

**Southeast Coastal Ocean Observing Regional Association (SECOORA):
Supporting Resilient Ecosystems, Communities and Economies**

Program Performance Report

Award Number: NA16NOS0120028

Reporting Period: 1 December 2018 – 31 May 2019

Date submitted: June 26, 2019

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1) Progress and Accomplishments

Goal 1: Continue SECOORA’s region-wide governance and communication structure to engage users and stakeholders in coastal observing science

Milestone A: Maintain governance and management for the RA and RCOOS: *On-Track*

Activities	Status
Effectively manage grants and contracts	The SECOORA Year 3 Descope proposal was submitted to the IOOS office 10/29/18.
Ensure SECOORA’s operational & governance structure enables us to achieve our vision	The SECOORA Board adopted the Governance Committee’s recommendation to revise the SECOORA Conflicts of Interest policy to restrict PI’s from serving on the Board. The Governance Committee’s recommendation to reduce the Board size to 11 members was approved at the January 2019 Board meeting and will be voted on by the membership at the SECOORRA annual meeting in June 2019.
Maintain effective communication with US IOOS and the IOOS Association	Highlights this period include meetings in DC between IOOS Association and NOAA leadership March 1; participating in the IOOS Spring meeting March 18-21 in DC; and monthly IOOS Program Office, IOOS Association Executive Committee and RA Director calls.
Expand and diversify funding.	SECOORA resubmitted an LOI to the Curtis & Edith Munson Foundation on 10/30/18. The proposal was funded in April 2019. Proposed activities include working with FACT to re-establish three acoustic stations in South Florida and add 30 water temperature sensors at established acoustic receiver stations.
Update and maintain SECOORA’s RCOOS Plan	In January 2019, the Board of Directors decided that the next SECOORA RCOOS Plan will be used to guide the 2021 – 2026 efforts. This plan should not focus on technology/observing platforms but identify research themes in which SECOORA should focus efforts. SECOORA is in the process of drafting a 2021 – 2026 RCOOS plan that identifies focus areas, research themes, and observing/technology required meet the research needs. The draft RCOOS plan is currently

Activities	Status
	in review by the SECOORA Board of Directors, Pls, and subject matter experts. In summer 2019, the plan will be shared with stakeholders for input.

Milestone B: Engage users and other stakeholders to prioritize investments: *On-Track*

Activities	Status
Improve web-based information system and web presence	SECOORA continues to track website usage with Google Analytics. There was a 24% increase in website sessions on secoora.org (from 22,940 to 28,350) this period. SECOORA is now tracking data portal sessions (portal.secoora.org). Data portal sessions have decreased 15% in the reporting period (from 6,064 to 5,148). This is normal, as hurricane is season when the portal is most active. SECOORA newsletters, stories, and videos can be accessed via website, Facebook and Twitter. SECOORA’s website redesign has been delayed until July 2019.
Identify and promote opportunities for non-members to engage in SECOORA activities and initiatives	SECOORA awarded two Data Challenge awards in April (see Milestone B “Engage students in problem solving using ocean observing data”). The Data Challenge is open to students from member and non-member institutions. SECOORA’s webinar series – <i>Coastal Ocean Observing in Your Community</i> – is steadily growing. During the reporting period, 3 webinars were hosted, and 250 people attended (increasing 131% from 108 to 250). There are over 515 people signed up for the webinar listserv. Webinar recordings can be found here .
Implement an effective outreach strategy	SECOORA’s outreach strategy is based on goals in the Strategic Plan and Fundraising Strategy. Primary marketing and outreach mechanisms are e-newsletters, e-mails, social-media, and the website. During this period subscription to the newsletter increased by 16% (from 884 to 1022); Facebook “likes” have grown 6% (from 426 to 452); and, Twitter “followers” have grown 9% (from 595 to 650). SECOORA shared approximately 137 Facebook posts and 172 Twitter “tweets”, referring a combined 579 sessions to the SECOORA website (decreasing 40% from 965 to 579) and 19 stories were published on the website (www.secoora.org/news).
Support citizen science opportunities	SECOORA, the South Atlantic Fishery Management Council (SAFMC), FACT, and NC State University partnered on a NC Sea Grant Community Collaborative Research Grant proposal submitted 11/20/18. The team found out the proposal was not funded in February 2019. The project team is still actively looking for citizen science opportunities that will help identify how climate is impacting fisheries (e.g. range shifts).
Engage students in problem solving using ocean observing data	SECOORA released the Data Challenge in February 2019. The Challenge focused on use of WebCAT camera data. Five proposals were submitted. In April 2019, the Undergraduate award was presented to Deanna and Kelsea Edwing from UNCW. The Other award (open to graduate and early career professionals) was presented to Matthew Conlin from the University of Florida. The two projects chosen clearly communicated benefits to specific user groups, expanding prospective use of web camera data for environmental monitoring. Read more . SECOORA issued the second Vembu Subramanian Ocean Scholar opportunity. Proposals were due 5/24/19. Three proposals were submitted. SECOORA and Axiom Data Science hosted a classroom-based workshop for undergraduate students at UNCW on 2/22/19 (Course instructor Lynn Leonard). Approximately 25 undergraduate students worked through data discovery scenarios that highlighted how to use the data portal to access and visualize environmental data. In February, two USF undergraduate classes participated in field trips to the USF COMPS Clam Bayou station. The students learned how data from the station is important to environmental monitoring. The Clam Bayou station is a partnership between YSI Xylem, SECOORA, and USF COMPS. Over 250 students have been taught through this partnership since it began in 2014.

Activities	Status
Coordination of SOCAN activities	SOCAN Coordinator Leslie Wickes continues to engage stakeholders within the region and nationally. Wickes spent time on the road, visiting stakeholders with Sapelo Sea Farms, Mote Marine Laboratory, and UGA/GA Sea Grant Shellfish Research Laboratory. The SOCAN website was updated to include webpages with state specific content for North Carolina and Georgia . These pages provide OA information, identify monitoring locations, and provide socioeconomic data. The South Carolina webpage is currently in development. Two newsletters were also published: January/February and March/April . These newsletters feature updates on OA research, funding news, and identify work being conducted by regional stakeholders, such as researchers, hatchery operators, and oyster growers. Finally, Wickes led or was a co-PI on three grant proposals submitted during this reporting period.

Milestone C: Provide DMAC infrastructure to enable collaboration and decision-making (SECOORA and Axiom Data Science, LLC): *On-track*

Activities	Status
IOOS DMAC standards compliance and implementation of Data Management, Products, and Services	<p>Responsible contractor: Axiom Data Science, LLC. SECOORA follows the IOOS recommended standards-based services and requirements to ingest, manage, and provide access to all our funded data streams (in-situ, remotely sensed and numerical models). See portal.secoora.org. Progress during this period is as follows:</p> <ul style="list-style-type: none"> • Maintain IOOS compliant services and applications for integration with national products: <ul style="list-style-type: none"> ○ THREDDS 4.6.10 - https://thredds.secoora.org ○ ERDDAP 1.82 - https://erddap.secoora.org ○ SECOORA ISO WAF - https://thredds.secoora.org/iso ○ NECI Archive - https://ncei.axiomdatascience.com/secoora/ • Provided technical support to CORMP, UNCW researcher Wilson Freshwater, and UNC-IMS researcher Nathan Hall (ModMon) for authoring ISO 19115-standard metadata using the Research Workspace, and to the DNR SC data manager for transfer of provisional SEAMAP data files for display and access in the SECOORA data portal. • Released an administrator version of the SECOORA sensor dashboard for tracking of sensor status and performance history in the SECOORA data portal. • Maintained submission of 66 sensor feeds to NCEI for long-term preservation. Submitted 2 new gliders missions to the IOOS Glider DAC (angus-20190522T0000 and franklin-20190522T0000). • Expanded SECOORA data portal holdings to include: <ul style="list-style-type: none"> ○ University of North Carolina Wilmington Center for Marine Science (UNCW-CMS) Onslow Bay, 6 historical bottom temperature stations ○ UNCW - Coastal Ocean Research and Monitoring Program (CORMP) separation of met buoy and wave buoy for 41064 and 41159 ○ UNCW CORMP historical CTD and ADCP sensor data- OB27M ○ Cherry Grove webcam ○ QA/QC datasets <ul style="list-style-type: none"> ▪ USF CMS - Coastal Ocean Monitoring and Prediction System (COMPS)- 14 stations ▪ UNCW-CMS- 6 stations ▪ UNCW CORMP- 9 stations ▪ NOAA NERRS, Charleston Harbor- 1 station ▪ Duke University- 1 station • Maintained the SECOORA FACT Node. Working with the IOOS ATN (now contracted to Axiom) and OTN to develop a smooth pathway for all FACT data to get into ATN. <ul style="list-style-type: none"> ○ Maintained the FACT OTN layer to SECOORA portal which dynamically pulls from the FACT node as they update it.

