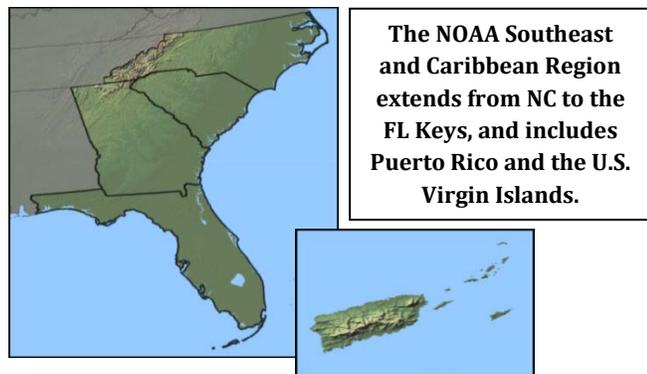


The Southeast and Caribbean Region

Geography and Environment

The National Oceanic and Atmospheric Administration's Southeast and Caribbean region is composed of the land areas of North and South Carolina, Georgia, Florida, Puerto Rico, and the U.S. Virgin Islands, and the marine environment adjacent these lands. Topography ranges from mountains to coastal plains to expansive or abrupt continental/island shelves and intervening ocean basins. The region contains extensive riverine, estuarine, marsh, barrier island, forest, mangrove, and coral reef systems.



Climate is warm-temperate to tropical. Three large marine ecosystems support a diverse assemblage of marine life, with 18 protected marine species, over 600 marine managed areas, and one of the world's largest shallow water coral reefs. The Gulf Stream is an important influence on biological, chemical, and physical characteristics. The Florida Keys National Marine Sanctuary lies at the crossroads between the Gulf of Mexico and the Caribbean Sea, and is the most biologically diverse coral reef ecosystem within the wider Caribbean. Natural and human-influenced hazards include thunderstorms and tornadoes, floods and debris flows, earthquakes, tsunamis, drought and wild fires, winter storms, subsidence, saltwater intrusion, coastal erosion, and tropical storms and hurricanes.

Social and Economic Context

The region is socially, politically, and culturally diverse. The expansion of recreation and tourism, residential development, service industries, and commercial space is transforming the region's social, economic, and physical state. Population in the region continues to increase, especially along the coast and Piedmont area (Atlanta to Raleigh corridor). Populations in NC, SC, GA and FL saw 15.3-18.5% increases from 2000 to 2010, while the U.S. Virgin Islands (USVI) showed little gain in population and Puerto Rico (PR) decreased. The growing population across the Southeast has increased demands on resources, such as water for residential, agricultural,

industrial, and recreational uses. Of the almost 43 million people living in the four southeast states, 37% reside in the coastal counties bordering the Atlantic Ocean, and 4.4 million live in flood hazard areas. In PR and USVI, a substantial number of the 3.8 million residents live in close proximity to the coast.

In 2010, economic activity in the Southeast region (excluding U.S. territories in the Caribbean) accounted for more than 10% of the U.S. economy, supporting 16 million jobs, yielding \$657 billion in wages, and producing \$1.7 trillion in gross domestic product (GDP). Ocean-dependent activities like commercial fishing, ocean-dependent tourism and recreation, and shipping accounted for 323,000 jobs, \$7.6 billion in wages, and \$17.2 billion in GDP. As in other parts of the nation, the largest share of ocean-dependent jobs was in the tourism and recreation sector. In 2010, tourism and recreation accounted for 85% of the region's ocean-dependent jobs and 71% of its GDP. The marine transportation sector accounted for another 11% of ocean-dependent jobs and 23% of GDP. The region has over 35 ports and terminals that service cargo and passenger ships including some of the country's largest and fastest growing container ports.¹

Drivers and Challenges

Understanding what matters to the constituents of the region is a step toward improving overall NOAA responsiveness. Important drivers and challenges influencing the concerns of NOAA constituents include:

- Rapid land-use changes
- Economic development
- Population growth in both inland corridors and coastal areas
- Degraded water quantity and quality, including impacts from land based sources of pollution
- Climate-change impacts
- Degradation and loss of riverine, coastal and marine habitats, including coral reefs
- Sustainability of fisheries and food security
- Recovery of protected species
- Offshore and coastal energy development
- Extreme weather, flooding, and geologic events
- Modernizing maritime infrastructure to keep pace with global shipping trends

¹ National Oceanic and Atmospheric Administration (NOAA). Spatial Trends in Coastal Socioeconomics (STICS) Data. Based on data from the Bureau of Labor Statistics and the Bureau of Economic Analysis. Silver Spring, MD: NOAA National Ocean Service. <http://coastalsocioeconomics.noaa.gov/>.

