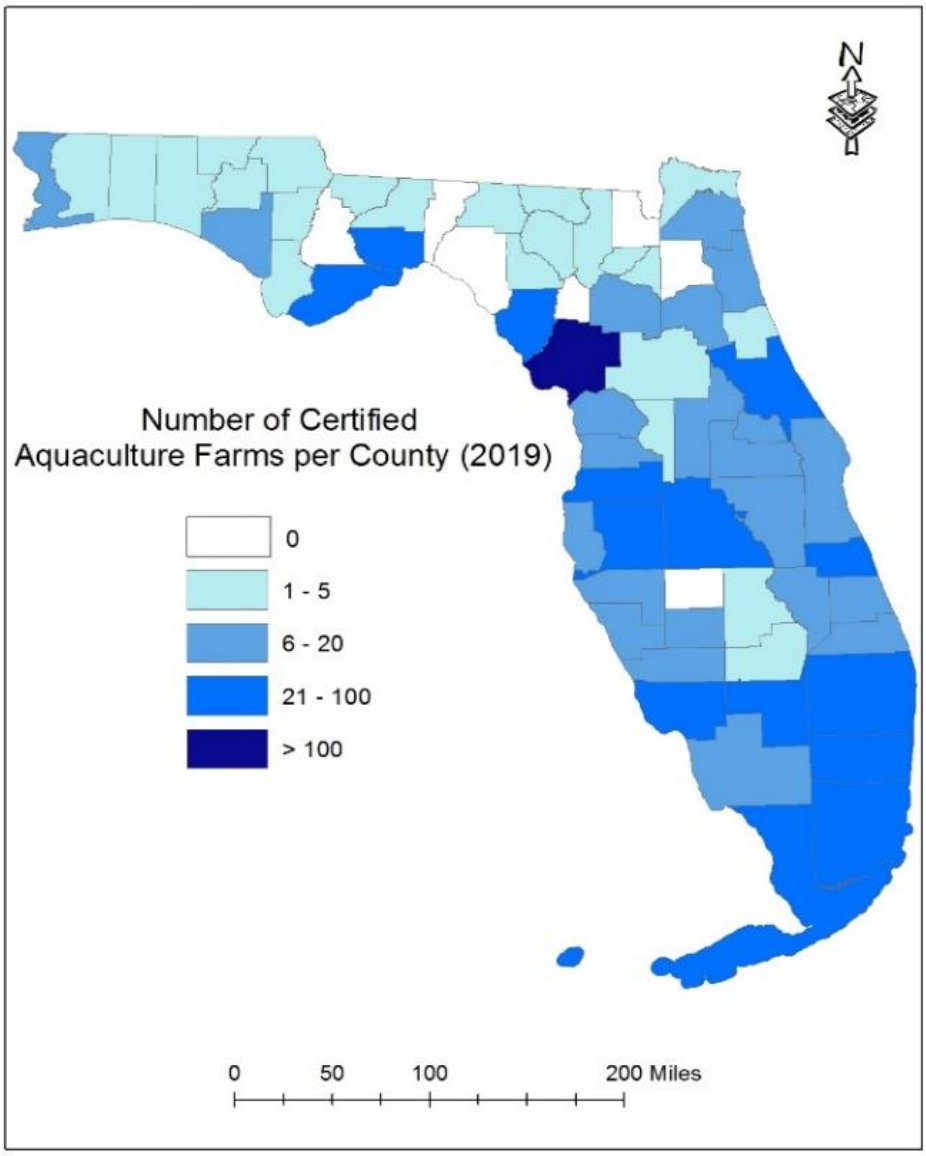


Source: WJCT Public Media, "New Florida Congressional Districts Taking Fire, " August 2015, https://news.wjct.org/post/new-florida-congressional-districts-taking-fire.

b. Florida Marine Aquaculture

The aquaculture industry in Florida produces the greatest variety of aquatic species of any state in the nation and represents Florida's most diverse agribusiness. Aquaculture farms are located statewide and produce an estimated 1,500 varieties of fish, plants, mollusks, crustaceans, turtles and alligators (See Map 3).[18]

Map 3
Aquaculture Farms by County



Source: Florida Aquaculture Plan, October 2019. Aquaculture Review Council, Florida Department of Agriculture and Consumer Services, http://www.fdacs.gov.

[18] "Florida Aquaculture Plan," October 2019. Aquaculture Review Council, Florida Department of Agriculture and Consumer Services, http://www.fdacs.gov.

Aquaculture in Florida is increasingly important, with income in 2018 valued at $71.6 million for 325 farms. In the U.S., total aquaculture sales for 2018 was $1.5 billion for 2,932 farms. Ornamental fish is the largest segment in the state, at $28.7 million in sales for 109 farms, followed by mollusks/hard clams, at $16.0 million for 115 farms, and crustaceans (shrimp, crawfish, prawn), at $14.3 million for 15 farms. Other aquaculture (alligator, snails, frogs, etc.) produced $8.4 million for 64 farms and other food fish (tilapia, sturgeon, etc.) $4.0 million for 46 farms.[19]

6. Defense Industry in Florida

The location of military facilities along Florida's coasts provides a significant boost to the state's economy. Defense-related spending contributed $95 billion in 2019. Florida ranks in the top five of federal defense expenditures. Defense spending accounted for 914,787 direct and indirect jobs in Florida in 2019.[20]

