

**CARTERET**  
Economic Development

# Carteret County Marine Science Economic Impact Assessment



**2018**

Performed by:

Edward Brent Lane

Deborah Theresa Watts

**Carteret County**  
**Marine Science Economic Impact Assessment**

Final Report

September 10, 2018

Performed on behalf of the Carteret County Economic Development Department

Edward Brent Lane, Principal Investigator

Deborah Theresa Watts, Co-Principal Investigator

## ***Summary***

For over a century Carteret County has been home to a diverse and growing collection of marine science research, education, regulatory and industry agencies. These marine science activities benefit from the access a Carteret location offers to an extraordinary variety of environments and natural resources. Their operations are well supported by the county's workforce, infrastructure and commercial services. In return, the presence and work of the marine science agencies confer overt and subtle benefits that pervade the county. For Carteret, the marine sciences are an enterprise that creates significant practical economic benefits – jobs, income and wealth – for its current citizens while uniquely distinguishing the county as an attractive growth location for new visitors, residents, families and businesses.

In May 2018 the Carteret County Economic Development Department commissioned an analysis of the economic impacts made by marine science research and education agencies (MARSCI) located in the county. This Economic Impact Assessment (EIA) examined and calculated the contributions accruing in Carteret County from the research, education, policy and engagement activities of eight major marine science agencies:

- Carteret Community College Aquaculture & Marine Trades (CCC A&MT)
- Duke University Marine Lab (DUML)
- National Oceanic and Atmospheric Administration (NOAA)
- NC Aquarium at Pine Knoll Shores (APKS)
- NC Division of Coastal Management (DCM)
- NC Division of Marine Fisheries (DMF)
- NCSU Center for Marine Sciences and Technology (CMAST)
- UNC Institute of Marine Sciences (IMS)

In addition to the eight MARSCI agencies in this EIA there are numerous other Carteret County entities that have a marine or maritime research, education and/or policy component (Appendix A). Collectively these additional organizations represent a significant number of employees and economic impacts that materially enhance the total economic impacts described in this report.

## Findings

While they vary significantly in the nature of their missions and in the scale of their operations, these eight marine science (MARSCI) agencies constitute one of the nation's largest and most diverse concentrations of marine-related expertise and activity. Together the eight agencies have direct impacts from a collective annual budget of \$54 million and 542 employees. Collectively, Carteret's eight major marine science agencies constitute one of the county's largest sources of jobs, income and revenues.

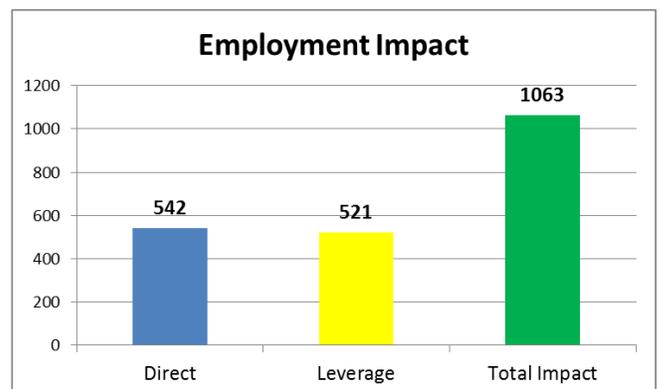
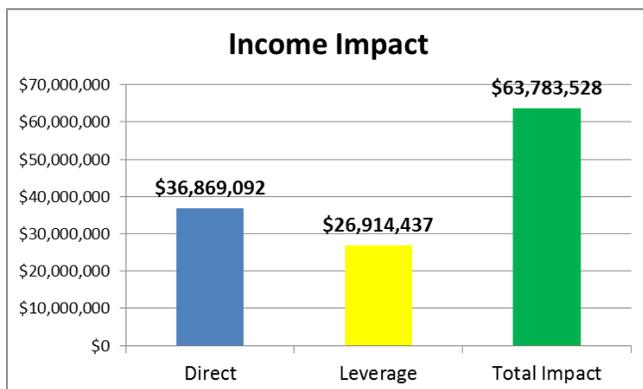
The economic impact assessment found that the eight MARSCI agencies' spending, along with that of their employees, **leveraged** an additional \$29 million in new economic activity and \$27 million in additional income supporting 521 jobs in Carteret County.

Carteret County's eight major marine science agencies account for a **total economic impact** in the county of \$83 million in economic activity, \$64 million in salary and investment income, and support the employment of 1,063 Carteret residents.

MARSCI Direct Impacts	
Total	\$54,264,284
Operations	\$17,395,192
Personnel	\$36,869,092
Employment	542

MARSCI Leverage Impacts	
Activity (GDP)	\$28,760,070
Income	\$26,914,437
Employment	521

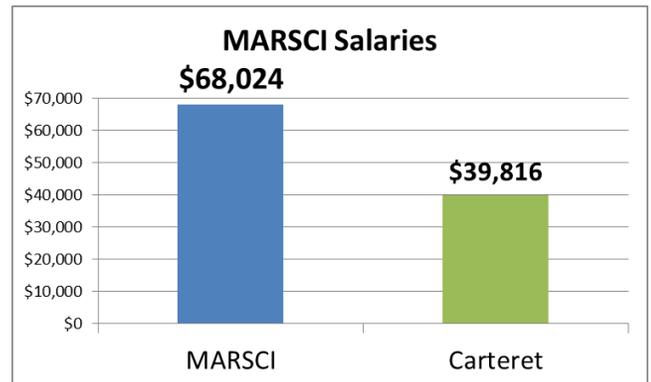
MARSCI Total Impacts	
Activity (GDP)	\$83,024,354
Income	\$63,783,528
Employment	1,063



## ***Carteret Marine Science Impact Significance***

Carteret County has a dynamic and diversified economy relative to most coastal areas with their near exclusive reliance on tourism and vacation homes. The economic impacts and effects of the county's marine sciences enterprise contribute to those qualities in distinctive ways:

- The MARSCI agencies are a source of skilled, high-wage employment paying an average of \$68,024 in salary and benefits compared to the average Carteret County job's \$39,816 in salary and benefits
- As a result, while the MARSCI total Employment Impact of 1,063 is 3.6% (of Carteret's 29,745 jobs in 2017), the MARSCI total Income Impact of \$64 million is 5.3% of the county's \$1.2 billion in income
- MARSCI's economic contributions add an estimated \$1.8 million in local sales tax revenues, an amount sufficient to pay the average Carteret County supplement of \$2,635 for 683 teachers
- Spending by the MARSCI agencies and their employees have a disproportionately high leverage effect on both earned and investment income, with \$64 million in total generated income, sufficient to support 1,129 Carteret households
- The nature of MARSCI research and education activities provides for both high-value and sustainable use of Carteret's natural resources, thus creating economic benefits while simultaneously preserving assets essential to other economic drivers, such as tourism
- Finally, in addition to their quantifiable economic impacts, the MARSCI agencies make long-term and transformative contributions to Carteret County's future through a variety of activities – from K-12 STEM education to workforce development to knowledge worker retention and attraction – that enhance the county's human capital resources and enliven community vitality



## ***MARSCI Economic Impact Assessment***

This report describes research commissioned by Carteret County Economic Development Department to assess the impact of the research, training, and engagement activities of eight primary marine science research and education entities (MARSCI) on the economy of Carteret County, North Carolina. This Economic Impact Assessment (EIA) examined and calculated the economic contributions accruing within Carteret County from the presence and operations of the following MARSCI entities:

- Carteret Community College Aquaculture & Marine Trades (CCC A&MT)
- Duke University Marine Lab (DUMML)
- National Oceanic and Atmospheric Administration (NOAA)
- NC Aquarium at Pine Knoll Shores (APKS)
- NC Division of Coastal Management (DCM)
- NC Division of Marine Fisheries (DMF)
- NCSU Center for Marine Sciences and Technology (CMAST)
- UNC Institute of Marine Sciences (IMS)

Their location in Carteret County offers numerous strategic advantages aligning with their diverse missions. Carteret County is central to the state's coastline, provides ready access to the second-largest estuary in the United States (the Albemarle-Pamlico Estuarine System), and is within easy reach of the northward flowing Gulf Stream, which supports one of most diverse and productive ecosystems in the world. Each of the studied MARSCI institutions plays a unique role in research and education enterprises in North Carolina and the nation. Their close proximity encourages synergies that enhance their effectiveness at meeting their individual missions.

