Developing the BLUE ECONOMY of Florida's Gulf Coast

A strategic roadmap for innovation and growth in the marine sciences cluster

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big
bright ideas on the gulf coast

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Together with our donors, Gulf Coast Community Foundation transforms our region through bold and proactive philanthropy. Gulf Coast is a public charity that was created in 1995 through the sale of the Venice Hospital. Since then, we have become the philanthropic home of more than 600 families who have established charitable funds here, and we have invested over $193 million in grants in the areas of health and human services, civic and economic development, education, arts and culture, and the environment. Learn more at GulfCoastCF.org.

Bright Ideas on the Gulf Coast

As part of its strategy to move the Gulf Coast region of Florida toward an innovation-based economy, Gulf Coast Community Foundation launched an initiative called BIG—Bright Ideas on the Gulf Coast. BIG is an entrepreneurial support network that matches growing businesses, start-ups, and "idea generators" with the resources and expertise they need to get their business ideas to the next step. This network leverages existing resources to nurture innovative ideas and new business opportunities in the region.

BIG promotes four targeted business sectors in which the region can compete nationally: digital arts, health innovation, sports performance, and marine sciences. The marine science BIG network includes community and regional leaders and experts in marine science, seafood, aquaculture, and sustainable foods. The group quickly coalesced, established new partnerships, and began generating and implementing ideas to advance the region's Blue Economy.

Acknowledgments

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We encourage you join these committed individuals in helping to build the region's Blue Economy.

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About This Study

Marine sciences represent the next wave of innovation and invention. Vast areas of the world's oceans remain unexplored, and many marine ecosystems are being studied for the first time. New species of marine life are continuously being discovered and being developed into new medicines from the sea. Clean water is fast becoming one of the world's most limited resources, and demand for water technologies is at an all-time high. Growing global demand for seafood and slowing harvests from wild fisheries are fueling demand for farmed fish and shellfish.

Developing solutions to these emerging global issues represent billion-dollar market opportunities for researchers and businesses throughout the United States. But the regions best positioned for future growth in these markets will be those with a vibrant marine science and technology cluster – or Blue Economy. The Blue Economy is the sum of all economic, educational, and environmental activity connected to ocean and coastal resources. Regional Blue Economy industry and innovation clusters have developed in San Diego and Monterey, Calif.; Southern New England; and Tampa-St. Petersburg, Fla. These clusters grow around marine-research institutions, attract public and private funding, lure businesses, spawn jobs, and help diversify regional economies.

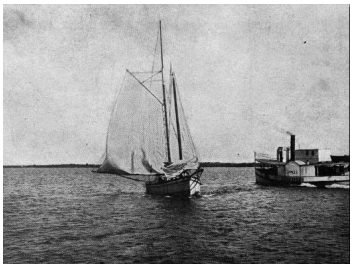
Here along Florida's Gulf Coast, strong ties to regional maritime resources have created a small but emerging Blue Economy cluster. Florida's Gulf Coast region includes Manatee, Sarasota, and Charlotte counties. The region lies at the heart of three contiguous national estuaries and is home to Florida's oldest operating commercial fishing hub. Mote Marine Laboratory is among the world's premier marine-research organizations, and a number of organizations work to conserve, leverage, and learn from the diverse coastal ecosystems in the region's backyard. Currently, more than 800 institutions and businesses are active in aquaculture, fisheries, biomedicine, biotechnology, marine engineering, water quality, coastal ecology, sustainable foods, agritourism, and marine recreation. Thousands of jobs and tens of millions of dollars in economic activity are tied to the resources and habitat of the region's waters.

Florida Gulf Coast's Blue Economy is already building momentum and positioning for future growth in emerging global market areas. Cutting-edge marine research in the region is unveiling new water technologies, biomedical advances, and increasing our understanding of marine ecosystems. Regional businesses are working to transform research into commercial opportunities to reduce Florida's significant seafood trade deficit. Business leaders are developing networks of regional marine entrepreneurs, encouraging innovation in the marine sciences, and crafting a vision for the region's future Blue Economy. Achieving this vision will diversify the regional economy, create high-quality jobs, address regional challenges such as hunger, conservation, and STEM education, and continue to ensure that critical marine habitat is conserved for future generations.

Recognizing the immediate and long-term potential of the marine sciences to transform the regional economy, Gulf Coast Community Foundation commissioned this cluster study and innovation strategy for developing the region's Blue Economy. This report identifies the size and scope of the region's marine cluster, outlines potential growth opportunities and challenges, and provides a blueprint for advancing economic development in this cluster. The foundation is committed to supporting regional action, spurring implementation at the state and regional level, and informing leaders about the Gulf Coast's significant, but largely hidden, Blue Economy.

The Gulf Coast's Marine Legacy

The history of Florida's Gulf Coast has been shaped by the sea. Ceremonial shell middens in Osprey may be among the oldest in the southeastern U.S. and indicate that the region has been home to people for 5,000 years. Abundant coastal resources and access to the sea first attracted settlers to the region in the 19th century.



1880-1910 – At the turn of the 20th century, Tampa was home to the largest fish house in the U.S. The steamship *Mistletoe* brought tourists from Tampa to Longboat Key and returned with fish caught in Sarasota Bay. In 1898, 3,600 tons of fresh fish, 20 tons of salted fish, 800 barrels of oysters, and two tons of fish roe were shipped from Sarasota.[1]

1920-1930 – Fishing continued to thrive through Sarasota's boom and bust times. In 1935, the commercial fishing industry in Sarasota employed 165 people and landed a million pounds of fish.[2] Hundreds of fishing piers dotted the coast though many, including the one pictured at left, in Sarasota at Ringling Blvd., were destroyed in the 1921 hurricane and never reconstructed.

1940-1950 – Commercial and day fishermen netted from beaches and boats throughout the Gulf Coast. During WWII, Lemon Bay in Englewood was the largest producer of clams in the U.S. The region's sport fish and famous seasonal mullet runs continued to attract visitors from afar. Rapid development began to reduce regional fishing opportunities and harm marine ecosystems.

1960-1980 – Marine sciences began to take hold in the region. In 1965, Sarasota R&D, Inc. developed fish finders and experimented with underwater radio signals. Mote Marine Laboratory moved to City Island in 1978. The Mote aquarium opened in 1980 and welcomed 250,000 visitors in its first year. In 1982, over 275 commercial fishers landed over $4.4 million worth of seafood in the region.[3]

1990-today – Tampa Bay, Sarasota Bay, and Charlotte Harbor were designated estuaries of national significance in 1990. The emergence of sustainable aquaculture and fishing practices helped the region's seafood industry survive and grow. Biotechnology and marine engineering firms continued to develop in the region. Mote's professional research staff grew to 95 – up from a dozen in 1978.[4]

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The Gulf Coast's Blue Economy

Oceans have historically provided food and resources, attracted residents and visitors, moved global commerce, drawn explorers, and inspired innovators. Today, the world's largest and most dynamic regions are all located along coastlines and are the primary generators of economic activity and population growth.

The concept of the *Coastal Economy* quantifies the value of economic activity in coastal regions. In contrast, the *Blue Economy* is a focused definition of business and jobs in industries with direct ties and connections to the ocean.

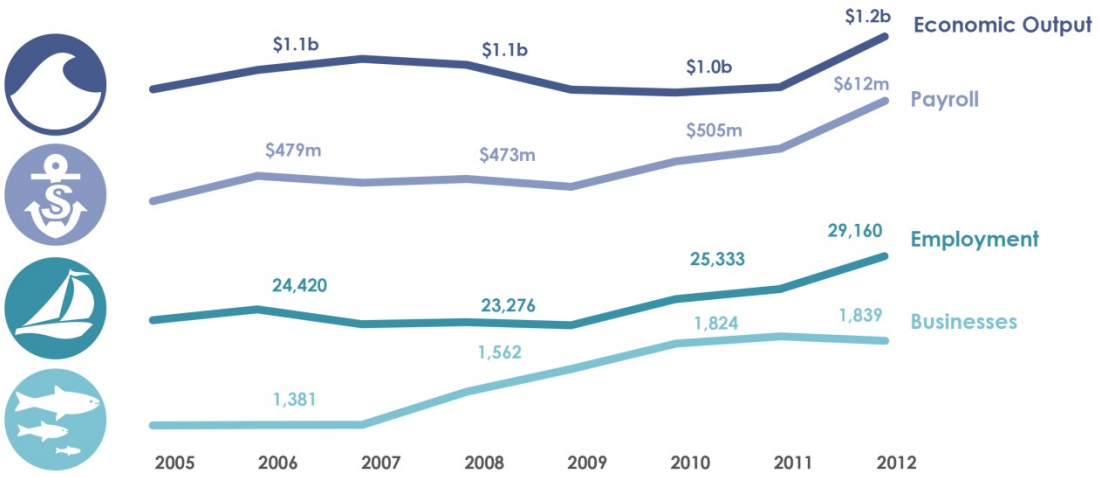
Counting Coastal Economic Activity

In 2011, 45 percent of all U.S. economic activity (gross domestic product) was generated in coastal economies.[5] In Florida, coastal counties contribute nearly 80 percent of the state's total economic output. Florida's ocean resources, including beaches, coral reefs, mangroves, bays, and estuaries, support billions of dollars in tourism, fishing, recreation, and research activity. In 2010, economic activity tied to Florida's oceans was estimated to account for $17.5 billion in gross state product and directly support over 228,000 jobs.[6]

The National Oceanic and Atmospheric Administration (NOAA) provides the best available estimates of the impact of coastal-related economic activity in the U.S. These estimates are imperfect, but do provide comparable data for regions across the country. According to NOAA's estimates, Florida's Gulf Coast region (including Manatee, Sarasota, and Charlotte counties) ranks as the 17th largest regional coastal economy in the U.S.