National Oceanic and Atmospheric Administration (NOAA). Economics: National Ocean Watch (ENOW) Data. Based on data from the Bureau of Labor Statistics and the Bureau of Economic Analysis. Charleston, SC: NOAA Coastal Services Center. www.csc.noaa.gov/enow.

NOAA in the Southeast and Caribbean

NOAA has substantial assets within the region, including workforce concentrations in:

- Beaufort, NC (NOS, NMFS)
- Asheville, NC (NESDIS)
- Charleston, SC (NOS, NMFS, NWS, NESDIS)
- Miami, FL (OAR, NMFS, NWS, NOS, NESDIS)
- St. Petersburg, FL (NMFS, NOS, NWS, AOC)

Although not major concentrations, NOAA assets are also located in PR and the USVI, enabling engagement within the U.S. domestic and wider-Caribbean. The region includes three National Marine Sanctuaries:

- Monitor NMS, NC (offices in Norfolk, VA)
- Grays Reef NMS, Georgia
- Florida Keys NMS, Florida

A River Forecast Center is located in Atlanta, while Weather Forecast Offices are located in each state and U.S. Caribbean. Geodetic advisors reside with institutions in NC, SC, FL and PR. The NOAA aircraft operations center is located at MacDill Air Force Base in FL and two ships (Ronald Brown and Nancy Foster) home port in Charleston, SC. Port agents, law enforcement staff, and navigation managers are distributed along the coast. In addition to NOAA employees and facilities, NOAA engages with and benefits from partnerships with NOAA-supported entities, including:

- 6 National Estuarine Research Reserves
- 6 Coastal Zone Management programs
- 5 Sea Grant programs
- 3 Cooperative Institutes
- 2 Regional Integrated Science and Assessments programs
- 2 regional associations of coastal ocean observing systems
- 2 regional Fishery Management Councils

Regional Collaboration

Regional collaboration expands on existing coordination and communication efforts by enhancing program integration activities to address NOAA's priorities at national and regional scales, and improving productivity and value to constituents. Regional teams identify and apply NOAA's range of capabilities to design place-based solutions for constituents. Each team helps NOAA to:

Integrate: The network helps NOAA achieve goals by facilitating collaboration, within regions and between national and regional groups. By growing occasions to work together, the network identifies ways of solving problems that improves how NOAA does business.

Innovate: The network enables line offices to generate ideas for better serving the public. Decision-support tools and user-friendly visualizations have been catalyzed by team efforts, and the network helps tailor application of products to the needs of other regions.

Engage: The network amplifies NOAA's capacity by forging links to agencies, universities, membership groups, private companies, and nonprofits. Regional teams offer a place-based approach to engagement that highlights NOAA's capabilities as a whole.

NOAA's Southeast and Caribbean Regional Team (SECART) helps NOAA address regional issues by:

- Promoting and leveraging a One-NOAA approach
- Improving communication throughout the region, within and external to NOAA
- Assisting and coordinating means by which NOAA line offices, partners and constituents contribute to and benefit from NOAA products... and the research and development activities that lead to these products...as they address regional issues
- Sharing technical and administrative assets and expertise to add value to activities and projects
- Improving access by NOAA staff, partners, stakeholders, and constituents to NOAA products
- Identifying regional issues, requirements and priorities, proposing and pursuing coordinated solutions, and advocating for these within NOAA
- Identifying methods to engage regional partners in a sustainable, systematic, and inclusive way

The SECART Integrated Operating Plan for FY13 helps address these objectives utilizing an integrative, cross-line office approach, with an emphasis on enhancing communication and coordination. Priority activities are aligned with the goals of NOAA's strategic plan.

Ensuring Healthy Oceans

Coastal and marine habitats in the Southeast and Caribbean region are threatened by land use changes, increased demands on water, non-point source pollution, fishing pressures, and invasive species. NOAA is working with local agencies, communities, and researchers to better understand ecosystem processes (including human elements) and develop protection and management strategies that promote ecosystem sustainability, food security, recreational opportunities, and livelihoods.

