



Coastal Waccamaw
Stormwater Education Consortium

Helping local governments meet requirements for stormwater education and public involvement

ANNUAL REPORT

January 1, 2021 – December 31, 2021

Prepared on behalf of the CWSEC by
Victoria Green, Coastal Carolina University and
Kim Morganello and Katie Collins, Clemson Extension

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2021 ACTIVITY TOTALS SUMMARY

Minimum Control Measure #1: Public Education and Outreach

Outreach Strategy	# Distributed / Reached	Outreach Strategy	# Distributed / Reached
Brochures/Informational Cards/Booklets	4,550	Newsletters	3,325
Websites	37,954	Television	40,000
Posters/Exhibits/Displays	300	Technical Assistance via Meeting Participation	390
Billboards	141,059	Magazine	6,500
Workshops/Seminars	1,081	Presentations	965
Field Workshop/Field Trip	297	Conference Hosting	684
LID Manual	62	Social Media	91,871

Minimum Control Measure #2: Public Involvement/Participation

Activity	# of Activities	# of Participants	Activity	# of Activities	# of Participants
River, Marsh and Beach Cleanups	31	534	Volunteer Water Quality Monitoring in Surfside Beach	23	97
Adopt-A-Landing Cleanups	24	96	Volunteer Water Quality Monitoring in Murrells Inlet	23	184
Pet Waste Stations in Murrells Inlet	2	5,000 bags	Volunteer Water Quality Monitoring on Waccamaw River	23	290
SCCIN Quarterly Meetings	2	34	Volunteer Water Quality Monitoring in Briarcliffe Acres	23	56

EXECUTIVE SUMMARY

History

From its conception in May 2004, the Coastal Waccamaw Stormwater Education Consortium (CWSEC) set out to fulfill new federal Clean Water Act requirements associated with the National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Program. Six small municipal separate storm sewer systems (SMS4s) located within the Myrtle Beach Urbanized Area unanimously endorsed a coordinated approach to regional stormwater education. They charged the educational service providers with developing a Regional Stormwater Education Strategy and a Phased Education Work Plan based on a formal needs assessment. This can be found at http://cwsec-sc.org/wp-content/uploads/business/guidance/11-04_phased_education_work_plan.pdf.

The Consortium’s first staff member, Karen Fuss, began work in October 2005 and became the first CWSEC Coordinator in summer 2006. In November 2014, Lisa Swanger assumed the Coordinator role which serves as a central point of contact to better coordinate communication amongst the SMS4s and education providers. In Summer 2020, Dr. Monica Gray assumed the role of Director. Ahmed Bakr assumed the Coordinator role in November 2020.

Based on guidance from South Carolina Department of Health and Environmental Control (SCDHEC) staff in March 2007, CWSEC members and educators chose to focus educational messages on those pollutants contributing to 303(d) impaired waters listings. Late in 2007, the Towns of Atlantic Beach and Briarcliffe Acres signed resolutions to join CWSEC. A second needs assessment in December 2009 aimed to guide future educational programming during the second 5-year NPDES Phase II permit cycle. The findings stressed the unique needs and priorities that vary among

SMS4s and their target audiences. The education providers then participated in strategic planning sessions and updated the goals and

strategies. CWSEC members approved the changes in June 2011 (refer to page 3). The education providers continue to coordinate, communicate and involve each SMS4 to serve each of their needs for Minimum Control Measures (MCM) #1 and #2 for public outreach and engagement.

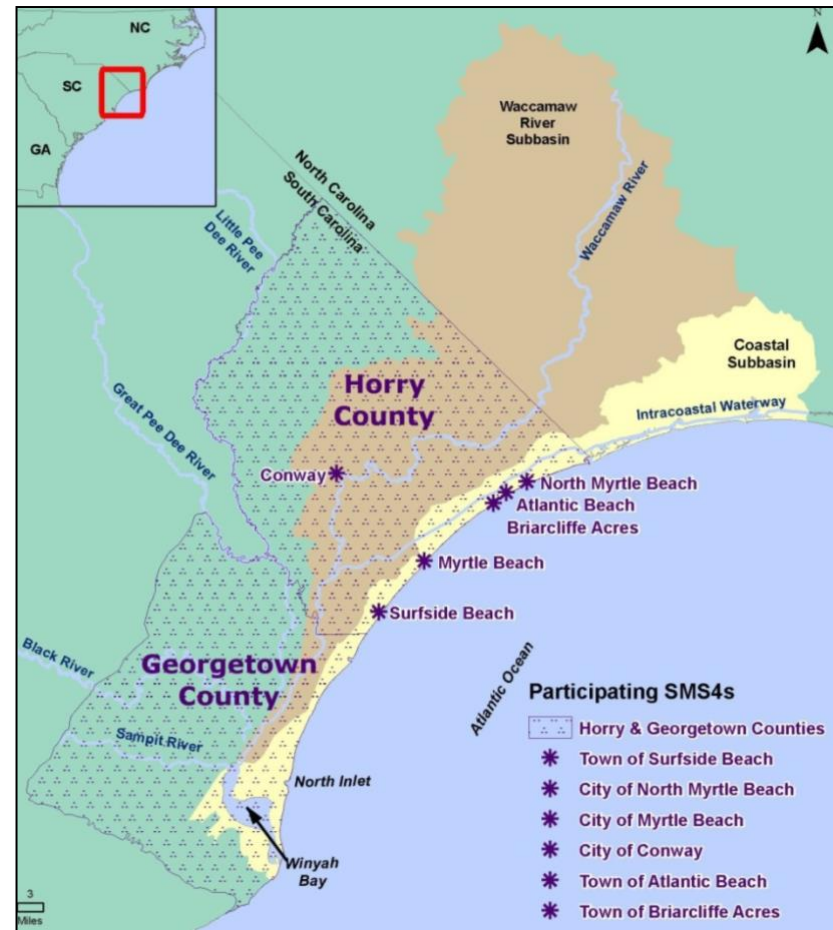


Figure 1. Map of CWSEC SMS4s

Goals and Strategies (Approved June 2011)

