



**SECOORA**  
DELIVERING DATA FOR DECISIONS

Southeast Coastal Ocean Observing Regional Association (SECOORA):  
Delivering actionable coastal and ocean information from high-quality  
science and observations for the Southeast

## **Revised Scope of Work - Year 4 Core IOOS Funding and Table 2 (Non-CORE Funding)**

TOPIC AREA 1: Implementation and Development of Regional Coastal Ocean Observing Systems  
AWARD TYPE: Cooperative Agreement  
AWARD NUMBER: NA21NOS0120097  
PROJECT DURATION: July 1, 2021 – June 30, 2026

This revised grant proposal is submitted in response to the Funding Opportunity Title:  
Implementation of the U.S. Integrated Ocean Observing System (IOOS)  
Submitted: October 10, 2024  
Year 4: July 1, 2024 – June 30, 2025  
Funding Request: \$4,746,388

**Principal Investigator:**

Debra Hernandez, Executive Director  
SECOORA  
PO Box 13856  
Charleston, SC 29422  
P: 843-906-8686  
E: [debra@secoora.org](mailto:debra@secoora.org)

**Associate Investigator:**

Megan Lee, Business Manager  
SECOORA  
PO Box 13856  
Charleston, SC 29422  
P: 843-864-6755  
E: [mlee@secoora.org](mailto:mlee@secoora.org)

**Associate Investigator:**

Jennifer Dorton, Deputy Director  
SECOORA  
PO Box 13856  
Charleston, SC 29422  
P: 910-443-178  
E: [jdorton@secoora.org](mailto:jdorton@secoora.org)

**Associate Investigator:**

Gary Mitchum, SECOORA Board Chair  
Professor and Associate Dean  
USF College of Marine Science  
140 7<sup>th</sup> Ave. South  
St. Petersburg, FL 33701  
P: 727-553-3941  
E: [mitchum@usf.edu](mailto:mitchum@usf.edu)



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## Goals, Objectives, and Workplans

SECOORA is receiving \$4,746,388 in total Year 4 funding. **\$3,111,136 for the Core** funding component of the award. SECOORA will implement Goals 1 through 4 (as identified in our original proposal) to support SECOORA's base capacity and enhance the RCOOS. With the **\$1,635,252** in Non-Core Funding (IOOS, NOAA, Other Agency Funding) SECOORA will enhance our Goals while also addressing broader NOAA missions. Objectives and tasks related to both Core and Supplemental funding are described below and included in Table 1, Milestones.

Environmental Compliance for the work described in the SECOORA Year 4 Core award descope has been completed and the IOOS Program office issued a National Environmental Policy Act (NEPA) Categorical Exclusions (CE) Record of Environmental Consideration (REC) SAC release on 5/3/2022.

Environmental Compliance for the work being undertaken with Non-Core Funding (IOOS, NOAA, Other Agency Funding) has also been completed. The non-core funded activities described in the SECOORA Year 4 descope are a continuation of previous Non-Core funded activities and the SAC release email was provided by Debra Esty on 8/10/22 which covered all activities except for the Florida Gulf Coast University (FGCU) Harmful Algal Bloom project and support for the NOAA OMAO-OAR Saildrone-Glider project. The FGCU project was evaluated separately, and a Specific Award Condition Release/Record of Environmental Consideration was issued on 6/21/23 and signed by Krisa Arzayus. The Record of Environmental Consideration for the AOML led Saildrone-Glider activities was issued 8/18/23 and signed by Katherine Wheelock.

### **Goal 1: Continue successful operation of the SECOORA governance and management subsystem.**

**Objective 1.A: Maintain the SECOORA governance and operational structure through implementation of SECOORA's Bylaws and Strategic Plan.**

SECOORA's [Strategic Plan](#) was updated for the 2024-2028 period. The revised Strategic Plan still focuses on our commitment to a diverse, equitable, and inclusive organization which will further enhance our role in the region as a coordinating entity. SECOORA will continue to foster internship opportunities and training initiatives for our members and partners to promote diversity within the workforce. SECOORA is also working with the IOOS Association, other IOOS regions, and the IOOS Program Office to diversify workforces and improve our ability to provide relevant ocean and coastal data and information to underserved or underrepresented communities. Progress on the Strategic Plan is shared with the Board and members during annual meetings. The Year 4 Board meeting will be held in December 2024 in Charleston, SC and the Annual SECOORA Board and Members meeting held in May 2025 (location and date TBD, but the meeting will be in North Carolina).

**Objective 1.B: Maintain SECOORA's certification as a Regional Association.**

SECOORA is certified by NOAA as a RCOS. SECOORA prioritizes, gathers, manages, and distributes observation data for the SE, and has the data management architecture, policies, and procedures to support these activities. SECOORA's certification renewal was approved 11/8/22. SECOORA's Certification web page is the up-to-date source for certification documents: <https://secoora.org/certification>. The site has extensive details on our operations and policies, and it is maintained and updated annually, as needed. Additionally, SECOORA staff, along with our Science Committee, and subject matter experts, will update our Regional Coastal Ocean Observing System Strategic Operational Plan (RCOOS Plan) during Year 4.

### Objective 1.C: Annually update SECOORA's 2020-2025 RCOOS Plan

Implementation of the [RCOOS Plan](#) occurs through the four subsystems: observing, DMAC, modeling and analysis, and engagement. Details of this implementation throughout the five-year period of this proposal are described in Goals 2 – 4. The SECOORA Deputy Director leads management of the RCOOS through execution of subawards with our partners and supports SECOORA's Science Committee which reviews annual updates to the Plan. Since the initial RCOOS Plan development, SECOORA has approved addendums to the original plan. These finalized addendums include a [Modeling Framework](#) (2023), [Harmful Algal Bloom Plan](#) (updated May 2023), and the [HFR Plan, Version 2](#) (2022). The overall SECOORA RCOOS Plan is currently in review by the Science Committee and a full review and revised version of the Plan will be undertaken during Year 4. The revised RCOOS Plan will cover the period 2026-2030.