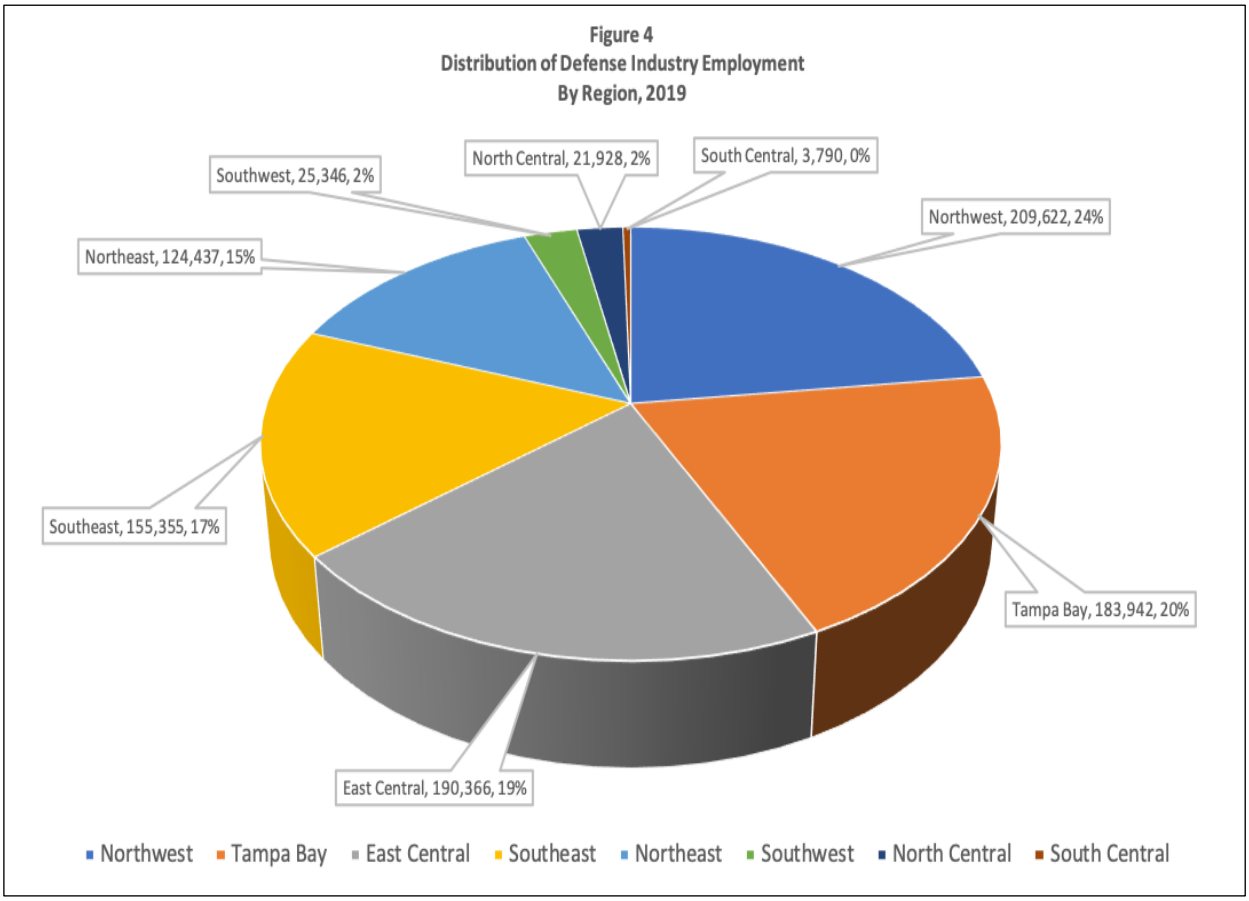
The largest proportion (24%) of defense jobs is located in the northwest region of Florida, followed by the Tampa Bay region with 20%, East Central region with 19%, Southeast region with 17%, and Northeast region with 15%. Nearly all military installations are located near the coast, with six in northwest Florida counties, five in the northeast, five in the central region, and three in the southeast. Three of these installations are in non-coastal locations.[21] Defense jobs in Florida represent 15,230 contractors, 112,575 contracts and $15.3 trillion in contracts during 2018.[22]

[19] 2018 Census of Agriculture, USDA National Agricultural Statistics Service, 2018.
[20] Enterprise Florida, "Florida Defense Industry Economic Impact Analysis," January 2020.
[21] Enterprise Florida, "Florida Defense Industry Economic Impact Analysis," January 2020.
[22] "Government Contracts Won," Florida Defense Contractor Lists, 2018.

Table 11
Economic Impact of Defense Industry in Florida's Regions, 2019 Update

Region	Economic Impact ($Billion USD)	# of Jobs	% of Jobs
Northwest	$22.7	209,622	24.0%
Tampa Bay	$19.3	183,942	20.0%
East Central	$18.4	190,366	19.0%
Southeast	$16.1	155,355	17.0%
Northeast	$14.2	124,437	15.0%
Southwest	$2.3	25,346	2.0%
North Central	$1.8	21,928	2.0%
South Central	$0.3	3,790	0.0%
Total	$95.1 Billion	914,786	99.00%

Adapted from Table 5, Enterprise Florida, "Florida Defense Industry Economic Impact Analysis," 2020 Update, pg. 52, January 2020. **Note: Totals may not sum due to rounding.**