The EIA included analyses of the individual and aggregate economic impacts of the assessed institutions on the overall economic activity within Carteret County and more specifically on their contributions to income and employment for the County's citizens. The impacts examined included direct and leveraged effects in Carteret County on:

- change in economic activity/gross regional product
- labor income impact change on employment
- non-labor income impact change in total income and household support
- economic activity impact changes in local sales tax revenues

At the direction of the client, in order to isolate the economic impacts specific to marine science this assessment excluded analysis of the tourism spending effect of the NC Aquarium at Pine Knoll Shores.

### ***Assessment Methodology***

The EIA included the performance of four primary tasks:

1. Budgetary, operational and employment information were compiled on each of the studied entities and assessed using conventional input-output economic models to calculate economic contributions
2. Interviews were conducted with leadership of the studied entities to gather descriptive information of institutional activities contributing economic impacts
3. A stakeholder meeting of studied entities' and client-identified community stakeholders' leaders was convened to discuss and describe impact enhancement opportunities
4. Assessment, interview and discussant outcomes were compiled and synthesized in written, oral and audiovisual formats for multimedia communication

## ***Economic Impact Analysis***

The Carteret County economy is quantitatively impacted by the eight studied MARSCI agencies principally through 1) the “Direct Impact” of those organizations’ operational and research expenditures and 2) the “Leverage Impact” of spending of their employees and suppliers. While their nature as marine research and education organizations lends an air of the unusual to their operations, MARSCI agencies affect their local economy in much the same manner as more familiar industries, businesses and public agencies. As with these other firms, MARSCI agencies are buyers of goods and services for their operations where a reliance on suppliers within Carteret County creates additional economic impacts in those businesses’ revenues and employee incomes. As employers, the MARSCI agencies’ personnel payroll and benefits similarly contribute directly to the county’s overall income while the spending by their employees for the necessities of household life also helps support businesses in the Carteret economy.

Such spending by the MARSCI agencies and their employees creates a “Leverage Impact” in varying proportions to the amount and nature of the original MARSCI budgets and payrolls. These secondary impacts are described by economists as “multiplier effects” that generate additional employment and income above and beyond those of the initial MARSCI budgets and payrolls. Economic Impact Assessments identify and aggregate the total of these streams of spending effects to calculate the “Total Impact” throughout the economy.

Each of the eight studied MARSCI agencies provided information on their respective 2017 total budgets, operating budgets, personnel (payroll and benefits) budgets, and their number of fulltime (or equivalent) employees based in Carteret County. For most of the MARSCI agencies this information encompassed the entirety of their annual budgets, but for some it was necessary to exclude non-Carteret expenses and personnel. Because the intent of the assessment was to capture specifically the economic impact of marine science-related activities, only those portions of the Carteret Community College activities in Aquaculture and

Marine Trades were included in the assessment. Similarly, the large (but non-germane) tourism effect of spending by visitors to the NC Aquarium at Pine Knoll Shores was also excluded.

### ***Economic Impact Findings***

The assessment found that, when looked at collectively, the studied MARSCI entities constitute a geographically-concentrated set of marine science-related capabilities among the largest and most diverse anywhere in the United States. Their presence, operation and programmatic activities make significant, though often under-recognized, contributions to the economy of Carteret County and the economic wellbeing of its citizens.

Community awareness of MARSCI agencies' significance is likely challenged by the geographic disaggregation of their facilities between Morehead City and Beaufort, and by their waterside locations which lessens their visibility. Recognition is also challenged by the fact that the MARSCI agencies vary widely in scale of both employment and budgets relevant to this analysis. Moreover there is a varied periodicity to extensiveness of their individual levels of activity during the course of a year. This variability can result in an under-recognition of MARSCI activity and thereby their economic significance. Nonetheless, while at any given period in the year the apparent economic effect of any single MARSCI agency may be slight, collectively their impacts intertwine to create a varying, but continuous, stream of economic contributions throughout the Carteret economy.

The relatively capital-intensive nature of their facilities, the highly-skilled and well-compensated nature of their staff, and the value-added sustainable use they make of Carteret County's varied natural resources result in a high degree of "***economic leverage***" by MARSCI agencies, yielding substantial revenue, income and employment impacts within the county. In addition to their quantifiable impacts, the MARSCI agencies and their staff play pervasive roles in their communities that differentiate Carteret County in ways that enhance and attract innovative industry, entrepreneurs, individuals and families.

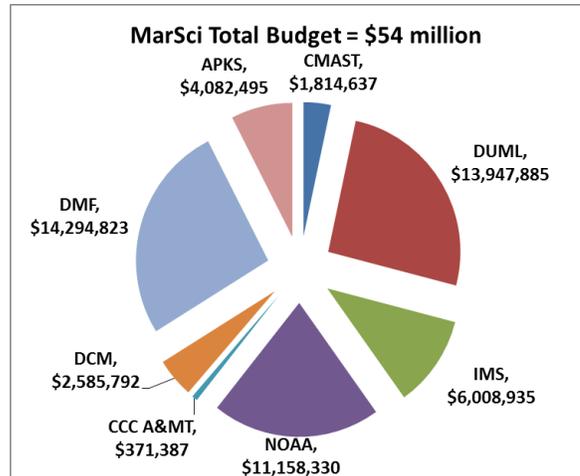
### MARSCI Carteret Operations Impacts

During FY 2017 the eight studied MARSCI entities had combined budgets of over \$54 million, of which they spent \$36.9 million on personnel payroll and benefits for full-time equivalent (FTE) employment of 542 people. They also spent another \$17.4 million on goods and services to carry out their operations and research.

By budget, the largest of the MARSCI agencies are the North Carolina Division of Marine Fisheries (DMF) (\$14.3 million) and the Duke University Marine Lab (\$13.9 million). By employment, the two largest are DMF (150) and the Beaufort NOAA operation (97). The size of the smallest agencies –

NCSU’s CMAST and the Carteret Community College’s Aquaculture and Marine Trades units – significantly understates the scale of their MARSCI roles as CMAST hosts numerous marine researchers employed elsewhere and the Carteret Community College educational and outreach activities provide ongoing education and workforce benefits.

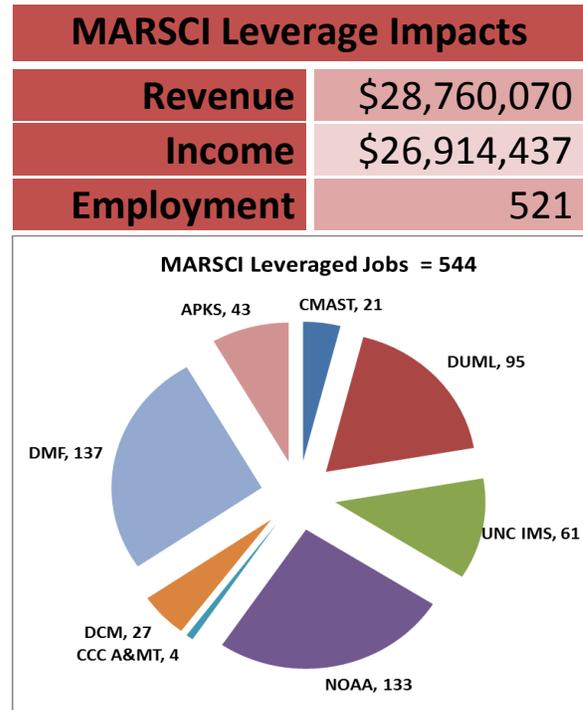
MARSCI Direct Impacts	
<b>Total</b>	\$54,264,284
<b>Operations</b>	\$17,395,192
<b>Personnel</b>	\$36,869,092
<b>Employment</b>	542



MARSCI Operations Direct Impacts by Agency			
Agency	Total Budget	Personnel	Employment
<b>DMF</b>	\$14,294,823	\$9,674,901	150
<b>DUML</b>	\$13,947,885	\$6,725,009	89
<b>NOAA</b>	\$11,158,330	\$9,383,733	97
<b>IMS</b>	\$6,008,935	\$4,331,239	94
<b>APKS</b>	\$4,082,495	\$3,067,758	72
<b>DCM</b>	\$2,585,792	\$1,918,249	23
<b>CMAST</b>	\$1,814,637	\$1,476,620	10
<b>CCC A&amp;MT</b>	\$371,387	\$291,583	7

### MARSCI Leverage Impacts

This initial round of spending creates more spending across other businesses, consumers and citizens throughout the Carteret County economy. Thus the operations and employment of the MARSCI agencies exert an economic “leverage” that results in additional revenues, income and employment within the Carteret economy. The relatively-high operational costs nature of MARSCI facilities and above-county averages salaries magnify the beneficial effects of MARSCI activities, creating an additional \$29 million in revenues and \$27 million in wage and non-earned income which support an additional 521 Carteret jobs.