### Goal 2: Maintain and augment the SECOORA observing subsystem.

#### Objective 2.A: Maintain existing long-term coastal and ocean observing operations.

**Moorings:** SECOORA real-time and non-real-time moorings are operated by the University of North Carolina Wilmington (UNCW) and the University of South Florida (USF). All real-time moorings/instrumentation have a targeted up-time of 85%. Metrics for the real-time buoys are reported in the SECOORA 6-month progress reports. All UNCW and USF real-time data is made available to SECOORA and NDBC. QARTOD required and recommended tests are conducted for all real-time data and roll-up pass/suspect/fail flags are provided with the data.

USF operates 4 real-time moorings and 2 non-real-time moorings. USF moorings are located on the West Florida Shelf. UNCW operates 13 real-time moorings and 1 non-real-time mooring along the coasts of NC and SC. Maintenance activities for all USF and UNCW buoys includes using research vessels to visit the buoy locations annually and swapping the deployed buoys with refurbished buoy systems. Non-real-time moorings operated by both UNCW and USF are serviced 2 times per year (e.g. divers recover deployed sensors (i.e., CTDs and ADCPs) and swap in new sensors for continuous data collection. Data from these stations are downloaded from the sensors, quality controlled, and shared for archival with SECOORA via Research Workspace and shared with NOAA's NCEI for permanent archival. UNCW and USF also support the FACT Animal Telemetry Network (ATN) by deploying acoustic receivers attached to existing moorings (4 on UNCW moorings, 5 on USF moorings) to record tagged fish passage near the receivers. The receivers are recovered twice each year during mooring turnaround cruises, downloaded, and the data shared with the FACT ATN node.

*New EC Questionnaire:* UNCW co-located a wave buoy (FRP2Wave) with the FRP2 met/ocean buoy. UNCW installed the FRP2Wave buoy with non-federal funding in 2023 to meet the needs of local stakeholders such as the Fripp Island Sea Rescue and Charleston NWS offices. UNCW will use SECOORA funding to service this buoy when they annually service the FRP2 buoy. The Environmental Compliance (EC) Questionnaire for the FRP2Wave and the previously approved FRP2 buoy are submitted with this Year 4 proposal (Appendix A). SECOORA is submitting this as a combined FRP2 and FRP2Wave EC questionnaire since the FRP2Wave buoy is co-located with FRP2.

**High Frequency Radar (HFR):** SECOORA operates 19 HFR currently. The St Catherines (CAT) HFR installation in GA that was destroyed by a wildfire in 2022 may not be reinstalled due to lack of power and internet at that location.

- UNC-Chapel Hill (UNCCH) and East Carolina University's Coastal Studies Institute (CSI) operate four CODAR HFR on the North Carolina Outer Banks (HATY, JENN, OCRA, CORE).
- USF operates three CODAR on the west coast of Florida (RDSR, VENI, NAPL).

- The University of South Carolina (UofSC) operates three WERA in North Carolina and South Carolina (CSW, MBP, GTN).
- UGA Skidaway Institute of Oceanography (SkIO) operates two WERA in Florida and one WERA in Georgia (KSC, CNS, JEK). The fourth installation (CAT), located on St. Catherine's Island, was destroyed in a wildfire and has been non-operational since 2021. Reinstallation of the HFR at this site is still TBD as power and internet have not been restored at the site.
- Florida Institute of Technology (FIT) operates two WERA at Treasure Shores Park, FL and Hightower Park, FL (TSP, HTR).
- The University of Miami (UM) operates four WERA HFR in the Miami and Florida Keys area (STF, VIR, CDN, NKL).

SECOORA HFR operators will provide surface current data in near real-time with a targeted up-time of 85%. Hourly data is provided to the [HFR National Network](#). Operational and quality metrics are routinely checked. These include assessment of daily variations in coverage and uptime using metrics such as database latency, range of coverage, and number of solutions as implemented by the National HFR Network. UNCCH, CSI, UofSC, SkIO, FIT, UM, and USF have all received FCC operational licenses for their systems. All HFR operators maintain a list of recapitalization costs required for continued HFR operations and the information was provided with the [June 30, 2024 progress report](#). The progress reports provide details on HFR status, operators, location, and operating frequencies as well as required maintenance and upgrades needed for field operations and IT infrastructure.

**Glider Operations:** The SECOORA glider team includes SkIO, USF, UNCCH, and Georgia Tech. The team will conduct four (4) regional glider missions to capture regional 4-D information about temperature, salinity, and density structure, oxygen/turbidity/CDOM/chl-a concentrations for use to investigate hydrography and circulation dynamics in the region, including connectivity between the Loop Current, Florida Current, Gulf Stream. Each glider mission is 20-30 days in duration and includes short vessel trips to recover and deploy gliders into coastal waters. The team will continue to integrate smart piloting strategies using GENloS to optimize navigation based on real time data streams from operational ocean models, HFR, and other gliders. The glider team follows data collection and data sharing methods identified in the [U.S. Underwater Glider Workshop Report](#). Mission data are disseminated to the international scientific community via the National Glider Data Assembly Center (DAC) where they are made available to the oceanographic modeling community.

**Biological Data Collection:** The Estuarine Soundscape Observatory Network in the Southeast (ESONS) is led by the University of South Carolina Beaufort (USCB). The ESONS observatory consists of 9 passive acoustic sensors deployed in South Carolina: 3 in the May River, 1 in Chechessee Creek, 1 in Colleton River, 3 in Charleston Harbor, and 1 that will go in a TBD location near Pritchard's Island. The project team is evaluating locations and once the exact site is determined, SECOORA will submit the Environmental Compliance Questionnaire. Each station includes a passive acoustic recorder, water level loggers, and a temperature logger, all used to monitor animal behavior at multiple levels of biological complexity (from snapping shrimp to fish to marine mammals) and time scales. The project team conducts annual soundscape analysis to identify species, range, and seasonality for the May River, Chechessee Creek, Colleton River, Charleston Harbor, and North Inlet Winyah Bay. The collected wav files are shared with SECOORA for storage and visualization on the [soundscape webpage](#). In Year 4 the project team is prioritizing the purchase of additional network memory to process and store sound files. They will also purchase one new LS1 recorder to replace aging equipment.