Map 4

U.S. Military Bases in Florida

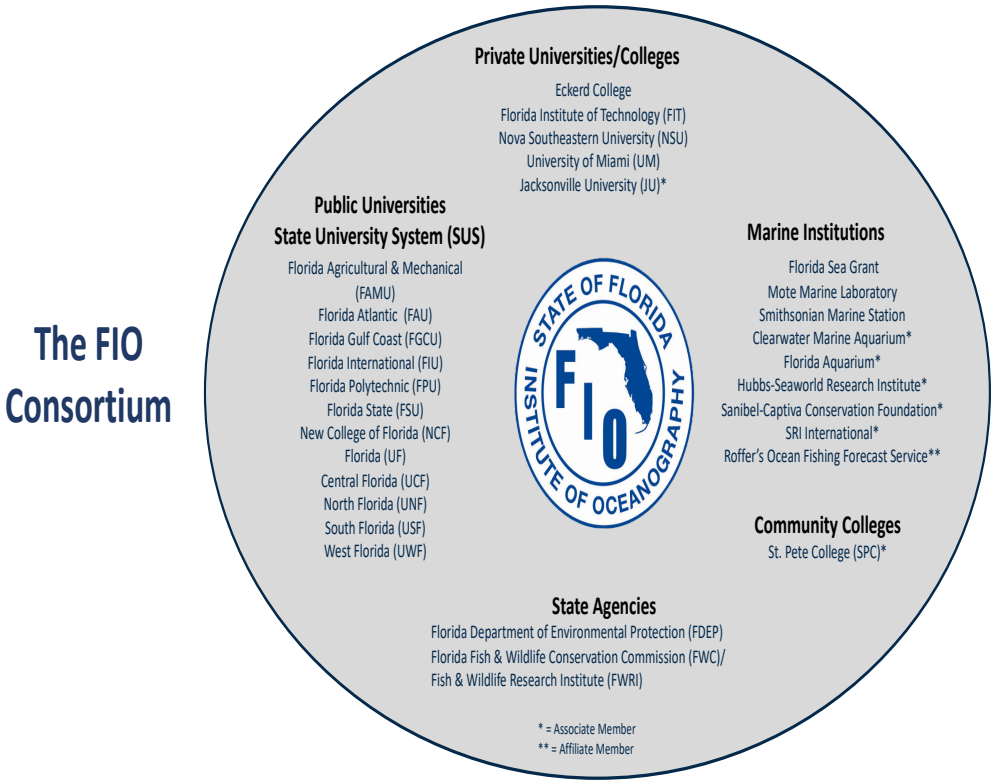
7. Marine Science Research

One aspect of Florida's Blue Economy that is valuable but difficult to assess is the direct and indirect economic value contributed by Florida's ocean and coastal scientific research community. This knowledge community is composed of a diverse range of public and private scientific research and engineering organizations that have not been adequately evaluated for their economic impact on Florida. Examples of the broad scope of the state's research community efforts are provided below, but they only provide a slice of Florida's total research assets. Florida Sea Grant lists more than 50 marine and coastal institutions in Florida. These organizations represent centers of knowledge, innovation, and research that drive economic value in direct and indirect ways.

The Florida Institute of Oceanography is a consortium of nearly all the major research facilities in Florida doing research on oceans, including public and private universities and research institutes. They report that their members receive millions of dollars from federal, state, and private sources for research funding. Its members do not include Disney in Orlando, the Florida Aquarium in Tampa, and the Pier Aquarium in St. Petersburg. There are also federal groups that have a research component in Florida, including the Environmental Protection Agency in Pensacola, the U.S. Geological Survey in St. Petersburg, National Oceanic Atmospheric Association (NOAA) Fisheries in St. Petersburg, NOAA's Hurricane Center in Miami, NOAA's Atlantic Oceanographic and Meteorological Laboratory, and the NOAA Florida Keys National Marine Sanctuary in Key Largo.[23]

[23] Florida Institute of Oceanography, University of South Florida, St. Petersburg, FL: http://www.marine.usf.edu.

Figure 5



After recent oil spills, academic institutions have received funding to conduct research on the effects that these spills have on the ecosystem. Florida universities have been given money under one grant, Request for Proposal (RFP-1), to conduct research under a variety of local ecosystem factors. The University of South Florida also received the Request for Proposal (RFP-2) grant, along with the RFP-2 Renewal grant, which will allow research on the Spawning Habitat and Early-life Linkages to Fisheries (SHELF), or SHELF project.[24]

[24] Personal communication with Cam Ngo, December 2019.

Table 12
Awards to Florida Research Universities
on the Effect of Oil Spills on Florida Ecosystems

Institution	Amount Awarded	Request for Proposals (RFP)
University of Florida	$294,006	RFP-1
University of Miami	$294,000	RFP-1
University of Miami	$285,119	RFP-1
Florida International University	$290,742	RFP-1
University of West Florida	$293,991	RFP-1
Florida State University	$293,960	RFP-1
University of South Florida	$293,555	RFP-1
University of Central Florida	$290,803	RFP-1
University of South Florida	$129,265	RFP-1
Nova Southeastern University	$293,202	RFP-1
University of South Florida	$887,200	RFP-1
University of South Florida	$749,999	RFP-2 Renewal
Total	**$4,395,842**	

Source: Personal communication with Cam Ngo, Florida Institute of Oceanography, December 2019

Florida Sea Grant is a university-based program at the University of Florida that supports research, education and extension to conserve coastal resources and enhance economic opportunities for the people of Florida. It is a partnership between the Florida Board of Education, the National Oceanic and Atmospheric Administration, and Florida's citizens and governments. The extension, education and outreach programs are done in partnership with the University of Florida's Institute of Food and Agricultural Sciences program and coastal counties of Florida.[25] Florida Sea Grant's main funding source comes mainly from NOAA, in which it receives approximately $4 million annually (75%) and funding from the Florida's State University System (25%).[26]

Florida Sea Grant supports the work of scientists, researchers and students in a wide variety of disciplines from institutions around the state by providing various funding opportunities throughout the year.[27] It has a history of funding projects in partnership with agencies, industry and non-governmental organizations, including the South Florida Water Management District, Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, Gulf and Caribbean Fisheries Institute, Billfish Foundation and Guy Harvey Ocean Foundation, to name a few.[28] Florida Sea Grant has currently funded seven research projects for approximately $1.4 Million ($200,000 each) to several State of Florida college programs.[29] They recently announced a $13.5 million funding opportunity for

[25] Florida Sea Grant website: https://www.flseagrant.org/funding/projects/.
[26] Email communication with Sherry Larkin, April 14, 2020.
[27] Florida Sea Grant website: https://www.flseagrant.org/funding/projects/.
[28] Site Review Briefing Book: Florida Sea Grant College Program, 2019.
[29] Email communication with Sherry Larkin, Ph.D., Director, Florida Sea Grant, April 14, 2020.

the aquaculture research field for three research projects that will address different aspects of domestic aquaculture.[30]

