

2018-2019 IMPACTS AND ACCOMPLISHMENTS

SCIENTIFIC LITERACY AND WORKFORCE DEVELOPMENT

IMPACTS

S.C. Sea Grant Consortium Launches State's First Statewide Environmental Education Certification Program for Educators

E.V. Bell, S.C. Sea Grant Consortium

Recap: The S.C. Sea Grant Consortium (Consortium) launches state's first statewide environmental education certification program with first class of 18 nonformal and formal educators.

Relevance: In 2013, the Consortium conducted a statewide needs assessment for the development of the state's first environmental education certification program. Up until this time, no environmental education certification program for educators had been developed. To gauge the need for the development of this type of certification, a statewide needs assessment was disseminated in 2013. Of the 120 respondents (formal and nonformal educators), 90% stated that a certification program would "improve skills" and 75% stated that a certification program would "increase understanding of environmental issues."

Response: From these results, a 14-member steering committee, led by the Consortium, was created which included representatives of formal and informal education institutions. Over the next three years, the steering committee created the framework and content for the state's first environmental education certification program. This program, called Palmetto Environmental Education Certification (PEEC), has the mission to "foster and empower a professional environmental education network to promote environmental literacy in South Carolina." The PEEC program includes four main requirements to be completed over two years: 1) four face-to-face workshops on effective environmental education instruction, 2) eight online modules that supplement information learned during the workshops, 3) a self-directed elective component that fosters exploration of various environmental topics, and 4) a culminating capstone project that demonstrates both mastery in environmental education content and pedagogy. In 2017, funding from

the Spaulding-Paolozzi Foundation supported the pilot and assessment of the PEEC program, positioning the program to officially launch in the fall of 2018.

Results: Led by the Consortium, the pilot of the PEEC program was successfully completed in March 2018, with 14 educators successfully completing the requirements. In addition, a comprehensive assessment was compiled that evaluated the students' experience, content knowledge, and feedback on particular aspects of the program. By completing the pilot and compiling a comprehensive evaluation, the PEEC program officially launched in September 2018 with the current cohort of 18 formal and nonformal educators representing each geographic region of the state.

S.C. Sea Grant Consortium's Beach Sweep/River Sweep Litter Cleanup Saves Taxpayers \$80,257 in 2018

Susan Ferris Hill, S.C. Sea Grant Consortium

Recap: Beach Sweep/River Sweep has economic, environmental, and societal benefits. In 2018, 1,458 volunteers statewide collected nearly 9.2 tons of litter, covered 111 miles of South Carolina's beaches, marshes, and waterways. There were 60 site captains at 39 cleanup locations across the state. The number of volunteer hours was 3,156, which puts the dollar value of volunteers' time at \$80,257. The state's natural resources are cleaner, safer, and more beautiful for all to enjoy.

Relevance: Natural resources account for \$33.4 billion in annual economic output for the state (S.C. Department of Natural Resources, 2016). The S.C. Department of Parks, Recreation, and Tourism reports that tourism spending reached \$22.6 billion in 2017. Clean beaches, marshes, and waterways are critical to support commercial and recreational boating and fishing, wildlife viewing, tourism, and other industries. A litter-free environment also contributes positively to quality of life.

Response: The S.C. Sea Grant Consortium and S.C. Department of Natural Resources organize the Beach Sweep/River Sweep litter cleanup. Through the use of volunteers, the cleanup contributes to the economic, environmental, and societal well-being of the state. Participants and the public are more informed about natural resource issues, such as litter's detrimental effects on the landscape and wildlife, and people are empowered to take action and become environmental stewards.

Results: In 2018, the coastal portion of Beach Sweep/River Sweep was rescheduled due to impacts from Hurricane Florence; inland counties remained with the September date. Statewide 1,458 volunteers collected 9.2 tons of litter, covered 111 miles of beaches, marshes, and waterways, and recycled as much as possible. There were 60 site captains at 39 cleanup locations. The number of volunteer hours was 3,156, which puts the dollar value of volunteers' time at \$80,257 (Independent Sector, 2018).

S.C. Sea Grant Consortium Website Continues to be Significant Source of Science-Based Information

Susan Ferris Hill, S.C. Sea Grant Consortium

Recap: The S.C. Sea Grant Consortium website is a source of science-based information for decision-makers and the public to help them make wise choices regarding natural resource conservation and sustainability. The website also provides users with information about Consortium organization and processes. The website received 2,261,333 hits (a 14% increase from FY17-18), 429,652 visits (a 9% increase from FY17-18), and 1,531,632 downloads (a 12% increase from FY17-18) during the reporting period.