Activities	Status
	<ul style="list-style-type: none"> ○ Installed an improved monitoring system for the FACT/OTN node database. ○ Provided new administrative features on the FACT Research Workspace to facilitate data access and sharing.
Maintenance of DMAC infrastructure (hardware and software)	The Axiom data system is the backbone of the cyber infrastructure that is leveraged to acquire, archive, and share SECOORA data and information products. The open-source interoperability and data stewardship systems of the SECOORA infrastructure were maintained to provide full-lifecycle data management services. During this period, Axiom began phasing in newer generation compute nodes for faster and denser processing with lower total energy usage, implemented universal log collector for all Axiom applications and added new data center racks for expanded capacity and growth.
Establishment and release of new SECOORA Portal	<p>Version 2.10 of the SECOORA data portal was released, which introduced portal display of existing data quality flags from sources, layer opacity controls, and updates to the visualization and data handling for moving platforms. Full release notes can be found at https://axiomdatascience.com/portal-updates/ and a summary is provided:</p> <ul style="list-style-type: none"> • A revised prototype version of the Hurricane Tracking Tool for spatial and temporal tracking of historical hurricane observations. The initial public release was made available in January 2019 with subsequent revisions underway to integrate active hurricane tracks into the tool. • Started enabling the ability to visualize trajectories (gliders, wave gliders, floats, etc.) alongside other data layers in the portal. This was requested via feedback from users and from glider operators. See: wave glider track visualization. • Implementation of QARTOD QA/QC checks for real-time and delayed-mode data feeds using flags from quality tests run by data provider. The flags are viewable and available for download in the data portal and/or Axiom data servers at the following resolutions: source level (i.e. flag roll-up summary); station level for all sensors; detailed test results at the sensor level. The basic/required quality tests for all additional SECOORA assets are run on observation data in a staging environment with documentation of the test code and thresholds, with excepted live release in August 2019.
Address 10 requirements per NOAA IOOS Contribute Data Page	See SECOORA December 2018 progress report.

Goal 2: Maintain existing core observation investments in the region

Milestone A: Maintain High Frequency Radars (HFR) distributed throughout the region

Institution/Contractor	Status
University of South Florida (USF) (Weisberg, Merz) All HFR sites On-Track	<p>USF continues to operate and maintain 3 CODAR HFR sites (Naples, Venice and Redington Shores) and 2 WERA HFR sites (Venice and Ft. DeSoto Park) which overlook the USF mooring array. Data are sent to SECOORA, NOAA NDBC, and the IOOS HFRNet for integration, display, and dissemination. Plots of the data are also being posted on the USF College of Marine Science COMPS Ocean Circulation Group web site (http://ocgweb.marine.usf.edu). All systems have been operational and reporting at above 90% up time.</p> <p>During this reporting period, work also continued on a National Academy of Sciences-Gulf Research Program award aimed at obtaining a better understanding of the Gulf of Mexico Loop Current. SECOORA is a partner on this award. USF received funding to deploy 3 new CODAR systems; one in the Dry Tortugas and two in the Keys (Marathon and Key West).</p> <p>Of note, USF was informed by the FCC that with their request for the new HFR licenses all of the USF radar will have to transition to Part 90 (the new ITU bands) during the next year before the renewal of FCC licenses for HFR per the rulemaking for Marine radars under FCC-17-33</p>

Institution/Contractor	Status
	<p>paragraph 54 Oceanographic Radar applications. A new FCC HFR license application for the new ITU bands 5.25 MHz (CODAR) and 13.45 MHz (WERA) has been submitted and USF should hear back by September 2019 if the licenses have been approved.</p>
<p>University of Georgia (UGA), Skidaway Institute of Oceanography (SkIO) (Savidge): CAT On-Track JEK Delayed</p>	<p>St. Catherine’s (CAT) HFR has been performing well. Recently, some damage to the Tx antennas has been detected. Minor repairs are needed and will be undertaken during Summer 2019. The Jekyll (JEK) HFR sustained significant damage in 2016 from Hurricane Matthew but was operating reasonably well until Hurricane Irma in 2017, using approximately half the original number of Rx and Tx antennas. Hurricane Irma destroyed the remaining antennas and their cables – consequently the JEK site has been down. Funding from the Hurricane Irma/Maria Supplemental will be used to make site repairs.</p> <p>The NSF PEACH project WERA radar data from 4 sites at Cape Hatteras continues to be provided to PI Seim’s team at UNC-CH, for combining with the SECOORA supported CODAR data (CORE, HATY, DUCK). WERA radial data that have been smoothed in time and space to match the CODAR sampling will continue to be provided to Hugh Roarty at Rutgers for inclusion in their regional mapping of surface currents within MARACCOOS.</p> <p>Through the Fill the Gaps campaign, funding to purchase the 4 leased PEACH WERA was obtained. SECOORA purchased two of the WERA and provided funds to SkIO to purchase the other two WERA. The SECOORA purchased WERA will be operated by PIs Seim and Voulgaris. SkIO Radar Technician Ben Hefner has made significant progress in identifying and seeking permission to deploy two of the PEACH in Florida, just north of Cape Canaveral. This will expand coverage north of the WERA that are being deployed by PI Maul.</p>
<p>University of Miami (Shay) STF On-Track VIR Delayed CDN Delayed NKL In Progress</p>	<p>UM has only been able to repair 1 of 3 WERA which were severely damaged in 2017 due to Hurricane Irma. UM has repaired the HFR installation (STF) at the US Navy Test Facility at Dania Beach (STF). Hurricane supplemental funding was provided in May 2019 and repairs for VIR and CDN will begin during the next reporting period.</p> <p>On 28 March, PI Shay received the approved “Land Use Agreement” from the Florida Department of Environmental Protection (DEP), office of Attorney to be reviewed by University of Miami’s attorneys. On 18 April, the University of Miami’s General Counsel sent the draft of the “Use Agreement” back to the DEP after completing a review with minimal comments. On 20 May, the NEPA process was completed for the UM HFR installation at Valois Boulevard. Once the Land Use Agreement has been fully executed by the University of Miami and FL DEP, deployment of the HFR will begin.</p>
<p>University of NC - Chapel Hill (UNC-CH) (Seim) All HFRs On-Track</p>	<p>UNC-CH operates CORE, HATY, and DUCK CODARs. All systems performed well during the reporting period (uptime of > 95%); there were no significant outages at any sites. There is some concern about the antenna at CORE as the phases on the loops are more variable than is typical, and this may be an indication of component degradation/failure in the receive antenna. As this site was heavily impacted by Hurricane Florence in Sep. 2018 it is anticipated that the site sustained some damage.</p> <p>UNC-CH continues to evaluate the real-time QC processing described in Haines et al. (2017). After damage to HATY in 2017 due to hurricanes led to reduced performance, data managers found the QC to be removing too much data. Updyke at ODU has also found that DUCK QC may be improved if short-term measured beam patterns from the AIS system there are applied.</p> <p>Finally, UNC-CH will assume responsibility for the operation of one additional site, a WERA HFR located on Ocracoke, to expand coverage in Raleigh Bay, NC. This system was installed through NSF funding and SECOORA, through an agreement with Hezel, has purchased the HFR. An initial assessment of coverage and data quality impact has been developed along with a plan to repair/upgrade the site to make the communication more robust.</p>