Mote Marine Laboratory and Aquarium is celebrating over 65 years as one of the few remaining independent, non-profit international marine research laboratories. The Mote research enterprise has more than 20 diverse research programs with ~220 staff including 36 Ph.D. level researchers at six campuses/facilities stretching from Sarasota Bay to Key West, along with significant science education/outreach and ocean policy components that are integrated with its research endeavors. As Mote has grown, so has its strong partnership with the State of Florida. Two recent collaboration examples to highlight are: 1) mitigating the scientifically complex impacts of red tide and 2) leading coral reef restoration with innovative research and a living coral gene bank of over 1,600 distinct genotypes. In 2019, Mote was named to lead the six-year Florida Red Tide Mitigation and Technology Development Initiative. Building upon the ongoing and highly productive FWC-Mote cooperative red tide research and monitoring program, Mote is now also coordinating development, testing, and implementation of innovative, effective, and environmentally sustainable technologies and approaches for controlling and mitigating the impacts of red tide. Mote has also been an important collaborator with the state in responding to the catastrophic coral disease event and series of other stressors on our reefs by leading cutting-edge coral genetic and restoration science at its Elizabeth Moore International Center for Coral Reef Research and Restoration on its Summerland Key campus and a new environmentally hardened coral gene bank on its 200-acre Mote Aquaculture Research Park in Sarasota. An independent study in 2017 determined a nearly $90 million annual economic impact by Mote to the State of Florida. Overall, despite Mote's growing international presence, the synergy of science and service to Florida communities will always be a cornerstone of Mote's mission.[31]

The Marine Biomedical Program at Harbor Branch Oceanographic Institute (HBOI) at Florida Atlantic University has been researching marine biotechnology since it was established in 1984 as the research arm of SeaPharm. Its mission is to discover marine-derived medicines, using the ocean's natural products and the products' therapeutic potential for developing pharmaceutical drugs. A primary focus has been on the discovery of compounds useful against pancreatic, lung, colon and breast cancers. Research also focuses on discovery of products useful against multi drug resistant bacterial infection and parasitic diseases such as Malaria and Cryptosporidiosis. It is also involved with sustainable production of bioactive marine natural products. HBOI's work in developing biomedical products from the ocean results in about $750,000 a year in research grants, with funding from the National Institutes of Health, NOAA, the Florida Biomedical Research Fund, and from private donations.[32]

[30] Florida Sea Grant website: https://www.flseagrant.org/funding/projects/.
[31] Personal communication with Kevin Claridge, Associate Vice President, Mote Marine Laboratory, April 30, 2020.
[32] Personal Communication with Dr. Amy Wright, HBOI, December 2019.

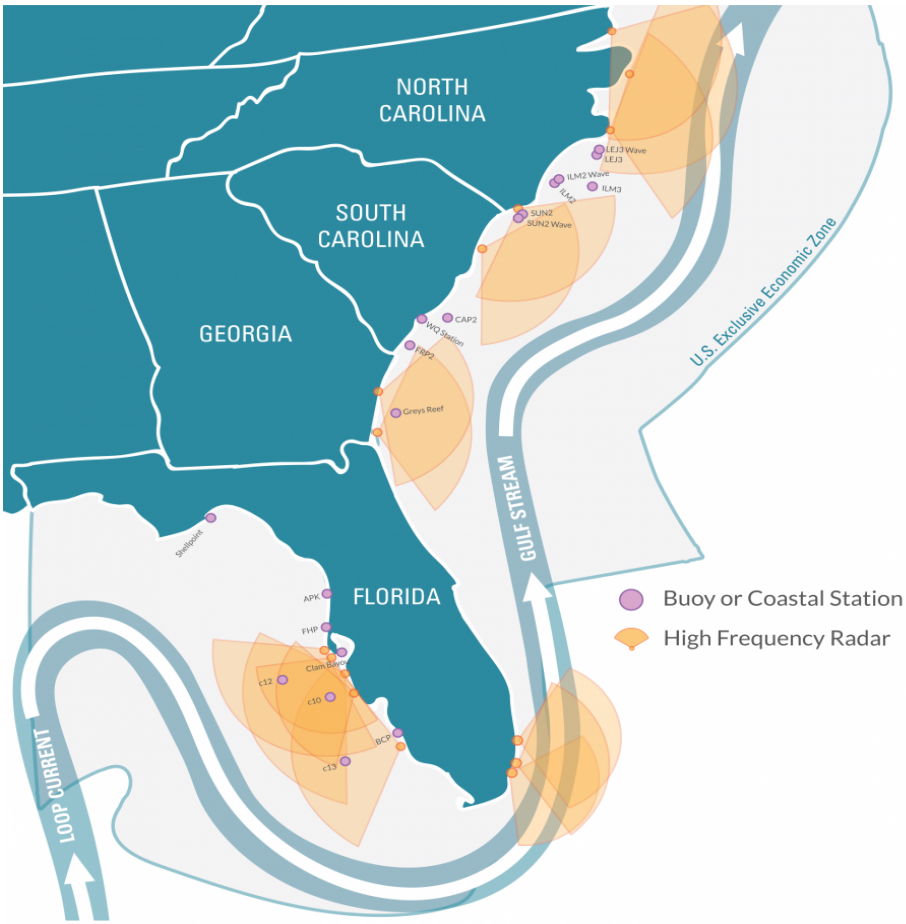
At the University of Florida's Department of Pharmacy, the National Cancer Institute has provided almost $85,000 to fund research for up to four years. The purpose of the research is to target new anticancer agents from marine cyanobacteria.[33]

8. Mapping

The Southeast Coastal Ocean Observing Regional Association (SECOORA) is the coastal ocean observing system for the Southeast United States, which includes North Carolina, South Carolina, Georgia, and Florida. Its emphasis is on improving coastal hazard resilience in the Southeast area and support partners to collect and report water quality data, create tools for historical circulation and climate data and support models and information to improve beach water quality advisory notices.[34] SECOORA works to make coastal and ocean real-time and historical data publicly available. Over 75% of the budget funds observing assets, model development, data communications and tools to meet the needs of targeted user groups. The SECOORA ocean observing system is comprised of multiple data products, moored and coastal stations, high-frequency radars, and a glider observatory.[35] It is one of eleven regional coastal observing systems of the NOAA led United States Integrated Ocean Observing System (U.S. IOOS). U.S. IOOS is described as "the weather service for the coastal oceans and Great Lakes," providing "the ability to "see" what is happening both above and below the surface and makes that information readily available."[36] SECOORA supports projects that are important to stakeholders in the southeast in which they produce oceanographic observations, models, web tools, applications, and products based on stakeholders needs. Each project SECOORA supports is linked to their focus areas in marine operations, coastal hazards, ecosystems (water quality and living marine resources), and climate variability.[37]

[33] Personal communication with Dr. Valerie Paul, University of South Florida (USF), January 2020.
[34] SECOORA website: https://secoora.org.
[35] SECOORA website: https://secoora.org.
[36] SECOORA website: https://secoora.org.
[37] SECOORA website: https://secoora.org.