Coastal-intensive regional economies are those with strong employment and economic connections to the ocean and coasts. In 2012, an estimated 29,160 jobs, 1,839 businesses, $612 million in wages, and $1.2 billion in gross regional product were tied to the coastal economy of Florida's Gulf Coast region. On average, coastal economic activity generates at least 10 percent of overall gross regional product.[7]

Florida Gulf Coast's Regional Coastal Economy



Source: National Oceanic and Atmospheric Administration, Economics: National Ocean Watch 2014

The *Coastal Economy* is a broad definition of economic activity in coastal areas. The *Blue Economy* is a focused definition of a cluster of industries dependent on and connected to the ocean.

Measuring the Blue Economy

Along Florida's Gulf Coast – including Manatee, Sarasota, and Charlotte counties – the Blue Economy includes institutions and businesses active in aquaculture, seafood, biomedicine, biotechnology, marine engineering, water quality, coastal ecology, sustainable foods, agritourism, and recreation.

There is no nationally recognized definition of the Blue Economy, and current industry and employment data do not adequately capture ocean-related economic activity. To estimate the scope and size of the Blue Economy in the Gulf Coast region requires combining several different data sources to gain a clear picture. This study adapts methodology developed by The Maritime Alliance (TMA) in San Diego that looks at businesses and employment in core marine-dependent industries as well as other related industries.[8] TMA's assessment of the *Blue Economy* differs from NOAA's estimates of the *Coastal Economy* by excluding tourism employment, but including marine manufacturing and research and technology jobs.

The Blue Economy of Florida's Gulf Coast includes 788 businesses and an estimated 2,395 workers in core blue industry sectors. Wages and salaries paid to these workers totaled nearly $55 million.[9] Each of these jobs supports additional jobs directly and indirectly throughout the region – magnifying the impact of the marine industries.

Blue Economy Industry Segment	2014 Quarterly Businesses	2014 Quarterly Employment	2014 Annual Payroll ($ m)
Fishing and Seafood	427	493	$3.6
Boat Building and Sales	158	844	$29.3
Recreational Transport	115	587	$14.1
Passenger and Freight Transport	87	276	$7.9
Marine Research	1	195	n/a
Total Core Marine Industries	788	2,395	$54.9
Total Marine-Related Industries	1,954	21,552	$757.2

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

In addition to core marine industries, the regional Blue Economy overlaps with related industries that may also have significant ties to the ocean. These industries 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. There are 1,954 businesses and 21,550 workers in these related industries, including an undetermined number of jobs linked to the Blue Economy.

Direct marine employment in these related industries cannot be identified with precision and are not counted toward the Blue Economy. However, it is important to recognize that there are businesses in these industries engaged in ocean-related activities. For example, marine-related research may be conducted by firms in scientific research and development, biotechnology, or medical and pharmaceutical industries. In other cases, businesses in advanced manufacturing, water supply systems, and environmental and engineering service industries produce multiuse technologies or products in marine science and technology fields.

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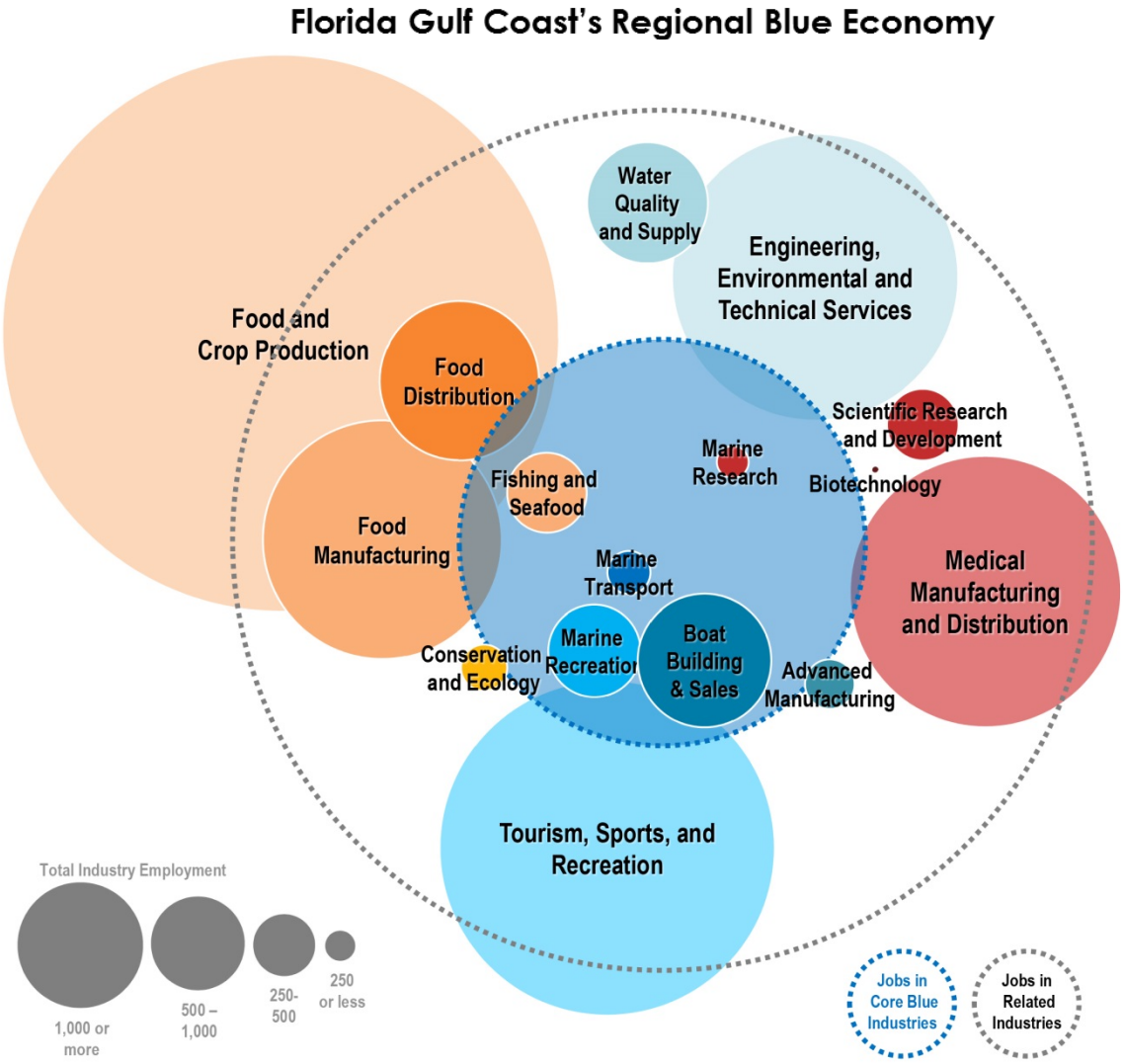
The graphic below highlights the total employment size and relationships between core and related marine industries in 2014.



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

Blue Economy Cluster Segments

Aquaculture – In 2012, total U.S. aquaculture production was estimated at $1.6 billion, while Florida production reached $95 million. Currently, only a small fraction of the state total is produced in the Gulf Coast region. But regional aquaculture producers are expanding capacity to meet rising domestic and international demand for ornamental fish, food fish, and shellfish. There are at least two large hatcheries operating in the region, and more firms involved in water technology and engineering with applications to aquaculture.

Regional businesses include:

- *Bay Shellfish Co.* in Terra Ceia, the largest producer of seed clams in the U.S.
- *Aquasafra, Inc.* in Bradenton, one of the largest tilapia hatcheries in the U.S.

Fisheries and seafood – The village of Cortez in Manatee County is one of the oldest and last working waterfronts in Florida. While commercial fishing has declined over the decades, community coalitions are dedicated to preserving the region's fishing heritage. Today, there are at least 15 companies active in fishing, seafood processing, wholesale, and distribution throughout the Gulf Coast. A significant portion of imported seafood is caught in American waters, but exported overseas for processing and then reimported as frozen and processed products. In the Gulf Coast region, a small network of commercial fishing, seafood distributors, and restaurants is working to change this pattern and expand Florida-caught and -produced seafood.

Regional businesses include:

- *Star Fish Company* in Cortez, a commercial fishing, wholesale, and retail seafood business in operation since the 1920s.
- *Healthy Earth Cortez (formerly Anna Maria Fish Company)* in Cortez, the first U.S. producer of bottarga. This sun-cured roe product of grey-striped mullet is highly valued in major markets and was previously imported.