Institution/Contractor	Status
University of South Carolina (Voulgaris) All HFRs On-Track	<p>University of South Carolina is responsible for the continuous operation and maintenance the WERA HFRs located at Georgetown, SC (GTN) and Fort Caswell, NC (CSW). The operation of the two systems was continued with some minor down time during this reporting period. At CSW Hurricane Florence induced erosion at the location of the TX array continues to affect the antennas requiring additional, temporarily adjustments. At GTN hardware issues with the controlling computer were responsible for some down time, while erosion is still active and requires continuous monitoring to ensure the antennas are not over-exposed to the beachfront, an area of turtle nesting. Finally, routine maintenance was undertaken at both sites. Overall, GTN uptime was 94% and CSW was 88%. The lower uptime at CSW is attributed to the downtime associated with Hurricane Florence.</p> <p>Finally, USC finalized the development of a method for the inversion of the Doppler spectra from a single HFR station to determine wave spectra and bulk characteristics. For this analysis, data from a VHF system were used as the verification and required the colocation of wave measuring devices within the radar footprint. The results were published in Alattabi et al. (2019) and the code has been published as open source (Cahl et al, 2019) in zenodo (http://doi.org/10.5281/zenodo.2643696).</p>

Milestone B: Maintain in-situ stations along the Carolina and West Florida Shelf (WFS) coasts

Institution/Contractor	Status																																																							
USF (Weisberg) - Coastal Ocean Monitoring and Prediction System (COMPS) moorings All moorings On Track	<p>Operations: Three real-time, data transmitting surface moorings (C10, C12, C13) were maintained, along with two non-real-time subsurface moorings (C11 and C15). All data from C11 and C15 continue to be uploaded to Research Workspace for data archival and sharing with SECOORA and NCEI. Additionally, the C12 measurements were expanded to include an ocean acidification package transmitting surface water quality and ocean carbon system data in real time. This effort is made possible through a collaboration with Dr. Kim Yates from USGS St. Petersburg Center for Coastal and Marine Science. These sensors are presently out of the water for repair and calibration, and their performance is not included with our SECOORA up time reporting.</p> <p>Along with the SECOORA-funded buoys, USF maintains a RESTORE Act-funded, real time station (C21) offshore of St Pete Beach, FL. This funding was leveraged through a competitive grant from Pinellas County and is included as part of the SECOORA and COMPS.</p> <table border="1"> <thead> <tr> <th></th> <th>C10</th> <th>C12</th> <th>C13</th> <th>C21</th> </tr> </thead> <tbody> <tr> <td>Wind</td> <td>86%</td> <td>96%</td> <td>74%</td> <td>84%</td> </tr> <tr> <td>Barometric Pressure</td> <td>85%</td> <td>96%</td> <td>74%</td> <td>84%</td> </tr> <tr> <td>Water Temperature</td> <td>86%</td> <td>96%</td> <td>74%</td> <td>N/A</td> </tr> <tr> <td>Salinity (Surface)</td> <td>86%</td> <td>96%</td> <td>74%</td> <td>N/A</td> </tr> <tr> <td>Air Temperature</td> <td>86%</td> <td>96%</td> <td>74%</td> <td>84%</td> </tr> <tr> <td>Relative Humidity</td> <td>85%</td> <td>95%</td> <td>74%</td> <td>84%</td> </tr> <tr> <td>Longwave Radiation</td> <td>33%</td> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>Shortwave Radiation</td> <td>86%</td> <td>N/A</td> <td>N/A</td> <td>NA</td> </tr> <tr> <td>Currents (ADCP)</td> <td>83%</td> <td>92%</td> <td>71%</td> <td>83%</td> </tr> <tr> <td>Waves</td> <td>N/A</td> <td>N/A</td> <td>N/A</td> <td>84%</td> </tr> </tbody> </table> <p><i>Discussion of low stats:</i> The low data return for C13 was caused by a power outage due to a damaged solar panel. The solar panel was replaced and the real time data flow has been re-established. The Longwave Radiation (LWR) sensor on C10 has experienced an internal hardware failure. This sensor will be replaced during the mooring service trip in July 2019.</p>		C10	C12	C13	C21	Wind	86%	96%	74%	84%	Barometric Pressure	85%	96%	74%	84%	Water Temperature	86%	96%	74%	N/A	Salinity (Surface)	86%	96%	74%	N/A	Air Temperature	86%	96%	74%	84%	Relative Humidity	85%	95%	74%	84%	Longwave Radiation	33%	N/A	N/A	N/A	Shortwave Radiation	86%	N/A	N/A	NA	Currents (ADCP)	83%	92%	71%	83%	Waves	N/A	N/A	N/A	84%
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	<p>Finally, USF personnel noticed a substantial number of dropouts in the hourly GOES data returns from the C10 and C21 stations. The GOES transmitter in the two moorings will be replaced on the July mooring service trip in an effort to reduce the number of communication dropouts.</p> <p>Data Management: USF worked with Second Creek Consulting to develop a new Coastal Ocean Monitoring and Prediction System (COMPS) data management system and implement QARTOD tests on all COMPS real-time data. The redesigned data management system was fully implemented in April 2019. Axiom is in the process of converting all COMPS data feeds to this new system and ingesting the QARTOD flags.</p>																																										
<p>USF (Luther) - Coastal tidal & meteorological stations All stations On-Track</p>	<p>Operations: Sites collecting water level and surface meteorological parameters are Big Carlos Pass, Clam Bayou, Fred Howard Park, Aripeka, and Shell Point. A full suite of water quality sensors are operated on the Clam Bayou site in partnership with YSI/Xylem.</p> <ul style="list-style-type: none"> • USF installed a new test station at the USF docks on Bayboro Harbor on 3/7/2019. This station has a full suite of water level and meteorological sensors, with both acoustic and radar water level sensors. The station will allow USF personnel to test and evaluate systems under actual operating conditions before being deployed in remote locations. • The Clam Bayou Site was completely refurbished during the week of 5/13-17/2019. USF/COMPS, YSI/Xylem, and FWRI personnel removed, cleaned, calibrated, and re-deployed the multiprobe water quality sonde; inspected/cleaned all components; removed the EXO2 protective well, cleaned it and applied anti-fouling paint; and the met mast was dropped to replace sensors at the top. Crews collected in-situ calibration/evaluation data for chl, CDOM, pH, alkalinity, and pCO2, as is done every 4 to 6 weeks. <p>Data Management: See USF (Weisberg).</p> <p>Partner Activities: USF personnel are working with St. Petersburg and Pinellas County water management staff to develop predictive tools based on short-term climate forecasts to help mitigate wastewater releases into Tampa Bay and surrounding waters. This work is funded in part by the Tampa Bay Environmental Restoration Fund. Data from the Clam Bayou water quality station have been integral for assessing the impacts of the recent wastewater releases on dissolved oxygen, chlorophyll, and turbidity. USF is also working with city staff from St. Petersburg and Gulfport to quantify the occurrence of low DO events and to distinguish naturally occurring from wastewater-related events.</p> <p>USF is working with the Tampa Bay Estuary Program, the US Fish and Wildlife Service, and the Tampa Port Authority to analyze Automatic Identification System vessel tracking data to estimate the impacts of ship wakes on critical marine habitat in Tampa Bay. A report on this effort is at https://www.tbep.tech.org/TBEP_TECH_PUBS/2019/TBEP_06_19_Ship_Wakes.pdf.</p>																																										
<p>University of North Carolina - Wilmington (UNCW) (Leonard) - Coastal Ocean Research and Monitoring Program (CORMP) mooring network All stations On-Track</p>	<p>Operations: UNCW operates 9 moorings in NC and SC coastal waters. Buoy statistics for the reporting period are below. Note that ILM2 and LEJ3 have co-located WaveRider buoys (i.e. 2 moorings on station) that provide spectral wave data and water temperature. SUN2 had a co-located acoustic system (comprised of an ADCP and Nemo) to provide wave data and surface and bottom water currents (2 moorings on station). Four non-real time temperature and salinity (CTDs) sensors have been deployed at the seafloor and mid-water at the ILM2 and ILM3 buoys. These data will be used to support an undergraduate research project and will be uploaded to the Research Workspace for metadata creation and data sharing.</p> <table border="1" data-bbox="451 1696 1464 1892"> <thead> <tr> <th></th> <th>ILM2</th> <th>ILM3</th> <th>LEJ3</th> <th>SUN2</th> <th>CAP2</th> <th>FRP2</th> </tr> </thead> <tbody> <tr> <td>Air Temperature</td> <td>94%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>79%</td> </tr> <tr> <td>Air Pressure</td> <td>94%</td> <td>100%</td> <td>99%</td> <td>100%</td> <td>99%</td> <td>79%</td> </tr> <tr> <td>Wind Speed, Gust, Direction</td> <td>94%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>79%</td> </tr> <tr> <td>Surface Salinity</td> <td>94%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>98%</td> <td>74%</td> </tr> <tr> <td>Surface Water Temperature</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>98%</td> <td>74%</td> </tr> </tbody> </table>		ILM2	ILM3	LEJ3	SUN2	CAP2	FRP2	Air Temperature	94%	100%	100%	100%	100%	79%	Air Pressure	94%	100%	99%	100%	99%	79%	Wind Speed, Gust, Direction	94%	100%	100%	100%	100%	79%	Surface Salinity	94%	100%	100%	100%	98%	74%	Surface Water Temperature	100%	100%	100%	100%	98%	74%
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	Waves	100%	N/A	100%	0%	N/A	N/A
	Currents	N/A	N/A	N/A	0%	N/A	N/A
	<p><i>Discussion of Low Buoy Statistics:</i> The SUN2wave system was recovered on 12/7/18 due to failures on both ADCP/NEMO units. The instruments were sent to RDI for service and the repairs are scheduled to be completed by 7/18/19. The ADCP repairs have taken much longer than anticipated and RDI attributes their delay in servicing to availability of a proprietary connector. To mitigate for the ongoing loss of data at this station, CORMP has obtained a CDIP Datawell Waverider buoy and will deploy it at the SUN2WAVE site until the repaired instruments are returned. This deployment is scheduled for June. In the meantime, CORMP technicians have completed a total redesign of the buoy and mooring. The new system includes a new armored inductive loop, a newly fabricated buoy tower and hull, and a fully redesigned datalogger and communications system.</p> <p>FRP2: The buoy was turned around in April 2019 and the system included an upgraded modem on the 4G network (required by Verizon); however, the 4G service is not fully available in this location. Because of the unanticipated data transfer gaps, CORMP technicians are reconfiguring the communication system on the FRP buoy to include the addition of an iridium satellite Short Burst Data solution that will be implemented in the next reporting period.</p> <p>Data Management: Following Hurricane Florence, CORMP decided to keep its data production services running on an Amazon Cloud Workspace and rely on UNCW network resources primarily for backup and archival purposes. Although use of Amazon requires a nominal fee, this approach allows the CORMP data management team (Second Creek Consulting) to circumvent issues associated with UNCW ITS security and network maintenance and ensures continued access to CORMP data should UNCW be impacted by a natural disaster or campus power issue.</p> <p>Partner activities: CORMP continues to work with FACT partners (SERC, Florida Wildlife Commission and Georgia DNR) to maintain the VEMCO acoustic receivers on the three Onslow Bay buoys and a non-real time bottom frame in Onslow Bay (OB27). VEMCOs are downloaded and cleaned during scheduled mooring maintenance, and data are submitted to the FACT node.</p>						