- 1.) Maximize efficiency and effectiveness through coordinated and collaborative stormwater education activities.
 - Efforts are collaborative, synergistic and non-duplicative
 - Work, plan and report together as an entity – member SMS4s and education providers
 - Adaptive management in which assessment results are used to guide improved implementation
 - Identify and maximize use of individual organizational strengths
 - Be a cost-effective deliverer of educational services
 - Support the needs and goals of core education providers
- 2.) Using a regional watershed approach, help member SMS4s meet NPDES Phase II stormwater permit requirements for public education and outreach and public involvement/participation.
 - Deliver public education and involvement activities that address water quality information
 - Work, plan and report together as an entity – member SMS4s and education providers
 - Tailor support activities to individual member SMS4s needs
 - Recognize the changing needs of member SMS4s and evolving regulatory requirements within the region
- 3.) Provide and exchange technical information and expertise on innovative stormwater best management practices and supporting funding opportunities.
 - Serve as an information provider on technical and current innovations and associated environmental conditions
- 4.) Improve watershed and stormwater awareness in target audiences that informs decision-making and promotes behavior change to address water quality impairments.
 - Keep current on educational theory/behavior change/social research/effective communication techniques
 - Make local educational resources and service providers readily accessible
 - Support identification of external funding opportunities, proposal development, and project delivery
- 5.) Continue to serve as a model for collaborative stormwater education and involvement throughout the state of SC and beyond.
 - Define target audiences to address water quality threats and impairments
 - Use programming in which increased awareness and/or behavior change is measurable
 - Stormwater education efforts by public/municipalities are shifted to a watershed focus
 - Empower population to serve as stewards of their watersheds through delivery of messages and taking action
- 6.) Continue to serve as a model for collaborative stormwater education and involvement throughout the state of SC and beyond.
 - Communicate outreach efforts and success stories beyond the Consortium and target audiences
 - Build upon Consortium collaboration and successes to secure future grants

Core Education Providers



Coastal Carolina University CWSEC

Monica Gray, CWSEC Director
Ahmed Bakr, CWSEC Coordinator

Coastal Carolina University's Waccamaw Watershed Academy

Susan Libes, Founding Director
Victoria Green, Volunteer Monitoring Program Manager

Clemson Extension's Carolina Clear

Kim Morganello, Carolina Clear Program Coordinator
Guinn Wallover, Water Resources Extension Agent

Murrells Inlet 2020

Stacy Johnson, Executive Director

North Inlet - Winyah Bay National Estuarine Research Reserve

Beth Thomas, Education Coordinator
Hayley Fournier, Education Specialist
Maeve Snyder, Coastal Training Program Coordinator


S.C. Sea Grant Consortium

April Turner, Coastal Communities Specialist
Brooke Saari, Coastal Water Quality Specialist

Winyah Rivers Alliance

Cara Schildtknecht, Waccamaw Riverkeeper

Member MS4s

MS4 Contacts	MS4 Annual Priorities and Projects
 <p>Benjamin Quattlebaum, Town Manager</p> <p>http://townofatlanticbeachsc.com/</p>	<p>The Town of Atlantic Beach is focused on reducing litter entering their stormwater system, particularly during Town events. Atlantic Beach is also undertaking an effort to identify locations of septic systems within the Town to determine whether any systems are failing and could connect to sewers.</p>
 <p>Brian Palliser, Town Councilman and Stormwater/Lake Committee Member</p> <p>http://www.townofbriarcliffe.us/</p>	<p>Briarcliffe Acres' stormwater focus is on their recently established (February 2019) water quality testing program coordinated by CCU and Town Council, as well as making improvements to stormwater runoff throughout the town. The Town is also continuing to work with neighboring municipalities to keep White Point Swash at its natural location while maintaining adequate tidal flushing of the tidal estuary. An ongoing focus will continue to be directed towards the water quality testing program to observe changes and trends within White Point Swash. The Town continues to educate their residents by raising awareness on how to properly maintain septic systems.</p>
 <p>Brandon Harrelson, Director of Public Works</p> <p>http://www.cityofconway.com/departments/public_works/</p>	<p>Conway's Water Quality and Drainage Commission includes 4 members, with the City actively looking to fill 3 open positions, serving for 3-year terms. The City seeks to add businesses into the River-Friendly Business Program, implemented to help reduce the environmental impact on the Waccamaw River and the community, and to recognize each business for their commitment and participation. Program materials are at: http://www.cityofconway.com/departments/public_works/river-friendly_business_program_overview.php. The City has also continued to support the Waccamaw Riverkeeper's River Sweeps, the Waccamaw River Volunteer Water Quality Monitoring Program, restoration of the Crabtree Canal, and has instituted a stormwater inspection program.</p>



Ray Funnye, Director of Public Services;
Tracy Jones, Stormwater Division Manager;
Danielle Turner, Billing Coordinator;
Chris Hancock, Stormwater Compliance
Inspector

<http://www.georgetowncountycleanwater.com/>

Georgetown County Stormwater Division's mission is to protect and improve the quality of life of all citizens of Georgetown County and surrounding communities, and provide for the collection and conveyance of stormwater runoff in accordance with all federal, state, and local regulations in the safest, most efficient, and cost-effective manner possible. The Stormwater Management Plan is designed to reduce the discharge of pollutants from Georgetown County's SMS4 to the maximum extent practicable, protect water quality, and satisfy the appropriate requirements of the Clean Water Act. They also engage in promoting equitable, acceptable, and legal measures for stormwater management. Major storm events have impacted the Grand Strand Area and coastline over the past 6 years. Severe flooding has impacted communities across Georgetown County. As such, Georgetown County has embarked on Watershed Master Planning for the entire County, starting with the Murrell's Inlet and Pawley's Island Regions. The objectives of this project are, but not limited to; having a detailed inventory of the drainage system to the major outfalls, a hydraulic model of these drainage basins and sub basins, identify problem areas that need new or upgraded infrastructure, review ordinance or policy changes to enhance the areas that are prone to flooding, and more.