Figure 6
SECOORA Footprint



The SECOORA footprint spans the eastern side of Gulf of Mexico to South Atlantic Bight and is connected by the Loop Current-Florida Current-Gulf Stream continuum.
Source: SECOORA website: https://secoora.org

The Gulf of Mexico Alliance (GOMA) is a 501c3 non-profit organization that was established in 2004 in response to the President's Ocean Action Plan to significantly increase regional collaboration and enhance the environmental and economic health of the Gulf of Mexico. Florida is basically split between SECOORA on the Atlantic coast and GOMA on the Gulf coast. GOMA is led by five Governors of the Gulf States (Alabama, Florida, Louisiana, Mississippi, and Texas) with support from state and federal agencies, academic organizations, non-profits, and businesses in the region. The organization has identified six priority issues that benefit from its regional collaboration. These include coastal resilience, data and monitoring, education and engagement, habitat resources, water resources, and wildlife and fisheries. Equally important, the Alliance also provides a forum to share knowledge and expertise as well as an opportunity to collaborate to reduce duplication of effort.[38]

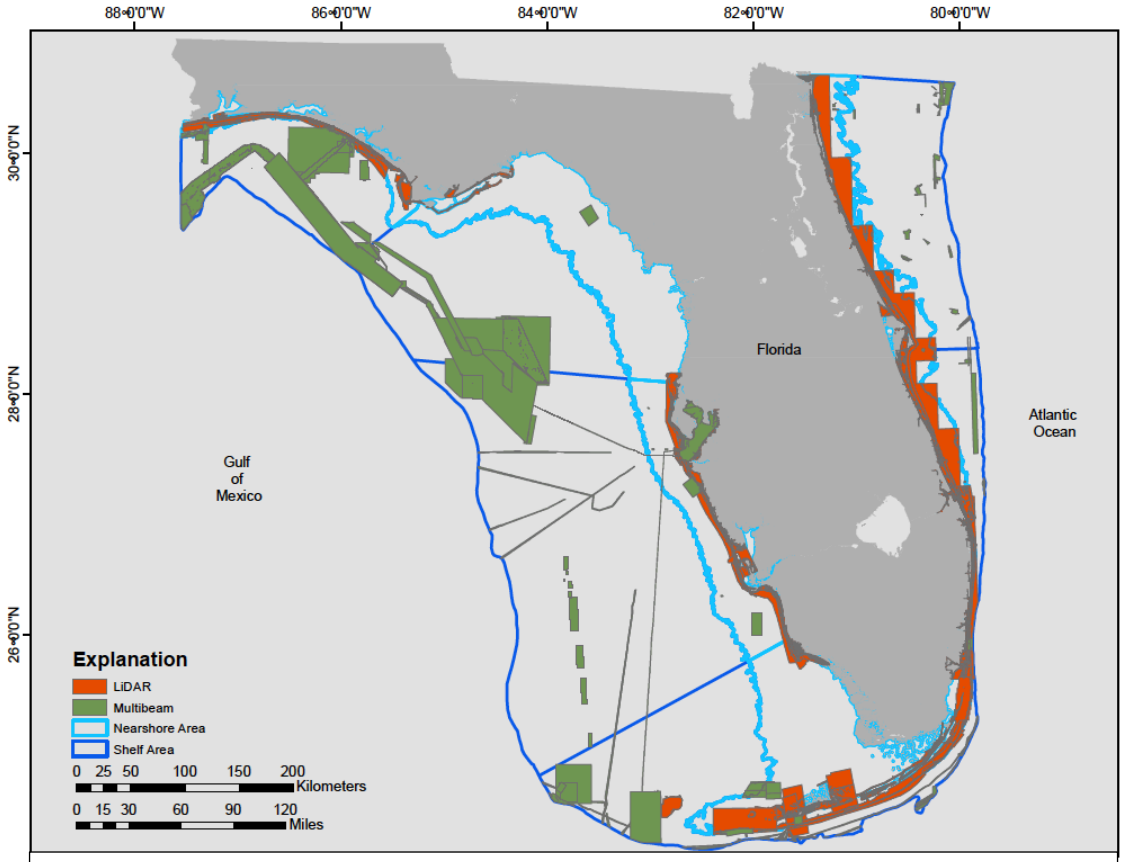
[38] Gulf of Mexico Alliance (GOMA), https://gulfofmexicoalliance.org. Accessed April 19, 2020.

The Florida Coastal Mapping Program at the University of South Florida College of Marine Science is recognized as a statewide coordinating entity, with a goal of promoting and facilitating the collection and dissemination of Florida coastal seafloor data to fill priority areas and gaps over the next decade. The steering committee is comprised of six State and four federal agencies (plus a coordinator) that was established in January 2017. The programs mission is to create a statewide program to achieve high resolution seafloor mapping for all of Florida's coastal waters, from the shoreline to the edge of the continental shelf. This program recognizes and promotes such data as a critical baseline for a myriad of sectors including fisheries, infrastructure, navigation, benthic habitat mapping, restoration projects, resource management, emergency response, red tides, and coastal resiliency and hazard studies.[39]

There is a large statewide Community of Practice including numerous agencies, academia, NGOs, and the private sector. They have completed a comprehensive data inventory, gap analysis (2017), and statewide stakeholder prioritization (2019) for all of Florida's coastal waters. NOAA, the US Army Corps of Engineers, and the US Geological Survey continue to invest in Florida's seafloor mapping in response to the coordinated gap analysis and prioritization. There is a continuing effort to seek investment from both federal agencies and the state to support this effort.[40]

[39] Email communication with Cheryl J. Hapke, Ph.D., Coordinator of the FL Coastal Mapping Program, April 13, 2020.
[40] Email communication with Cheryl J. Hapke, Ph.D., Coordinator of the FL Coastal Mapping Program, April 13, 2020.. For more information go to https://arcg.is/1Of0OT0.