Milestone C: Maintain the sensors on NOAA GRNMS buoy

Institution/Contractor	Status
UGA (Noakes) - Support to NOAA's Ocean Acidification Program NDBC Gray's Reef National Marine Sanctuary (GRNMS) NDBC ID #41008 buoy On-Track	<p>Operations: During March 2019, NDBC contacted Dr. Noakes to inform him that the GRNMS buoy would be swapped with a new buoy. The new buoy was set up with a MAPCO2 system at the Charleston USCG dock on May 22 and 23. The old buoy was recovered on May 29 and the new buoy deployed. PMEL set up a call to the MAPCO2 to start the system. All instrumentation on the system responded to the call and began reporting data as requested.</p> <p>The primary MAPCO2 system has been operating at 100% during this reporting period. Earlier in the reporting period (on the "old" buoy), the auxiliary SAMI-pH and Seabird sensors were working, but the SAMI data were erratic, prompting PMEL to stop reporting the pH data on the webpage. With the new buoy (starting May 29), all instrumentation including the SAMI-pH are now reporting at 100%.</p>

Goal 3: Begin to address geographic gaps in observations

Milestone A: Establish a regional glider observatory in the South Atlantic Bight (SAB)

Institution/Contractor	Status
UGA SKIO (Edwards)	<p>Operations: SKIO/UGA took delivery of the new SECOORA glider, a G3 Slocum with a pumped CTD, Aanderaa oxygen optode, WetLabs EcoPuck triplet, and integrated Vemco acoustic</p>

Institution/Contractor	Status
North Carolina State University (NCSU, He) UNC-CH (Seim) USF (Lembke) Georgia Institute of Technology (GIT, Zhang) Glider operations On-Track	<p>receivers. SkIO technicians modified autoexec settings, created and customized mission, mission attribute, and data transfer settings, and performed extensive tests to prepare it for deployment. SECOORA set up a naming competition and the selected name for the new G3 is <i>Franklin</i>. UGA/SkIO also took delivery of a new G3 this reporting period, named <i>Angus</i>.</p> <p>During this period, SkIO performed 2 deployments for SECOORA, a joint deployment of Angus and Franklin (deployed May 21, anticipated recovery June 15). The gliders were jointly piloted by SECOORA glider observatory members at SkIO/UGA, GIT, UNC, and USF.</p> <p>Hurricane Gliders: Edwards and SECOORA are lead PIs on the Hurricane Gliders proposal. Edwards participates in bi-weekly planning meetings with NOAA, Navy, and collaborating institutions to support analysis of prior work and planning for the upcoming hurricane season.</p> <p>Navy Gliders request: Edwards served on a steering committee for developing and justifying an IOOS request to the US Navy for up to 20 Navy gliders to further support Hurricane Gliders activities through the 2019 season. The request was submitted late May 2019.</p>

Milestone B: Install a new coastal water quality and meteorological station in Charleston Harbor, SC:

Institution/Contractor	Status
South Carolina Department of Natural Resources (Sanger) Charleston Harbor - Delayed	<p>The Charleston Harbor station is currently non-operational. SC DNR worked with the Army Corps of Engineers Charleston District and the US Coast Guard to try and upgrade the station to a 4-piling structure in order to increase stability; however, the Army Corps installed a single pile structure that is not suitable (due to stability issues) for the water quality sensors. SC DNR is continuing to explore options to expand the site to a 4-piling structure.</p>

Goal 4: Continue delivery of operational model forecasts and products to serve priority users

Milestone A: Enhance and operate a Coupled Marine Environmental Assessment and Prediction System for the SE

Institution/Contractor	Status
NCSU (He) - Support and enhance SABGOM model On-Track	<p>The project team is on-track with modeling efforts. The team maintains the SABGOM and CNAPS ocean prediction systems to run on a 24/7 basis, providing time- and space-continuous regional marine environment predictions on a user-interactive web portal. NCSU has made significant progress in refining the full couplings of wave, atmosphere and ocean circulation models. The coupled system has been used to generate: 1) regional nowcasts and forecasts of ocean circulation, waves, and marine weather, and 2) several regional ocean hindcast on representative events such as Hurricane Florence. Additionally, the project team has successfully implemented both variational data assimilation and Kalman filter methods for the regional ocean predictions. The prototype data assimilative modeling system is being developed to run in pseudo-operational mode starting in the beginning of Year 4.</p>

Milestone B: Operate the WFS FVCOM ocean model

Institution/Contractor	Status
USF (Weisberg) On-Track	A new red tide tracking product based on the higher resolution Tampa Bay Circulation Model (TBCOM) has been developed and served online to the public. These short-term (4.5-day) products are produced in a Collaboration for the Prediction of Red tide (CPR) initiative between the USF College of Marine Science, and the Florida Wildlife Research Institute (FWRI). Along with short-term predictions, USF also provides a seasonal prediction based on West Florida Shelf water properties and circulation. This seasonal prediction has been successful in accounting for red tides in 20 out of 25 years for which joint satellite altimetry and <i>K. brevis</i> cell count data exist. USF will provide stakeholders with the 2019 red tide seasonal forecast in early June.