Thom Roth, Stormwater Manager;
Brandon Wagner, Deputy Stormwater Manager;
Chelsea Cogliano, Watershed Planner

<http://stormwater.horrycounty.org/>

Horry County Stormwater Management is continuously working to implement the provisions of the SMS4 stormwater permit. Effective July 2017, the Horry County Stormwater Management Ordinance and Design Manual were both revised, addressing water quality requirements in the SMS4 permit. Horry County's program is advised by its 11-member Stormwater Advisory Board. The Department has targeted training workshops for HOAs and participates in other educational opportunities to raise awareness regarding stormwater runoff. Horry County is a partner in the implementation of the Hog Inlet-Cherry Grove Watershed Plan, along with CWSEC members City of North Myrtle Beach and Waccamaw Regional Council of Governments. The County continues to be a major contributor to several water quality monitoring programs throughout the region.



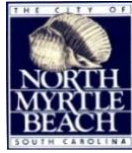
Janet Curry, Director of Public Works;
Eric Norris, Street Division Superintendent

http://www.cityofmyrtlebeach.com/departments/public_works_department/index.php

The priorities of the Myrtle Beach stormwater management program are to: protect, maintain, and enhance the health, safety and general welfare of the citizens of the City; decrease the degradation of the beaches; prevent damage to properties from improper drainage and flooding; and protect drinking water supplies. The City participated in a stormwater service and rate evaluation study in FY21 that guided operational level of service enhancements and asset management needs within our community and provided a recommended stormwater management fee rate structure from FY22 – FY25.

After a slight pause of capital projects during the pandemic, the City is moving forward in developing the next phases of our citywide Watershed-based Stormwater Master Plan, whereby the consultant is providing recommendations for flood risk mitigation and water quality improvement projects. Some highlighted capital projects include completion of 25th Avenue South Header Pipe that removed 4 beach outfall pipes from the recreational beachfront and completion of additional the Yaupon Drainage Improvements that provided additional storage capacity to alleviate localized flooding conditions. Some advanced planning updates to our Stormwater Management Capital Improvement Plan included adding the following projects: stormwater land acquisition bank, stormwater master plan implementation projects, flood risk mitigation projects, and beach nourishment. We are in the process of designing a number of neighborhood drainage improvement projects to mitigate localized flooding, as well as our next ocean outfall project at 24th Avenue North that seeks to remove and reroute up to 11 beach outfall pipes from the recreational beachfront.

Continued emphasis on our Fats, Oils, and Grease public outreach initiative, non-point source pollution education, and intradepartmental coordination of stormwater best management practices will occur during the active permit cycle.



**Kevin Blayton, Director of Public Works;
Jay Beeson, Stormwater Compliance Manager;
Dana Hamilton, Engineering Division Manager**

<https://www.nmb.us/182/Public-Works>

North Myrtle Beach conducts continuous water quality monitoring within the coastal waters, including: ocean water quality at Cherry Grove pier and weekly beach water quality sampling. This monitoring work allows us to identify and target problem areas with specific water quality improvement methods, and assess the effectiveness of those management practices. In addition, the city is working jointly with Horry County and the Waccamaw Regional Council of Governments to implement a watershed improvement plan for Hog Inlet / Cherry Grove Marsh. We also fund a joint project with Horry County and Town of Briarcliffe Acres for WQ monitoring at White Point Marsh, which includes a camera for swash monitoring (<https://video-monitoring.com/beachcams/coastalcarolina/whitepointswash/slideshow.htm>).



John Adair, Public Works Director

<http://www.surfsidebeach.org/publicworks.html>

The Town of Surfside Beach's stormwater focus is on flood prevention, water quality, and public education of coastal issues. Surfside Beach has a Stormwater Committee comprised of 5 members, each serving four-year terms. The town recently approved a Stormwater Utility Fee, to fund various large infrastructure improvements, operational expenses, as well as pursuing various grant opportunities. This fee will provide a dedicated source of funding for these projects. The 2021 focus was on public education, with information given out on websites and street festivals. This is in addition to the Town's volunteer monitoring effort and public education component.

CWSEC Role with NPDES Phase II Permit

Authorized by the Clean Water Act of 1972, the NPDES permit program controls water pollution by regulating the discharge of pollutants into waters of the United States. In South Carolina, the SCDHEC administers the NPDES program. EPA's NPDES Stormwater Phase II Rule establishes a stormwater management program that is intended to improve the nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. The Phase II Rule defines a stormwater management program for a small MS4 as a program composed of six elements or minimum control measures (MCMs), including: 1) Public Education and Outreach on Stormwater Impacts; 2) Public Participation / Involvement; 3) Illicit Discharge Detection and Elimination; 4) Construction Site Runoff Control; 5) Post-Construction Stormwater Management in New Development and Redevelopment; and 6) Pollution Prevention / Good Housekeeping for Municipal Operations. The Consortium specifically addresses MCMs #1 and 2.

The NPDES General Permit for Storm Water Discharges from Regulated SMS4 went into effect on January 1, 2014 and can be found at https://www.scdhec.gov/sites/default/files/docs/Environment/docs/Final_SMS4_Permit.pdf. For MCM #1, this permit requires identification of pollutants of concerns, target audiences, outreach goals and assessment. CWSEC had previously established a program that complies with these requirements, which is demonstrated through the procedural flowchart on the following page (Figure 2) and the formalized annual activity plan. Each year, the activity plan is formulated, discussed, and approved during biannual core education provider meetings (spring and fall) and biannual CWSEC meetings (summer and winter). The status on achieving the current and former year's planned activities is also discussed during these biannual meetings. The approved activity plan is compiled and presented in a Microsoft Excel spreadsheet containing the following information: pollutant of concern; target audience; activity description; MCMs addressed; lead service provider; and geographic target. The partnership between the member SMS4s and educators often continues from the planning stage into activity implementation. Once the activity is completed, this information is compiled into a database containing the above information from the activity plan and type of assessment utilized.

Public involvement and participation activities led by CWSEC, such as volunteer water quality monitoring, storm drain marking and community cleanups, continue to expand and clearly satisfy the new permit requirements for MCM #2. Additionally, the permit states that each member SMS4 must ensure that their Stormwater Management Plan (SWMP) is easily accessible to the public. Employing the CWSEC website (<http://cwsec-sc.org/>) with links to each SMS4's SWMP provides a way to access all the CWSEC SMS4 members' plans from one central location. Several major changes were written into the new permit in other MCMs, such as Total Maximum Daily Load (TMDL) monitoring and implementation, illicit discharge detection and elimination, and construction and post-construction, which will result in SMS4s making adjustments in their stormwater programs in order to fulfill these new requirements. Some of these may warrant education and outreach, which can be addressed during activity plan creation when appropriate.