Regional Priorities for the NOAA Habitat Blueprint

The NOAA Habitat Blueprint provides a framework for NOAA to act strategically across programs and with partners to address coastal and marine habitat loss and degradation. Establishing focus areas for long-term habitat science and conservation is one element of the

Blueprint. NOAA's regional teams are helping coordinate meetings of NOAA offices and partners to identify spatial intersections where collaboration among NOAA and external management and science programs would address habitat-dependent objectives. Focal habitats and locations are expected to consider federally-managed fish species, protected species, at-risk areas, resilient coastal communities, and societal uses. An initial activity in the Southeast will involve developing a white paper identifying regional habitat-related efforts.

Advancing Sentinel Site Cooperatives

The North Carolina Sentinel Site Program (NC SSP) utilizes existing assets and programs to better leverage resources across NOAA and its partners to integrate efforts and provide information and tools to help communities and resource managers adapt to sea level change. As part of the NC SSP's 5-year Implementation Plan, the NC SSP will determine gaps in research and monitoring information related to factors controlling the response of coastal habitats to sea level rise through a 2-day research and monitoring workshop. Researchers will share work and identify and prioritize research and monitoring gaps. Given national SSP requirements, gaps in research and monitoring needs should be identified by June 2013. Gaps will be used to inform budget options for fiscal out-years. Several aspects of the sentinel sites work will also facilitate Habitat Blueprint objectives.

Coral Listings

NOAA recently announced a proposal to list seven reef-building corals in the Caribbean under the Endangered Species Act, as well as proposing that the two Caribbean coral species (*Acropora palmata* and *Acropora cervicornis*) currently listed be reclassified from threatened to endangered status. A final decision is expected following a public comment period. Corals are important to the biodiversity of world oceans and have economic value for communities. Reefs provide home to over 25% of ocean fish and up to two million marine species. Threats to corals include disease, rise in ocean temperatures, ocean acidification, effects of fishing, and poor land-use practices. There is evidence that reducing local stressors can help improve resiliency for many coral species. Through NOAA in the Caribbean, NOAA has an established network in the U.S. Caribbean and south Florida reef track engaging stakeholders and communities, aiding communication, and coordinating scientific, technical assistance, and marine resources management across NOAA and with partners. If any coral species are listed, regional expertise can contribute to NOAA's outreach to communities as well as identify data or best management practices that may inform recovery plans and identification of critical habitat. Caribbean needs for addressing corals can be furthered through strategic prioritization via the NOAA Caribbean

Strategy and NOAA budget process, partnerships like the Caribbean Landscape Conservation Cooperative, and integration of NOAA's capacity across lines such as in partnership with NOAA's regional climate services.

Enabling Climate Adaptation and Mitigation

Low-lying coastal areas, population growth, valuable fisheries, and fragile coral reef systems are among the characteristics making this region vulnerable to impacts from climate change. Considerations for the region include sea level rise, coastal erosion, ocean acidification, elevated water temperatures, changes in precipitation, drought, and more frequent weather events such as storms and flooding. NOAA is enhancing its climate-related services in this region by working with stakeholders to meet their needs for credible information related to local- and region-specific impacts and adaptation strategies.

Southeast and Caribbean Climate Outreach Community of Practice

Through FY10 to FY12, regional efforts established a Climate Outreach Community of Practice (CoP) for coastal managers in the Southeast. CoP's purpose is to enhance the capacity of coastal climate extension and outreach professionals to provide accurate and timely information, tools, and assistance on coastal climate issues to stakeholders. Two workshops were hosted to bring the region's extension and outreach community together with climate experts, community planners, and decision makers to help them understand climate change considerations, adaptation strategies, and risk and vulnerability assessment processes and tools. Outcomes from the workshops included several requests for more information and communication, including a "who's who" directory of climate information providers and practitioners, and recognition that communication among the CoP needs to be sustained. FY13 priorities will support a prototype directory of climate information providers and practitioners, linked from the SECART website and the prototype National Climatic Data Center integrated regional climate services portals, as well as a webinar series for the CoP to sustain communication among the members and provide information on climate science and service activities in the region.

Communication and Outreach with NIDIS Projects

Broad portions of the Southeast continue to be in a severe to exceptional drought, with negative agricultural, natural resources, recreational, health, and economic impacts. To assist communities' planning and information needs, two National Integrated Drought Information System (NIDIS) pilots are active in the region: Carolinas and Apalachicola-Flint-Chattahoochee (ACF). Both pilots are designed to promote long-term capacity in early warning systems for drought onset while supporting impact assessment, reporting, and

communication during events. This is achieved in part through interaction with constituents and by providing NIDIS pilot information as input to regional outreach utilizing websites, newsletters, webinars, and the U.S. Drought Portal. During FY13, NIDIS pilot efforts will simultaneously benefit from regional partner lists, to better engage non-traditional constituents in drought early warning and assessment activities.