Sustainable foods – Sustainable, local, and organic foods are the fastest-growing segment of U.S. agriculture and account for over $20 billion in retail sales. Florida organic farms produced nearly $83 million in organic products in 2012. There are at least 43 organic farms and producers and 20 farmers markets or natural-foods cooperatives on the Gulf Coast. However, with continued urban development, the agricultural heritage of the region is at risk. In 2012, there were 30,000 fewer acres in the region in cultivation than just five years earlier. This trend could turn around as more market opportunities for local food supplies are created. Regional restaurateurs, cooperatives, businesses, and governments are teaming up to provide locally sourced foods to regional schools, stores, and restaurants.

Regional businesses include:

- *Global Organics* in Sarasota, one of the largest distributors of organic fruits, vegetables, juices, milk, eggs, nuts, and coffee in the Southeast.
- *Gamble Creek Farm* outside of Bradenton, which has roots as a community-supported farm and education center. The farm is now being revived to supply organic produce to local restaurants, produce compost from fish byproducts, and serve as a processing site for local seafood.

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Marine bioscience – The Gulf Coast is home to more than a dozen pharmaceutical manufacturers and over 50 companies engaged in scientific research and development. Many more regional firms are active in healthcare and medical equipment manufacturing. Marine medicine is a growing field, though largely nascent in the region today. In 2012, seven medicines derived primarily from marine ingredients were approved for use by the Food and Drug Administration, but over 1,400 are in clinical or development phases.[10] With its demographics, research institutions, quality medical care, and growing medical tourism market, businesses in the Gulf Coast region may be positioned for growth in biomedicines, particularly as research from regional marine-research institutions is commercialized and leveraged by the private sector.

Regional businesses include:

- *ASO Corporation* headquartered in Sarasota, the world's second-largest producer of wound-care products.
- *Cambryn Biologics* in Sarasota, a biotherapeutic manufacturing and commercialization company of biologic products for advanced wound healing.

Marine biotechnology – Marine science and technology research examines the enormous biodiversity of ocean ecosystems to develop components and products for everyday use. There are at least eight biotechnology firms on the Gulf Coast. Nationally, a growing number of businesses are producing goods derived from marine components or ingredients. Marine biomaterials are currently used in pharmaceuticals, cosmetics, food and consumer products, and industrial applications. As new research leads to marine technology development and commercialization, business opportunities in the region could grow.

Regional businesses include:

- *Osprey Biotechnics* in Osprey, which develops microbial products for environmental, industrial, and agricultural applications.
- *Biodyne* in Sarasota, which produces microbial products for bioremediations, water treatment, algae management, and other applications.

Marine engineering and technology – Marine engineering encompasses the design, construction, and operation of marine equipment and facilities – from boats to docks – and the technology and services to support them. Florida led the nation in recreational boat sales in 2012 with spending of over $1.9 billion. Boatbuilding is unique among manufacturing industries, as 95 percent of boats sold are made in the U.S.[11] There are over 70 boatbuilders and dealers in the region, ranging from established businesses such as Chris-Craft, Inc. to smaller family-operated and custom builders. The Gulf Coast has a long history of boatbuilding and is also home to a number of businesses that manufacture and provide marine materials, navigation equipment, electronics, marine supplies, and construction and engineering services.

Regional businesses include:

- *Ram Marine* in Nokomis, which designs, permits, and constructs residential, commercial, and municipal waterfront structures.
- *Dukane Seacom* in Sarasota, the world's largest designer and producer of underwater acoustic beacons for the U.S. military and commercial marine and aviation services.

Water quality – There are 71 companies engaged in water supply construction and engineering and another 500 environmental and technical consulting and geotechnical and testing services operating on the Gulf Coast. Not all of these firms are directly engaged in marine activity, but many more could be. Florida exports over $6 billion each year in professional and technical services and exports over $1.4 billion in water management machinery and equipment.[12] Regional firms could export their expertise to global markets as demand for water quality monitoring, bioremediation, and water supply systems expands rapidly in emerging international markets.

Regional businesses include:

- *Environmental Biotech* in Bradenton, a technology and service provider for solutions to drainage, waste water, and environmental water issues.
- *Cortec Biotechnology* in Sarasota, which produces marine corrosion control, bioremediation, and cleaning products.

Coastal ecology – Florida has the second-largest coastal shoreline of any state, with over 8,400 miles of coast and tidal areas. These coastal ecosystems and wetlands are critical to tourism, water quality, biodiversity, and infrastructure resilience. In the Gulf Coast region, there are at least 17 environmental, conservation, and wildlife organizations, 33 environmental consulting firms, and a small number of dedicated coastal engineering businesses. Commercial opportunities in this segment will continue to emerge as greater resources are dedicated to protecting and restoring the world's coastal ecosystems.

Regional businesses include:

- *Coastal Tech* in Sarasota, which specializes in coastal engineering, coastal zone management, coastal geology, and environmental permitting services.
- *Sarasota Bay Watch* in Sarasota, a nonprofit, community-based organization dedicated to preserving and restoring Sarasota Bay's ecosystem. The organization works with partners across the region, including national estuary programs in Sarasota, Tampa, and Charlotte.

Agritourism and recreation – In 2012, 7.5 million people visited Sarasota and Manatee counties, contributing $1.5 billion in direct spending to the regional economy. The Sarasota Bay Economic Valuation Study, conducted by the Sarasota Bay Estuary Program, estimated the value of all ocean-related recreational visitation at nearly $500 million per year.[13] That same study found that wildlife viewing, fishing, and kayaking are among the most popular recreational activities for visitors.

Marinas, fishing charters, kayak rentals, ecotours, and other water-related tourism activities directly support over 100 businesses along the Gulf Coast. Ecotourism and agricultural-based tourism (or agritourism) combine two of Florida's largest industries and have direct connections to the growing sports and recreation industry in the region. Recent momentum in this arena is blending the tourism, recreation, agriculture, and natural resource assets of the Gulf Coast to create new business opportunities.

Regional businesses include:

- *Gulf Coast AgVentures,* a newly formed group of businesses and organizations dedicated to opening agriculturally oriented businesses to the public for tours and school field trips.
- *HovieSUP* in Sarasota, a national manufacturer of stand-up paddle boards, and *Zap Skimboards* in Venice, the world's largest maker of skimboards.

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Blue Economy Opportunities

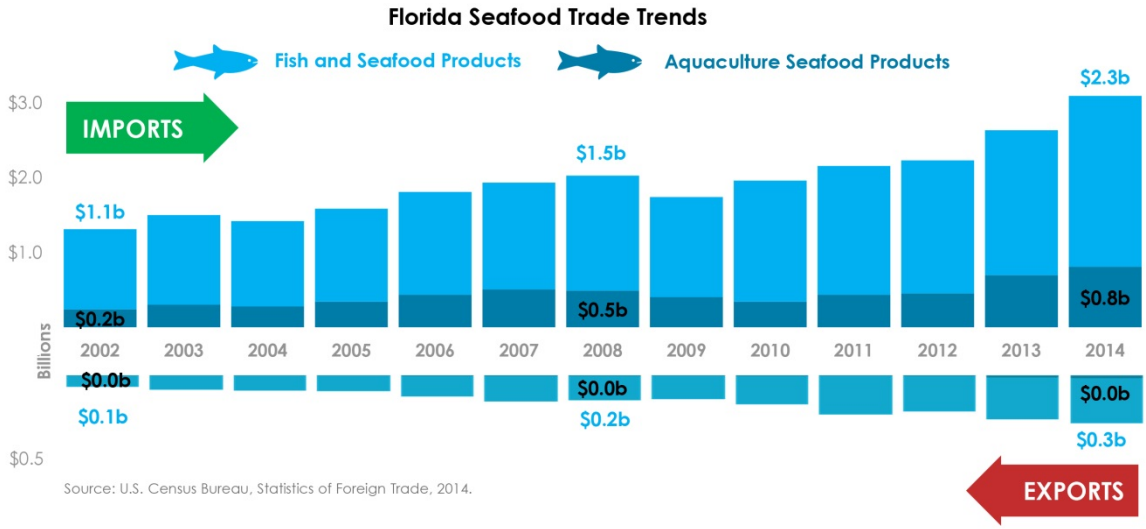
Significant global trends are reshaping our future and creating billion-dollar market opportunities in entirely new areas of science and technology. Businesses and research institutions along Florida's Gulf Coast are poised to address these emerging challenges and meet the growing demand for marine services and technology.

Global population and food needs are growing

Worldwide demand for food is increasing along with rapidly growing income and populations in emerging economies such as Brazil, India, and China. Seafood is an important food source in these nations and around the world, but most wild fisheries are overfished and stocks are depleted. Aquaculture is expected to become the future solution to global food security. The World Bank estimates that by 2030 aquaculture will account for two-thirds of all global seafood production.[14]

As a result, the aquaculture industry is growing quickly and currently contributes 48 percent of worldwide seafood supply, up from just nine percent in 1980.[15] Aquaculture includes offshore farms, hatcheries for shellfish and finfish stock, and onshore tank facilities. With recent advances in technology, the environmental sustainability and productivity of aquaculture practices has improved. The U.S. is a relatively small aquaculture producer, but a major supplier of technology and capital – exporting advanced water technologies, scientific research, feed, equipment, and investment to producers around the world. By 2030, the global market for aquaculture water technology alone is expected to double to over $13 billion.[16]

The U.S. is the second-largest consumer market for seafood in the world, but domestic production is negligible and the nation relies on imports to satisfy over 90 percent of seafood demand. Over 2.5 million metric tons of seafood worth $18 billion is imported annually.[17] Many of these products are first caught in U.S. waters but processed overseas before being reimported for consumption.