Relevance: Decision-makers and the public seek to be informed about the coastal and marine environment and related community issues, and the S.C. Sea Grant Consortium website continues to be a significant source of this information. The website also describes the organization and purpose of the S.C. Sea Grant Consortium, as well as offers a comprehensive presentation of the agency's diverse and relevant research, education, and outreach programming.

Response: The Communications and Information Services (CIS) staff maintains the Consortium's website (www.scseagrant.org) and ensures the content is updated regularly with new information. CIS monitors website usage on a monthly basis with the web statistics software Sawmill version 8.

Results: The website received 2,261,333 hits (a 14% increase from FY17-18), 429,652 visits (a 9% increase from FY17-18), and 1,531,632 downloads (a 12% increase from FY17-18) during the reporting period. The top five PDF downloads, and the number of times each was downloaded, are:

- *Guide to the Salt Marshes and Tidal Creeks of the Southeastern United States* – 43,214
- *Low Impact Development in Coastal South Carolina: A Planning and Design Guide* – 36,291
- *Coastal Heritage: Tank to Table, How Single Oyster Mariculture Works, vol. 31, no. 2* – 18,306
- *Physical and Chemical Properties of the Ocean (Ch. 2 Of Sand and Sea)* – 17,868
- *Sea Level Rise Adaptation Report: Beaufort County, South Carolina (full report)* – 14,899

ACCOMPLISHMENTS

S.C. Sea Grant Consortium's *Coastal Heritage* Magazine Wins Three Prestigious Awards

Susan Ferris Hill, S.C. Sea Grant Consortium

Coastal Heritage is the flagship publication of the S.C. Sea Grant Consortium. The magazine offers an in-depth look into environmental, historical, and cultural patterns of change and how these affect residents and visitors. *Coastal Heritage*, published quarterly, has 5,000 subscribers, staff distributes an additional 200-500 copies each year, and the online text and PDF versions were viewed 141,239 times in FY2018-2019.

It is important to the Consortium that *Coastal Heritage* remains relevant, interesting, and well-researched, and continues to provide science-based information in an easy-to-read format to subscribers and other readers. Recognition by communications professionals from around the U.S. is one metric by which we measure the success of the publication.

Communications professionals from around the U.S. acknowledged *Coastal Heritage* magazine in national awards competitions. The *Coastal Heritage* team was recognized with three prestigious awards during FY18-19: a Notable State Document Award in the Serials category from the South Carolina State Library (this award recognizes exemplary state publications that provide significant information to the public); a Distinguished Award for Informational Materials from the Society for Technical Communication-Carolina Chapter; and an APEX Award of Excellence in the Magazines and Journals category.

The South Carolina Sea Grant Consortium Completes Pilot of the State's First Environmental Education Certification Program

E.V. Bell, S.C. Sea Grant Consortium

Funding from the Spaulding-Paolozzi Foundation enables the S.C. Sea Grant Consortium (Consortium) to pilot and assess the state's first environmental education certification program with 14 formal and nonformal educators, thereby positioning the program to officially launch in September 2018. In 2013, the Consortium conducted a statewide needs assessment for the development of the state's first environmental education certification program for formal and nonformal educators. Up until this time, no such certification program existed; therefore, a statewide needs assessment was disseminated in 2013 to gauge the interest.

Of the 120 respondents (formal and nonformal educators), 90% stated that a certification program would "improve skills" and 75% stated that a certification program would "increase understanding of environmental issues." Based on the needs assessment results, a 14-member steering committee comprised of university faculty, nonformal and formal educators, and ecotourism operators was created in 2014.

Led by the Consortium, the steering committee developed the framework and content for the state's first environmental education certification program between 2014 and 2017. This program, called Palmetto Environmental Education Certification (PEEC), has the mission to "foster and

empower a professional environmental education network to promote environmental literacy in South Carolina” and includes four main requirements: 1) four face-to-face workshops on effective environmental education instruction, 2) eight online modules that supplement information learned during the workshops, 3) a self-directed elective component that fosters exploration of various environmental topics, and 4) a culminating capstone project that demonstrates both mastery in environmental education content and pedagogy.

Prior to launching the official program, the Consortium sought funding to conduct a pilot of the program to assess content and participant experience. In 2017, the Spaulding-Paolozzi Foundation awarded \$7,500 to the Consortium to conduct the pilot and associated assessments. Between August 2017 and March of 2018, 14 formal and nonformal educators participated in a PEEC pilot coordinated by the Consortium. They received certification by completing the face-to-face workshops, online modules, electives, and final project requirements.