Informing Climate Science Center and Landscape Conservation Cooperative Science and Services

NOAA is a regional partner with the Department of Interior (DOI) in supplying and supporting the delivery of climate science and services. A mechanism for NOAA-DOI coordination at the regional scale is the Landscape Conservation Cooperative (LCC) network, supported in part by DOI Climate Science Centers (CSC). Together, the DOI CSCs and LCCs provide a framework to identify landscape-scale science and services priorities for conservation and management. NOAA is engaging with the Southeast CSC and South Atlantic, Peninsular Florida, and Caribbean LCCs, and utilizing its network of partners, to ensure that NOAA priorities are informing DOI CSC and LCC science planning and funding decisions. NOAA's Eastern and Southern regional climate services directors (RCSDs) sit on steering or advisory groups for these entities, and coordinate input into science planning meetings, project proposal reviews, planning initiatives, and cross-DOI CSC and LCC coordination.

Caribbean Sub-Region Focus

Climate priorities influencing NOAA execution in the Caribbean are considered within the context of NOAA's Climate Goal societal challenge areas, which constitute a framework for development and delivery of climate services to make decisions for adaptation actions and other climate-sensitive needs. "Climate Impacts on Water Resources" targets the management of water resources under changing climate conditions; "Coasts and Climate Resilience" examines how sea-level rise and inundation impact coastlines and coastal communities; "Sustainability of Marine Ecosystems" promotes climate science and services in support of managing marine ecosystems; and "Changes in the Extremes of Weather and Climate" focuses on enhancing the ability of resource managers, policy makers and the public to apply climate information to prepare for and adapt to changes in climate extremes and their impacts. Drawing from this perspective, needs for climate services have been identified for the Caribbean that couple NOAA and interagency capabilities with information and services gaps among NOAA constituents. They provide a basis for linking NOAA assets to service delivery opportunities via partner networks and by engaging user communities:

- Increasing understanding of regional and local impacts from hazardous water resources events and providing information to support hazards and land use planning with respect to water resources
- Assessing impacts of climate change on sea level rise, coastal habitats and species, coral ecosystems, and coastal infrastructure, and supporting restoration and conservation of reefs and coastlines to maintain healthy habitats
- Delivering outlooks of extreme climate-scale events, closely coupled to assessments of societal and economic impacts and building capacity for early warning systems (e.g. coral bleaching events)
- Improving communication and coordination of information delivery and service provision between governments, the private sector, nongovernmental organizations, academia, and the media

Communication of Caribbean Climate Information

NOAA's activities in FY12 helped strengthen and expand partnerships for climate science and service delivery in the Caribbean. Strategic guidance includes the draft NOAA Caribbean Strategy, which has as one of its goals "Strengthened Understanding of, and Adaptation to, a Changing Climate." NOAA in the Caribbean (NOAACarib), an initiative whose steering committee reflects multi-line office and NOAA-partner membership, works to integrate activities in the region, such as through a first-ever all-hands NOAA in the Caribbean partners meeting held in May 2012. External partnerships also are helping to guide NOAA's vision for Caribbean climate services. These include the Caribbean LCC, which NOAA engages through its steering committee and by supporting a Caribbean LCC outreach and partnership coordinator, part of a collaboration among NOAA, U.S. Forest Service, and the PR Dept. of Natural and Environmental Resources. A 2010 memorandum of understanding between NOAA and the Caribbean Community Climate Change Centre (CCCCC) provides a mechanism for international, Caribbean-wide collaboration on climate science and service delivery, with an emphasis on coastal and resource management issues. The Caribbean Regional Climate Outlook Forum (CariCOF) process, reinitiated in FY12 with leadership from NOAA's Climate Program Office in partnership with the Caribbean Institute for Meteorology and Hydrology, links NOAA capabilities in climate forecasting to meteorological services across the region and with partners.