Map 5
Florida Coastal Mapping High-Resolution Elevation Data Footprints[41]



Map of high-resolution elevation data footprints (light detection and ranging [lidar] and multibeam) on the Florida shelf. More than 80 percent of Florida's shelf elevation has not been mapped. The light blue line outlines the area from the shoreline to the 20-meter isobath, and the dark blue outer boundary is the edge of the continental shelf. The individual lines on the west Florida shelf are individual track lines of multibeam bathymetry. Note that the footprints shown may not represent the entirety of a given survey but only those data that fall within the Florida Coastal Mapping Program zone.

[41] Hapke, Cheryl J, Philip A. Kramer, Elizabeth Fetherston-Resch, Rene D. Baumstark, Ryan Druyar, Xan Fredericks, and Ekaterina Fitos, "Florida Coastal Mapping Program-Overview and 2018 Workshop Report - pg. 5, Open-File Report 2019-1017. Prepared in cooperation with the Florida Institute of Oceanography, Florida Fish and Wildlife Research Institute and Florida Department of Environmental Protection. Accessible at: https://pubs.usgs.gov/of/2019/1017/ofr20191017.pdf.

9. Renewable Energy

Among the marine-based sources of renewable energy, Florida has focused on the ocean's currents. Foremost among the state's efforts is the Southeast National Marine Renewable Energy Center at Florida Atlantic University in Boca Raton. The Center is working to harness the marine hydrokinetic energy of the open-ocean currents, particularly the Florida Current portion of the Gulf Stream system, as well as ocean thermal energy.

There is a broad cross-section of the ocean energy industry in Florida, ranging from engineers to laboratories, universities, and private companies, and the government agencies involved in developing this industry. One example is NextEra Energy, Inc., a Florida based company in Juno Beach with subsidiaries that operate the largest U.S. nuclear power generation fleet. As a leading clean energy company, it has more than 14,000 employees in 36 states and Canada. Their facilities have a total capacity 21 gigawatts. The subsidiaries also generate renewable energy from the wind and sun (NextEra Energy Resources, LLC, a wholesale electricity provider) and include Florida Power & Light Company, Florida's largest electric utility. It owns 85 wind facilities in the U.S. and Canada, co-owns and operates the world's largest solar power generating facility (Solar Generating Systems), plus owns generating plants powered by natural gas, nuclear fuel, and oil.[42]

10. Florida's Coastal Ecosystems

During the past decade, coastal communities, local governments, and states have begun to expand economic analyses to include ecosystem services, focusing on economic risk mitigation from disasters. These represent critical areas for future study to fully understand the value and vulnerabilities of Florida's ocean and coastal economy.[43]

The economic valuation of natural capital and ecosystem services for ocean and coastal systems is an important consideration to understand true economic costs and values. These natural capital approaches to support environmental and economic decision-making have not been fully realized in terms of actual application in economic policy and risk management decisions.[44] A recent report by the U.S. Geological Survey combined engineering, ecological, geospatial, social, and economic tools to provide a rigorous valuation of the coastal protection benefits of all U.S. coral reefs (values beyond direct tourism value).[45]

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[42] Next Era Energy Resources, Our Company, Accessed December 2019, http://www.nexteraenergyresources.com.
[43] Personal communication with Laura Geselbracht, The Nature Conservancy, who provided this review for the report.
[44] Hooper, Tara, Matthew Ashley, Tobias Borger, Olivia Langmead, Oceane Marcone, Sian Rees, Olivia Rendon, Nicola Beaumont, Martin Attrill, and Melanie Austen (eds). 2019. Application of the Natural Capital Approach to the Marine Environment to Aid Decision-making PHASE I FINAL REPORT.
[45] Storlazzi, C.D., Reguero, B.G., Cole, A.D., Lowe, E., Shope, J.B., Gibbs, A.E., Nickel, B.A., McCall, R.T., van Dongeren, A.R., and Beck, M.W., 2019, Rigorously valuing the role of U.S. coral reefs in coastal hazard risk reduction: U.S. Geological Survey Open-File Report 2019–1027, 42 p., https://doi.org/10.3133/ofr20191027.

Coral reefs in Florida provide an estimated $319 million per year in avoided losses from storm surge and flooding in 2010 dollars. (Storlazzi *et al*. (2019) Kildow *et al.* (2006) estimated an average annual value for Florida reef snorkeling and scuba diving at $454 million and $54 million, respectively. Taken together these values exceed **$1 billion/year annually in 2020 dollars**.[46] This estimate does not account for the large number of other coral reef services provided annually, such as recreational and commercial fishing benefits, which are substantial.

Table 13
Ecosystem Service Values for Coral Reefs in Florida

Ecosystem Service	Annual Value (millions)	Year Study Based	Annual Value in 2020 Dollars (millions)[1]
Avoided losses from storm surge	$319	2010	$376
Average non-market value of diving	$54	2005	$69
Average non-market value for snorkeling	$454	2005	$599
TOTAL			**$1,035**

[1]2020 dollars were calculated using the U.S. inflation rate.

A recent analysis by Geselbracht revealed that five of the state's key coastal ecosystems (coral reefs, beaches, mangrove forests, saltmarshes, and oyster reefs) conservatively provide nearly $194 billion dollars a year (in 2020 dollars) for services such as storm-surge reduction, fisheries production, nutrient reduction/cycling, water cleansing, shoreline protection and recreation. While the recreational service value of this dollar figure overlaps to some extent with the economic data provided above, many of the services provided by these ecosystems have not been valued and are not accounted for in the figure provided above. In addition to the benefits from coral reefs, a variety of ecosystems provide key services and have a large value for Florida.[47]

[46] Storlazzi, C.D., Reguero, B.G., Cole, A.D., Lowe, E., Shope, J.B., Gibbs, and others. 2019, Rigorously Valuing the Role of U.S. Coral Reefs in Coastal Hazard Risk Reduction: U.S. Geological Survey Open-File Report 2019–1027, 42 p., https://doi.org/10.3133/ofr20191027 and Kildow, J. 2006. Phase I - Florida's Ocean and Coastal Economies Report. Center for the Blue Economy, Digital Commons @ Center for the Blue Economy, available at: https://cbe.miis.edu/noep_publications.
[47] Geselbracht, L. 2020. Economic Value of Key Coastal Ecosystems of Florida Based on Published Studies. The Nature Conservancy, Florida.