Milestone C: Provide an early warning system for swimming beach and shellfish harvesting waters

Institution/Contractor	Status
USC (Porter) On-Track	<p>The project team continues to maintain the platform howsthebeach.org and provide public access to daily estimates of swimming beach bacteria levels for Myrtle Beach, SC, Sarasota, FL, Charleston, SC, and Kill Devil Hills, NC; all sites available on: http://howsthebeach.org/. Extending the work done for the beach water quality projects, the project team developed http://howmyscriver.org for the Saluda River Monitoring Coalition. The Coalition was formed to monitor <i>fecal coliform</i> at 11 sampling sites on the Saluda, Broad, and Congaree rivers. The website provides access to monitoring data.</p> <p>The project team has also initiated a project with the City of Folly Beach, SC to provide site-specific water quality data and nowcasts for both the swimming beaches on the Atlantic Ocean side of the island and the shellfish harvesting waters of Folly River on the landward side of the island. The team is working with the SECOORA WebCAT project to integrate video feeds from the Folly Beach Pier with (under development) automated feature extraction algorithms to identify and summarize beach utilization during times of weather, currents and water quality warnings.</p>

Milestone D: Optimize and enhance the SECOORA Marine Weather Portal (MWP)

Institution/Contractor	Status
SECOORA (Dorton)/ Second Creek Consulting (Galvarino) On-Track	<p>The MWP is hosted on the SECOORA website: http://mwp.secoora.org/. The MWP previously relied on nowCOAST for forecasts, hurricane maps, NWS watch and warning maps, and NWS point forecasts. Due to nowCOAST performance vulnerabilities during peak usage, Second Creek harvests data products directly from the NWS and the National Hurricane Center for display on the MWP. This results in a better user experience and increased site reliability when displaying hazards, hurricane tracks, and forecasts.</p> <p>Data additions: Everglades temp/salinity stations; a variety of water level datum options for CO-COPS stations; new well-known marine locations along the Gulf and Atlantic Florida coasts; and auto refresh capabilities to ensure users view the latest hazard and map data at all times.</p> <p>Outreach: The MWP project team members (Dorton, Galvarino, Porter) participated in the Charleston Boat Show, 1/25-27/19. During this event, they highlighted the MWP (as well as other SECOORA products) and requested feedback on the site from boat show attendees.</p>

Milestone E: Python Data Analysis Tools for Oceanographic Services

Institution/Contractor	Status
Independent Contractor, Filipe Pires Alvarenga	Activities conducted fall into three areas of work. 1. Assist in development of IOOS.us Documentation and Demonstration sub-pages; 2. Support current and continue developing

Fernandes, Oceanographer, Brazil On-Track	software packages to IOOS; and, 3. Ensure software deployment via conda-forge packages and updates. All work is reviewed by the IOOS program office. Full details, listing accomplishments this period, are found in Appendix A.
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Milestone F: Special Projects

Institution/Contractor	Status
OTN/ATN On-Track	SECOORA established contracts with Joy Young, Fisheries Data Solutions (10/19/18) and Chris Kalinowsky, Georgia Department of Natural Resources (12/4/18). Young and Kalinowsky have submitted progress reports directly to the IOOS ATN manager. These reports are included in Appendix B.
OTT Biology pilot projects On-track	SCDNR conducts the SEAMAP-SA fisheries independent surveys for the south Atlantic. SCDNR has provided a dataset to Axiom for the OTT Biology project. Axiom supported the SEAMAP program through data processing and preview of a subset of fish abundance data for two species (available via the SECOORA data portal and data view) for discovery of data patterns. This task is ongoing as the data provider is working to prepare additional data for transfer to SECOORA.
Scholarship Delayed	SECOORA worked with members at the UNC Coastal Studies Institute to submit a Hollings Scholar opportunity last reporting period. Unfortunately, no one selected this opportunity. SECOORA will resubmit it in Fall 2019.
Additional Observations Initiative On-track	SECOORA hosted a competitive mini-proposal opportunity focused on increasing ocean observing in one of the following areas: HABS, ocean sound, coral health. Ten proposals were submitted for this \$30,000 funding opportunity. A review team convened in May to review the proposals and make the final selection. Dr. Eric Montie, USC Beaufort, was selected for funding for his proposal, "Integrating Biological Sound and Noise Measurements into Regional Coastal Ocean Observing Systems (RCOOS) in Estuaries of South Carolina. Project start: 6/1/2019.

Goal 6: Continue building critical elements of the observing system by adding biogeochemical and marine sound sensors, and HFRs

Milestone A: Install and operate new HFRs: **On Track**

Florida Institute of Technology (FIT)/Maul On-Track	FIT received funding to deploy two HFRs in the Cape Canaveral area. Dr. George Maul has identified two locations, Sebastian Inlet State Park and Patrick Air Force Base as the best locations for the HFR installations. These locations will provide coverage of the Oculina Bank Habitat Area of Particular Concern, an important fishery area off the east coast of Florida. Dr. Maul has requested permission to use the state park and requested a list of required permits and conditions for working on state park property. Additionally, a formal base action request has been submitted to the Air Force requesting use of Patrick AFB. This request will have to be approved by the Department of Defense.
SkIO/Savidge On-Track	Through the Fill the Gaps campaign, SECOORA and SkIO purchased the used WERA from the NSF PEACH project (PI Savidge). The lease terms for the WERA were complete in March 2019. SECOORA purchased two systems and SkIO, through a subaward from SECOORA, purchased the other two. Locations for the SECOORA HFR are being evaluated. It is anticipated that one HFR will remain on Ocracoke, NC (current location) and the other will move to the Myrtle Beach, SC area. SkIO is evaluating locations from coastal Georgia to north Florida for two systems that will fill coverage gaps between the CAT/JEK and soon to be deployed FIT HFRs (see above).

2) Scope of Work

Scope of work is as described in the [Year 3 Statement of Work](#).

3) Personnel and Organizational Structure

Current lists of SECOORA Members and Board are available on our [website](#). Additionally, SECOORA personnel job descriptions and employee CVs are available on: <http://secoora.org/certification>.

4) Budget Analysis

SECOORA's March 31, 2019 financial report for Year 1 funds shows a budget balance remaining of approximately \$25,000. The March 31, 2019 financial report for Year 2 funds shows a budget balance remaining of approximately \$195,000. The March 31, 2019 financial report for Year 3 funds shows a budget balance remaining of approximately \$2.7M. We are within budget and on track with spending. SECOORA continues to receive invoices regularly from our sub-awardees and we process them during bi-monthly administration meetings. All invoices are paid within forty-five days. SECOORA continues to draw from ASAP monthly. As a reminder SECOORA pays out its monthly operational costs (i.e. payroll, etc.) and then conducts the ASAP draws in the middle of the following month for both the preceding month's operational expenses and the sub-awardee invoices.

Appendix A - Python Data Analysis Tools for Oceanographers

1) Assist in the development of the IOOS.us Documentation and Demonstration sub pages

- The IOOS Jekyll theme used in some of the pages had a minor security vulnerability which was fixed in [ioos/ioos_jekyll_theme #29](#), [#30](#), [#31](#), and [ioos/notebooks_demos #336](#).
- The notebooks in the page go stale with time and PRs [ioos/notebooks_demos #324](#), [#327](#), [#328](#) kept them running with the latest environment and services. Note that some notebooks had to be skipped during testing because they cannot be correct (URL rot, unsupported library version, etc.). Not all of the notebooks are tested for code style; to ensure clarity, [#332](#) and the page publication was greatly simplified with the use of *doctr* [#331](#). In order to avoid regression the CIs are now testing with the latest *minconda* release [#335](#).
- The page was also updated to use the pangeo binder, a faster and scalable instance of JupyterHub [#323](#) and [#338](#).
- There are some of significant environment updates in the IOOS recommended *env*: use Python 3.7 [#322](#), remove R from the default environment [#325](#), use non-R env as default, and added *nc-time-axis* [#326](#).
- Three new notebook were added to the page: hurricane GIS parts 1 and 2 [#330](#) and [#337](#), and IOOS models part 2 [#333](#).