Florida imported over $3.0 billion in seafood in 2014 and imports more farmed fish products than any other state. Seafood imports into Florida have more than doubled in the past 10 years and are expected to continue to rise. In contrast, Florida produces little seafood for export or domestic consumption. As a result the state's total seafood trade deficit amounts to $2.7 billion a year.

Florida can begin to produce more seafood from aquaculture and wild fisheries to satisfy the billions of dollars in domestic and export markets. Production costs in Asian economies are rising and becoming cost-competitive with the U.S. again. As a result, some major producers are near-shoring or relocating production domestically. Along with greater recognition of the transportation footprint and safety of imported foods, there is latent demand for locally raised and processed seafood products. Sustainable seafood from farmed and wild fisheries can offset the Gulf Coast region's trade imbalance, manage and conserve ocean resources, and enable the region to grow more food locally and responsibly.

Opportunities for the Gulf Coast

Aquaculture is the most immediate regional market opportunity in the marine sciences today. Investment in the technology, science, and facilities to produce value-added seafood products is expected to increase in the near term.

The Gulf Coast is uniquely positioned to attract investment with experience in aquaculture, significant consumer demand, available agricultural property in inland areas, coastal resources, and fisheries management and technology research. The region is already home to several producers and hatcheries. Mote Marine Laboratory recently licensed cutting-edge water recirculation technology and caviar production facilities to a group of regional investors. Continuing to attract investment, grow existing businesses, and create new ventures will require a regional growth and marketing strategy for aquaculture and development of workforce pipelines.

Concerns over food sourcing and sustainability are rising

Compared with other developed nations, the U.S. consumes relatively little seafood, and trends in consumption have remained relatively stable since the 1960s. Americans consume 13 times more beef, pork, and chicken annually than seafood. Unlike beef and pork, seafood does not have a unified national advertising campaign, and unlike chicken, most seafood is not produced and processed domestically.

However, Americans are becoming more conscious of the health benefits and environmental impacts of the food we consume. Future demographic shifts and the growing consumer power of the millennial generation may also prompt large-scale changes in the food industry. Studies show that millennials value specialty, organic, and locally produced food and are willing to pay for it. Younger generations are also more likely to dine out regularly and do so at different establishments than generations before. The rising market share of Chipotle restaurants, which offer sustainable and locally sourced ingredients, is one example of this trend. The health benefits of seafood are also well documented. Fish provide high-value protein and essential micronutrients. Fears over mercury contamination and environmental concerns over dolphin-safe tuna are fading into the nation's cultural memory.

Seafood consumption may benefit from these trends. With recent media attention and public concern over the security and sustainability of food products imported from Asia and a rising cultural awareness of the benefits of eating healthily and locally, the domestic seafood industry may be positioned for growth. The Gulf Coast was once home to hundreds of commercial fisheries, processors, distributors, and seafood markets, and it could be again. Growing sustainable regional food ecosystems on the Gulf Coast will also provide local seafood to schools, restaurants, and markets while investing funds back into the region to support jobs and feed families.

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Opportunities for the Gulf Coast

Two-thirds of all seafood is consumed outside the home. The key to growing regional seafood consumption lies with retail restaurants and public education campaigns. The Monterey Bay Aquarium produced one of the first seafood guides in the late 1990s, which helped propel that institution as an internationally recognized leader in sustainable seafood. Other public education campaigns in Maine, Washington, and San Diego have helped generate interest and market demand for local seafood. Mote Marine Laboratory can partner with the Florida Department of Agriculture, local governments, and regional organizations to launch similar efforts for the Gulf Coast and to position the organization as a leader in sustainability and fisheries certification for the entire southeastern U.S.

Initiatives to connect schools with local food are also expanding in Florida. Sarasota County Schools – with a $7.2-million food budget – has set a goal to source at least 50 percent of school foods from the region. Many produce and dairy products for schools are already sourced locally, but there is interest in including seafood. Sarasota and Manatee county governments and regional community organizations are also supporting efforts to develop sustainable regional food systems. Expanding these existing regional efforts to include locally produced seafood may have a real impact and support start-up producers and promote fledgling seafood markets in the region.

Oceans represent the next wave of scientific discovery

Oceans are the most biodiverse and unique ecosystems on earth and home to 80 percent of all life on the planet. The oldest, largest, and smallest organisms on earth live undersea, and there are potentially tens of millions of species yet to be identified. Compared with life on land, we know relatively little about marine life and the genetic materials and compounds it may hold.

Marine biomedicine is a rapidly emerging field encompassing bioprospecting (the exploration of new genetic materials from marine life) and pharmaceuticals discovery, biotechnology, molecular genetics, bioinformatics, and other areas of study. Half a dozen drugs with marine bioactive components are currently approved, and many more new medicines are in research and development phases. Marine life shows significant promise in developing new medicines from the sea. For example, sponges generate compounds used in HIV drugs, corals are included in anti-wrinkle creams and surgical implants, microalgae are used as nutritional supplements, skates and sharks are under study for wound-healing and infection-fighting properties, and sea snail venom is being used to develop pain relievers.

Marine bio-compounds are currently used to make everyday products such as shampoo, toothpaste, ice cream, and many other foods and cosmetics. Algae are being cultivated to produce biodiesel as a large-scale alternative to carbon-based fuels. Solar energy cells have been created from the chemicals found in the shells of shrimp. Marine micro-organisms are used in bioremediation systems to remove pollutants from water and soil. New biomaterials derived from mussels are being used to replace traditional paint and chemical coatings on boats. The discovery and application of marine biotechnology is a relatively new market area but one that is expanding quickly.

Marine medicine and biotechnology fields are just emerging but represent significant long-term opportunities for scientific advances. However, with declining federal funds for marine research, the U.S. risks losing ground to other nations. Public-private partnerships will fund the majority of future research and development in the marine sciences and marine biotechnology.

Opportunities for the Gulf Coast

Florida is emerging as a national leader in the biosciences and medicine. Networks such as BioFlorida are bringing together research centers, universities, investment firms, and development companies to produce innovative new products. The Gulf Coast region is home to a small cluster of biotechnology firms, a growing number of medical and pharmaceutical manufacturers, and two leading research centers in Mote Marine Laboratory and the Roskamp Institute. The region can leverage these existing assets and commercialize research in marine medicine and biotechnology fields.

Mote Marine Laboratory is a national leader in research into the disease resistance and wound-healing capabilities of sharks, skates, and stingrays. Real-world applications of this research include treating battlefield wounds and fighting the growing number of microbes around the world. However, private investment and venture philanthropy is needed to provide gap funding to advance these research programs to the next stage. Mote is exploring funding models and research partners to better leverage its existing intellectual property and patented technologies. As new partnerships and research advances lead to technology commercialization, opportunities for marine medicine and biotech firms on the Gulf Coast could grow.

Oceans are the untapped resource of the future

Earth's oceans represent one of the last frontiers of discovery, as 95 percent of the world's oceans remain unexplored. More humans have walked on the moon than have dived to the deepest depths of the oceans. These waters hold the world's largest oil and gas reserves, the greatest concentration of oxygen sinks, the most substantial source of stored energy, the most significant biodiversity, and vast stores of precious metals and minerals. Deep-sea exploration is a relatively new field of science and technology, but one that is receiving increased attention and funding.

Cell phones contain over a dozen precious metals and rare minerals. Growing global demand for consumer electronics and next-generation advances in transportation and communications electronics will continue to drive growth in global metals markets. Deep-sea mining of the rich mineral deposits contained in underwater vents and nodules is only just starting, but holds long-term promise. The European Commission estimates that by 2030, 10 percent of the world's mineral supply could come from marine mining, with a value of over $15 billion.[18]

Oceans also hold tremendous energy potential in the forms of thermal and tidal generation, algae-based biofuel, and as locations for future solar and wind generation installations. The U.S. Bureau of Ocean Energy Management estimates that harnessing just 1/1000 of the energy available from Gulf Stream ocean currents would supply one-third of Florida's electrical needs.[19] Research into these technologies has been ongoing for decades, but the market feasibility and commercialization of marine energy technologies is only now accelerating. A recent U.K. study estimated the global market value of marine energy to reach $70 billion by 2050.[20]

Research and development of desalinization technologies, wave power generation, and algae-based biofuels is happening all along the west coast of Florida. Florida is also a leader in robotics, simulation, and microelectronics manufacturing – technologies that are essential to deep-sea exploration. Odyssey Marine Exploration in Tampa Bay is best known for locating sunken archeological treasures, but the company is now using deep-sea technology to locate underwater mineral deposits. Businesses and researchers on the Gulf Coast can collaborate with other regions in Florida to develop the region's capacity as a testing and proving ground for deep-sea technologies and research center for future marine exploration. The Gulf Coast region can build on existing strengths in STEM education and marine sciences to help train the future deep-sea exploration workforce.