Table 14
Annual Published Values for Florida Ecosystems Benefits

Ecosystem	Annual Value in Florida From Literature in 2020 dollars	Services Valued	References
Coral Reef	$1.0 billion	Storm surge reduction, on-reef tourism and non-market value of snorkeling and diving	Storlazzi et al., 2019 and Spalding et al. 2017
Beach/Dune	$55.5 billion	Beach use only	Houston, 2013
Mangrove	$49 billion	All ecosystem services	Beever, 2014
Saltmarsh	$5.5 billion	All ecosystem services	Bell, 1997 (translated to 2020 dollars)
Seagrass Meadow	$83.1 billion	Commercial and recreational fisheries, nutrient cycling	Florida Department of Environmental Protection, 2000 (from Smithsonian Marine Station at Fort Pierce website)
Oyster Reef	$173 million	Degraded oyster habitat, Commercial fisheries, Nitrogen removal, SAV enhancement, Shoreline protection, and landscape processes.	Grabowski et al., 2012
TOTAL Estimated Annual Value from Published Literature	**$194 billion**		

According to NOAA Centers for Environmental Information (2020), the U.S. has sustained 265 weather and climate disasters since 1980 where overall damages/costs reached or exceeded $1 billion (including Consumer Price Index adjustment to 2020). The total cost of these events exceeds $1.775 trillion.[48]

There is a growing statewide interest and need to quantify economic value and risks from shocks (acute events) and stressors (underlying vulnerabilities) that impact natural and human-built assets. Both shocks and stressors represent significant and persistent threats to Florida's coastal and ocean economy. Both knowledge areas require additional economic data acquisition and analysis.

[48] NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2020). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/stkw-7w73.

Florida's ocean and coastal economy is a cornerstone for the state's economic well-being and an important component of the U.S. ocean and coastal economy. According to NOAA (2019), Florida was the largest employer in the nation's marine construction sector and Miami-Dade County was the largest contributor to the state's ocean economy. Overall, Florida's ocean economy ranked second in employment and third in gross domestic product among all coastal states.

Florida's role in the blue economy is strong and has great potential for growth and diversification. Economic growth opportunity examples include water quality remediation (technology research, development, commercialization, and application); aquaculture to expand food production and living resources restoration (fish and shellfish stock enhancement, seagrass restoration, coral restoration, and nutrient bioremediation technologies); harmful algal bloom monitoring, modeling, and mitigation (development of new sensors, predictive models, consensus/ensemble models, and big data analytics); expansion of Florida's marine industry and manufacturing sector; and connections between space exploration and ocean support services (Space X is operating a fleet of ocean-going vessels at Port Canaveral that includes ships for crew and fairing recovery and autonomous drone ship barges to land boosters at sea). With this strong economic foundation and valuable natural and human-built assets, Florida is uniquely positioned to advance leadership and growth in Florida's blue economy and aspire to be a global leader in ocean and coastal innovation and technology.[49]

11. The Blue Economy

The blue economy holds great promise for Florida's economy. It is broadly described as encompassing "economic activities that create sustainable wealth from the world's oceans and coasts." These activities focus attention on using ocean and coastal resources to further economic development while enhancing "healthy, resilient oceans and well-managed coastlines."[50] The blue economy's goals include "the sustainable use of ocean resources for economic growth, improved livelihood and jobs, and ocean ecosystem health." It covers multiple industries, ranging from renewable energy to fisheries, maritime transport, tourism, climate change, and waste management. In the United States, the blue economy would also include businesses and industries that rely on the ocean and Great Lakes natural resources.[51]

According to the National Oceanic and Atmospheric Administration, the blue economy contributes about $304 billion to the nation's GDP and employs 3.3 million people overall. In early 2019, the U.S. announced that there were 23 new commitments totaling $1.21 billion to spend in support of the blue economy. This funding is targeted to support sustainable fisheries,

[49] National Oceanic and Atmospheric Administration Office for Coastal Management, 2019. Report on the U.S. Ocean and Great Lakes Economy: Regional and State Profiles, Charleston, SC.
[50] Middlebury Institute of International Studies, Center for the Blue Economy, https://www.middlebury.edu/institute/academics/centers-initiatives/center-blue-economy.
[51] The World Bank, "What is the Blue Economy," 2017, https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy.

marine science, and the prevention of marine debris. This further adds to the growing list of commitments the U.S. has made since 2014 to the blue economy, totaling 113 commitments and over $4.3 billion.[52]

The blue economy is a growth opportunity for both the state and national economies. For example, California is one of the leaders promoting the blue economy, which consists of 12% of the GDP of the U.S. blue economy although California itself only has 2.1% of its economy in the blue sector. California is also home to the Center for the Blue Economy, an organization that promotes the blue economy through leading research, analysis, and education in creating the sustainable ocean and coastal economy. They are currently finalizing their Ocean Climate Action Plan to educate and incorporate climate legislation at a national level.[53]

Meanwhile, Florida is building its own blue economy. Florida's coastal industries are key to building a sustainable foundation for the blue economy. The Marine Research Hub of South Florida, Inc. is a 501(c)(3) non-profit organization formed to raise the visibility, reputation, and prestige of South Florida's oceanographic research institutions and encourage the transfer of technology towards the commercialization and monetization of marine research. It is both a non-profit Florida corporation with a Board of Directors and a consortium. This was created through a Memorandum of Understanding between eight founding members , including the Marine Industries Association of South Florida and the region's three economic development organizations and local universities in south Florida. The objective of the Marine Research Hub is to foster collaboration among research, education, business, and economic development organizations and establish the region as a global leader in oceanographic research, positively impacting the health of the oceans and bringing substantial benefits to the global population.[54]