Near-Term Caribbean Climate Objectives

The activities, strategic frameworks, and agreements outlined above will guide next steps for NOAA's delivery of regional climate services to the needs of Caribbean constituencies in FY13. Specific activities will include:

- Produce a 2012 NOAA in the Caribbean workshop report summarizing opportunities and partnerships to help implement climate services including for priorities in the draft NOAA Caribbean Strategy
- Produce a 2012 Southeast and Caribbean CoP workshop report and provide webinars on climate adaptation and contextualized for Caribbean needs
- Convene a 2013 CariCOF to continue building regional capacity to develop and deliver climate outlook products and information on impacts
- Convene a 2013 NOAA in the Caribbean partners meeting and utilize it to further link NOAA climate services capacity to needs and information gaps

Supporting a Weather-Ready Nation

NOAA is helping regional decision-makers, residents and businesses prepare for and respond to high-impact weather events, including hurricanes, thunderstorms and tornadoes, snow and ice storms, drought, and flooding. Efforts focus on reducing impacts, improving water resources management, transportation efficiency and safety, and working with the health sector to identify linkages among human health, weather, water, and climate. In the Southeast, coasts are vulnerable to flooding from hurricanes, tropical storms and extra-tropical low pressure systems. Storm surge and related coastal flooding is often the greatest threat to life and property from a tropical cyclone. Much of the populous Atlantic and Gulf of Mexico coastlines lie less than 10 feet above mean sea level, and over half of the nation's economic productivity is located in coastal zones. Priorities influencing NOAA execution are improving readiness and resiliency from tropical storms along the Southeast coast and Caribbean.

Communication of Storm Surge Hazards

NOAA's National Hurricane Center (NHC) is responsible for issuing track, intensity, and size forecasts for tropical cyclones. The NHC, coordinating with NWS offices and other forecast centers, predict the potential impacts by issuing surge, wind, and rainfall forecasts for tropical storms and hurricanes. The forecasts are the basis for watches and warnings issued to alert the public of these hazards. The suite of warnings includes tropical storm and hurricane watches and warnings primarily based on wind speed forecasts. Forecasts of storm surge are included within the products, but currently the NHC and local NWS offices do not explicitly issue a warning for storm surge, one of the major threats from a tropical cyclone. NOAA regional assets can assist needs to educate the public and emergency managers to provide a better understanding of hurricane hazards and storm surge watches, warnings, and decision support products.

Decision Support for Coastal Hazards from Storms

In May 2011, feedback from the North Carolina Emergency Management (NCEM)/East Carolina

University (ECU)/NOAA Hurricane Workshop showed a need among decision-makers for training on better understanding and utilizing tropical cyclone forecast and warning information. To help address this need, a series of webinars were arranged within the region, including: 1) impacts of storm surge, storm tide, and available tools to facilitate assessment; 2) local factors that impact storm tide (e.g., channels, estuaries, barrier islands); and 3) impact of wind and available tools for assessment. Each webinar was attended by 60 to 70 decision-makers from the mid-Atlantic to the Gulf coasts. Three webinars will be scheduled in the spring of 2013 to again improve readiness for the 2013 Atlantic hurricane season.

Inundation Forecasts and Post-Storm Assessments

With the goal of saving lives and property through improved inundation forecasts and understanding of impacts, NOAA will work to develop a network of volunteer observers to capture water inundation heights and extents, and information on impacts. Following storms Irene and Sandy, NOAA has been challenged to understand the degree of coastal and inland locations impacted by storm surge. This effort will gather people active in storm surge modeling, forecasting, and measurement to identify needs, opportunities, and constraints for providing inundation information, and to for plan implementation. Incorporating the use of Sea Grant extension agents, this effort could also facilitate the building of long-term climatologies of flooding.

Collaborating and Informing on Rip Current and other Beach Hazards

Beach hazards account for a significant risk to the safety and health of citizens and visitors to the region. Since 2000, there have been over 82 rip current-related fatalities in the Carolinas alone. NOAA is testing a new Beach Hazards Message to incorporate alerts to additional potential hazards that beach-goers could experience such as harmful algal blooms. Line offices are collaborating on how to use the Beach Hazards Message at a national level to relay forecasts and information, and enhance services provided to the public.

Growing Capabilities for Environmental Forecasts

NOAA has established six pilot projects to prototype ideas in the Weather Ready Nation Roadmap. Projects are designed to enhance NOAA's presence in targeted locations, and will emphasize the role of communities in preparing for environmental events. The Tampa Bay Weather Forecast Office is serving as a test program for integrating environmental services, looking to expand the focus on ecosystems and enable collaboration with federal and local partners. Enhanced collaboration will enable exploration of new efforts with agencies and evolving partners, including assessing the effectiveness of integrated environmental support services.