Planning & Operations Summary for

March 2012



Coastal Waccamaw
Stormwater Education Consortium

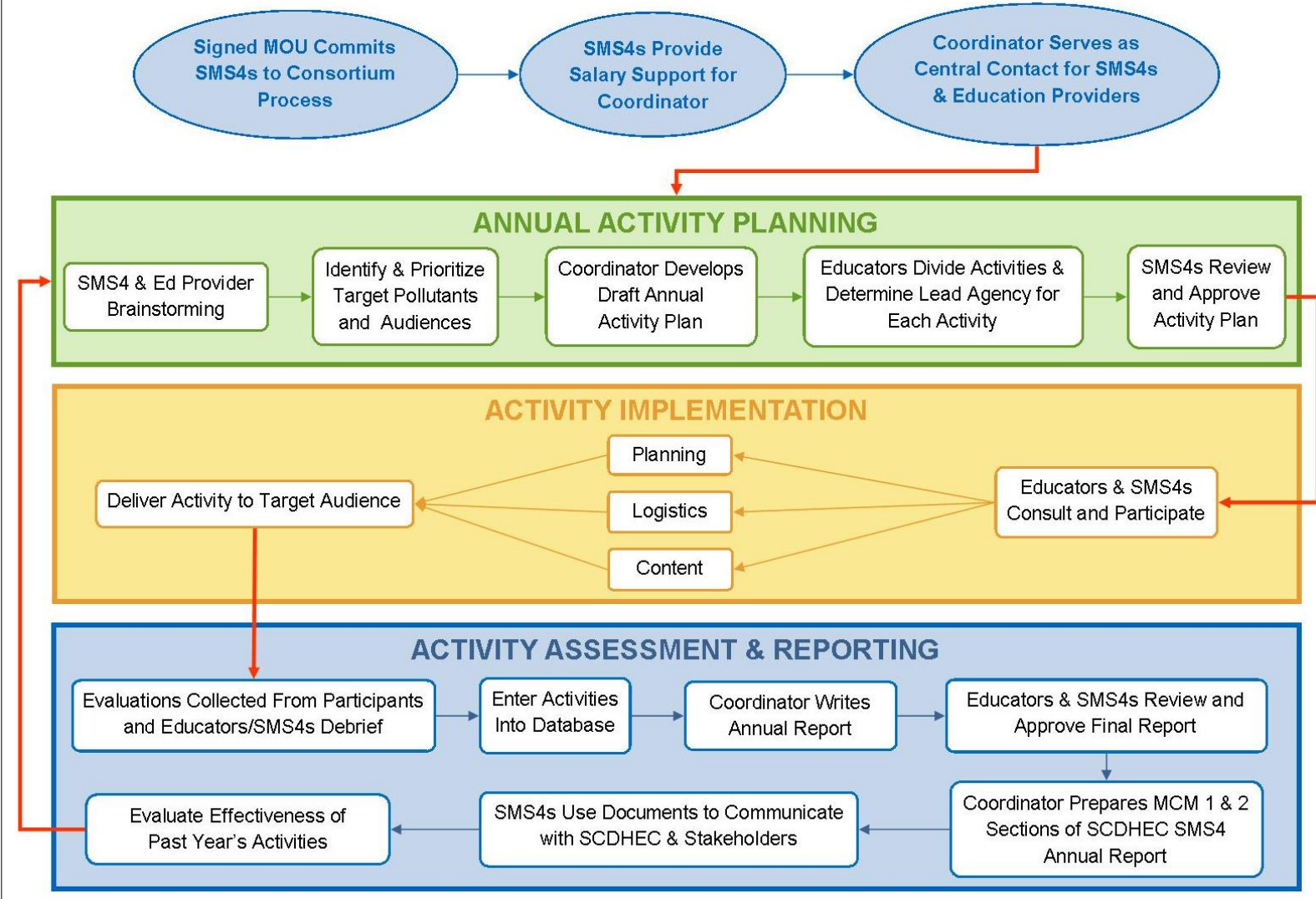


Figure 2. Flowchart describing collaborative process between education providers and MS4s guiding the Consortium's annual activities.

2021 ACTIVITY HIGHLIGHTS

The Coastal Waccamaw Stormwater Education Consortium’s reporting cycle follows the calendar year for the purposes of matching SC DHEC’s permit cycle. Therefore, this report covers the activities that occurred from January 1, 2021 – December 31, 2021. The annual activity plan, approved by CWSEC members in January 2021, appears in Appendix A. This contains both the number of activities and impacts during 2021. Appendix B includes an abbreviated version of the activity database and depicts additional activities beyond those that were accounted for in the annual activity plan (highlighted in blue). Numerous events, workshops and projects were conducted in 2021. Several notable ones are highlighted in the following section.

Best Management Practices (BMPs)

Healthy Pond Series

Following the success of the Grand Strand Stormwater Pond Conference in February 2020, the Grand Strand Healthy Pond Series was launched as an opportunity for homeowner association representatives, pond owners, and pond managers to increase their knowledge of pond management best practices. This community-based discussion series provides ways for pond owners to learn, connect, and share. The series is organized by the North Inlet – Winyah Bay NERR, Clemson Extension, and the S.C. Sea Grant Consortium.

Due to the continuing impacts of COVID-19, most of the Healthy Pond Series workshops were hosted virtually during the 2021 reporting year. The workshop topics included: shoreline erosion (97 participants), wildlife management (80 participants), and managing nutrients (30 participants). The final workshop of the year, “Pond Inspection 101” was hosted in-person with 22 participants at the South Strand Recreation Complex in Myrtle Beach, giving pond owners a chance to learn directly from Horry

County Stormwater Department staff about pond inspection and maintenance. Total participants in the three virtual and one in-person workshops totaled 229 participants.

In summer 2022, the Grand Strand Stormwater Pond Management Conference will return to provide a forum for the latest information, resources, and tools on stormwater pond management for Grand Strand communities.



Figure 3. “Pond Inspection 101” workshop hosted at the South Strand Recreation Complex in Myrtle Beach.