**Additional Mooring Activities (Non-Core Funding (IOOS, NOAA, Other Agency Funding)):**

NOAA Ocean Acidification Observing Network (NOA-ON) Gray's Reef: Ocean acidification and water quality monitoring at the Gray's Reef National Marine Sanctuary (GRNMS) is part of NOAA's international effort to quantify the effects of ocean acidification. The University of Georgia (UGA, PI Scott Noakes) will continue to maintain and oversee the long-term operation of the OA sensors at GRNMS and work with NOAA PMEL to ensure data integrity. These sensors include pCO<sub>2</sub>, pH, DO, salinity, chlorophyll, turbidity and water temperature. Sensors are mounted on under the Gray's Reef NDBC mooring and on the seafloor. The entire system including the MAPCO<sub>2</sub>, equilibrator, battery pack, span gas and air block will be replaced once during the year, typically scheduled in early fall. Work includes vessel trips to and from the buoy location, and diving on the site to inspect and/or replace parts. As needed, additional trips (typically 2-3) will be made replace sensors that have failed. Partners for the OA project include the UGA, NOAA PMEL, NOAA NDBC, and the USCG, which provides vessel support for mooring maintenance.

Retuning/Testing/Additional Recapitalization Work by RA's HFR Operators to Comply with FCC Regulations and/or Recap HFR Stations:

- *HFR recap:* HFR operators in the southeast have identified priority funding needs for HFR sparing and replacements (e.g., equipment, supplies, training) as well as IT upgrades. SECOORA will work with individual HFR operators to purchase required items and ship them to the HFR operator to support recapitalization and sparing efforts.
- *HFR event:* SECOORA is working with NOAA IOOS (POC Brian Zelenke) and UGA SkIO (POC Catherine Edwards) to host a media event on the east coast of Florida to highlight the newly deployed HFR on the Space Coast. The group is currently discussing hosting options with NASA's Kennedy Space Center since one of the HFR is located on the base. The exact location and date for the event are TBD but early 2025 is the goal.

Harmful Algal Blooms: SECOORA is continuing to support the development of HAB monitoring and tracking for coastal Georgia and Estero Bay, FL.

- Florida Gulf Coast University (FGCU, PI Parsons) will continue operations of four live streaming fixed station sensors in southwest FL as an early warning system for potential HABs and acute water quality events and sharing live stream data with SECOORA. FGCU will integrate short term buoy deployments for bloom and/or water quality event responses to create ephemeral data streams that spatially enhance the live streaming fixed stations to better monitor changes in blooms and/or water quality conditions that may occur. The short-term buoy deployments for this project include vessel trips within Estero Bay to deploy and recover the buoys. The team will use field sampling tools (autosamplers & McLane Imaging Flow Cytobot [IFCB]) to quickly sample, identify, and assess water quality parameters which include: phytoplankton communities, chlorophyll a concentrations, and nutrients (i.e., total nitrogen, total phosphorous, nitrate, nitrite, ammonium, phosphate, and silicate). Dr. Parson's will also develop and update IFCB classifiers for the southwest FL region that can be integrated into a standardized library that can be utilized by other SECOORA and GCOOS user groups to improve regional IFCB classification systematics.
- UGA SkIO (PI Cohen) has conducted weekly to daily HAB sampling in the Savannah River Estuary (SRE). This is the first consistent, comprehensive HAB monitoring program for the state of Georgia. The team collects water samples from the SRE and processes samples in the lab to identify HAB species, with specific emphasis on *Akashiwo sanguinea*. In Year 4, the team will collect water samples from a wider geographic region, enabling collection of water upstream and downstream of the current sampling location in the SRE. Four sites will be incorporated, with two upstream sites providing a sense of whether these dinoflagellates benefit from freshwater in the Skidaway River, and two downstream sites addressing their extent in Wilmington River and Wassaw Sound, which



connects to the coastal ocean. Cell densities and a suite of physicochemical parameters will be measured (pH, salinity, temperature, dissolved oxygen, ammonium, chlorophyll fluorescence) and *A. sanguinea* cell counts will be posted on the SECOORA website: <https://secoora.org/georgia-harmful-algal-blooms/>.

**Regional Ocean Data Sharing (RODS) Marine Heatwaves:** SECOORA is working with CARICOOS, GCOOS, FACT and other partners to collect and share surface and sub-surface temperature data within the region to evaluate marine heatwaves and their impacts on key ecosystems. SECOORA buoy operators have temperature sensors that are already or can be deployed at midwater and bottom locations below the buoy; however, they need inductive cables to transfer the data from the sensor to the Campbell data loggers on the buoy so that the data can be telemetered to shore in near real-time. RODS funding will be used to upgrade the buoy telemetry systems to include subsurface water temperature data in real-time. This does not require additional field work or placing new sensors in new locations.

**Additional Glider Activities (Non-Core Funding (IOOS, NOAA, Other Agency Funding))**

**Support for Glider deployments/recoveries:** SkIO will support IOOS Hurricane Glider efforts by assisting with Navy glider operations during the 2024 and 2025 hurricane seasons. SkIO will coordinate deployment, recovery, and logistical activities with IOOS and the U.S. Navy for 1-2 gliders each year. Planning and updates will be provided on the weekly IOOS Glider team calls hosted by the NOAA IOOS office.

**Support of NOAA OMAO-OAR Saildrone-Glider project:** SkIO (PI Catherine Edwards) will support Saildrone/glider coordination efforts by using past and future data from both platforms. Glider data from prior hurricane seasons will be post-processed to publication quality and shared via the SECOORA data portal and with collaborators at AOML/PMEL. These data, together with data collected in recent Saildrone missions, will be analyzed for trends related to successful co-location of the vehicles along the southeast and Caribbean region. PI Edwards will work with the NOAA AOML/PMEL Saildrone team to coordinate deployments in hurricane season 2024, explore spatial and regional trends in co-located data, and leverage this insight to develop strategies for co-location and data assimilation in future hurricane seasons.