It is useful to recognize the dominance income plays in effecting leveraged economic impacts. Of the eight studied MARSCI agencies, DMF (\$7.6 million) and the Duke Marine Lab (\$7.4 million) have the highest leveraged effect on economic activity in Carteret County. This is attributable to the higher multiplier effect income paid (and spent) by Carteret employees has on job creation than operational budgets alone.

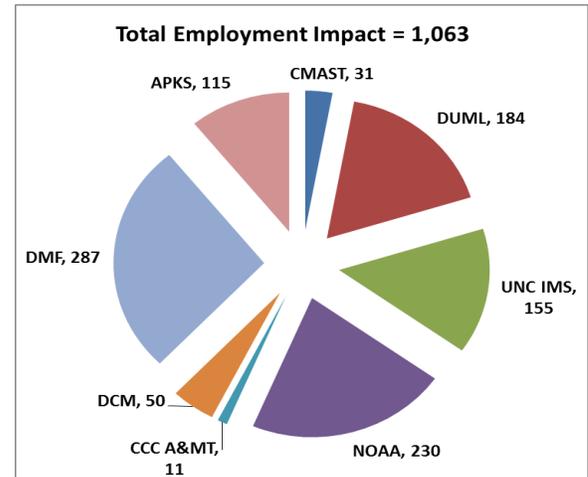
MARSCI Leverage Impacts by Agency			
Agency	Revenue	Income	Employment
DMF	\$7,576,256	\$7,062,678	137
DUMML	\$7,392,379	\$4,909,257	95
NOAA	\$5,913,915	\$6,850,125	133
IMS	\$3,184,735	\$3,161,804	61
APKS	\$2,163,722	\$2,239,463	43
DCM	\$1,370,470	\$1,400,322	27
CMAST	\$961,758	\$1,077,933	21
CCC A&MT	\$196,835	\$212,855	4

## MARSCI Total Impacts

Calculating the total economic impact of the eight studied MARSCI agencies on the economy of Carteret County requires combining the aggregate of their operational budgets, payrolls and employments with the collective leveraged impacts those expenditures create in the county. During 2017 they made a total annual economic contribution of over \$83 million, adding \$64 million to the income of county citizens and supporting 1,063 jobs.

These impacts differ significantly across the eight MARSCI agencies. Despite its significantly smaller employment (184 vs. 287), DUML's high capital intensity results in a revenue impact (\$21.3 million) similar to that of the DMF (\$21.9 million). The more payroll-intensive, slightly less capital intensive NOAA Beaufort Lab has the second largest impact on income (\$16.2 million) and employment (230).

MARSCI Total Impacts	
<b>Revenue</b>	\$83,024,354
<b>Income</b>	\$63,783,528
<b>Employment</b>	1,063

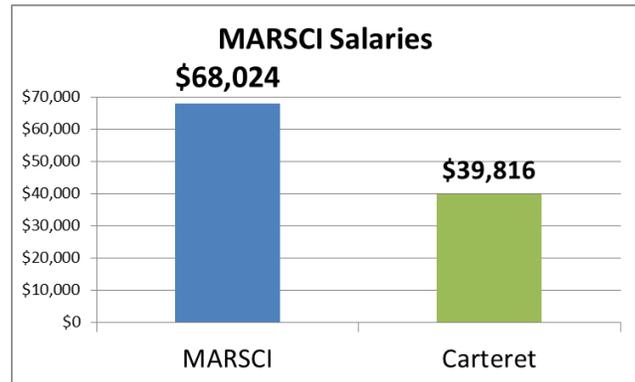


MARSCI Total Impacts by Agency			
Agency	Revenue	Income	Employment
DMF	\$21,871,080	\$16,737,579	287
DUML	\$21,340,264	\$11,634,266	184
NOAA	\$17,072,245	\$16,233,858	230
IMS	\$9,193,670	\$7,493,043	155
APKS	\$6,246,217	\$5,307,221	115
DCM	\$3,956,262	\$3,318,571	50
CMAST	\$2,776,395	\$2,554,553	31
CCC A&MT	\$568,222	\$504,438	11

## ***Carteret Marine Science Impact Significance***

Carteret County has a dynamic and diversified economy relative to most coastal areas with their near exclusive reliance on tourism and vacation homes. The economic impacts and effects of the county's marine sciences enterprise contribute to those qualities in distinctive ways:

- The MARSCI agencies are a source of skilled, high-wage employment paying an average of \$68,024 in salary and benefits compared to the average Carteret County job's \$39,816 in salary and benefits



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- Finally, in addition to their quantifiable economic impacts, the MARSCI agencies make long-term and transformative contributions to Carteret County's future through a variety of activities – from K-12 STEM education to workforce development to knowledge worker retention and attraction – that enhance the county's human capital resources and enliven community vitality

## ***MARSCI Human Capital Impacts***

### **Perspectives from the Field: Interviews with Opinion Leaders**

Behind the numbers that describe the economic impact of marine science in Carteret County are the people and places that are the foundation for those numbers. On-site interviews with key opinion leaders in the marine science community greatly informed and provided context for understanding the economic impact update. Table 1 lists the individuals and organizations that contributed to this effort.

<b>Table 1: Marine Science Cluster Interview List</b>	
<b>Organization</b>	<b>Interviewee</b>
<b>Beaufort City Government/DUML</b>	Rett Newton
<b>Carteret County Schools</b>	Heather Dietzler
<b>Carteret County Community College</b>	John Hauser
<b>Carteret County Community College</b>	Traci Mancini
<b>Carteret County Community College Aquaculture</b>	David Cerino
<b>Duke University Marine Labs</b>	Andy Read
<b>National Park Service – Cape Lookout Nat’l Seashore</b>	Jeff West
<b>NC Aquarium – Pine Knoll Shores</b>	Hap Fatzinger*
<b>NC Coastal Estuarine Research Program</b>	Rebecca Ellin
<b>NC Division of Coastal Management</b>	Braxton Davis
<b>NC Division of Marine Fisheries</b>	Steve Murphy
<b>NC Maritime Museum</b>	Joseph Schwarzer
<b>NCSU – Center for Marine Science and Technology</b>	Dave Eggleston
<b>NCSU – Marine Aquaculture Research Center</b>	Steve Hall
<b>NCSU – Sea Grant</b>	Chuck Weirich
<b>NOAA– National Marine Fisheries Service</b>	Aleta Hohn
<b>NOAA – National Centers for Coastal Ocean Science</b>	Greg Piniak
<b>UNC – Institute. for Marine Science</b>	Rick Leuttich

\*Financial data received, on-site interview not conducted due to interviewee being off-site

The goal for this engagement effort, to describe qualitatively and quantitatively how the marine science cluster affects economic prospects and culture in Carteret County, framed discussions with 18 opinion leaders in the Carteret County MARSCI community. Interviewees shared

perspectives on the personal and professional advantages and challenges of living and working in this region—what draws them to and keeps them in Carteret County. Interviewees reflected on the current and possible future roles of their organizations in the county and regional economy—solo or in cooperation with other organizations in the marine science cluster. From the organizational perspective they considered: what spinoff activity has occurred or might be anticipated; what elements are missing from the marine science cluster; what could be done by their organization, by the collective MARSCI cluster or by local or state government to improve the offerings in the area to make it more supportive or attractive to companies, labs or startups in the MARSCI cluster. On the quantitative side, interviewees added contextual comments regarding budget and employment data for the most recent fiscal year used as input to the economic impact analytical model that was used to develop the EIA of the studied organizations.