General Stormwater / Watershed Outreach Programs

Flooding 411

Horry and Georgetown counties have experienced several years of extreme storms and flooding. Large parts of the watershed are vulnerable to flooding, and many residents have experienced impacts to property, safety, and livelihoods. However, flood risks are often poorly understood by coastal residents, especially those that are newcomers to the region. As impacts are projected to increase with changes in climate and sea levels, providing residents with information on understanding and mitigation is needed. A survey distributed to coastal MS4s provided input on flood education needs. MS4s in Horry and Georgetown counties shared valuable feedback on high priority flooding topics, knowledge gaps, and target audiences. To address these identified needs, CWSEC Education Providers including Clemson Extension, S.C. Sea Grant Consortium, and the North Inlet-Winyah Bay and ACE Basin NERR Coastal Training Programs partnered to develop a webinar series for coastal residents called Flooding 411. Recognizing that flooding issues occur across the SC coast, this webinar series was made available across all coastal counties. Starting in July 2021, Flooding 411 provided four 90-minute webinars to address flooding issues that coastal South Carolina residents are facing. Various scientific and government experts were brought in to deliver information on subjects such as flooding safety, property protection, community impacts, and who to contact.

Workshop descriptions:

- "Water in Our Landscape: Constant Change" taught residents about coastal hydrology, various types of flooding, and available tools to understand flood issues in the local area.
- "Who's Who for Flood Management and Recovery" taught residents about how to contact appropriate agencies for flood preparation and recovery assistance and about understanding

the National Flood Insurance Program and FEMA flood maps.

- "Reducing Flood Impacts to Your Property and Community" taught residents to manage water on their property, develop a flood readiness strategy, and locate relevant resources.
- "Successful Community Flood Management" showcased different flooding management strategies from all along the coast!

The debut of this series was a success reaching approximately 90 to 140 participants and an average of 40 SCPEAC CEU certificates were awarded for each webinar. Overall, 95% of surveyed respondents indicated that these webinars were worthwhile to attend, 100% learned something new, and 67% plan to apply their knowledge in some way.

As a result of the successful response to this series, Flooding 411 will be adapted to provide expanded education opportunities in the future. The weekly webinar series will be repeated with the goal of offering flood education programs annually at the kick-off of hurricane season. Additional flood education programs, including "Ask An Expert Hour" workshops, will allow for extended Q&A with experts on topics such as flood insurance, dams, and floodplain management. Future opportunities may include adapting webinar content into resources or hosting in-person workshops, especially for communities that have barriers to accessing virtual education programs. Flooding 411 information and upcoming events can be accessed at: <https://www.scseagrant.org/flooding-411-program/>

COASTAL SOUTH CAROLINA RESIDENTS:



Are YOU Prepared for Flooding?

Join us for **Flooding 411**, a FREE webinar series to learn from experts about flooding in our communities, how to protect your life and property, and what to do when you are impacted by flooding.

FLOODING 411
2021 WEDNESDAY WEBINAR SERIES

Can't make it? Recorded sessions will be available for registered participants unable to attend live.

- ▶ **Water in Our Landscape: Constant Change**
July 14, 1:30 - 3:00pm
Learn about coastal hydrology, different types of flooding, and available tools to understand flood issues in your local area.
- ▶ **Who's Who for Flood Management and Recovery**
July 21, 1:30 - 3:00pm
Learn about how to contact appropriate agencies for flood preparation and recovery assistance as well as the National Flood Insurance Program and FEMA flood maps.
- ▶ **Reducing Flood Impacts to Your Property and Community**
July 28, 1:30 - 3:00pm
Learn to manage water on your property, develop a flood readiness strategy, and locate relevant resources.
- ▶ **Successful Community Flood Management**
August 4, 1:30 - 3:00pm
Learn about different flooding management strategies from all along the coast!

Register Free Here

Register at: <https://bit.ly/2SN6Y0X>

For more information, contact Ellen Sturup Comeau at (843)-473-6023, or email ecomeau@clermson.edu

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Figure 4. Flooding 411 webinar series flyer.

Waccamaw Conference

The 2021 Waccamaw Conference was unlike any other. As the COVID pandemic shuttered our community to events, the planning partners (Waccamaw Riverkeeper, North Inlet-Winyah Bay NERR, and American Rivers) devised a plan to continue the success of the annual education conference. Rather than a single-day in-person conference, the Waccamaw Conference expanded to cover a month of webinars, virtual events, outdoor events, and interactive competitions. It was an ambitious plan, but the 2021 Waccamaw Conference set the stage for the future of hybrid events in the Waccamaw River watershed.

“Confluence: The Blue Trail Connection” took place from World Water Day (March 22) through Earth Day (April 22). Over the five weeks of the conference, attendees were invited to tour the Waccamaw River watershed from Lake Waccamaw to Winyah Bay as we explored a different section each week. Virtual webinars and in-person cleanups were held each week focusing on that week’s section of the watershed. The goal was to allow community members to explore the river at their own pace and comfort level.

While previous conference themes focused on a single aspect of the Waccamaw River watershed like trash, fecal bacteria, or history, the 2021 Waccamaw Conference focused on much of what the Blue Trail has to offer. History, culture, recreation, and business are all important to the success of the Blue Trail and the protection of the Waccamaw. Attendees were encouraged to find their passion along the river during the conference. This broader focus, along with the hybrid approach, allowed the conference to reach more people than ever before.

The planning team also built on the previous success of the Student Science Poster & Art Contest through community engagement. Students throughout the watershed are encouraged to submit their science poster or artwork relevant to the theme of the conference. Once again, the Student Science Poster & Art Contest

was a hit, garnering more than 50 student submissions. Students submitted posters covering a variety of Blue Trail topics from the beauty of paddling the river to the importance of picking up dog poop to keep it clean! Posters were put on display through a virtual gallery where attendees could vote on their favorite poster for the People’s Choice Award. Awards were also given to the top posters in both categories (art and science) for each age group represented in the contest.

The success of the 2021 Waccamaw Conference has led the planning team to consider hybrid events for future Waccamaw Conferences. In 2022, the conference will take on a similar format over the course of one week and will aim to expand participation throughout the watershed. The planning team has also welcomed the Waccamaw Watershed Academy as a new partner. Despite the constraints of the COVID pandemic, the Waccamaw Conference flourished in 2021 and has led the team to review and improve their approach to community education.