**Support for Hurricane Glider missions:** The SECOORA glider team will conduct 2 hurricane missions during the 2024/25 hurricane seasons. The goal of these missions is to capture regional 4-D information about temperature, salinity and density structure for hurricane intensity modeling (by NOAA AOML and the US Navy). Mission locations are TBD based on hurricane forecasts but will take place in the Gulf of Mexico, along the West Florida Shelf, or South Atlantic region.

**Objective 2.B: Expand the observing subsystem to address the region's highest priority needs as identified in the SECOORA RCOOS Plan.**

**Water Level Network (WLN):** SECOORA established a real-time, regional water level network in Year 1 to address needs for community flooding information. Year 4 WLN team members include the American Shore and Beach Preservation Association (ASBPA)/Hohonu, and Georgia Tech. Year 4 activities for each team include maintenance/cleaning of sensors deployed in Years 1-3, development of operation and maintenance procedures, and further refine QA/QC (QARTOD) tests and sharing flags with Axiom Data Science. Note that planned sensor deployment documentation has already been shared with the Environmental Compliance Manager via a [Google Drive spreadsheet](#). The team finalized Standard Operating Procedures (SOPs) for 1) site reconnaissance; 2) sensor installation, maintenance, and removal; and 3) vertical elevation surveys and they are available on the SECOORA website and on the Southeast



Water Level portal (<https://wl.secoora.org>) on the Documentation page. The water level advisory committee, convened in Year 1 and comprised of NOAA, state, and regional governments, and Sea Grant representatives, will continue to provide oversight for this project.

### **Goal 3: Implement, integrate, and expand the Data Management Cyberinfrastructure, and Modeling and Analysis subsystems.**

The DMAC subsystem is an integrating and foundational subsystem of the RCOOS, that when coupled with the observing, modeling and analysis subsystems, enables the transformation of raw data into accessible and credible information for decision-makers. SECOORA works with its DMAC contractor, Axiom Data Science, to provide data management support, data systems architecture, software engineering, and cyberinfrastructure operational services to meet the US IOOS DMAC [data standards and requirements](#). Axiom works with SECOORA and our partners to support a regional data assembly center, operate and continuously improve its functionality, and provide a regional web-based data portal (<https://portal.secoora.org/>) for access to ocean and coastal environmental data and information products across the US SE.

#### **Objective 3.A: Maintain and enhance the DMAC subsystem.**

**Core DMAC subsystem:** SECOORA will continue to operate and improve the core DMAC subsystem. More information on SECOORA data standards and requirements and adherence to the NOAA Environmental Data Management Framework can be found in the [SECOORA Data Management and Cyberinfrastructure Plan](#), which includes the Data Sharing Policy and Methods to Address IOOS Core Capabilities.

Core components of the SECOORA DMAC subsystem include the following:

- High Performance Computing (HPC)
- Data Assembly and Quality
- Implementation of Community Standards and Systems
- Modern Big Data Analysis and Machine Learning
- Data Product Support
- Integration with Other National Cyberinfrastructure
- Human Expertise and Capacity
- Provide real-time buoy data from SECOORA funded buoy operators (UNCW, USF) to NOAA NDBC via ERDDAP server
- Annual data archival for physical oceanographic, biogeochemical, and meteorological data with NOAA's NCEI
- Product Usage Statistics – SECOORA uses Google Analytics to track usage statistics for the data portal, webpage, and products.

Additional details on these subcomponents can be found in the SECOORA DMAC Plan and supporting appendices, found here: <https://secoora.org/certification/> - section III. Data Management and Cyberinfrastructure.

**Additional Data Management Activities (Non-Core Funding (IOOS, NOAA, Other Agency Funding))**  
Curation of and CI/CD support for IOOS open source GitHub repositories and support for DMAC technical implementation tasks: This project supports the technical implementation of the IOOS DMAC system (PI Filipe Fernandes) including the following activities: monitoring and testing DMAC products and services, ongoing development of the IOOS data discovery and access tools, technical research, and engagement with external groups (e.g., Pangeo), and maintenance of the IOOS GitHub software and tool ecosystem.

Additionally, it funds the ongoing development and maintenance of several open-source software packages that are crucial to the IOOS DMAC enterprise.

**Regional Ocean Data Sharing (RODS) Marine Heatwaves:** SECOORA is working with CARICOOS, GCOOS, FACT and other partners to collect and share surface and sub-surface temperature data within the regions to evaluate marine heatwaves and their impacts on key ecosystems. The FACT Network is a collaboration of over 300 scientists using acoustic telemetry to monitor the movements of animals in inshore, estuarine, nearshore, and offshore environments. Acoustic receivers within the FACT Network range from North Carolina to the eastern Gulf of Mexico and into the Bahamas and U.S. Caribbean. While the main purpose of the technology is to determine animal locations, complimentary data types such as water temperature are recorded once per hour. As part of the data processing for animal location information, the FACT Network has been extracting temperature data from receivers and publishing the data through the SECOORA data portal with water temperature data contributed from over 400 sites. The overall goal of this project is to examine ocean temperature regimes in the Southeast U.S. using data collected over the past 20 years. This project will support a student to extract temperature data from the SECOORA data portal, identify any gaps, and conduct preliminary analysis. Future directions include combining these efforts with other regional associations to create a more holistic understanding of nearshore oceanic temperature changes across the Southeast, Caribbean, and Gulf of Mexico.

#### Objective 3.B: Maintain and enhance the Modeling and Analysis subsystem

##### 3.B1. Modeling: Provide forecasts for select coastal ocean phenomena

**WFS Models:** SECOORA partner, USF, will maintain the West Florida Shelf and Tampa Bay (WFCOM and TBCOM) daily nowcasts/forecasts of currents, temperature and salinity, and surface height fields with a targeted up-time of 90%. WFCOM downscales from the deep ocean, across the continental shelf and into the major estuaries by nesting the unstructured grid FVCOM in the GOM HYCOM, affording increasingly finer resolution upon approaching the coast. TBCOM achieves 20-m resolution by nesting FVCOM in WFCOM. TBCOM includes Tampa Bay, Sarasota Bay, the Intra-Coastal Waterway and all the inlets connecting these with the Gulf of Mexico. Both WFCOM and TBCOM provide daily, 4.5-day (1 day hindcast, 3.5-day forecast) trajectories to assist with red tide tracking, search and rescue operations, other environmental concerns (e.g., oil spills), and glider path planning. Model output is available via [NOAA GOODS](#) and the [COMPS THREDDS server](#).