2) Support current and continue developing important software packages for IOOS. This activity can be divided into two sub-sections:

a) packages from the IOOS GitHub organization

- Added Python 3.7 testing to projects [ioos/cc-plugin-glider #34](#), [ioos/cc-plugin-ncei #49](#), [ioos/cc-plugin-ugrid #14](#), and [ioos/pyoos #87](#)
- Improved plugin installation by removing exact pins in [ioos/cc-plugin-ncei #48](#)
- Fixed CI failures in *compliance-checker* and added a URL *fillmismatch* workaround for compatibility with latest netcdf-c ([ioos/compliance-checker #623](#), [#645](#), and [#631](#))
- *erddapy* was moved to the IOOS organization ([ioos/erddapy #71](#), [#73](#), [#76](#), [#78](#), and [#79](#)). Some refactoring was needed before the move to ensure that CIs, autopublish, tests, etc would work as expected ([#65](#), [#66](#), [#67](#), [#68](#), [#69](#), and [#70](#)). Added caching for repeated requests ([#63](#) and [#64](#)) and allow for multiple CSV in the *to_pandas* method ([#75](#)), and fixed the wheel building for PyPI ([#74](#))
- Issue maintenance PRs to *ciso* ([ioos/ciso #14](#)) and *odvc* ([ioos/odvc #27](#))

b) packages from third party organizations that are important for IOOS

- Fixed a bug in *gridgeo* to return a single coordinate when more than one is found ([pyoceans/gridgeo #45](#)) and small re-factors before issuing a new release ([#44](#), [#46](#), [#47](#), [#48](#), and [#49](#))
- Increase the timeout interval in *ioos-tools* to deal with slow servers ([pyoceans/ioos_tools #15](#)) and small re-factors before issuing a new release ([#17](#), [#18](#), [#19](#), and [#20](#))
- Created a new package named *nbrr* to help with reproducible notebook publication and testing on GitHub ([pyoceans/nbrr #1](#), [#6](#), [#7](#), [#8](#), [#9](#), [#10](#), and [#11](#)), and fixed a dependency deprecation warning ([ericdill/depfinder #29](#))
- Major re-factor of *python-ctd* to use *pandas-flavor* instead of monkey patching ([pyoceans/python-ctd #55](#), [#56](#), [#57](#), [#58](#), [#60](#), [#61](#), [#62](#), [#63](#), [#64](#), [#65](#), [#66](#), [#67](#), [#68](#), [#72](#), and [#75](#)) and added a new feature to perform bindata via interpolation ([#71](#))
- Updated the *o2sat* function in [pyoceans/python-oceans #61](#)
- Improved *folium* documentation and updated to latest *leaflet* ([python-visualization/branca #53](#), [python-visualization/folium #1040](#), [#1095](#), [#1126](#), [#1149](#), [#1152](#), [#1157](#), and [#1158](#))
- Issued a new release of *utide* ([#66](#), [#71](#), [#74](#), and [#75](#))
- Improved matplotlib documentation ([matplotlib/matplotlib #14286](#))
- Fixed *nco*'s testing on Windows ([nco/nco #117](#))
- Created a testing framework for *gridded* ([NOAA-ORR-ERD/gridded #40](#))
- Added versioned documentation to *gsw* ([TEOS-10/GSW-Python #45](#) and [#50](#))
- Fixed *netcdf-c* compilation with latest gcc ([Unidata/netcdf-c #1411](#))

- Improved and updated *netcdf4* testing ([Unidata/netcdf4-python #868](#) and [#869](#))
- Added Unix epoch time conversion to *pyjanitor* ([ericmjl/pyjanitor #114](#))

3) Ensure software deployment via conda-forge packages and updates.

a) new packages

- *openapi-codec* ([conda-forge/staged-recipes #7987](#))
- *wgrib* ([conda-forge/staged-recipes #8057](#))
- *sphinxcontrib_stuff* ([conda-forge/staged-recipes #8069](#))
- *sphinxcontrib-serializinghtml* ([conda-forge/staged-recipes #8076](#))
- *geocube* ([conda-forge/staged-recipes #8118](#))
- *python-gist* ([conda-forge/staged-recipes #8278](#))
- *git-crypt* ([conda-forge/staged-recipes #8329](#))
- *Xskillscore* ([conda-forge/staged-recipes #8423](#))

b) infrastructure maintenance

Conda-forge is working together with ESIPLab via an incubator project ([ESIPFed/conda-forge-incubator #2](#) and [#3](#)) to improve the ABI migration mechanism. When a new version of a package exists a PR is issued to the central pinning updating the package version ([conda-forge/conda-forge-pinning-feedstock #162](#), [#164](#), [#179](#), [#199](#), [#210](#), [#217](#), [#221](#), [#228](#), [and #229](#)), then we can toggle the migrator and the bot will send automatic PRs to all the packages in topological order ([regro/cf-scripts #495](#), [#501](#), [#502](#), [#507](#), [#509](#), [#510](#), and [#513](#)). This new process is documented in [conda-forge/conda-forge.github.io #715](#), [#788](#), and [#790](#).

c) package updates list

[conda-forge/antlr-feedstock #22](#)

[conda-forge/antlr-feedstock #23](#)

[conda-forge/antlr-feedstock #24](#)

[conda-forge/autoconf-feedstock #23](#)

[conda-forge/basemap-feedstock #46](#)

[conda-forge/basemap-feedstock #49](#)

[conda-forge/blas-feedstock #32](#)

[conda-forge/cartopy-feedstock #58](#)

[conda-forge/cc-plugin-ugrid-feedstock #1](#)

[conda-forge/compliance-checker-feedstock #29](#)

[conda-forge/descartes-feedstock #9](#)

[conda-forge/django-autoslug-feedstock #7](#)

[conda-forge/django-feedstock #65](#)

[conda-forge/eccodes-feedstock #75](#)

[conda-forge/emacs-feedstock #30](#)

[conda-forge/erddapy-feedstock #16](#)

[conda-forge/erddapy-feedstock #18](#)

[conda-forge/esmf-feedstock #36](#)

[conda-forge/fiona-feedstock #114](#)

[conda-forge/fiona-feedstock #125](#)

[conda-forge/fiona-feedstock #126](#)

[conda-forge/gdal-feedstock #270](#)

[conda-forge/gdal-feedstock #271](#)

[conda-forge/gdal-feedstock #271](#)

[conda-forge/gdal-feedstock #272](#)

[conda-forge/geopandas-feedstock #52](#)

[conda-forge/geoplot-feedstock #9](#)

[conda-forge/geoviews-feedstock #7](#)

[conda-forge/giflib-feedstock #19](#)

[conda-forge/giflib-feedstock #21](#)

[conda-forge/gridgeo-feedstock #13](#)

[conda-forge/gstreamer-feedstock #17](#)

[conda-forge/imagemagick-feedstock #57](#)

[conda-forge/ioos tools-feedstock #14](#)

[conda-forge/jupyter client-feedstock #21](#)

[conda-forge/leptonica-feedstock #9](#)

[conda-forge/libnetcdf-feedstock #69](#)

[conda-forge/libnetcdf-feedstock #80](#)

[conda-forge/libspatialindex-feedstock #18](#)

[conda-forge/libspatialite-feedstock #37](#)

[conda-forge/libssh2-feedstock #29](#)

[conda-forge/libwebp-feedstock #18](#)

[conda-forge/matplotlib-feedstock #209](#)

[conda-forge/mss-feedstock #45](#)

[conda-forge/mtspec-feedstock #8](#)

[conda-forge/notebook-feedstock #42](#)

[conda-forge/notebook-feedstock #51](#)

[conda-forge/oceans-feedstock #14](#)

[conda-forge/odfpy-feedstock #6](#)

[conda-forge/openblas-feedstock #70](#)

[conda-forge/openimageio-feedstock #4](#)

[conda-forge/pdal-feedstock #56](#)

[conda-forge/proj.4-feedstock #41](#)

[conda-forge/proj.4-feedstock #48](#)

[conda-forge/pyhdf-feedstock #20](#)

[conda-forge/pyhdf-feedstock #21](#)

[conda-forge/pyhdf-feedstock #23](#)

[conda-forge/pyhdf-feedstock #24](#)

[conda-forge/pynio-feedstock #59](#)

[conda-forge/pyproj-feedstock #24](#)
[conda-forge/pyproj-feedstock #41](#)
[conda-forge/pyscaffold-feedstock #19](#)
[conda-forge/python-eccodes-feedstock #44](#)
[conda-forge/python-feedstock #252](#)
[conda-forge/python-oauth2-feedstock #4](#)
[conda-forge/ggis-feedstock #66](#)
[conda-forge/ggis-feedstock #67](#)
[conda-forge/qjson-feedstock #11](#)
[conda-forge/qt-feedstock #102](#)
[conda-forge/qt-feedstock #103](#)
[conda-forge/qt-feedstock #106](#)
[conda-forge/r-mapview-feedstock #8](#)
[conda-forge/r-pillar-feedstock #10](#)
[conda-forge/r-repr-feedstock #14](#)
[conda-forge/r-sf-feedstock #15](#)
[conda-forge/r-sf-feedstock #16](#)
[conda-forge/rasterio-feedstock #117](#)
[conda-forge/rasterio-feedstock #120](#)
[conda-forge/rasterio-feedstock #122](#)
[conda-forge/rasterio-feedstock #99](#)
[conda-forge/rtree-feedstock #14](#)
[conda-forge/scikit-learn-feedstock #92](#)
[conda-forge/shapely-feedstock #47](#)
[conda-forge/sixs-feedstock #6](#)
[conda-forge/sphinx-feedstock #55](#)
[conda-forge/spyne-feedstock #11](#)
[conda-forge/tesseract-feedstock #12](#)
[conda-forge/tzcode-feedstock #5](#)
[conda-forge/wgrib-feedstock #1](#)

Appendix B OTN/ATN Progress Reports

FACT Data Wrangler Progress Report: Joy Young

Over the past eight months data dissemination within FACT and between regional networks has moved from a person-to-person process facilitated by a volunteer to the implementation of the cloud-based data sharing system (aka the 'node') overseen by the Data Wrangler. The system and the scope of work necessary to oversee the process has evolved with greater use of the technology and increasing number of participants. The following summary describes highlights from the process, goals, and challenges of node implementation I have encountered as the FACT Data Wrangler.