### **Synthesis of Perspectives: Interviewees’ Observations on Carteret’s MARSCI Cluster**

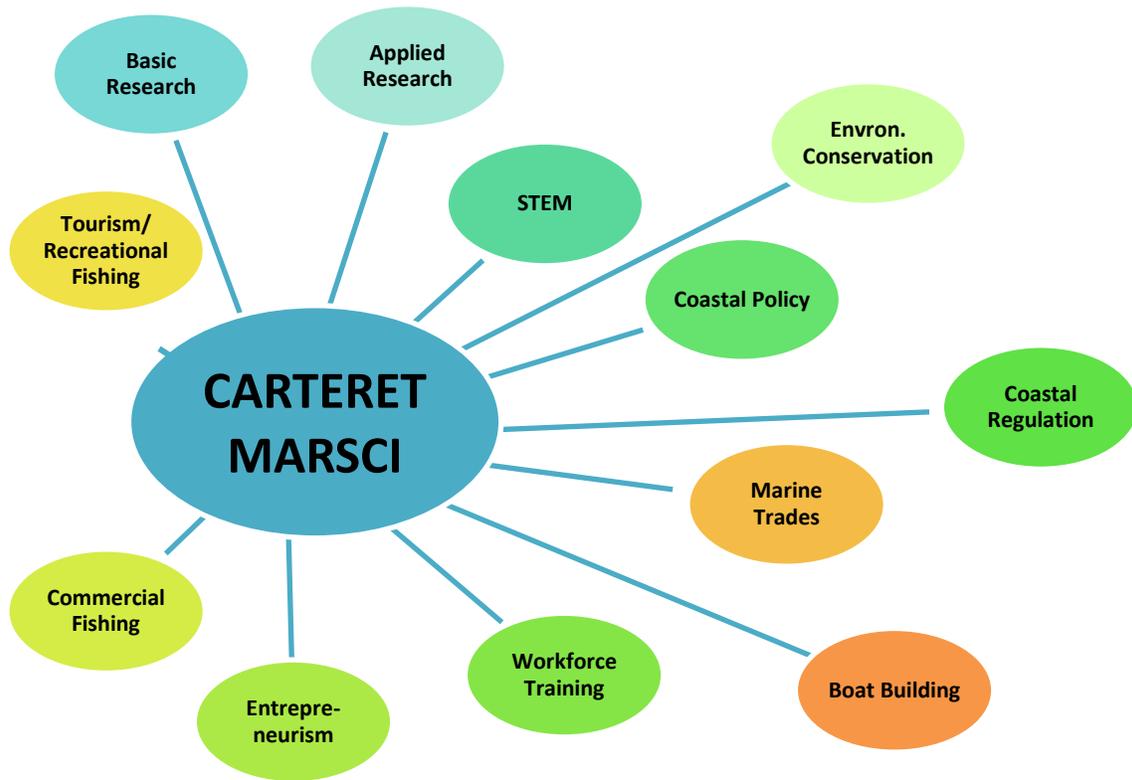
The following section provides a synthesis of Individual discussions with 18 Carteret MARSCI leaders that identifies key issues that reflect major strengths and challenges affecting the ability of the local marine science and education cluster to positively affect economic growth in Carteret County.

**Location, Location, Location**—The environmental and ecosystem assets present in Carteret County (and coastal North Carolina in general) combine to make this location uniquely valuable for marine science and maritime research. The confluence of major ocean currents, expansive estuarine systems, varied physical attributes (including dynamic barrier islands and inlets), extraordinary biodiversity and a rich maritime history embodied in the densest concentration of shipwrecks in the United States makes this area attractive to scientists and researchers across a variety of disciplines. All interviewees spoke about the value of the setting for pursuits covering a broad range of marine and coastal science and for their particular area of interest.

**Cross-Cutting Collaboration: the Potential and the Reality**—The concept of intersection informs more than the meeting of the Labrador and Gulf Stream currents at Cape Lookout; it aptly describes the juncture in marine science of chemistry, biology, physics, and geology creating opportunities for interdisciplinary research that could result in new ways of understanding, managing and innovating around living organisms and environmental processes. The relatively small and stable nature of the Carteret research community facilitates awareness of expertise, specialized equipment and other assets in the area, enhancing the potential for identifying opportunities to partner. Examples of research collaboration were identified but as described are opportunistic rather than strategic and are as likely to involve collaboration with their home institutions as with other local entities in the Carteret marine science cluster. Barriers resulting from local facilities being branches of remote administrative headquarters were cited as one impediment to collaboration. A *Center of Excellence* model was suggested as a potential vehicle to promote collaboration across disciplines and institutions. Such a center could incentivize collaboration by providing resources (monetary and physical) needed to change the prevailing model of stand-alone efforts.

**Scope: Vectors of Marine Science on Carteret's Economy**— The scope of enterprises and sectors directly involved with or benefiting from marine science research and education in Carteret County is impressive. Each of the linkages depicted in Figure 1 is but the beginning of a vector that echoes through the local economy with multidimensional impacts that have been captured in this study's EIA, reflecting direct, indirect and induced economic impact. Beyond these financial dimensions, the organizations and individuals that make up Carteret's marine science cluster make many contributions to enhancing the quality of life in Carteret County overall. Interviewees cited their active involvement and leadership of various civic, cultural and non-profit/charitable efforts. Youth engagement stands out, with a wide and on-going range of programs and outreach efforts that involve local member organizations of Carteret's marine science cluster.

**Figure 1: Carteret Marine Science Cluster: Vectors of Impact**



**Span but not Scale**– Descriptions of Carteret’s marine science cluster mirror that of the bays, sounds and estuaries that surround it—wide but relatively shallow. Endeavors included in the broader cluster portfolio touch an impressively comprehensive range of activities, including:<sup>1</sup>

- Basic research
- Health-focused research
  - Animal
  - Human
- Environmental science
- Applied research
  - Fishing
    - Commercial

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<sup>1</sup> Note: this list reflects areas of activity specifically referenced during interviews with leaders in select major Carteret MARSCI entities and is not meant to be construed as a comprehensive accounting of all categories of marine science research, education and engagement efforts taking place in Carteret County.

- Recreational
    - Aquaculture
    - Boat building and maintenance
- Coastal Conservation
- Coastal Ecology
- Coastal Hazards
- Policy Development and Testing
- Regulations Development, Testing and Implementation
- Marine Archeology
- Maritime Heritage and History
- Education
  - K-8 – field trips, experiential opportunities
  - Summer camps
  - Internships
  - College semesters at the coast
  - Workforce
    - Aquaculture
    - Marine Trades
    - Hospitality/Culinary
  - Early College
  - Graduate Research
  - Adult programming

As has been cited in other external reviews, the absolute size of individual efforts, notably at local facilities of higher education institutes, operate at limited scales that might leverage greater impact through more collaboration.

**Leveraging this Asset Base**– No obvious gaps in Carteret’s marine science cluster were noted by interviewees. Suggestions for growing the impact of the cluster took two tracks: organizational and regional. On the organizational level the need for increased funding, more personnel, competitive salaries and support for enlarging undergraduate field studies and semesters-at-the-coast programs were cited as impediments to expanding program scale and impact. These are largely internal challenges that can only be resolved by the individual organizations, although better data on impact and potential could augment their arguments for expanded support.

More creative ideas surfaced regarding how the cluster and its overall impact might be expanded, including the following:

- Build on nascent collective branding efforts with development of a marketing plan that reflects common goals targeting specified markets with awareness building and engagement messages
- Create a collaborative Center of Excellence around areas of particular collective expertise combined with nature-based competitive advantages. The place-based confluence of national and state coastal management and regulatory agencies, Cape Lookout National Seashore, basic research strengths, and emerging specialization in innovative technologies (e.g., drones) creates the fascinating possibility of creating a national center for comprehensive development, testing and application of emerging technologies for monitoring, managing and conserving threatened marine wildlife and coastal environments and for crafting best-practice policies around use of these technologies
- Broaden the economic and educational benefits of marine science in Carteret County by developing and expanding experiential opportunities that more closely link the tourism and heritage sectors to the basic and applied research elements of the cluster. Suggestions included creating citizen science and ecotourism offerings that embed visitors into field and ocean research events, boat building, etc.