**CNAPS model:** SECOORA partners NC State University and Fathom Science operate the CNAPS model, a near-real time nowcast/ forecast for regional-scale marine environment conditions. The CNAPS team developed a 30-year (1993-2022) Ensemble Data Assimilative (ENDA) ocean hydrodynamics reanalysis and they will continue working on the generation of marine biogeochemistry (BGC) reanalysis for the same period. The BGC model was implemented in an offline capacity in Year 3, but turning and validating this offline model has been challenging due to the lack of BGC observations. In Year 4, the CNAPS team plans to use recent satellite data (e.g. NASA PACE) to help with model calibration. This will allow the team to have the BGC model ingest the CNAPS-2 ENDA ocean hydrodynamic reanalysis to generate 4-dimensional (x, y, z, t) daily output of key state variables (e.g., NO<sub>3</sub>, chl a, DIC, pCO<sub>2</sub>, DO) in the marine nitrogen and carbon cycles. The resulting long-term BGC time series (to be available by the end of Year 4 or the beginning of Year 5) will be extremely valuable to understand the long-term variability in regional marine ecosystems (both living marine resources and water quality) and in climate change impacts on the regional marine ecosystem

#### Additional Modeling Activities (Non-Core Funding (IOOS, NOAA, Other Agency Funding))

CORA: National coverage of 40 yr ADCIRC reanalysis with tides and ERA5 atmospheric forcing: The goal of this project is to conduct a long-term reanalysis (1979-2022) of coastal storm surge with the ADCIRC storm surge and tide model (UNC-CH, PI Brian Blanton). Using the ECMWF ERA5 atmospheric reanalysis, NOAA observed water levels, and a data assimilation system for ADCIRC (Asher et al. 2019), the results will provide detailed datasets of long-term coastal water levels for use in a variety of applications, including flood hazard assessments and boundary conditions for smaller-scale, regional simulations. Year 4 activities will include:

- *Update SLR rates in CORA-GEC V1.0*. In Y3, the team completed the V1.0 simulation and developed an improved approach to handling the prior error analysis for data assimilation. In early Year 4, the posterior computation will be completed and made available to NOAA and collaborators.
- *Incorporate tropical cyclones*. Using the IBTrACS database of Atlantic tropical cyclones and the ADCIRC GAHM vortex model, the team will compute cyclone-specific wind/pressure fields for insertion into the ERA5 meteorology on a high-resolution (~ 5 km) nested and storm-following grid. The ADCIRC wind interface NWS13 already handles nested grids of meteorology in netCDF format. The approach will be tested for the year 2018, leveraging the extensive Hurricane Florence hindcast dataset of both winds and water levels that we have already assembled.
- *Preliminary version of CORA-PAC*. Using a new grid for the eastern Pacific ocean the team will compute a prior and posterior dataset as a preliminary version of CORA-PAC. The simulations will include the adjusted SLR rates for the region and the SWAN wave model.
- *Data access and post-processing*. V1.1 and PAC posterior results will be made available through the RENCi THREDDS Data Server (TDS). The team will continue to work with NOAA and project partners that are hosting the large datasets on cloud resources for more general access and develop specific post-processing of the large data files to facilitate easier uses.
- *Documentation*. Continue to develop and maintain project documentation suitable for end-users of the datasets. The documentation will contain comparisons of the prior and posterior datasets, with statistics that characterize both the posterior accuracy and the improvements over the prior solution.

Integration and evaluation of models to couple with NWM (USF – Liu and Weisberg): The Ocean Circulation Lab at USF (PI Yonggang Liu) is participating in the cross-model software evaluation study to be coordinated by NOAA Unified Forecast System Coastal Application Team (UFS CAT). A USF graduate student or postdoc will work as a tester to configure and assess the Finite Volume Community Ocean Model (FVCOM) models for New York Harbor/ Cook Inlet on NSF funded Texas Advanced Computing Center (TACC). This effort is to support coastal model evaluation in NOAA operational environments. This effort is in response to a series of white papers that were written by the UFS CAT focused on total water level, navigation, and risk reduction. The work itself will include conducting standard test runs for a given region and a given specified computational time / resources to allow fair quantitative model inter-comparison and their performances for a given sub-application. The model developed by USF Ocean Circulation Lab will be evaluated independently from other models, and then evaluated for forcing/coupling with either atmospheric, wave or hydrological models. The outcome is providing skill assessment documentation and evaluating the model in the context of operations (stability, code management, ease of operation, etc.)

Integration and evaluation of models to couple with NWM (USF-Tejada-Martinez – previously UNF-Akan Cigdem): The primary objective is to support the evaluation of the FVCOM and the Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM) within NOAA operational environments. This

evaluation is part of the UFS CAT project aimed at enhancing marine navigation safety and efficiency through improved coastal modeling. The scope of this work includes configuring, running, and evaluating FVCOM and SCHISM models in selected NOAA operational environments using the TACC resources. The focus will be on the New York Harbor and Cook Inlet regions. The team will conduct baseline simulations for selected hindcast periods: January 1 - March 31, 2022 which includes Nor'easter events and July 1 – September 30, 2021 which includes hurricanes Elsa, Henri, and Ida. Model results will be based on NOAA defined metrics.

### 3.B2. Integrate improvements in the analysis components of the modeling and analysis subsystem to speed transformation of data into information required by users.

**AI Portal:** Florida Wildlife Research Institute (FWRI) and Axiom are building an artificial intelligence annotation data portal (AI portal). In year 4, we propose finalizing the portal by refining content, adjusting capabilities, and completing a beta testing phase with the intention of publishing a final product by the end of Year 4. The team will document data standards for AI applications, including metadata and reformatting requirements for imagery, video, and acoustics data; and identifying and resolving file storage and access issues. The team will also continue to develop imagery, video, and acoustic use cases and create interactive web pages demonstrating the machine learning pipeline.