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Opportunities for the Gulf Coast

The waters of the Gulf of Mexico do not contain deep-sea mineral deposits; Texas firms already provide services to the undersea oil and gas industry; and California is a more suitable location for wave and tidal power generation. However, the Gulf Coast of Mexico provides an ideal test environment for many aspects of marine energy research, remote sensing, ocean observation, deep-sea exploration, and technology development and deployment.

Florida's marine research presence and active marine technology firms coupled with the entrepreneurial and venture capital assets of the Gulf Coast region could establish the region as the innovation and commercialization hub of the broader Tampa-St. Petersburg marine-science cluster. Other national Blue Economy clusters such as San Diego are making resources available for investors and start-ups and establishing incubator programs for marine technology firms. Florida's Gulf Coast can launch similar efforts to spur research and product development in marine exploration, technology, and science.

Clean water may soon be the world's most limited resource

The world is expected to add more than a billion new residents between now and 2030, with major implications for food, energy, and water needs. Clean, safe, and affordable drinking water is one of the world's most limited, but vital, resources. Recent research by MIT indicates that by 2050, 52 percent of the world's population will live in water-stressed areas.[21] Water supplies are also vital to manufacturing, technology, aquaculture, and tourism industries in the U.S.

Water infrastructure and treatment systems in the U.S. are aging quickly and will require significant new capital investment. Demand for more efficient and environmentally sensitive waste treatment is also growing. Florida's future water and wastewater infrastructure needs have been estimated at $32 billion over the next 20 years.[22] Ultra-purified water is essential to advanced manufacturing processes for semiconductors, electronics, life sciences, and aquaculture. Global investment in aquaculture water systems alone is estimated to reach $13 billion by 2030.[23]

Ensuring clean water supply is important, but maintaining healthy oceans and seawater quality may be critical in the future. Oceans regulate regional climates, dictate local weather patterns, store carbon dioxide, and ultimately absorb much of the world's pollution. Coastal ecosystems are critical to tourism, water quality, biodiversity, and infrastructure resilience. A changing global climate will necessitate investment in risk mitigation and protection of coastal areas, beaches, and infrastructure from extreme weather events and sea-level rise.

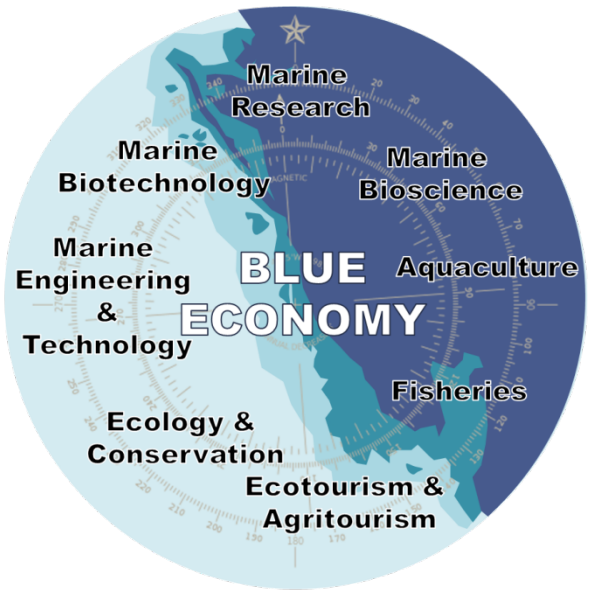
Harmful algae blooms, or red tides, cost Florida communities millions of dollars in lost economic activity and harm regional commercial fishing and tourism industries. Florida's coral reefs are a unique resource and a major driver of tourism in the state, but ocean acidification is endangering many reefs and the ecosystems they support.

Opportunities for the Gulf Coast

With rising demand and limited water supplies, the market for reclamation, recirculation, and desalinization technologies will continue to grow. Florida is a national leader in water reuse, and Tampa Bay is home to the country's largest desalinization plant. In St. Petersburg, SRI International's Marine and Space Sensing group conducts research to improve the health and security of marine environments. In a recent example of research commercialization, SRI licensed ocean sensing technology to the firm Spyglass Technologies, Inc. in St. Petersburg for applications in undersea oil and gas exploration. Businesses in the Gulf Coast region can pursue commercialization and licensing agreements from research centers in Tampa Bay and beyond to take advantage of growing opportunities in water quality monitoring technologies and ocean observation systems.

With significant state and federal wetland and water management regulations, Gulf Coast companies have developed unique experience in water quality, marine construction, and wetlands engineering that may be leveraged in international markets. Regional firms could be encouraged to export this expertise to meet rising demand in developing economies for professional and technical marine engineering services. Tampa Bay, Jacksonville, and other regions in Florida have developed regional export strategies to help regional firms tap into international markets.

Commercial opportunities in coastal ecology will continue to emerge as global environmental issues are addressed and resources are dedicated to protecting and restoring critical ecosystems. Mote Marine Laboratory is conducting research on predicting and managing red tides and has demonstrated success in rapid restoration of coral reefs. These advances could prove valuable to Florida communities as they seek to protect the natural treasures that attract visitors and residents to the state. Mote's coral technologies could be spun off into a commercial or nonprofit organization dedicated to marine ecosystem restoration efforts around the globe.



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Blue Economy Challenges

While there are immediate and future market opportunities in the marine sciences, Blue Economy businesses continue to face challenges, and barriers exist to developing a robust Blue Economy cluster in Florida's Gulf Coast region. Some of these challenges, such as the uncertain geopolitical and international regulatory environment of ocean resources, cannot be addressed through regional action. Other business challenges can be met with coordination and cooperation among research centers, businesses, government, and community organizations within the Gulf Coast region. The most significant challenges to growing the region's Blue Economy include:

- Limited marine science research base
- Emerging marine science workforce
- Declining investment in marine research
- Constrained innovation and invention in the marine sciences
- Lack of marine cluster identity and business engagement

Limited Research Base

Silicon Valley grew up around Stanford University; the Austin technology cluster is centered on the University of Texas; and the Cambridge biotech cluster surrounds the Massachusetts Institute of Technology. A research and higher-education presence is critical to the success of any regional industry cluster. Successful Blue Economy clusters in San Diego, Monterey, Massachusetts, and North Carolina all benefit from the substantial presence of private, public, and federal marine research centers.

The Gulf Coast's Blue Economy is anchored by Mote Marine Laboratory. Mote is one of 120 marine research centers around the country and is a recognized international leader in ocean research. Mote was established in 1955 and has grown to 95 scientists and researchers today. Mote's funding and research impact has also expanded and now covers over 24 unique areas of study.

Mote Marine Laboratory Research Programs	
Behavioral Ecology and Physiology	Manatee Research
Benthic Ecology	Marine and Fresh Water Aquaculture
Chemical and Physical Ecology	Marine Biomedical Research
Coral Reef Ecology and Microbiology	Marine Immunology
Coral Reef Monitoring & Assessment	Ocean Acidification
Coral Reef Restoration	Ocean Technology
Dolphin, Whale and Sea Turtle Hospitals	Phytoplankton Ecology
Ecotoxicology	Sarasota Dolphin Research Program
Environmental Health	Sea Turtle Conservation and Research
Environmental Laboratory for Forensics	Shark Biology and Conservation
Fisheries Ecology and Enhancement	Spotted Eagle Ray Conservation
Fisheries Habitat Ecology	Stranding Investigations

Mote's research presence, partnerships, and intellectual property are a significant regional asset. The organization's impact in the region can be amplified through new funding models, greater utilization of patents and innovation, increased private partnerships, and emerging technology transfer and commercialization efforts.

The presence of Mote in the region is significant, but the Gulf Coast's research strengths lag other marine clusters. St. Petersburg's Bayboro Marine Science District is home to over a dozen private, public, and federal research centers that collectively employ over 1,120 researchers and scientists.[24] Monterey Bay, Calif., is home to over two dozen scientific, research, and educational organizations involved in marine research. Together, these institutions host over 2,000 researchers and faculty. The nation's oldest marine research center – Woods Hole Oceanographic Institution – anchors the Southern Massachusetts marine cluster and employs over 1,000 researchers alone.

To grow a regional marine cluster, the Gulf Coast must identify and connect with the research organizations in the St. Petersburg-Tampa marine cluster. Notable organizations include University of South Florida College of Marine Science and Center for Ocean Technology; SRI International; Charles Stark Draper Laboratory; Eckerd College Marine Science Program; Florida Institute of Oceanography; U.S. Geological Survey Center for Coastal & Wetland Studies; Fish and Wildlife Research Institute; National Oceanic & Atmospheric Administration; National Marine Fisheries Service; and the U.S. Coast Guard.

Facilitating partnerships, growing networks, and coordinating research initiatives among Gulf Coast organizations with those in St. Petersburg and other areas of Florida will open up greater opportunities. Rather than trying to build more research capacity or lure new federal research centers, the Gulf Coast can build on existing strengths in entrepreneurship, business mentoring, and venture capital to position the region as the innovation hub and commercialization incubator for marine sciences throughout Florida.

Emerging Workforce

A talented and ready workforce as, well as partnerships with higher education institutions, is critical to the development of regional innovation clusters. Gulf Coast Community Foundation has made workforce development and STEM education priority issues in the region.