**Living, Working and Playing in Carteret County**—Carteret County has it all, if in small doses. The charm of small town life is seen as an asset in recruiting and retaining talent, especially those with young families or at more established points in their career. Off-setting challenges noted by interviewees include the following:

- Employment opportunities: the scale of operations in the marine science sector and the relatively small size of the community at large create a situation where employment

opportunities at the professional level are seen as somewhat limited. The number of research positions has been fairly stable, with a few new hires anticipated in coming months. The issue of trailing spouses affects the success of recruitment efforts

- Recreation opportunities, cultural offerings, and the physical attractiveness of the area contribute to the sense that Carteret is a good place to be. Younger and single adults find the pace and recreational offerings limited but improving; the same remoteness that is seen by many as an asset for work can be unattractive to people wanting a faster-paced, more urban lifestyle
- Housing and infrastructure: The need for affordable housing, especially at the entry level, and the inadequacy of broadband service (availability, speed and affordability) are seen as impediments to growth that cut across sectors in the Carteret economy

**Metrics of “success”**– By most measures documented in this EIA, the organizations that constitute Carteret’s MARSCI cluster continue to make positive contributions on many levels to the county. That said, efforts to develop a unifying brand around marine science to better promote awareness and interest in the marine science research and education organizations in Carteret County and the possibility of collaborations around common interests and promising developments point to the value of regularly documenting progress along metrics that reflect expansion and deepening of the marine science cluster. Information collected would support data-driven strategies and decisions. This assessment provides a baseline against which changes in several important factors can be compared over time. Other baseline measures could be obtained in concert with the development and launch of branded marketing efforts and/or through targeted surveying of members of the broader MARSCI cluster. The following indicators of growth and success point to the information that needs to be collected across the elements of the MARSCI cluster and monitored going forward:

- Increased number of organizations in the Carteret MARSCI cluster
- Overall increased employment by Carteret’s MARSCI cluster
- Growth in MARSCI employment at different levels of education

- Expansion in the physical plant of local MARSCI institutions
- Increased investment in local marine science research and education institutions
- Growth in number and/or scale of collaborative projects among cluster members
- Increased awareness of Carteret’s marine science research and education resources in broader scientific, education and funding communities
- Extension/ expansion of MARSCI programming to broader community/tourists/students
- Higher scientific literacy among Carteret citizens
- Increased number of local students pursuing degrees/certifications in marine science and trades
- Better land management, conservation, and fisheries policies

### **Rounding Out the MARSCI Cluster Analysis**

Questions and topics discussed during the interviews and as a results of the EIA point to additional information that is needed to fully understand the ways in which the Carteret marine science and education cluster is actively and potentially affecting competitiveness in Carteret County:

- As a significant physical, economic and cultural presence in Carteret County the organizations composing the MARSCI cluster need to be actively engaged in the county’s strategic planning efforts. The dearth of affordable housing for marine science new hires, staff and students is one example where concerns expressed by leaders of studied institutions and public officials intersect
- A stated but unproven assumption is that the various marine science research and education resources present in Carteret County have a significant effect on education and career choices made by local youth. Given the pending launch of the Marine Science and Technology Early College program (MaST), a timely baseline comparison of Carteret students with those in other coastal counties along parameters related to this question is needed. Appropriately timed follow-on assessments would provide data needed to validate further public investment and to guide potential joint strategic partnerships between marine science research and education institutions and the local school system

- The potential for spin-offs and partnerships between Carteret's marine science laboratories and commercial operations in a number of marine-science arenas has been a recurrent theme over time in the county but only a limited number of actual examples can be cited. There would be value in conducting an objective post-mortem assessment of previous technology transfer initiatives with an eye to informing future efforts to create a local entrepreneurial ecosystem that is better and more realistically aligned with Carteret's MARSCI cluster

## ***Conclusions***

For over a century Carteret County has been home to a diverse and growing collection of marine science research, education, regulatory and industry agencies. These marine science activities benefit from the county's extraordinary variety of environments and natural resources and their operations are well supported by the county's workforce, infrastructure and commercial services. In return, the presence and work of the marine science agencies confer overt and subtle benefits that pervade the county. For Carteret the marine sciences are an enterprise that creates significant practical economic benefits – jobs, income and wealth – for its current citizens while uniquely distinguishing the county as an attractive growth location for new visitors, residents, families and businesses. Primary conclusions extracted from focused analysis of the quantitative and qualitative impact of MARSCI in Carteret County are highlighted below:

### ***The Scope and Span of MARSCI in Carteret is Economically Significant.***

While they vary significantly in the nature of their missions and in the scale of their operations, the eight studied MARSCI agencies constitute the core of a geographically-concentrated set of marine science-related capabilities among the largest and most diverse anywhere in the United States. Their Carteret County location offers tremendous advantages to their disparate missions as it provides ready access to the second-largest estuary in the United States and is within easy reach of the northward flowing Gulf Stream, which supports one of most diverse and productive ecosystems in the world. Together the eight agencies have a collective annual budget of \$54 million and 542 employees, placing Carteret County among the nation's leaders as a center of marine research, education and policy. They are economically significant, locally and beyond.

### ***Marine Sciences are an Industry with Scale***

While their nature as marine research and education organizations may appear unconventional, MARSCI agencies affect their local economy in much the same manner as more familiar industries, businesses and public agencies. Collectively, Carteret's eight major MARSCI agencies

constitute one of the county's largest sources of jobs, income and revenues. As with firms in other industries, MARSCI agencies are buyers of goods and services for their operations whose reliance on local suppliers creates additional economic impacts through gains in Carteret County businesses' revenues and employee incomes.

### ***MARSCI in Carteret Leverages Significant Ancillary Economic Activity and Jobs***

The capital intensive nature of MARSCI operations, the high skilled and compensated nature of their staff, and the value-added sustainable use they make of Carteret County's natural resources result in a high degree of "***economic leverage***" by MARSCI agencies yielding substantial revenue, income and employment impacts within the county. This Economic Impact Assessment found that the eight MARSCI agencies' spending, along with that of their employees, leveraged an additional \$29 million in new economic activity and \$27 million in additional income supporting 521 jobs in Carteret County. All total, Carteret County's eight major marine science agencies are found to account for a total economic impact in the county of \$83 million in economic activity, \$64 million in salary and investment income, and the employment of 1,063 Carteret residents.

### ***MARSI in Carteret is a True Cluster***

The pervasive and active presence of MARSCI impacts across industry, government and all levels of education identify MARSCI in Carteret County as a fully-formed cluster, with all the opportunities that implies as a targeted focus for inclusive strategic planning and investment for synergistic growth.

### ***MARSCI Impacts Prone to Underestimation***

The MARSCI agencies' presence, operation and programmatic activities were found to make significant though often under-recognized contributions to the economy of Carteret County and the economic wellbeing of its citizens. Community awareness of MARSCI agencies' significance is likely challenged by the geographic disaggregation of their facilities between Morehead City and Beaufort, and by their waterside locations which lessens their visibility. Recognition is also

challenged by the fact that the MARSCI agencies vary widely in scale of both employment and budgets relevant to this analysis. Moreover there is a varied periodicity to the extensiveness of their individual levels of activity during the course of a year, resulting in an under recognition of MARSCI activity and thereby their economic significance. Nonetheless, while at any given period in the year the apparent economic effect of any single MARSCI agency may be slight, collectively their impacts intertwine to create a varying but continuous stream of economic contributions throughout the Carteret economy.

***Collaboration among MARSCI Stakeholders is an Under-Developed Asset***

Innovative developments with potential for economic importance are evident among studied MARSCI entities but the dearth of administrative and physical infrastructure to support more larger-scale collaborations complicates efforts to leverage benefits from strategic interactions.

***MARSCI Transformation Effects***

MARSCI in Carteret County is a powerful change agent contributing to making the region more economically competitive and environmentally sustainable. In addition to their documented quantifiable economic impacts, MARSCI agencies make long-term and transformative contributions to Carteret’s future through a variety of activities – from K-12 STEM education to workforce development to knowledge worker retention and attraction – that enhance the county’s human capital resources and enliven community vitality. MARSCI agencies and their staff play pervasive roles in their communities that differentiate Carteret County in ways that enhance and attract innovative industry, entrepreneurs, individuals and families. In addition to the eight MARSCI agencies in this EIA there are numerous other Carteret County entities (Appendix A) that have a marine or maritime research, education and/or policy component. Collectively they represent a significant number of employees and economic impacts that materially enhance the total economic impacts described in this report.