Communication

- Primary author of manuscript (in submission) on the origins, philosophy, and future direction of the FACT Network to be published in Fisheries and Coastal Science open-access journal. The role of the ATN, specifically in support of the FACT Data Wrangler and GADNR coastal array is described therein. This synergistic paper has eight co-authors including two graduate students, four state and federal employees, and two regional node representatives.
- Awarded, in partnership with SECOORA as lead organization, \$15000 Munson Foundation Grant to deploy three receivers and 30 temp loggers in southern Florida and improve the FACT Network projects page on the website.
- Created materials for, and taught two, data processing workshops in Florida and Georgia.
- Attended two regional meetings; the FACT network biannual meeting and mid-Atlantic Telemetry group (i.e. MATOS) meeting.

Data Acquisition

- Recruited 15 new member organizations (Total number of member organizations is 93).
- Finalized and uploaded 110.2 million lines of detection data from 4770 individual deployments at 860 stations including:
 - 35.5 million verified tag detections matched to tagged animals,
 - 18 million unmatched detections (e.g., yet to be resolved and false detections),
 - 56.7 non-animal (e.g., sentinel or test tag) detections.
- Uploaded metadata from 4966 tags.
- Registered data from eighty-four tag and array studies.
- Completed two major data processing events. Between the two events:
 - Number of detections doubled (41 to 110.2 million)
 - Number of deployments tripled (1335 to 4770 deployments)
- In the second data processing event alone, made 154 connections between tag and array owners.
- Growth is expected to increase at a similar rate as more new and historic projects and organizations are added.

Quality Assurance Quality Control

- Identified an error in equipment functionality- receivers recorded incorrect tag identifiers. Working with the proprietor to resolve issues.
- Identified and resolved issues with Ocean Tracking Network staff on double reporting (project managers submitting data to two different sources) and mirroring (the process by which tags and detections are cross-matched between nodes).
- Identified and resolved issues with Axiom staff on an email notification system when files are uploaded to Research Workspace and project permissions.

GA Department of Natural Resources Progress Report – Chris Kalinowsky

Beginning on October 15, 2018 the Georgia Department of Natural Resources-Coastal Resources Division partnered with the Animal Tracking Network (ATN) through the Southeast Coastal Ocean Observing Regional Association (SECOORA) to maintain a Coastal Receiver Array (CRA) comprised of 26 autonomous acoustic receivers in Georgia's nearshore and offshore waters along St. Simons Island. This network of receivers 'listens' 24-hours-a-day, 7-days-a-week for the presence of marine species fitted with uniquely coded acoustic transmitters in order to track the movements of animals tagged with

Vemco telemetry tags. Receivers record the presence of acoustically tagged animals that pass within 300 meters of the receiver.

The CRA consists of an inshore/nearshore component where 10 Vemco VR2W receivers are attached to navigation buoys along the St. Simons shipping channel starting at the channel entrance and extending to approximately 6 miles offshore. The offshore component consists of 16 Vemco VR2W receivers anchored to the seafloor and ranges from 6-24 miles offshore (Figure 1). Receivers are serviced 2-3 times a year to download data and replace batteries. Georgia's CRA complements similar projects conducted by other state, federal, academic, and non-governmental groups but is the only one of its kind in Georgia marine waters. The detection data for tagged animals are shared with other researchers, locally, regionally, and internationally via the Florida Atlantic Coast Telemetry (FACT) Network. These data are used to better define the migration and habitat preferences of many coastal migratory species.

Georgia's CRA was initially deployed in 2014 through federal funding, in cooperation with SC Department of Natural Resources, to track the nearshore movements of Atlantic Sturgeon. That funding expired in 2018 and the project wrapped up leaving the longevity of the CRA in jeopardy. Recognizing the importance of this array, the Animal Tracking Network (ATN) partnered with GADNR to fully fund operation of the array through 2019 and possibly again in 2020. The GADNR/ATN partnership was formed at a critical point in the timeline of the CRA project. Had alternative long-term funding not been established quickly, the CRA project would have ended and receivers would have been removed from the water. Being the only active offshore telemetry array in Georgia, this would have created a large gap in regional observational coverage. This loss would have detrimentally impacted many ongoing regional telemetry projects.

Research and Fisheries Management Impacts

Data from the GA CRA have been shared with 46 different research groups from 10 different state, federal, and non-governmental organizations. These data represent 41 different species (670 different individuals) inclusive of threatened and endangered species. Included in this number are 179 Atlantic Sturgeon, 13 Loggerhead sea turtles, 15 Kemp's Ridley sea turtles, 58 Tripletail, 10 Red Drum, 28 Tiger Sharks and 40 White Sharks. This collaboration continues to provide groundbreaking data on the movements of marine animals. For example, cobia detection data collected by the CRA is being used by resource managers with the South Atlantic Fishery Management Council (SAFMC) to guide current and future resource management. Data from Georgia's CRA were used as part of the SAFMC Southeast Data, Assessment, and Review (SEDAR) Atlantic Cobia Stock Identification Workshop hosted April 10-12, 2018. The results from this workshop were used to provide stock delineation guidance to the SAFMC SEDAR 2019 Atlantic Cobia Stock Assessment.

The continuous operation and strategic location of the CRA have proven valuable for many studies that track animal movements between overwintering habitat in Florida and critical habitats to the north. Being that the array has changed very little since it was established, researchers are able to examine repeat migrations of animals through the region across multiple years. The array fills a major gap between similar arrays in South Carolina and Florida. Data from the array are vital to several recently funded regional studies. This includes an ongoing tagging study on the migrations of Atlantic Cobia by researchers in Virginia, North Carolina, South Carolina, Georgia, and Florida. Without Georgia's array there would be a significant and detrimental gap in array coverage in the Southeast.

Current funding from the ATN has allowed for the expansion of Georgia's CRA further into offshore waters. The GA CRA originally consisted of 24 receivers, 8 nearshore receivers in the St. Simons channel and 16 receivers deployed offshore in 2 separate lines (Figure 1). When funding expired in 2017 the south line (8 receivers) was removed from the water to reduce maintenance costs during the partially funded 2018 season. In Fall 2018, Georgia DNR was able to extend the coverage of the original north receiver line by adding 8 additional receivers. This extended the range of observational coverage from 14 miles to 24 miles offshore and crosses an additional offshore artificial reef system (Figure 2). We expect that this modification will allow us to capture acoustic tag data from a greater number and diversity of species. Additionally, the modification should allow for a comparison to be made between site use at differing reef locations (nearshore vs. offshore). Further enhancements to the CRA are planned for 2019. Additional receivers have been purchased to replace receivers along the shipping channel (ATON mounted receivers) that have been lost to storms or damage. These missions are planned for early summer (2019) and will include an entire swap-out of the 8 nearshore receivers in the St. Simons shipping channel and the addition of 2 new receivers to the end of the current line. This will bring the total number in the nearshore line up to 10. Additionally, 15 tags (Vemco V16) have been purchased and will be deployed this summer/fall (2019) (Species TBD). In situ receivers were most recently downloaded during the fall (2018) mission (simultaneous with the Fall 2018 deployment of new receivers to extend the north line.) This download consisted of 7 receivers and resulted in 12,153

confirmed detections of 63 different individuals across all species (Table 1). These data were shared with 14 different research groups (Table 2).