**Southeast Area Monitoring and Assessment Program, South Atlantic (SEAMAP-SA):** SC Department of Natural Resources (SCDNR) SEAMAP-SA staff will provide updated data for all types (abundance/biomass, length frequency, life history, and tagging) for the core SEAMAP-SA surveys (Reef Fish, Coastal Trawl, Pamlico Sound, and Coastal Longline) as they are made available. SEAMAP-SA staff will conduct test downloads and summaries of updated data to ensure accuracy and work with Axiom to finalize the workflow and formatting for allowing downloads in two formats – the SEAMAP-SA style and DarwinCore. Axiom will develop user tracking to allow SEAMAP-SA staff to provide data use metrics to NOAA and the SEAMAP Committee.

## Goal 4: Effectively implement the engagement subsystem to support product co-design and delivery.

A central goal of SECOORA is to develop, in partnership with end users, operational products that will support decision-making. Along with ongoing delivery of the regional model forecasts that fill temporal and spatial gaps in observations, SECOORA will develop and enhance products in collaboration with our partners to support their operational needs.

### Objective 4.A. Engage with stakeholders to identify and respond to their needs

#### 4.A1. Support community-driven networks focused on priority societal issues aligned with SECOORA's mission and Strategic Plan.

SECOORA partners with other national and regional networks to leverage expertise and expand observing capacity. SECOORA will remain engaged with these groups during Year 4:

- [IOOS Association](#) is a national nonprofit organization established to advance [U.S. IOOS](#) and the nation's coastal observation information needs by working with the [11 Regional Associations](#), US IOOS, NOAA federal agencies, and other partners
- SECOORA will continue to manage funding, partner on proposals, and provide personnel support for the [FACT Network](#), Southeast Ocean and Coastal Acidification Network ([SOCAN](#)), and the Southeast and Caribbean Disaster Resilience Partnership ([SCDRP](#)).
- The Water Level Advisory Committee is engaged with the [Water Level Network](#) and will provide guidance and feedback for the team related to sensor locations, station metrics, data sharing, etc.

(Objective 2B).

#### 4.A2. Maintain and enhance the SECOORA outreach and engagement subsystem to address priority issues in the region

The SECOORA Marketing and Communications Specialist will continue the [Coastal Ocean Observing in Your Community](#) webinar series, website updates with [news stories](#) and extreme event pages such as the [Florida Red Tide Resources Page](#) and the [Hurricane Resources Page](#), quarterly newsletters, social media posts, and hosting and participating in workshops and meetings.

#### 4.A3. Engage students in problem solving using ocean observing data

The SECOORA Education and Outreach Committee, under the leadership of the Marketing and Communications Specialist, provides guidance on prioritizing education and outreach needs. Annually SECOORA will host two student awards: the [Data Challenge](#) and [Vembu Subramanian Ocean Scholars Award](#). Also, SECOORA will continue providing opportunities for formal and informal educators to develop online coastal and ocean related [curriculum](#).

#### Objective 4.B: Product Development

SECOORA will work with stakeholders to identify product needs and evaluate existing products to determine ongoing limitations and demands as well as potential for expanding either geographic coverage or product offerings. All proposed products fit within the identified SECOORA focus areas and provide environmental and/or economic benefit to our stakeholders. Current products include [Text a Buoy](#), [Estuarine Soundscape Observatory Network](#), the [Marine Weather Portal \(MWP\)](#), [Eyes on the Storm](#), [Southeast Water Level Network](#), and [How's the Beach](#).

SECOORA will invest in the following product development efforts:

**How's the Beach Expansion:** Support the enhancement of How's the Beach nowcasts (UofSC), and the integration of How's the Beach, ShellCast (NCSU), and Beach Condition Reporting System (BCRS, Mote Marine Lab). The project team will: 1) A. work with EPA partners to assess the Virtual Beach modeling toolset, and B. host a modeling workshop for beach managers and regulators to advance the community of practice around modeling techniques and evaluation; 2) continue to develop documentation on web development and data sharing related to the integration of How's the Beach with BCRS and How's the Beach with Shellcast; 3) A. develop initial models for expansion of ShellCast forecasting into selected shellfish harvesting waters of GA, and B. continue developing models for expansion of How's the Beach nowcasting to swimming beaches of Tybee Island, GA.

**Situational Awareness Support-tool for weather forecasters and ocean rescue groups:** Using data from UNCW's NC and SC buoys, this tool leverages the SECOORA DMAC subsystem to allow weather forecasters and ocean rescue groups to register, administer, and view custom thresholds for any combination of in situ parameters. Users can save their selected thresholds and receive texts or emails when the threshold criteria are met or exceeded (e.g., waves are above 2 ft, winds are above 15 knots). During Year 4, the team will add additional users to the test group (e.g., NOAA NWS staff in Melbourne, FL, SECOORA staff, Power Squadron members, Beach Rescue organizations) for the tool. Also in year 4, the team will poll users to determine effectiveness and evaluate the workload and database maintenance for registering users to sign up for and change alert thresholds.

#### **Additional engagement activities (Non-Core Funding (IOOS, NOAA, Other Agency Funding))**

SECOORA partners with other national and regional networks to leverage expertise, expand observing



capacity, and provide education opportunities. SECOORA will engage with these groups during Year 4:

- The [FACT Network](#) is a grassroots collaboration of marine scientists from the Bahamas to the Carolinas using acoustic telemetry to better understand and conserve our region's important fish and sea turtle species. Year 4 funding specifically supports the FACT Data Wrangler (Lead PI Joy Young) who leads communications, data acquisition efforts, data quality control, and FACT data visualization tool development. The FACT team will continue development of procedures/protocols to facilitate data and metadata acquisition and ingestion in accordance with FACT data policies and standards. All acoustic telemetry data, after processing and quality control, are submitted to the National ATN Data Assembly Center for archive. Note, funding is used to support the FACT data management node. Funds are not used to support field work related to animal tagging.
- [Southeast and Caribbean Disaster Resilience Partnership](#) (SCDRP) seeks to strengthen community resilience and support rapid disaster recovery from storms and disasters by serving as the primary network for professionals in emergency management, climate adaptation, and disaster recovery in the U.S. Southeast and Caribbean territories. The SCDRP Coordinator will provide support to the SCDRP Executive Director, host virtual monthly partnership meetings, publish the SCDRP newsletter, and assist with planning for the SCDRP annual meeting. [RODS](#) and [SECART](#) funds will be used to support the SCDRP Executive Director and the Coordinator as well as host the 2025 SCDRP Annual Meeting.
- [Southeast Ocean and Coastal Acidification Network](#) (SOCAN); PIs Hall and Reimer have taken a leadership role in synthesizing and applying available science in addition to serving in funding proposal coordination roles throughout the Southeast since its inception. In Years 4 and 5, SOCAN will continue its core commitments as well as work to assess research and monitoring gaps, societal, economic, and vulnerability needs in the Southeast. The team will host two virtual webinars targeted at specific OA stakeholder communities (e.g. shellfish growers, coral reef researchers), synthesize data from OA sensors deployed in the Florida Keys National Marine Sanctuary, and partner with the Mid-Atlantic CAN to plan and host an underrepresented community listening session in either southern Virginia or northeastern North Carolina.
- [Vembu Subramanian Scholar](#): SECOORA will submit a NOAA Hollings Scholar opportunity in Year 4. The goal is for the scholars to work with a SECOORA member and learn all facets of an ocean observing program. Scholarship funds are provided to the institution that hosts the Hollings scholar. These funds support the scholar above and beyond the Hollings funding to assure that the scholar has a well-rounded experience. If a Hollings Scholar does not choose a SECOORA institution for their experience, then the funds will be used to support a travel award for the annual SECOORA [Vembu Subramanian Ocean Scholars Award](#). The goal of this award is to provide students and early career professionals with the opportunity present their ocean science research at or attend a regional or national meeting. Funds are provided as a subaward to the awardees home institution.

## Summary

The proposed \$4,746,388 in funding will support the continued operation of the core RCOOS framework. As a mature RA, SECOORA must balance maintenance, filling important gaps in observations, and creating new connections to users through thoughtful expansion of products and services to build-out the RCOOS. The proposed activities will deliver stakeholders the ongoing observations and modeling products they rely on, and new integrative project components that leverage existing SECOORA efforts (observations, models, and DMAC) to create new and exciting opportunities.

## Milestones and Cost Proposal

Table 1. Goals, Objectives/Milestones and Schedule



Milestones	Q1	Q2	Q3	Q4
<b>Goal 1: Continue successful operation of the SECOORA governance and management subsystem</b>				
Maintain the SECOORA governance and operational structure	X	X	X	X
Maintain SECOORA's certification as a RCOS	X	X	X	X
Update the SECOORA RCOOS Plan	X	X		
<b>Goal 2: Maintain and augment the SECOORA observing subsystem</b>				
Operate and maintain 17 existing real-time moorings offshore of NC, SC, and FL	X	X	X	X
Operate and maintain 3 non-real time moorings offshore of NC and FL	X	X	X	X
Operate and maintain 19 HFRs nationwide	X	X	X	X
Conduct 4 glider missions	X	X	X	X
Maintain the SC estuarine soundscape observatory using passive acoustic recorders	X	X	X	X
Site, deploy, and maintain water level sensors	X	X	X	X
<b>Goal 3: Implement, integrate, and expand the DMAC and Modeling and Analysis subsystems</b>				
Maintain and enhance the SECOORA DMAC subsystem	X	X	X	X
Maintain the CNAPS model	X	X	X	X
Maintain the WFS models (WFCOM and TBCOM)	X	X	X	X
Construct an interactive AI annotation data portal	X	X	X	X
Develop biological data analysis tools through integrations of SEAMAP-SA fish survey data	X	X	X	X
<b>Goal 4: Effectively implement the Engagement subsystem to support product co-design and delivery</b>				
Maintain and enhance the SECOORA outreach and engagement subsystem	X	X	X	X
Engage students through SECOORA scholarship and funding opportunities	X	X	X	X
Enhance How's the Beach to include products for shellfish & recreational swimming water advisories	X	X	X	X
Develop a situational awareness tool for weather forecasters and ocean rescue	X	X	X	X

Core Funding Cost Proposal. Summarized costs of this 2024-2025 effort are in Table 2. \$3,111,136 supports SECOORA Goals 1 through 4.