Extending Existing Water Level Forecasts Into Tidal/Surge Zones of Rivers Feeding Tampa Bay

Historically, NWS River Forecast Centers (RFC) have modeled rivers using techniques that prohibit the extension of river-level forecast models into areas of flat slope and areas affected by tides and storm surge. Much of the coastal plain of the Southeast falls into this category, an area coincident with concentrated populations living near the coast and other water bodies. With the recent implementation of the Community Hydrologic Prediction System (CHPS) at NWS RFCs, the U.S. Army Corps of Engineers' HEC-RAS hydrodynamic modeling system can be integrated into operational modeling and forecast systems at the Southeast RFC. This effort will help to incorporate the effects of storm surge, and is necessary to facilitate the construction of real-time inundation mapping services that can complement NOAA's coastal inundation mapping efforts.

Promoting Resilient Coastal Communities and Economies

With increasing demands on resources, communities must balance environmental and economic considerations. NOAA is working with stakeholders to increase community resilience and productivity in the region through coastal and ocean planning, improved water quality, port and marine transportation resilience, and reduction of impacts from hazards and climate change.

Post-Disaster Redevelopment Planning

NOAA is supporting the Governor's South Atlantic Alliance to promote a regional approach to disaster-resilient communities. Areas of the southeastern states continue to experience climate and hazards events that threaten populations and infrastructure, and the tourism and fishing industries. Understanding our vulnerability to and impacts of these events enables managers and decision makers to adapt management strategies, improve planning, and develop mitigation options. NOAA is contributing to actions identified by the Alliance to improve post-disaster redevelopment planning for coastal communities. Building from a Long-Term Recovery Planning Summit held in Florida, the Alliance is evaluating disaster recovery resources, tools, and partnerships for regional application.

Wave Run-up and Coastal Vulnerability

Coastal over-wash, erosion, and inundation from storms are significant issues facing coastal communities. These were clearly demonstrated following Hurricane's Irene and Sandy in the Southeast, where effects were observed well away from where the storms made landfall. Wave run-up is an important but complex component to coastal inundation. NOAA is working with other federal

partners on a study to advance our understanding of how wave run-up contributes to coastal inundation levels on the East Coast. This will allow NOAA to better calculate total water levels given storm conditions, and assess the vulnerability of beaches and dunes to erosion, over-wash, and inundation. When completed, the wave run-up model can be added to the suite of hazard resiliency tools available to partners and stakeholders.

Regional Partnerships

Multi-partner coordination activities are occurring in the region focused on drivers and needs. These partnerships provide opportunities especially for interagency and state-federal collaborations. Partnerships include:

- *Governors' South Atlantic Alliance (SAA)* – a regional ocean partnership among the states of NC, SC, GA and FL, with a mission to increase collaboration among the states and with federal agency partners and other stakeholders, and to sustain and enhance the environmental, natural resource, economic, public safety, social, and national defense missions of the states and the South Atlantic region
- *Southeast Regional Partnership for Planning and Sustainability (SERPPAS)* – a partnership between state environmental and natural resource officials from the southeast (NC, SC, GA, FL, AL, MS), the Department of Defense and other federal agencies to promote collaboration in resource-use decisions
- *Southeast Natural Resource Leaders Group (SENRLG)* – a group of federal executives who lead agencies with resource conservation missions, to improve and enhance the federal response to stakeholders
- *National Fish Habitat Initiative/Action Plan (NFHI or NFHAP)* – a diverse partnership focused on restoring fish habitats, the NFHI is being implemented in the Southeast through two groups, the Southeast Aquatic Resources Partnership (SARP) and the Atlantic Coastal Fish Habitat Partnership (ACFHP)
- *Caribbean Regional Association (CaRA) and Southeast Coastal Ocean Observing Regional Association (SECOORA)* – two of eleven Regional Associations, CaRA and SECOORA are responsible for coordinating coastal and ocean observing activities in the Caribbean and Southeast, respectively
- *NOAA in the Caribbean Collaborative* – steering committee comprising NOAA and partner agencies whose purpose is to identify and respond to regional challenges, needs, and opportunities through collaboration across NOAA and with NOAA partners
- *NOAA in the Carolinas Collaborative* – a grassroots partnership of NOAA and external partners from NC and SC whose mission is to use a One-NOAA approach to work more efficiently and enhance NOAA products and services to the sub-region