Figure 5. Waccamaw Conference 1st Place Elementary Art winner titled Waccamaw Sunset by Sophia Grace.

Waccamaw Riverkeeper Paddle Patrol

The Waccamaw Riverkeeper launched a new program in 2021 to investigate sources of pollution on the river while providing guided paddles for community members. The Waccamaw Riverkeeper Paddle Patrol is hosted on the third Friday of the month year-round, as conditions allow. From July through November, paddlers joined the Riverkeeper at different locations along the Waccamaw to explore the river, learn about pollution issues, and help keep the river clean for everyone to enjoy.

Based on data collected by the Waccamaw River Volunteer Water Quality Monitoring Program, the Waccamaw Riverkeeper targets locations with evidence of potential pollution for patrol. Investigating pollution on the water is an integral part of protecting clean water. Thankfully, trash was the only major pollution source detected during the 2021 patrol season. While trash is a major pollutant in our waterways, it is one that can be easily removed during patrol. The Waccamaw Riverkeeper Paddle Patrol will continue to monitor pollution sources and provide education to local paddlers on clean water protection.



Figure 6. Paddlers explore near the sunken boats at Pitch Landing during the October Waccamaw Riverkeeper Paddle Patrol

Media / Outreach Materials

Virtual Programs

Despite a global pandemic, the North Inlet-Winyah Bay National Estuarine Research Reserve was able to host various virtual opportunities.

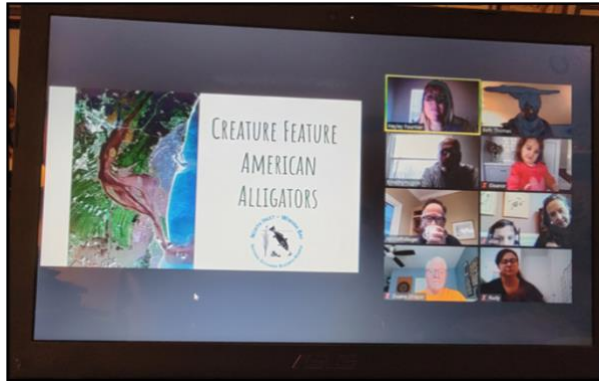


Figure 7. Participants experienced many different creatures that inhabit the NIWB Reserve! One of which is the American Alligator.

Once a month, the Reserve's education staff hosted "Virtual Biodiscovery" which allowed students and the general public to engage in a South Carolina-based research project in partnership with the S.C. Sea Grant Consortium. Other virtual activities included species-based programming such as fish, alligators, and sea turtles (Figure 7). The NI-WB NERR partnered with the ACE Basin NERR to host "South Carolina's National Estuarine Research Reserves." During this virtual partnership, participants were able to learn about the Reserves and about the current research projects happening at each location.

Not only did the Reserve host virtual public programs, but we were also able to host virtual field trips for local schools that were not able to attend in-person field studies. These virtual field

studies hosted Socastee Elementary, Holy Trinity Catholic School, J.C Lynch Elementary, and Waccamaw High School students.

FOG

In 2021, the mass media effort of Clemson Extension's Carolina Clear program focused on the proper management and disposal of fats, oil and grease (FOG). The target behavior of "Can it, Cool it, Trash it" aims to prevent FOGs from clogging pipes and causing environmental harm to downstream water quality. In the 2019 Carolina Clear statewide survey, 2,000 residents were asked in an open-ended question how they currently dispose of their kitchen grease. Approximately one third of the respondents (35%) let the grease cool and solidify, then they put it in the trash. The remaining 65% of respondents had varying answers including pouring it down a sink or toilet, pouring it into the trash when warm, reusing it, etc.

The associated billboard was located on US Highway 17 North from January to April of 2021 as well as on US Highway 501 South from January to March of 2021. The billboard campaign was made possible through a partnership with the Outdoor Advertising Association of South Carolina. The billboards resulted in a combined 141,059 estimated weekly impressions.



Figure 8. CWSEC Fats, oils, and grease billboard reminding drivers to "Can it, Cool it, Trash it."

Water Quality Monitoring

WWA's Volunteer Monitoring Program

Despite the challenges of volunteering in a pandemic, the Waccamaw Watershed Academy's dedicated and valued volunteers continued to conduct routine water quality monitoring along the Waccamaw River, in the Town of Surfside Beach, in the Town of Briarcliffe Acres, and in Murrells Inlet. The area's small MS4s continue to support these volunteer-based water quality monitoring programs that help fulfill MCMs #1 and #2 for public outreach and engagement and MCM #3 for illicit discharge detection and elimination.

In 2021, the Waccamaw Watershed Academy released a comprehensive Volunteer Handbook that summarizes the program's sampling protocols and quality assurance procedures. The handbook was developed to support a major update of the volunteer monitoring program's Quality Assurance Project Plan (QAPP). Both were submitted to SC DHEC and approved in July 2021. The handbook and QAPP represents over 15 years of collaborations among volunteers, stormwater managers, and scientists.



Figure 9. Murrells Inlet Volunteers George and Ethel at a volunteer training in August.

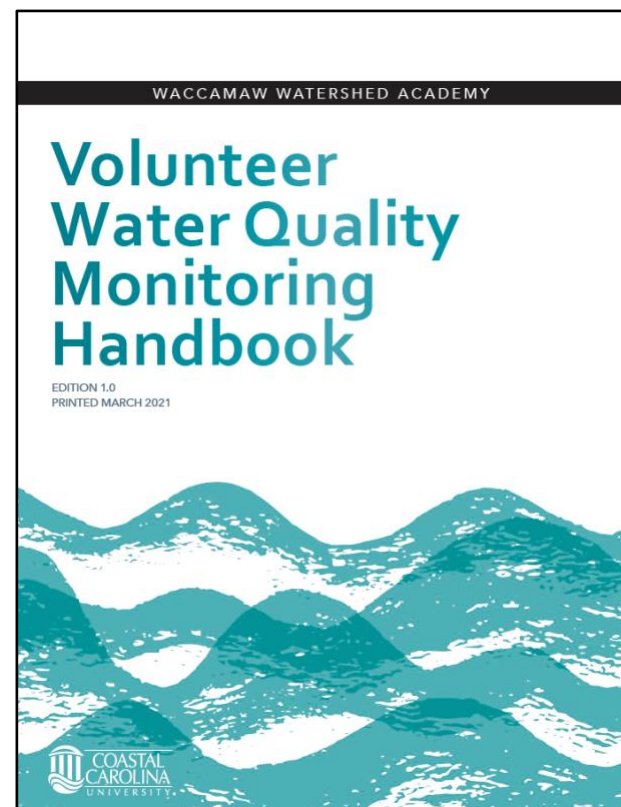


Figure 10. The WWA's new Volunteer Handbook.