The University of South Florida Sarasota-Manatee, New College, State College of Florida, and Ringling College of Art and Design are clustered in Florida's Gulf Coast region. State College of Florida offers degrees in biotechnology. New College's Pritzker Marine Biological Research Center includes research laboratories and living classrooms for the marine biology program. A quarter of New College's graduating class of 2013 completed a major in environmental studies or the natural sciences.[25] A growing number of programs are connecting high school students in the Gulf Coast with careers in the marine sciences and exciting interest in the next generation of scientists. Riverview High School in Sarasota created an aquaculture greenhouse and science center, or "AquaDome," to expose students to fish farming and marine sciences. Mote offers a variety of experiences and programs for students in the region and pathways to internships and volunteer opportunities.

The Gulf Coast's institutes of higher education are generally recognized for strengths in academic and creative areas other than marine sciences. High school students graduating in the region must look outside the region for universities with established marine biology, oceanography, and marine technology programs.

Florida's universities are leaders in marine science education and produce talented workers. Over the past decade, Florida universities are ranked among the top five schools in the country in terms of degree production in key marine sciences fields. For example, Eckerd College in St. Petersburg graduated 56 students with a bachelor's degree in Marine Biology and Biological Oceanography in 2013 and ranked fifth in the nation in total graduates over the last decade.

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Top-Ranked Florida Universities in Marine Science Degree Production, 1993-2013			
	Marine Science Degree Program		
Degree Level	*Marine Biology and Biological Oceanography*	*Ocean Engineering*	*Chemical and Physical Oceanography*
Bachelor's	#5 Eckerd College	#3 Florida Atlantic University	#4 University of Miami
Master's	#1 Nova Southeastern University	#2 Florida Atlantic University	#3 University of South Florida (Tampa)
Doctorate	#4 University of Miami	#2 University of Florida	#5 University of South Florida (Tampa)

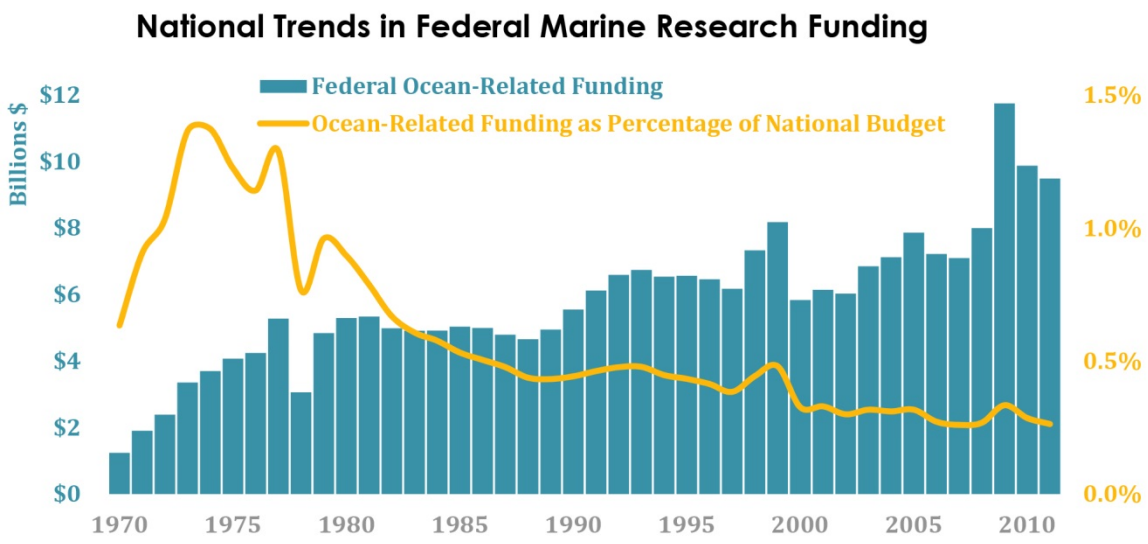
Source: National Center for Education Statistics | National Science Foundation, Matt Lettrich

Many of the marine science graduates of Florida universities find positions at Mote and at other research institutions throughout the state. However, as highly ranked as Florida institutions are, universities in other states produce more graduates in more ocean disciplines. Without a strong higher-education presence, research centers and businesses on the Gulf Coast must import marine science talent from across the state and country. The Gulf Coast region can establish connections to institutions throughout Florida to ensure career pathways are opened for regional high school students seeking higher education and for recent skilled graduates seeking jobs.

Declining Investment

In 2014, Florida captured $863 million in venture capital funding, primarily in the software and healthcare industries.[26] But the state's total represents less than two percent of total U.S. venture capital flow. Access to capital for Florida entrepreneurs remains a challenge across all industries. There are no available national estimates of the levels of venture investments in marine sciences and technology. Many recently launched venture firms specializing in aquaculture and marine technology are headquartered in Europe, where public and private research funding commitments in the marine sciences are substantial.

Federal funding accounts for the majority of ocean research, technology development, and conservation activities in the marine sciences – over $9 billion in 2011. However, federal support for ocean research has declined in real terms in recent decades. Ocean-related federal funding as a percent of all federal expenditures reached a high of 1.4 percent in the 1970s but has fallen to less than two-tenths of a percent in 2011.[27] With limited resources, agencies such as the National Oceanic and Atmospheric Administration, Environmental Protection Agency, National Science Foundation, Department of the Interior, and Department of Energy, among other agencies, are slowly disinvesting in ocean research.



Source: National Oceanic and Atmospheric Administration, National Ocean Economics Program

In 2013, the University of South Florida in Tampa performed $14.3 million in academic research and development (R&D) dedicated to oceanography. This level of research funding from all federal, state, and private sources ranked USF 14th among all public institutions. However, total R&D funding for the environmental sciences across all Florida institutions totaled $69 million – less than half the amount of leading institutions such as the University of California, San Diego ($165 million) and the Woods Hole Oceanographic Institute ($139 million).[28] Florida's higher education institutions and research centers are not as established as those in other states, but must continue to compete for limited research and development funding in the marine sciences.

Small Business Innovation Research (SBIR) awards fund a significant portion of federal research and development and enable small businesses to engage in research with the potential for commercialization. Between 2010 and 2015, Florida companies received over $23 million through 84 grants from the U.S. Navy and the National Oceanic and Atmospheric Administration. Florida ranked 11th in the nation for competitiveness in securing marine-related SBIR funding.[29] Five of the state's 84 awards went to naval defense research firms in the Tampa Bay region, and one award was made to Cesaroni Technology Inc. in the Gulf Coast region.

Florida, and the Gulf Coast, could better compete for federal, public, higher education, and private R&D investments in the marine sciences. To do so requires public-private cooperation, adapting to new models of funding research, leveraging research across institutions, and encouraging small businesses and entrepreneurs to pursue research and development funding from a variety of sources.

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Constrained Innovation and Invention

Between 2003 and 2013, businesses and entrepreneurs on the Gulf Coast have registered 1,827 patents, ranking the region 42nd out of 800 metro areas with fewer than a million residents. Approximately eight percent of all patents issued in the region in the past decade have been related to marine science and technology.[30] Mote Marine Laboratory instituted a patent program in 2002 to better protect and leverage the institution's intellectual property. Mote currently holds nine patents related to marine technology, biomedicine, water quality monitoring, and aquaculture, among other areas.

Patents are one measure of invention, but patent activity may not be directly tied to regional marine clusters. Marine science clusters such as San Diego, Monterey, Tampa, and Seattle do not rank among the top metropolitan areas in patent innovation related to marine science and technology. Tampa ranks 18th and the Gulf Coast region ranks 35th among the top 100 metropolitan areas in terms of marine-related patent activity. Instead, innovation and finance hubs such as Chicago, Boston, San Jose, and Miami attract the greatest activity. These hubs also tend to be home to significant venture capital and investment resources.

Marine-Related Patents Issued in Select Blue Economy Clusters, 2004-2014

	Number of Patents by Field		
Blue Economy Cluster	*Marine Engineering*	*Fishing and Agriculture*	*Biotechnology*
Boston, MA	448	218	6,930
San Diego, CA	311	195	4,889
St. Petersburg, FL	178	70	365
Gulf Coast, FL	95	47	88
Monterey, CA	13	35	30
	(e.g. Marine Propulsion, Ships, Buoys, Rafts, and Aquatic Devices, Liquid Purification or Separation)	*(e.g. Fishing, Food or Edible Material: Processes, Compositions, and Products)*	*(e.g. Multicellular Living Organisms and Processes, Molecular Biology and Microbiology, Drug and Bio-Compositions*

Source: U.S. Patent and Trademark Office

Cultivating relationships with investors in these and other major areas is critical to growing invention and innovation on the Gulf Coast. Increasing efforts to transfer and commercialize technology from research centers in the region and throughout Florida will also boost the region's innovation profile.

Lack of Cluster Identity and Business Engagement

Marine industries are often dominated by small firms. Each of the fishing and aquaculture businesses operating in the Gulf Coast region employs fewer than five employees – qualifying as a microbusiness. There are also over 300 non-employer businesses involved in fishing. These businesses may have a single employee-owner or rely on unpaid family members as workers. This illustrates the importance of small-business assistance for capital and finance, export markets, regulatory needs, and marketing and growth strategies.