Table 2. Core Funding: Costs by Objective, PI and Institution

Obj.	PI/Contractor	Inst.	YR 4
<b>Goal 1</b>	<b>Governance &amp; Outreach</b>		
1.A – 1.C	Hernandez (Governance & Outreach)	SECOORA	\$777,807
	<b>Goal 1 Sub-total</b>		<b>\$777,807</b>
<b>Goal 2</b>	<b>Maintain and augment the SECOORA observing subsystem</b>		
2.A – 2.B	<b>Moorings</b>		
	Leonard (NC and SC)	UNCW	\$329,362
	Liu (FL)	USF	\$300,000
	Hernandez (R/V Savannah ship time)	SECOORA	\$49,750
	<b>High Frequency Radar</b>		
	Seim (CORE)	UNC-CH	\$56,020
	Muglia (DUCK, HATY, OCRA)	ECU CSI	\$67,780
	Merz (VENI, RDSR, NAPL)	USF	\$110,000
	Voulgaris (CSW, MBSP, GTN)	UofSC	\$110,000
	Savidge/Edwards (JEK, CNS, KSC)	UGA SkIO	\$110,000
	Lazarus (TSP, HTR)	FIT	\$91,000
	Shay (CDN, VIR, STF, NKL)	UM	\$123,800
	<b>Gliders</b>		
	Edwards (\$110,000 in supplemental hurricane glider funding is being used to support SkIO in Yr 4)	UGA SkIO	\$0
	Lembke	USF, UNC-CH, GT	\$94,000
	Seim	UNC-CH	\$62,000
	Kasraie	GT	\$34,000
	Hernandez (glider supply funds)	SECOORA	\$9,090
	<b>Biological Data Collection</b>		
	Montie - ESONS (SC)	USC-B	\$20,370
	<b>Water Level Stations</b>		
	Elko and Glazer (NC, SC, FL)	ASBPA & Hohonu	\$74,998
	Clark (GA)	GT	\$75,000
	<b>Goal 2 Sub-total</b>		<b>\$1,717,170</b>
<b>Goal 3</b>	<b>Implement, integrate, and expand the DMAC and Modeling and Analysis subsystems</b>		
3.A	Maintain and Enhance the DMAC subsystem		
	Core DMAC support	Axiom	\$199,660
3.B	Maintain and enhance the Modeling and Analysis subsystem		
	He - CNAPS model	NCSU & Fathom Science	\$149,983
	Liu – WFS models	USF	Included in Moorings budget line
	McEachron – AI annotation portal	FWRI	\$88,000
	Smart - SEAMAP	SC DNR	\$28,856
	<b>Goal 3 Sub-total</b>		<b>\$466,499</b>
<b>Goal 4</b>	<b>Effectively implement the engagement subsystem to support product co-design and delivery</b>		
4.A1	Support community-driven networks focused on priority societal issues aligned with SECOORA's mission and Strategic Plan – Costs included in Goal 1: SECOORA Governance and Outreach		
4.A2	Maintain and enhance the SECOORA outreach and engagement subsystem to address priority issues in the region – Costs included in Goal 1: SECOORA Governance and Outreach		
4.A3	Engage students in problem solving using ocean observing data - Costs included in Goal 1: SECOORA Governance and Outreach		
4.B	Product Development		
	Porter (How's the Beach Expansion)	UofSC	\$149,660
	Situational Awareness Support-tool	UNCW	Included in Moorings budget line
	<b>Goal 4 Sub-total</b>		<b>\$149,660</b>

Obj.	PI/Contractor	Inst.	YR 4
	<b>GRAND TOTAL</b>		<b>\$3,111,136</b>

Non-Core Funding (IOOS, NOAA, Other Agency Funding). Summarized costs of this 2024-2025 effort are in Table 3. \$1,635,252 supports SECOORA Goals 1 through 4.

Table 3. Supplemental Funding: Costs by Objective, PI and Institution

Funding Area	Amount	PI & Institution	Task
<b>Goal 1: Continue successful operation of the SECOORA governance and management subsystem</b>			
SECOORA		Hernandez, SECOORA	
<b>Goal 2: Maintain and augment the SECOORA observing subsystem</b>			
Ocean Acidification	\$42,466	Noakes, UGA	OAP allotment of FY22 project resources in support of the NOAA Ocean Acidification Observing Network
HFR	\$108,400	Hernandez, SECOORA	HFR system wide support for retuning/testing/staff training by SECOORA's HFR Operators to comply with FCC Regulations. Funds will also support an outreach event at the KSC NASA location.
Harmful Algal Blooms (HABS)	\$111,949	Parsons, FGCU	Maintain and enhance the network of long-term water quality and HAB monitoring stations in southwest Florida (SWFL).
Harmful Algal Blooms (HABS)	\$103,209	Cohen, UGA-SkIO	Identify environmental conditions that are conducive to HAB formation in Georgia estuaries.
Gliders/SECOORA	\$70,000	Edwards, UGA SkIO	For hurricane glider operations use during the 2025 hurricane season (1 of 2)
Gliders/SECOORA	\$40,000	Edwards, UGA SkIO	For hurricane glider operations use during the 2025 hurricane season (2 of 2)
Gliders/SECOORA	\$66,000	Edwards, UGA SkIO	To support glider deployments and recoveries during the 2024 (\$40k) and 2025 (\$26k) seasons. (OMAO: Navy gliders)
Gliders/SECOORA	\$250,000	Edwards, UGA SkIO/ SECOORA	OMAO-OAR RFP Glider-Saildrone funds to support UGA work
<b>Goal 3: Implement, integrate, and expand the DMAC and Modeling and Analysis subsystems</b>			
DMAC: Filipe Fernandes	\$95,000	Fernandes, Independent Contractor	Curator of and CI/CD support for IOOS open-source GitHub repositories and support for DMAC technical implementation tasks

Modeling/ UNC Chapel Hill	\$325,900	Blanton, UNC-CH and RENCi	Year 4- "CORA: - National coverage of 40 yr ADCIRC reanalysis with tides and ERA5 atmospheric forcing" FY24 NOS Sea Level Rise (SLR) and Resilience Funds spend plan development
Modeling/University of South Florida	\$100,000	Liu, USF	Integration and evaluation of models to couple with NWM- USF; Drs. Weisberg and Liu (FVCOM)
Modeling/ University of North Florida – note this has changed to USF leading	\$50,000	Tejada-Martinez, USF	Integration and evaluation of models to couple with NWM- Akan Cigdem at USF. NOTE PI changed to Tejada-Martinez from USF
<b>Goal 4: Effectively implement the engagement subsystem to support product co-design and delivery</b>			
Regional Ocean Data Sharing	\$249,760	Hernandez, SECOORA	Regional Ocean Data Sharing Initiative
Marine Life/SECOORA	\$70,000	Young, FACT Network	Data Wrangler position for the FACT Acoustic Telemetry Network
SECOORA	\$3,000	Hernandez, SECOORA	\$3,000 of the total is to support the Southeast and Caribbean Disaster Resilience Partnership (SCDRP) which is an affiliate program of SECOORA.
Ocean Acidification (OA)/SECOORA	\$66,666	Hall, Mote Marine Laboratory & Reimer, Independent Contractor	OAP allotment of project resources in support of the Southeast Ocean and Coastal Acidification Network (SOCAN) for FY24 (\$33,333.34) and FY25 (\$33,333.33)
SECOORA	\$5,000	Hernandez, SECOORA	Vembu Subramanian Scholarship
<b>Total Non-CORE Funding</b>	<b>1,635,252</b>		

**Appendix A:** See EC questionnaire for UNCW FRP2/FRP2Wave buoys