END

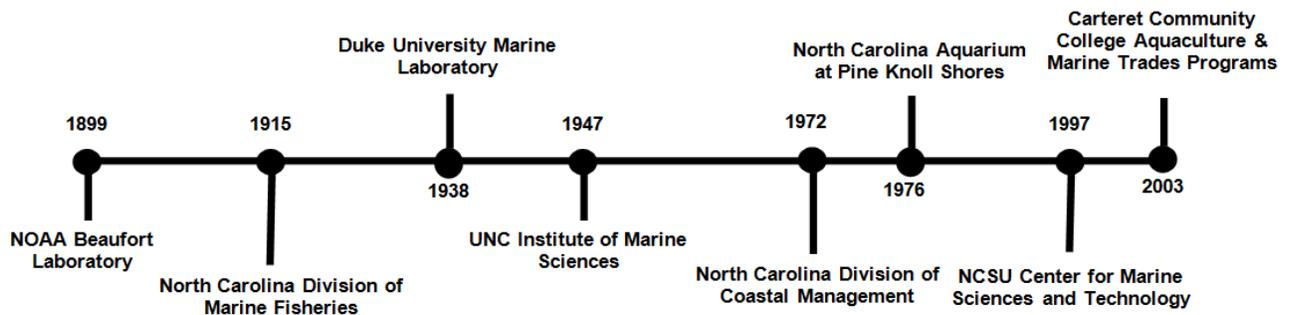
## APPENDIX A

For over a century Carteret County has been home to a diverse and growing collection of marine science research, education, regulatory and industry agencies. The first marine research field station was established in the county in 1860. Army surgeons stationed at Fort Macon catalogued the animal and marine life of the area and published their work in a series of articles in the 1870s. By the 1880s, professors and students from Johns Hopkins University were maintaining a field station in Beaufort, using the area as a summer teaching and research facility. Since those early beginnings the Carteret County marine science enterprise has expanded and diversified steadily (Figure 1). Profiles of the organizations that were focus of this study and other key members of Carteret County’s broader marine science cluster follow.

### Carteret Marine Science Studied Agencies

In May 2018 the Carteret County Economic Development Department commissioned an Economic Impact Assessment (EIA) that examined the economic impacts and calculated the collective contributions accruing from the research, education, policy and engagement activities of eight major marine science agencies (MARSCI) located in Carteret County.

Exhibit 1: Carteret MARSCI Development Timeline



### **Carteret Community College Aquaculture & Marine Trades Programs**

Beginning in 2003 Carteret Community College (CCC) launched its Aquaculture Technology Program that, in collaboration with Brunswick Community College, offers aquaculture lecture courses taught in person and via video conferencing in the a state-of-the-art saltwater aquaculture training, demonstration, and research facility in the CMAST building on CCC's campus. This program emphasizes both the science and enterprise management of mariculture (salt-water) species like oysters, clams, soft-shell crabs, and marine finfish, such as catfish, yellow perch, and hybrid striped bass. Local commercial shellfish operations provide on-the-job training for students through apprenticeships and cooperative education classes. The Marine Trades Program supplies the skilled workforce needed to supply the local and state boat building industry and to maintain the vessels used by the county's commercial and recreational boaters and its marine science institutions. <http://www.carteret.edu/programs/aquaculture-technology-university-transfer-option-degree/> and <http://www.carteret.edu/corporate-and-community-education/continuing-education-classes-vocational-marine-trades/marine-trades/>

### **Duke University Marine Lab**

Established in 1938, the Duke University Marine Lab (DUML) was the first permanent academic research facility to locate in Carteret County. DUML is a campus of Duke University and a unit within the Nicholas School of the Environment. Programs at the Marine Laboratory are central to the Nicholas School of the Environment's mission to provide interdisciplinary educational and research opportunities addressing an area of vital concern—the quality of the Earth's environment and the sustainable use of its natural resources. Faculty research at DUML is focused on oceanography, marine biology, marine biomedicine, marine biotechnology, and coastal and marine policy and management. Faculty and students study the biology of marine species, address global-scale marine issues, and use advanced technologies, analysis, and modeling that allow

science and policy to be evaluated across space, time and disciplines. DUML offers residential courses throughout the year. <https://nicholas.duke.edu/msc>

### **National Oceanic and Atmospheric Administration Beaufort Laboratory**

The National Oceanic and Atmospheric Administration's (NOAA) Beaufort Laboratory is the second-oldest (1899) federal marine laboratory and home to scientists from NOAA's National Marine Fisheries Service and National Ocean Service. Operated by the National Center for Coastal Ocean Science, this 60,000 square-foot lab on Pivers Island is recognized for its diversity of research areas, including: sea grasses, coral reefs, harmful algal blooms, seafloor mapping, aquaculture, and salt marsh ecology. The lab also houses the North Carolina Coastal Reserve and National Estuarine Research Reserve, which serve as living labs for scientists and students to learn about coastal systems. The lab has a full SCUBA diving roster, small boats, aquaculture systems, high-tech labs for cell analysis, necropsy facilities, electronics workshops, classrooms, and a large auditorium. <https://coastalscience.noaa.gov/about/facilities/>

### **North Carolina Aquarium at Pine Knoll Shores**

The North Carolina Aquarium at Pine Knoll Shores is one of three state aquaria established in 1976 to promote an awareness, understanding, appreciation, and conservation of the diverse natural and cultural resources associated with North Carolina's ocean, estuaries, rivers, streams, and other aquatic environments. The North Carolina Aquariums are a division of the North Carolina Department of Natural and Cultural Resources. The Aquarium offers opportunities for collaborative research and student internships for marine science institutions in the area. The Aquarium is an active contributor to STEM education efforts in the community, sponsoring experiential laboratory opportunities for K-12 students, continuing education workshops for teachers, and networking events between area researchers and K-12 educators. <http://www.ncaquariums.com/pine-knoll-shores>

### **North Carolina Division of Coastal Management**

The North Carolina Division of Coastal Management (DCM), headquartered in Morehead City, is part of the North Carolina Department of Environmental Quality. DCM works to protect, conserve and manage North Carolina's coastal resources through an integrated program of planning, permitting, education and research. DCM carries out the state's Coastal Area Management Act, the Dredge and Fill Law and the federal Coastal Zone Management Act of 1972 in the 20 coastal counties, using rules and policies of the N.C. Coastal Resources Commission, for which it serves as staff. DCM also receives oversight (and part of its funding) from the Office of Ocean and Coastal Resource Management, part of NOAA. DCM is responsible for several programs, including: permitting and enforcement; CAMA land-use planning; public beach and waterfront access; North Carolina Coastal Reserves; and grants for marine sewage pumpout. DCM collects and analyzes data for erosion rates, wetlands conservation and restoration, and to assess the impacts of coastal development. <https://deq.nc.gov/>

### **North Carolina Division of Marine Fisheries**

The North Carolina Division of Marine Fisheries (DMF), headquartered in Morehead City, can trace its roots back to 1822, when the North Carolina General Assembly enacted legislation to impose gear restrictions on oyster harvest. That was later followed by separate fish and shellfish commissions, which were combined in 1915 and established in Carteret County to form a commercial regulatory body. In 1965, the scope of the commission was expanded to include regulatory authority over recreational fishing activities in coastal waters. Today, DMF is responsible for the stewardship of the state's marine and estuarine resources with jurisdiction that extends to three miles off-shore. Its authority encompasses both commercial and recreational fishing activities in coastal waters. Research, monitoring and regulation efforts are conducted by its Fisheries Management, Habitat and Enhancement; Shellfish Sanitation and Recreational Water Quality; and Marine Patrol divisions. <http://portal.ncdenr.org/web/mf/about-dmf>