Along Florida's Gulf Coast, the Gulf Coast Community Foundation has begun an initiative for a Gulf Coast Blue Economy addressing ways to diversify the regional economy away from dependence on services and towards an innovation economy. They are focusing on the following business sectors: aquaculture, seafood, biomedicine, biotechnology, marine engineering, water quality, coastal ecology, sustainable foods, agritourism, and recreation. As part of this initiative, they have identified opportunities for expanding the blue economy in those industries, all of which have significant ties to the ocean. They include not only core marine industries in their initiative, but also non-core industries that also may have ties to the ocean. These include scientific research and development, medical manufacturing, biotechnology, advanced manufacturing, water supply systems, environmental and engineering services, sports and recreation, conservation and ecology, and food and crop manufacturing and distribution, all of which present opportunities to expand the regional economy.[55]

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[52] Sea Ahead, "Exploring How NOAA's Draft Bluetech Strategies Impact the Blue Economy," December 2019, https://sea-ahead.com/news/2019/12/5/exploring-how-noaas-draft-bluetech-strategies-impact-the-blue-economy.

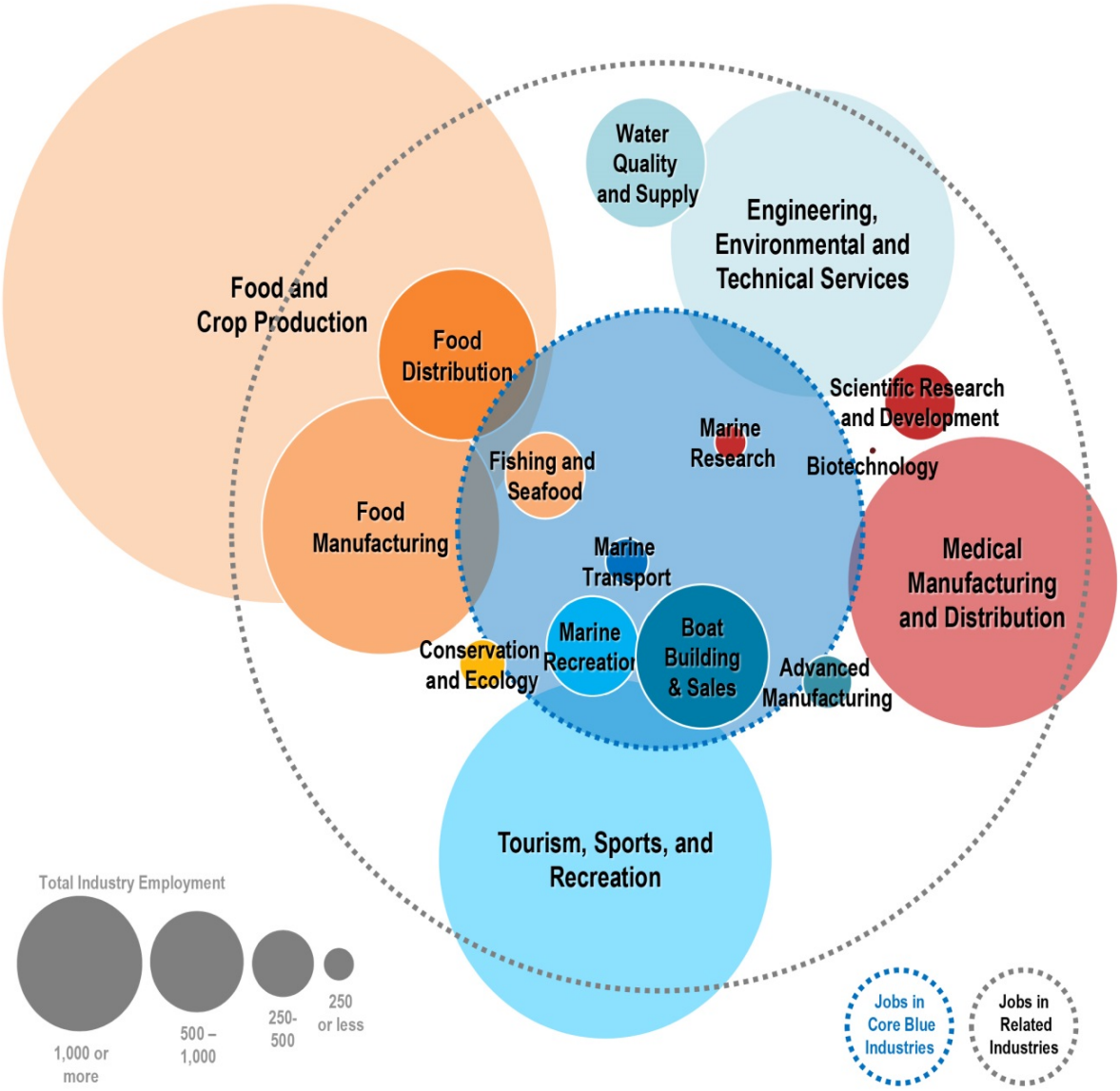
[53] Middlebury Institute of International Studies, Center for the Blue Economy, https://www.middlebury.edu/institute/academics/centers-initiatives/center-blue-economy.

[54] Personal Communication with Kelly Skidmore, Marine Research Hub of South Florida, March 2020.

[55] Gulf Coast Community Foundation, "Developing the Blue Economy of Florida's Gulf Coast," May, 2015, https://www.issuelab.org/resources/27234/27234.pdf?download=true&_ga=2.129462597.81560387.1573689110-864734859.1573689110.

As described in this brief overview, it is clear that the blue economy can lead the way for expanding both the nation's and the state's economy. Most importantly, it has potential to help diversify the state's economy and keep Florida moving forward in the future.

Figure 7
Developing the Blue Economy



Source: U.S. Census Bureau, Quarterly Census of Employment and Wages and Non-Employers Statistics, 2014.

Source: Gulf Coast Community Foundation, "Developing the Blue Economy of Florida's Gulf Coast," May, 2015, https://www.issuelab.org/resources/27234/27234.pdf?download=true&_ga=2.129462597.81560387.1573689110-864734859.1573689110.