Regional marine-based economies are often hidden in plain sight, without strong political representation or public recognition. Most marine businesses are small, spread across a range of industries, and lacking in unified trade associations or lobbying power. However, collectively they rank among the Gulf Coast's largest employers. There are over 2,200 workers making a living directly from Sarasota Bay – including commercial fishers, sport charters, yacht sales, kayak rentals, boatbuilders, and seafood markets and distributors – nearly the same as the total workforce of Publix in the region. These businesses depend on bayfront access, clean water, coastal ecosystems, and fair regulation. Increasing representation and awareness of the marine sector at state and federal regulatory levels is critical to future growth.

Marine technology and engineering firms often produce multiuse products and technologies with applications across a variety of industries. For example, L-3 Communications in Sarasota primarily produces "black box" flight recorders for the aviation industry, but it also manufactures marine voyage recorders and navigation equipment at the same facility. This is an example of a firm that would not be officially counted in a "core" marine industry sector, but would instead fall into a related industry. Organizations such as The Maritime Alliance in San Diego are petitioning the federal government for better data and industry classifications to more fully understand the full scope of Blue Jobs in the national economy.

Many other companies may not exist without proximity or access to marine resources, but their ties to the ocean are less visible or marine components simply provide inputs to final products (e.g., tourism or food manufacturing). Such firms may not recognize that they are part of the Blue Economy and may not identify as marine-related businesses in the Gulf Coast blue cluster. As a result, cluster growth strategies and economic development initiatives must reach out and build partnerships and networks across a wide variety of industries and involve many different companies.

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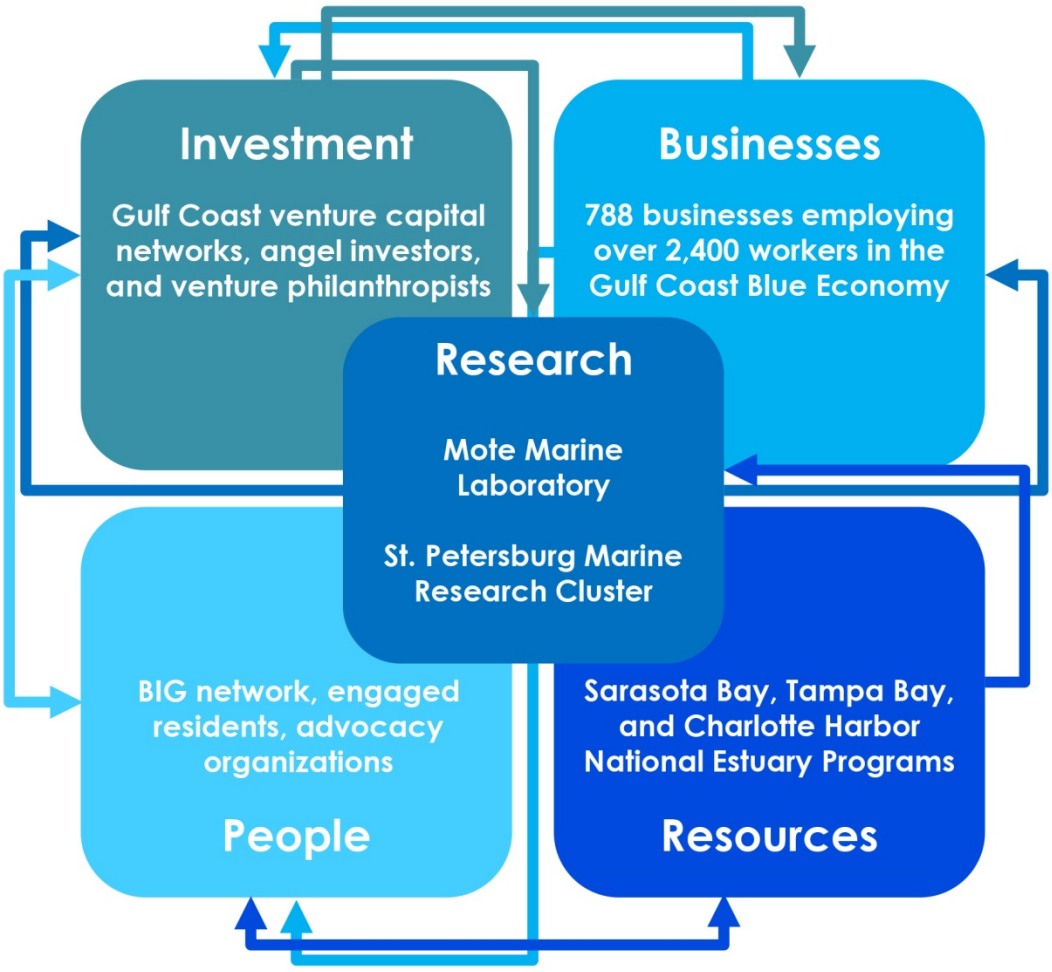
Growing the Blue Economy

The concept of the Blue Economy is gaining traction nationally, with more and more regional studies and initiatives underway in just the past few years. These efforts highlight largely hidden marine economies in communities across the country and advocate for investment in marine science and conservation of the nation's marine resources. Blue Economies link America's ocean heritage with emerging billion-dollar global market opportunities in marine research, science, and technology.

Gulf Coast Community Foundation has identified the need to diversify the regional economy away from dependence on services and seasons and toward innovation, entrepreneurship, international exports, and value-added production. The Gulf Coast's Blue Economy initiative represents one pathway to establishing an innovation economy in the region. This is a long-term proposition that no single organization can orchestrate. Regional partners and leaders from all sectors must coordinate and work together to seize emerging opportunities in the marine sciences.

The foundation's BIG marine sciences network has identified five key assets of the Gulf Coast's Blue Economy: People; Businesses; Investment; Research; and Resources. These asset areas also represent key elements of a regional economic cluster. These elements are dependent on each other, and all must be robust to support regional cluster innovation and economic growth.



The following critical strategies were developed in cooperation with the BIG marine sciences network and with input from subject-matter experts. These strategies represent immediate action steps and long-term priorities to guide partners and stakeholders in growing the Gulf Coast's Blue Economy.

Build a Cluster Identity

Regional economic clusters develop around concentrations of industry activity, research centers, higher-education institutions, and natural resources. Clusters are resilient, boost innovation and entrepreneurship, and spur job and knowledge creation. Regional economic clusters take time to coalesce and to develop the critical mass of businesses, educators, researchers, and the advocacy and political networks that support them. Building regional awareness and a cluster identity around the Gulf Coast's Blue Economy is the first step in this process.

- Coordinate regional economic development, public relations, and business networking efforts in the marine sciences.
- Increase advocacy efforts at the state and federal levels on behalf of the marine sciences and continue education efforts for the public and elected officials in the region.
- Connect with organizations in St. Petersburg and other regional marine clusters to share lessons learned, host national events, leverage advocacy efforts, and raise the profile of the Blue Economy.

Connect People

The Gulf Coast region attracts entrepreneurs, educators, and leaders. Residents are passionate, and not just about sailing, but about becoming engaged and transforming the region. Gulf Coast Community Foundation's BIG initiative has just begun to connect companies and leaders across the marine science cluster, with immediate successes. These efforts can be continued and expanded to develop a robust network of partners, funders, educators, entrepreneurs, and advocates for the region's Blue Economy.

- Continue to expand the BIG marine science group into a self-sustaining entrepreneurial and leadership-development network.
- Develop a marine science business network to bring together new partners and connect regional efforts to others across the state, country, and globe.
- Coordinate the efforts of regional ocean-oriented environmental, education, and advocacy organizations.

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Grow Businesses

Immediate opportunities for the region exist in expanding aquaculture and seafood businesses, while longer-term opportunities include encouraging regional firms to enter export markets and developing partnerships and networks among current marine science businesses. As market opportunities expand, the Gulf Coast must position to attract, retain, and grow marine businesses. Targeted business development efforts include developing workforce pipelines and encouraging technology transfer and research commercialization.

- Recruit marine science companies, including at least one "anchor" company in sustainable foods, seafood distribution, or marine science and technology.
- Encourage commercialization of technologies from research centers to spin off new business opportunities in marine sciences and technology.
- Provide work and volunteer opportunities at existing companies so that Mote interns and recent graduates stay in the region to work and build businesses.
- Expand regional seafood processing and distribution facilities to enable the region to produce and market more seafood locally.

Attract Investment

Funding for start-up businesses and for research into emerging technologies is critical. Public investment in research is declining, but public-private partnerships, equity investments, and venture philanthropy are the economic tools of the future. Gulf Coast partners can leverage the region's existing strengths in entrepreneurship, philanthropy, and venture funding to provide the infusion of capital necessary to jump-start innovation in the marine sciences. By doing so, the Gulf Coast region can uniquely position itself as innovation hub and incubator for marine start-ups.

- Develop venture funding networks specifically geared toward the marine sciences.
- Expand existing entrepreneurial efforts, incubators, and business assistance programs to target marine sciences.
- Align regional economic development plans and incentive programs to cover marine sciences industries.
- Attract private funding to support promising research at Mote and regional institutions.