### **North Carolina State University Center for Marine Sciences and Technology (CMAST)**

North Carolina State University's (NCSU) Center for Marine Sciences and Technology (CMAST) principal mission is to discover innovative solutions to questions and problems in marine systems and provide effective communication of these discoveries. NCSU faculty and students have conducted research, education and extension activities in Carteret County since the 1960s. The NCSU Seafood Laboratory was established in 1970 and was housed in the North Carolina Division of Marine Fisheries building from 1973-2000 when it moved to the CMAST facility. Established in 1997, the 52,000 square foot CMAST facility hosts faculty, staff, and students from three NCSU colleges and six departments; in addition, 45 marine science faculty from 12 NCSU departments are affiliated with CMAST. Also housed at CMAST are NCSU's Science House, the Marine Biotechnology Center of Innovation, North Carolina Sea Grant, Carteret County Cooperative Extension, and Carteret Community College, affording opportunities for integrated research and outreach. <https://cmast.ncsu.edu/>

### **University of North Carolina Institute of Marine Sciences (IMS)**

The University of North Carolina at Chapel Hill Institute of Marine Science (IMS) was established in 1947 to conduct both basic and applied marine science research. IMS, together with the on-campus Department of Marine Sciences, forms the internationally-recognized UNC Marine Sciences Program. IMS's mission is to serve the State and the Nation by conducting cutting-edge research, training young scientists, providing expertise to governmental agencies and industry, and promoting new knowledge to inform public policy. IMS is located on 6.5 acres of waterfront property on Bogue Sound in Morehead City. IMS facilities include approximately 60,000 square feet of research space, a running sea water system that feeds both indoor and outdoor experimental facilities, outside experimental ponds, a small on-site dormitory, meeting rooms, maintenance and fabrication facilities, a small fleet of trucks and motor-powered boats ranging in length from 17-25 feet and a 48-foot vessel, the R.V. Capricorn.

<http://ims.unc.edu/>

### **Additional Carteret Marine Science Entities**

In addition to the eight MARSCI agencies in this EIA there are numerous other Carteret County entities that have a marine or maritime research, education and/or policy component.

Collectively, these additional organizations represent a significant number of employees and economic impacts that materially enhance the total economic impacts described in this report.

### **Public Agencies and University Programs**

#### **Cape Lookout National Seashore**

Cape Lookout National Seashore (CLNS), authorized in 1966 as part of the U.S. Department of Interior National Park Service, preserves a 56-mile-long section of the southern Outer Banks, running from Ocracoke Inlet on the northeast to Beaufort Inlet on the southeast. Three undeveloped barrier islands make up the seashore: North and South Core Banks and Shackleford Banks. CLNS's barren and isolated resources provide an unequalled setting for field research in natural and cultural conservation, coastal management and environmental education. Proximity to Carteret County's marine science research facilities, aquarium and maritime museum provides important opportunities for rewarding collaborations. <https://www.nps.gov/cal/index.htm>

#### **Carteret County Shore Protection Office**

The Carteret County Shore Protection Office (SPO) serves as the main point-of-contact for all beach restoration and shore protection activities in Carteret County with the U.S. Army Corps of Engineers, Federal Bureau of Ocean Energy Management, North Carolina Division of Coastal Management, North Carolina Division of Water Resources, and other resource and permitting agencies regarding beach restoration and shore protection, technology and policy in the county. SPO oversees monitoring efforts associated with permit compliance related to engineered beaches. SPO manages waterway dredging projects, including all aspects of federal and state permitting and authorization, grant application preparation and administration, contractor solicitation and award,

construction oversight, and coordination of these activities with County Staff and the Board of Commissioners. <https://www.carteretcountync.gov/295/Shore-Protection>

### **Carteret County Public Schools Marine Science and Technologies Early College**

Carteret County Public Schools Marine Science and Technologies (MaST) Early College High School launches its inaugural class of 50 freshmen on August 15, 2018 in facilities located on the Carteret Community College campus. Fifty incoming freshmen in each of the next four years will bring the school to its full enrollment of 200 students in grades 9-12 in 2021. The school has a marine focus, with students able to earn high school and college credits simultaneously. Students accepted to MaST are interested in marine propulsion, marine biology and aquaculture, engineering, cosmetology, technology and graphic design, business, welding, electrical work, nursing, university transfer and more. MaST is a partnership of the County and Carteret Community College.

[https://www.carteretcountyschools.org/cms/page\\_view?d=x&piid=&vpid=1318758984](https://www.carteretcountyschools.org/cms/page_view?d=x&piid=&vpid=1318758984)  
[872](#)

### **East Carolina University Institute for Coastal Science and Policy and Program in Maritime History**

Founded in 2007, the East Carolina University (ECU) Institute for Coastal Science and Policy (ICSP) works to understand North Carolina coastal systems to provide direct service to the community by testing knowledge gained through research against the real-world challenges. ICSP research concentrates on four main areas and their interrelationships including coastal ecology, coastal geoscience, social science, and public policy. ICSP draws on emerging technologies and conceptual tools such as systems and network theory, geographic information sciences, and computer-based modeling. The ECU Program in Maritime History partners with the North Carolina Maritime Museum in the conservation of artifacts from Blackbeard's Queen Anne's Revenge maritime archeology site. <https://www.qaronline.org/visit>

### **North Carolina Coastal Reserve and National Estuarine Research Reserve**

The North Carolina Coastal Reserve & National Estuarine Research Reserve (the Reserve) is a program of the North Carolina Division of Coastal Management (DCM) in the North Carolina Department of Environmental Quality. The Reserve is managed through a federal-state partnership between NOAA and DCM, headquartered in Morehead City. The Reserve protects more than 10,000 acres of estuarine habitat for research, education, training and stewardship programs. The Reserve participates in collaborations to improve water quality, protect coastal and estuarine ecosystems, and work with partners to enhance the resilience of North Carolina's habitats and communities to coastal hazards. Locally, the Rachel Carson Reserve is located just south of Beaufort, encompassing 2,315 acres across four islands that are only accessible by ferry or private boat. <http://www.nccoastalreserve.net/web/crp>

### **Carteret County Cooperative Extension Service**

Carteret County Extension Service (CCES) provides educational and technical assistance to citizens and businesses of Carteret County in aquaculture, aquatic plant management fisheries, and pond management. CCES 4-H programs partner with Science House in sponsoring the Sea Wolves Leadership Program for K-12 students and summer experiential learning programs and camps. CCES promotes local foods, including Carteret Catch, a membership organization that promotes local seafood. <https://carteret.ces.ncsu.edu/>

### **North Carolina Division of Coastal Management**

The North Carolina Department of Environmental Quality's Division of Coastal Management (DCM) works to protect, conserve and manage North Carolina's coastal resources through an integrated program of planning, permitting, education, and research. DCM carries out the state's Coastal Area Management Act (CAMA), the Dredge and Fill Law and the federal Coastal Zone Management Act of 1972 in the 20 coastal counties, using rules and policies of the North Carolina Coastal Resources Commission,

for which DCM serves as staff. DCM also receives oversight (and part of its funding) from the Office of Ocean and Coastal Resource Management, part of NOAA. The Morehead City headquarters office houses DCM's director and the headquarters of the North Carolina Coastal Reserve. CAMA major development permits and federal consistency reviews are processed in this office. <https://deq.nc.gov/about/divisions/coastal-management>

### **North Carolina Maritime Museum at Beaufort**

The North Carolina Maritime Museum System is part of the North Carolina Department of Cultural Resources. It is headquartered in Beaufort and consists of the Graveyard of the Atlantic Museum in Hatteras, the North Carolina Maritime Museum in Beaufort and the North Carolina Maritime Museum at Southport. The Beaufort museum reflects coastal life and interprets lighthouses and lifesaving stations, the seafood industry, motorboats, and more and serves as the repository for artifacts from Blackbeard's wrecked flagship, the *Queen Anne's Revenge*. Studies in marine life, science, and ecology are available for all ages. Highlights include an annual wooden boat show and whales and whaling symposium; summer science programs; and junior sailing school. The Beaufort Museum's Watercraft Center teaches boatbuilding for all ages. The Beaufort Museum sponsors the Cape Lookout Studies program with a focus on marine biological research, whale and dolphin conservation and education.