After the approval of the QAPP updates, the WWA hosted training events across the Grand Strand in August. These training sessions served as opportunities for new and returning volunteer water quality monitors to share tips, best practices, and favorite sampling memories.

Brief summaries and highlights from the WWA's volunteer water quality monitoring programs in 2021 is provided below.

Waccamaw River Volunteer Water Quality Monitoring

The bi-state effort on the Waccamaw River has been monitoring twelve sites in South Carolina since 2006 and six sites upstream in North Carolina since 2011 and engages about 50 volunteers annually. The extensive data set provides a basis for identifying spatial and temporal trends across the Waccamaw Watershed. The Waccamaw Riverkeeper serves as the Field Coordinator for the program covering Lake Waccamaw in NC to Winyah Bay in Georgetown, SC.



Figure 11. Volunteers David and Donna collect a sample at Enterprise Landing.

In 2021, there were two periods of severe drought that affected the monitoring data in the Waccamaw Watershed: from May to July and from October into early 2022. River discharge was relatively low, especially compared to 2020. In May, the Volunteer Water Quality Monitoring program and CCU’s Environmental Quality Lab’s River Gaging program detected evidence of a widespread algal bloom. Volunteer Monitors observed anomalously high supersaturated dissolved oxygen levels (> 100 % DO) and elevated pH’s at downstream sites in late May. Dissolved oxygen is almost always undersaturated in the Waccamaw River, especially during

warm weather. This algal “super bloom,” as it was dubbed by the WWA, coincided with elevated conductivity caused by drought and elevated turbidity. Following these anomalous results, the WWA began routine monitoring for Harmful Algal Bloom species (HABs) at select rivers sites using NOAA’s Phytoplankton Monitoring Network protocols.

Murrells Inlet Volunteer Water Quality Monitoring

Eight sites in Murrells Inlet have been monitored since 2008 by four teams of two to four volunteers. Bob Steffens continues to serve as the field leader.



Figure 12. Volunteer Yvette collects a sample from the constructed wetland at Bike Bridge in Murrells Inlet.

Over the summer, CCU’s Dr. Paul Gayes and his research team installed a Vaisala weather station in Murrells Inlet. The new weather station is used by researchers for a wide range of applications in order to help them better understand our weather and how it impacts us - and supplements our volunteer monitoring data.

Some of the volunteer monitors serve on the Murrells Inlet Watershed Committee and strive to keep reduce the amount of polluted runoff from entering the inlet by following the suggestions outlined in the Murrells Inlet Watershed Plan adopted in 2014.

Surfside Beach Volunteer Water Quality Monitoring

Two Surfside Beach sites have been monitored since 2010 by a team of three to five volunteers. Ken Harth continues to serve as the field leader. Carol Harth provides supplemental rain data as a Community Collaborative Rain, Hail & Snow Network (CoCoRaHS) volunteer observer.

The Surfside volunteers continue to perform additional sampling at the request of the town’s Director of Public Works, as needed. In previous years, volunteers have conducted additional sampling in Myrtle Lake to identify sources of E. coli and collected samples in Lake Dogwood to identify sources of turbidity and E. coli. In both cases, the additional sampling was undertaken in response to elevated levels having been detected during the routine monitoring. Sometimes the needed data is less formal. For example, last fall Ken checked the oxygen content in a nearby Surfside stormwater pond to determine whether the aerators could be turned off for the year.

The Waccamaw Watershed Academy summarizes the volunteer data and presents water quality reports at the Town’s quarterly Stormwater Committee meetings. Several volunteer monitors serve as members on the Stormwater Committee and help keep the focus on important stormwater issues.

Briarcliffe Acres Volunteer Water Quality Monitoring

A team of five volunteers in the Town of Briarcliffe Acres have been monitoring two upland lake sites and one site in the Briarcliffe swash since 2019. Additional samples are also collected for Enterococcus analysis in the WWA’s Environmental Quality Lab’s state certified lab. Evaluation of the swash as a potential source of Enterococcus contamination to the downstream surf zone continues. Water Quality Provisional Reports are sent to the Town of Briarcliffe Acres and the Horry County Stormwater Watershed Planner following each sampling event.



Figure 13. Volunteers Kathy and Patty sample via golf cart in Briarcliffe Acres.

In 2021, the WWA began in-depth exploration of the algal blooms often observed in Briarcliffe Acres’ two lake sites. Data from the first two years of sampling have frequent periods of supersaturated oxygen levels and elevated pH which likely indicate algal blooms. In June 2021, these conditions were accompanied by incredibly high turbidity and visibly green-colored water. A grab sample was taken to CCU for examination under a microscope where a bloom

level concentration of the toxin producing cyanobacteria *Dolichospermum* sp. was observed. Following this event, the WWA began routine monitoring for HAB species at the Briarcliffe Acres sites using NOAA's Phytoplankton Monitoring Network protocol.



Figure 14. WWA and WRK staff learn SC AAS protocols with SC DHEC and Clemson Extension.

SC Adopt-a-Stream

In 2020, SC DHEC's statewide volunteer monitoring program, SC Adopt-a-Stream (SC AAS), expanded its protocols to cover tidal saltwater sites. In 2021, the Waccamaw Watershed Academy, the Waccamaw Riverkeeper, and North Inlet Winyah Bay NERR staff received training to serve as trainers who can teach and support volunteers in the SC AAS program for monitoring saltwater and freshwater sites. NI-WB NERR staff have begun training community members who are now monitoring new sites in Winyah Bay. The WWA is already monitoring several tidal saltwater sites in each of its programs using its own SC DHEC-approved protocols. This includes a saline site on the Sampit River sampled in conjunction with the WRK. By serving as a local trainer for the SC AAS, CWSEC education providers will be able to offer more opportunities to new volunteers, thereby expanding public participation and geographic coverage of waters in the Grand Strand.