Leverage Research

For six decades, Mote Marine Laboratory has been among the world's top marine research centers. Nearly every university and college in the Gulf Coast region offers degrees in marine sciences, and area high schools offer hands-on aquaculture learning experiences. However, the Gulf Coast does not have a competitive research presence when compared with other regional marine clusters. Developing partnerships with research organizations in the St. Petersburg marine cluster and throughout Florida can expand opportunities for Mote, regional education institutions, and regional business ventures.

- Coordinate research, education, and cluster-building initiatives with key partners in St. Petersburg.
- Establish a Research Commercialization Advisory Council with Mote and other educational partners to align, guide, and fund critical research.
- Catalog and leverage the intellectual property, patents, and research of Mote.
- Position Mote as the premier organization for Marine Stewardship Council certification and fisheries improvement projects in the southeastern U.S.
- Create more STEM education initiatives for youth in marine science, aquaculture, and fishing to provide career pathways and encourage entrepreneurs.

Conserve Resources

Sarasota Bay is home to a unique array of fish and wildlife and sensitive coastal ecosystems that attract visitors, improve the region's quality of life, and provide significant research opportunities. The Gulf Coast region hosts the largest shellfish grounds in the state and is in the middle of three adjoining national estuary programs. Coordinating conservation efforts among the region's many environmental and advocacy organizations can better conserve these unique resources and help make the region a leader in sustainable resource management.

- Support regional conservation and management plans to preserve the environmental and economic integrity of coastal resources.
- Conduct an inventory of regional waters and lands suitable for shellfish harvesting, aquaculture, and seafood-processing facilities.
- Leverage existing infrastructure for aquaculture (e.g., Port Manatee and Manatee County facilities).
- Commit RESTORE Act settlement funds from the Gulf of Mexico oil spill to long-term conservation, economic development, and region-building initiatives.

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Critical Regional Growth Strategies

Public and private leaders in the Gulf Coast region must intensify their efforts to develop the regional Blue Economy, working toward the following goals over the next 10 years:

- Make and consume more seafood regionally by expanding aquaculture production, sustainably harvesting wild fisheries, and marketing local seafood.
- Enhance the impact of regional research and development in the marine sciences, through coordination with institutions in St. Petersburg and commercializing Mote Marine Laboratory's existing research and technologies.
- Grow into a regional innovation and investment hub for marine science businesses throughout Florida by creating investment, funding, and entrepreneurial networks.
- Elevate awareness and recognition of the Gulf Coast's Blue Economy among regional businesses, residents, elected officials, and community leaders.

These goals can be accomplished through coordinated regional action on workforce, education, economic development, business climate, and entrepreneurial initiatives. Critical actions to be accomplished in the next three to five years include:

1. Connect regional economic development, public relations, and business networking efforts in the marine sciences to develop a shared Blue Economy cluster identity and raise public awareness.
2. Establish mechanisms to coordinate research, education, and cluster-building initiatives with key partners and institutions in St. Petersburg.
3. Develop a self-sustaining marine science business and advocacy network to bring together new business leaders, create new partnerships, provide investment opportunities, and connect regional efforts.
4. Encourage commercialization of technologies from regional research centers to spin off new businesses and create licensing opportunities for marine sciences and technologies.
5. Expand existing entrepreneurial efforts, business incubators, export support, and business assistance programs to directly target businesses in key sectors of the Blue Economy.
6. Support regional conservation and management plans that preserve the environmental and economic integrity of coastal resources.

Best Practice Regional Cluster Initiatives

The Maritime Alliance

San Diego, Calif., is a recognized marine sciences hub on the West Coast. Anchored by the U.S. Navy, regional research institutions include Hubbs-SeaWorld Research Institute, National Polytechnic College of Science, Scripps Institution of Oceanography, and San Diego State University's Coastal Waters Laboratory. Over 1,400 marine-related businesses operate in the region and employ over 46,000 workers.

The Maritime Alliance is a nonprofit industry association and self-described cluster organizer with an established mission of "Promoting BlueTech and Blue Jobs®." The Alliance was formed in 2007 to further the region's economic and workforce development opportunities and to conduct outreach and education to promote the region. The organization comprises more than 30 members, including start-up businesses, research institutions, and marine technology businesses. The Alliance sponsors research and organizes an annual business and technology summit and regular educational events to share best practices and discuss industry issues, as well as forums to help regional business grow, expand export business, and connect to investors.

The Alliance sponsors OceanSTEM – an initiative involving over 70 partners – which aims to raise awareness of marine technology careers and promote cooperation among regional education, research, and business workforce partners. The Alliance was involved in the creation of a regional seafood campaign to "Consider a Fish." This campaign targeted public school students and adults to promote the importance of sustainable seafood. The Alliance also responded to a trade adjustment grant to create a regional consortium for career pathways in marine technology – C4Pathways. This effort resulted in documentation of career paths, workforce needs, and identified opportunities for regional institutions to develop curriculum and programs geared toward regional employers, including the U.S. Navy.

The Alliance and its current executive director are credited with being the main driver of civic conversation about the San Diego Blue Economy and for providing resources to support local companies. The Alliance relies on corporate sponsorships ($5,000 annual) and pursues public grants to provide services and fund initiatives.

North Carolina Marine Science and Education Partnership

Carteret County, N.C., is located at the southernmost extent of the Outer Banks. The county is home to a significant marine sciences, education, and industry cluster. Education and research partners include the Duke University Marine Laboratory, North Carolina State University Center for Marine Sciences and Technology, the University of North Carolina's Institute of Marine Sciences, and the National Oceanographic and Atmospheric Administration's Center for Coastal Fisheries and Habitat Research. Together, these research centers directly account for over 400 jobs. The region has significant boatbuilding, fishing, aquaculture, and marine services industries.

In 2002, the North Carolina Marine Science and Education Partnership (NCMSEP) was formed among regional research institutions, the Carteret County Economic Development Council, and Carteret Community College. The partnership was formalized and conducted foundational economic analysis and workforce research in 2004 and 2006. The goal of NCMSEP is to foster collaboration among research and education partners to further economic development. The group now includes 18 member organizations from the region and across the state.

Successes include establishing a Marine Training and Education Center at Carteret Community College with programs for marine propulsion, boat manufacturing, fiberglass technology, and marina management. Private businesses have also been spun off from regional universities with support from the partnership – including Geodynamics LLC, which conducts underwater mapping. NCMSEP also sponsors marine education high school scholarships. The partnership has been credited with attracting employers to the region, expanding workforce training and education

programs, connecting research institutions, encouraging cooperation on research and shared use of research facilities and vessels, publishing research and communications to illustrate the cluster's impact, as well as encouraging spin-off businesses in the region.

Monterey Bay Crescent Ocean Research Consortium

Monterey Bay, Calif., is home to over two dozen scientific, research, and educational organizations involved in marine research. Collectively, these institutions host over 2,000 researchers and faculty. Notable centers include the Monterey Bay Aquarium Research Institute, Moss Landing Marine Laboratories, Naval Research Laboratory, Stanford University's Hopkins Marine Station, and other state and federal organizations.

The Monterey Bay Crescent Ocean Research Consortium (MBCORC) was formed in 1998 to support the overlapping interests of marine science-related institutions located throughout the Monterey Bay region. MBCORC has 27 founding members and sponsors initiatives, events, research, and coordination projects with other organizations.

Recent efforts to coordinate economic and workforce development in the region include MARINE (Monterey Area Research Institutions' Network for Education). This partnership among regional educators is intended to provide professional-development opportunities and enhance marine education. The Monterey Bay Marine Tech Accelerator is an informal organization of entrepreneurs, businesses, and investors that regularly meets to network and identify opportunities for collaboration. MBCORC and Brand Monterey Bay (the regional economic development organization) have launched a series of events and campaigns to increase recognition of Monterey Bay as a premier marine technology cluster and to enhance the regional innovation ecosystem. A recent focus of this group has been to build connections between Silicon Valley and Monterey Bay to identify, support, and implement commercialization of regional products, services, and technology.

Massachusetts Marine and Oceanographic Technology Network

The Massachusetts Marine and Oceanographic Technology Network (MOTN) was formed in 1994 as a nonprofit corporation with the express purpose of promoting, supporting, and expanding the marine technology manufacturing and service businesses within the state of Massachusetts. The organization has since expanded to encompass organizations and businesses throughout New England. MOTN is financed with membership fees, project contributions, and matching funds from the Massachusetts Office of Business Development.

A 2004 study identified 481 firms in the marine science and technology cluster, which directly employed more than 38,906 people throughout New England. The cluster is anchored by the Woods Hole Oceanographic Institute, in addition to naval facilities and defense contractors throughout Southern New England and high-technology firms based in Cambridge. State and regional economic development organizations throughout New England actively promote and support marine sciences clusters. Marine-related career pathways have also been developed by the Massachusetts Board of Education.

The organization is dedicated to increasing cooperation among, and opportunities for, member companies. Activities include trade shows, business assistance, networking events, and advocacy. The organization conducts briefings for U.S. Congressional committees and is active in national conferences and industry events. There are currently over 50 member companies, including industry suppliers, consultants, representatives, research institutes, and manufacturers. Members range from large organizations such as Lockheed Martin to regional universities and an array of small and medium marine technology, engineering, and service firms.

Notes

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