<https://ncmaritimemuseumbeaufort.com/>

### **North Carolina Sea Grant**

North Carolina Sea Grant (Sea Grant) is an inter-institutional program of the University of North Carolina system. This partnership between NOAA and the state of North Carolina is one of 33 Sea Grant programs across the nation administered by the National Sea Grant College Program. Sea Grant focuses on: research to support resolution of state, regional, and national coastal resource-management challenges; outreach via extension and communications teams who support the development and transfer of

resulting technologies and applications; internal program management, including grants administration; and educational programs that support a strong knowledge foundation for varied stakeholders, such as the academic community, government officials, businesses and industries, K-12 teachers and students, and the public. At the Morehead City facility Sea Grant operates the North Carolina State University Marine Aquaculture Research Center. <https://ncseagrant.ncsu.edu/> and <https://ncseagrant.ncsu.edu/coastwatch/previous-issues/2013-2/winter-2013/a-center-for-growing-seafood-testing-ideas/>

### **N.C. State University Science House**

The Science House enhances K-12 STEM (Science, Technology, Engineering, Math) education through hands-on, inquiry-based learning. Headquartered on the N.C. State Centennial Campus in Raleigh, Science House operates five satellite offices. Science House sponsors outreach and engagement efforts targeting students at all levels in Carteret County. Science House partners with 4-H in the Sea Wolves program to sponsor monthly teen coastal science cafes for talks with scientists and in supporting student teams in environmental knowledge and underwater drone construction competition. Science House promotes citizen science opportunities to the community.

<https://cmast.ncsu.edu/programs-cmast/science-house-cmast/>

### **NOAA National Weather Service**

The Newport/Morehead City office of the National Weather Service is one of 122 weather forecast offices in six regions Each weather forecast office (WFO) has a geographic area of responsibility, also known as a county warning area. The Newport/Morehead City WFO covers Beaufort, Carteret, Craven, Duplin, Greene, Hyde, Jones, Lenoir, Martin, Onslow and Pamlico counties, issuing local public, marine, aviation, fire, and hydrology forecasts. It also issues severe weather warnings, gathers weather observations and collects daily and monthly climate data for its assigned area. This local weather forecast office also controls the broadcasts of weather information

on the NOAA Weather Radio All Hazards Stations. <https://www.weather.gov/mhx/> and <https://www.weather.gov/about/>

### **Shellfish Sanitation and Recreational Water Quality Section**

The Shellfish Sanitation and Recreational Water Quality Section of the North Carolina Department of Environmental Quality's Division of Marine Fisheries ensures the safety of consumers of molluscan shellfish by monitoring harvesting waters and ensuring the proper handling of shellfish sold to the public. This section is also responsible for the permitting and inspection of shellfish processors statewide. The section ensures recreational water quality by monitoring ocean beaches and estuarine swimming areas for water quality, notifying the public when bacteriological standards for safe bodily contact are exceeded.

<http://portal.ncdenr.org/web/mf/shellfish-sanitation-and-recreational-water-quality>

### **Nonprofit Organizations**

#### **Bonehenge Whale Center**

The proposed Bonehenge Whale Center in Beaufort will provide facilities for research, exhibit preparation and display, marine conservation, educational programming, outreach, publications, and stranded specimen collection and maintenance of North Carolina cetaceans (whales, dolphins, and porpoises), past and present. "Bonehenge" grew out of successful efforts to prepare and re-articulate a 33.5 foot male sperm whale that stranded and died at Cape Lookout, now displayed at the North Carolina Maritime Museum. In early 2017, volunteers and donors collaborated to purchase land on West Beaufort Road adjacent to the North Carolina Maritime Museum's Gallants Channel Annex. The proposed site is now owned by the 501(c)(3) charitable non-profit, the Carolina Cay Maritime Foundation. A building proposed for this site will provide improved work and display space for projects to representing the diversity of cetaceans found along the North Carolina coast. Fundraising for this project is underway.

<https://bonehenge.org/>

### **Core Sound Waterfowl Museum**

Core Sound Waterfowl Museum (Core Sound), located on Harker's Island is a regional center for cultural preservation and natural resource protection that brings together partners and projects focused on sustaining communities through collaboration, education, heritage tourism and community development. Core Sound offers hands-on demonstrations of decoy carving and quilting, touchable community exhibits, relaxing outdoor experiences and meaningful field trips. Core Sound's work in STEM (Science, Technology, Engineering, Mathematics) ranges from pre-school activities in natural science along the Willow Pond trail to high school-level research on water quality and the effectiveness of living shoreline design practices. Ongoing projects include a wetland restoration project, hiking trail expansion, and outreach programming at the local high school in food sciences and marine science exploration. Summer camps and teacher workshops, school field trips and collaborations with Cape Lookout National Seashore provide experiential STEM opportunities at all levels. <http://www.coresound.com/>

### **Marine Bio-Technologies Center of Innovation**

The Marine Bio-Technologies Center of Innovation (MBCOI) was established in 2012 through an inception grant from the N.C. Biotechnology Center. As an independent, non-profit 501(c)(3) corporation, MBCOI combines a regional focus with a global perspective, serving as a nexus for information, collaboration, and commercialization of marine biotechnologies among its stakeholders, both domestically and internationally. MBCOI's regional office in CMAST in Morehead City provides convenient access to the local scientific community as well as more distant stakeholders such as the Coastal Studies Institute in Wanchese, and Eastern Carolina University in Greenville. MBCOI also has offices in Wilmington and the Research Triangle Park. [MBCOI.net/](http://MBCOI.net/)

## **North Carolina Coastal Federation**

The North Carolina Coastal Federation is a member-supported 501(c)(3) that is focused on protecting and restoring the North Carolina coast. Headquartered in Newport, the Federation also has offices in Wanchese and Wrightsville Beach. The Federation was created to give a united voice to the need for long-term coastal management by bringing together traditional and nontraditional organizations, government agencies and businesses to collaborate in delivering educational opportunities, restoration efforts, advocacy and news and information on issues affecting the coast. The federation has 16,000 supporters and reaches almost 300,000 people directly each year.

<https://www.nccoast.org/>

## **Private Sector**

### **Attollo UAS Aviation**

Attollo UAS Aviation (Attollo) provides comprehensive services to businesses and government around Unmanned Aerial Vehicles (UAV), or drones. Services include situation analysis, training, enterprise solutions and consulting related to UAV applications. Attollo focuses on unmanned systems, training, payloads, and ground-based data processing equipment. Local partners include Duke Marine Robotics & Remote Sensing Lab and University of North Carolina Institute for Marine Sciences in a U.S. Department of Defense-awarded UAV land and facility management project.

<https://www.attollouas.com/>

### **Geodynamics**

Geodynamics specializes in the development and execution of scientifically rigorous field programs, advanced geospatial data processing and analyses, and custom GIS database design for a variety of terrestrial, coastal, and offshore objectives. Clients include the U.S. Army Corps of Engineers, NOAA, the U.S. Navy, port and transportation authorities, resource management agencies, environmental consulting and engineering firms, and marine construction companies. Its founders and staff have educational and

work histories with local research institutions and have extensive experience in marine remote sensing and surveying and the science behind them.

<https://www.geodynamicsgroup.com/>

### **Marshallberg Farm**

Marshallberg Farm is the largest source of farm-raised, sustainable Osetra caviar and Russian sturgeon in the United States at its facilities in eastern and western North Carolina. The facility in Carteret County has a 40-tank indoor recirculating aquaculture system housed in two buildings, a total of 54,000 square feet of tank space with the ability to product five-to-seven tons of caviar and 80 tons of raw sturgeon (40,000 sturgeon). <https://www.marshallbergfarm.com/>

### **Seahorse Coastal Consulting**

Seahorse Coastal Consulting (SCC) is a startup company focused on real-time storm surge guidance with ADCIRC, a system of computer programs for solving time-dependent, free-surface circulation and transport problems in two and three dimensions, modeling tidally and wind-driven circulation in coastal waters, forecasting hurricane storm surge and flooding, dredging feasibility and material disposal studies. SCC specializes in ADCIRC implementation, support, training, testing, and troubleshooting; validation of coastal physical oceanographic models; open-ended analysis of physical oceanographic data; and software development for coastal modeling and data analysis projects. Its founders are alumni of North Carolina institutions with post-graduate training at local marine laboratories. <https://www.seahorsecoastal.com/>

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