Volunteer Involvement

Murrells Inlet 2020 Clean Ups

Murrells Inlet 2020 hosted multiple clean-up events during 2021. Three of our major clean-up events are the Spring Tide Clean Up, July 5th Clean Up, and Fall Haul. Spring Tide Clean Up is held in the spring of every year and brings together over 300 volunteers to help remove over four tons of trash from the Inlet each year. This is Murrells Inlet 2020's largest clean-up event and is instrumental in removing trash from the Murrells Inlet area including land and waterways.

The July 5th Clean Up is held every year to help remove trash from the Inlet and land as a result of July 4th festivities. The Fall Haul clean-up is held in mid-September every year in conjunction with the Department of Natural Resources Beach & River Sweep. This event is aimed at cleaning up the marsh and the river at Wacca Wache Landing. These programs continue to be a successful way to remove trash from our marsh, rivers, and land. The success of the programs is made possible by the continue support of the volunteers.



Figure 15. Volunteers pausing for a photo at the Fall Haul.

Technical Assistance

SC Coastal Information Network

The SC Coastal Information Network (SCCIN) is a coastal partnership providing quality educational and training opportunities to coastal decision-makers, community planners, local officials, and the public. Over the past 15 years, SCCIN has developed and expanded to serve its common audiences in a more organized, coordinated, and efficient manner. In addition to providing technical assistance through the website events calendar and resource portal, Network partners have collaborated on a number of coast-wide projects. One recent example is a series of training courses for real estate professionals (REPs).

With all of the rapid growth in the coastal communities of South Carolina, it has become clear that REPs are a key audience for new information and resource sharing, because they are often the primary contact for newcomers to the coast. In addition to their connection to new residents and business owners, REPs can influence natural resource policy and decisions since their industry relies on healthy coastal resources and resilient communities. As part of a SCCIN project to provide science-based information on important coastal topics and issues, the S.C. Sea Grant Consortium collaborated with academic, organizational, and agency partners to develop Calling the Coast Home, a continuing education program for coastal real estate professionals.

Coastal ecosystem/biodiversity, water quality at the neighborhood level, flooding and flood maps, and rebuilding regulations are the topics which were developed into four courses titled:

- Coastal Lifestyle for Clean Water
- Living with Water
- The Land-Water Connection
- Tidelands, Water, and Beach: Regulations and Rebuilding.

Each of these 2-hour course modules were offered through the Coastal Carolina Association of Realtors (CCAR) to its members for elective licensing credit in 2021. A clearinghouse of pertinent resources was also compiled and posted to the SCCIN website for REPs to reference as they help prospective clients navigate challenges associated with coastal home and business ownership.

The realtor elective courses will be offered again through CCAR in 2022 and SCCIN collaborators are exploring the feasibility of developing courses for the commercial real estate audience, as well as reshaping some of the module content for local government planning and zoning staff.

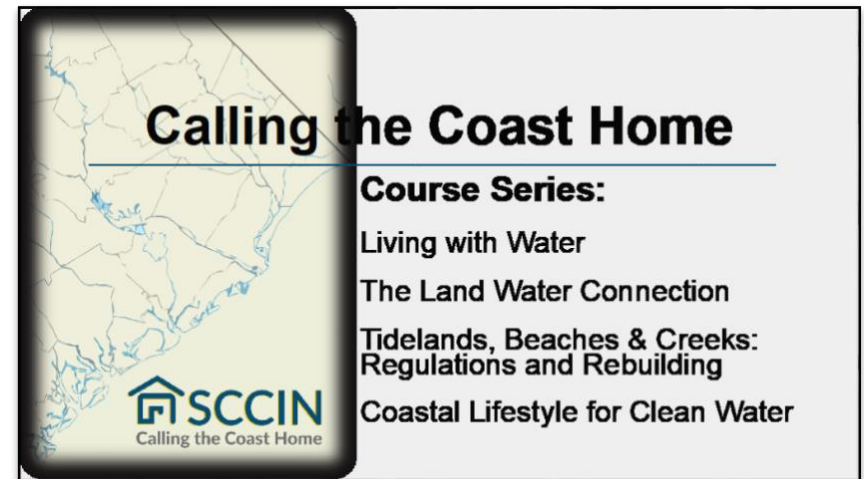


Figure 16. SCCIN provides continuing education courses to realtors on important coastal issues and topics

CONCLUSION

In 2021, the Coastal Waccamaw Stormwater Education Consortium continued to achieve our goals of developing and implementing effective stormwater education and outreach programs for member SMS4s located across the Waccamaw River Basin and coastal watersheds along South Carolina's northern coast. The collaborative approach taken by CWSEC core education providers and member SMS4s resulted in the successful completion of activities outlined in the 2021 Activity Plan, as well as additional efforts beyond the plan that sought to address multiple target pollutants and audiences.

CWSEC strategically provided a diverse array of high-quality stormwater education and outreach (MCM #1) and involvement (MCM #2) activities in support of the NPDES Phase II permit program. Using a regional watershed approach, CWSEC continues to serve as a model for collaborative stormwater education and involvement that seeks to increase stormwater and watershed awareness, inform decision-making, and promote behavior change to address water quality impairments in South Carolina.

The CWSEC continued to adapt during the second year of the COVID-19 global health crisis. The response included a blend of virtual and in-person programming aimed at delivering information while also keeping participants and staff healthy. The expansion of web-based platforms to educate audiences does not replace in-person programming but can be utilized in conjunction with more traditional approaches as the CWSEC moves forward.

After nearly 15 years of dedicated service, Coastal Carolina University announced it will step down as the coordinating organization for the CWSEC effective July 1. This difficult decision came after the sudden departures of CWSEC director Monica Gray and coordinator Ahmed Bakr from CCU in early 2022. CCU remains committed to the mission of the Consortium

and will continue to serve as an education provider through the education and outreach activities of the Waccamaw Watershed Academy.

Despite this change in leadership, the CWSEC education partners will continue to collaborate to build and deliver effective stormwater education and involvement to the Coastal Waccamaw region. We look forward to the future as a new coordinating organization will emerge in July 2022.