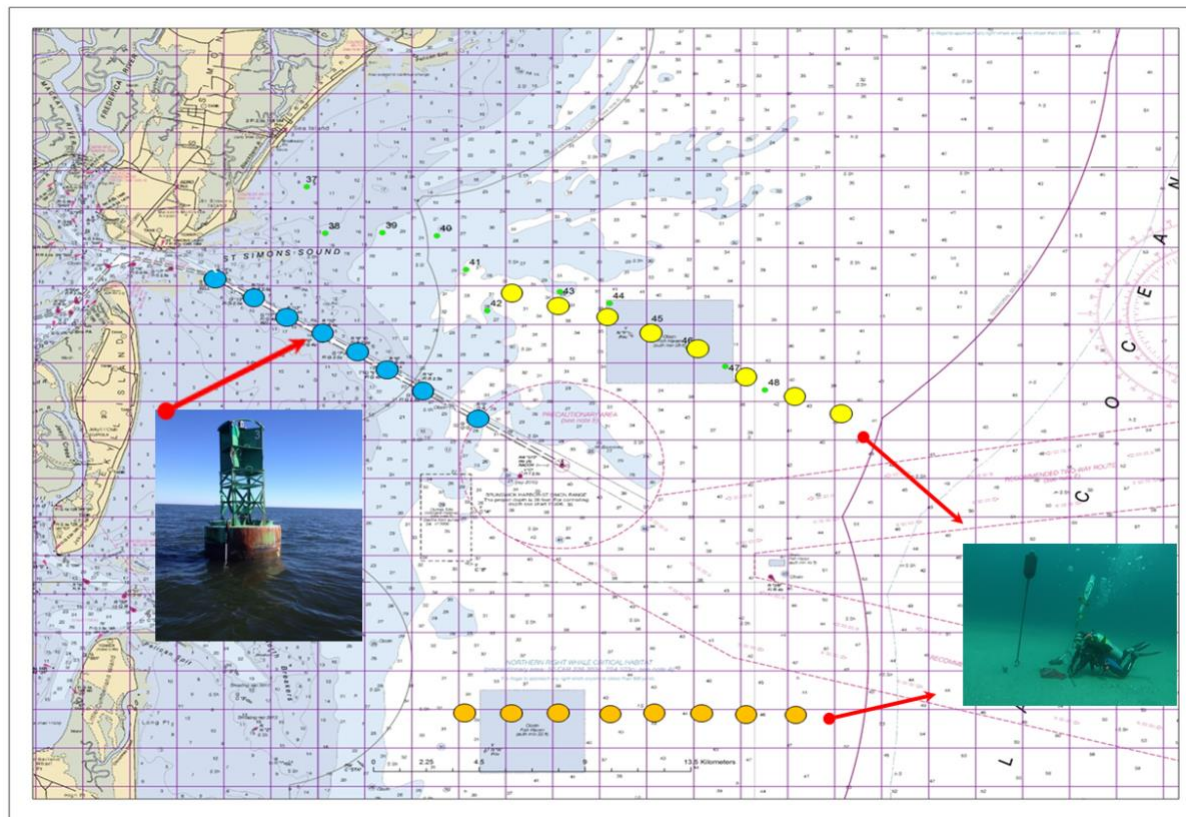


Figure 1. Georgia's CRA, original configuration 2014-2017

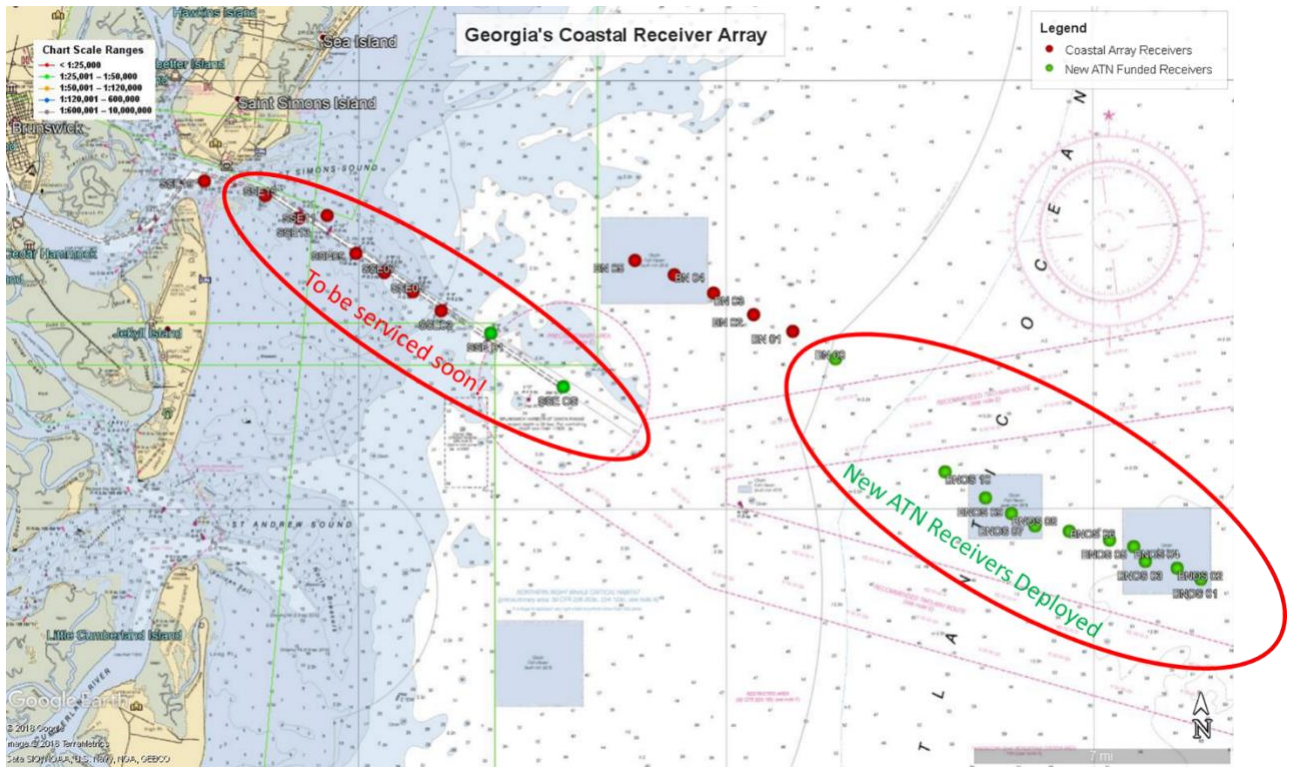


Figure 1. Georgia's Coastal Receiver Array (CRA).

Table 1. Detection information from the 2018 fall download.

Species	Common Name	Detections	Individuals
Acipenser oxyrinchus	Atlantic Sturgeon	486	9
Carcharhinus acronotus	Blacknose Sharp	247	7
Carcharhinus isodon	Finetooth	15	2
Carcharhinus leucas	Bull Shark	55	1
Carcharhinus limbatus	Blacktip Shark	139	8
Carcharodon carcharias	White Shark	127	3
Galeocerdo cuvier	Tiger Shark	229	5
Rachycentron canadum	Cobia	506	6
Rhizoprionodon terraenovae	Sharpnose Shark	35	2
Sciaenops ocellatus	Red Drum	373	4
Sphyrna barracuda	Barracuda	13	1
Sphyrna tiburo	Bonnethead Shark	180	3
Unknown	Unknown	369	12
Total		2405	63

Table 2. Organization and project codes for shared data from the 2018 fall download.

Organization	Project	Detections
FAU	BLKTP	70
OCEARCH	CCOCE	127
SCDNR/FWC/GADNR	COBCRP	440
FAU/SCDNR	FBLTP	40
GADNR	GADNRRD	170
OTN/SKOMAL	OTN.MMFSRP	369
OTN/BTT	OTN.V2LGBI	13
OTN/RSMAS	OTN.V2LURB	206
SCDNR	SCDNRBON	180
SCDNR	SCDNRBTP	29
SCDNR	SCDNRGPD	486
SCDNR	SCDNRTIG	78
Kennedy Space Center	USNKSC	500
VIMS	VIMCOB	66