The comprehensive assessments disseminated throughout the pilot enabled modifications to be made on the pacing of course content, online course platform and modules, and the final product requirements. The results of the pilot program and assessments were compiled into an executive summary and infographic one-pagers that can be accessed on the PEEC website: www.peesc.com. Based on the completion of the pilot and associated modifications, the PEEC program is set to launch in 2018.

The S.C. Sea Grant Consortium Partners with South Carolina State Parks to Expand Habitat Restoration Opportunities for Students

E.V. Bell, S.C. Sea Grant Consortium

A partnership with Huntington Beach State Park with the From Seeds to Shoreline® program enabled the expansion of restoration opportunities to include the transplanting of the federally endangered beach dune plant, sea beach amaranth (*Amaranthus pumilus*).

In 2011, the S.C. Sea Grant Consortium (Consortium) launched the state’s only salt marsh restoration program for K-12 students, From Seeds to Shoreline (S2S), in partnership with the S.C. Department of Natural Resources and Clemson University Cooperative Extension Service. The S2S program’s goal is to increase understanding about the salt marsh ecosystem among K-12 students and teachers through their active participation in cultivating and transplanting *Sporobolus alterniflorus*, to areas of degraded or eroded salt marsh.

The S2S network of partners includes 10 localized hubs located in nearly every coastal county and includes state and county parks, environmental non-profit organizations, and state and federal agencies. The hubs provide a local layer of support to participating teachers in their area by providing a variety of assistance including: salt marsh educational programs, assistance growing *S.*

alterniflorus, and locations for students to transplant their *S. alterniflorus* during their Restoration Day.

Each hub's participation is different depending on their organizational and programmatic needs, and opportunities exist for hubs to continually expand on their participation by providing new opportunities within the S2S framework. In May 2018, Huntington Beach State Park facilitated the opportunity for schools participating in S2S in Horry and Georgetown counties to include a dune plant restoration effort to complement the *S. alterniflorus* transplanting.

The U.S. Fish and Wildlife Service and Brookgreen Gardens worked together to cultivate seedlings of sea beach amaranth (*Amaranthus pumilus*) to be transplanted along Huntington Beach State Park's dune system. This plant is federally endangered and serves as a critical anchor plant for the establishment of dune formation. A total of 74 students representing elementary, middle, and high schools transplanted over 100 sea beach amaranth seedlings as part of their From Seeds to Shoreline (S2S) Restoration Day in May 2018. Students also assisted with the construction of informative signage and a cordoned-off area to protect the newly planted seedlings.

From this pilot effort, Huntington Beach State Park and the Consortium are evaluating future efforts to expand the current S2S program model for cultivating and transplanting sea beach amaranth for an augmented understanding of the important roles that both dune and salt marsh systems provide.

The S.C. Sea Grant Consortium's salt marsh restoration program, From Seeds to Shoreline®, Restores 1,888 Linear Feet of Shoreline

E.V. Bell, S.C. Sea Grant Consortium

During the 2017-2018 school year, 1,274 students planted 28,182 stalks of *Sporobolus alterniflorus* for a total of 1,888 linear feet of salt marsh restored during their participation in the From Seeds to Shoreline® program.

In 2011, the S.C. Sea Grant Consortium (Consortium) launched the state's only salt marsh restoration program for K-12 students, From Seeds to Shoreline (S2S), in partnership with the S.C. Department of Natural Resources and Clemson University Cooperative Extension Service. The S2S program's goal is to increase understanding about the salt marsh ecosystem among K-12 students and teachers through their active participation in cultivating and transplanting *Sporobolus alterniflorus*, to areas of degraded or eroded salt marsh. Specifically, participating schools collect *S. alterniflorus* seeds in the fall, cultivate seedlings at their school during the winter and early spring, and round out the project with a spring Restoration Day in which they bring their young seedlings to a designated area of salt marsh to transplant.

The program has grown from eight participating coastal schools in 2011 to an annual average of 30 schools that represent both coastal and inland counties. Based on the continued growth of the

program, S2S has expanded its partnership network to include county and state parks, nonprofit environmental organizations, and federal and state agencies from coastal and inland locations. This network of partners provides a local layer of support to participating schools by assisting with growing *S. alterniflorus*, providing salt marsh programming, and serving as host sites for the transplanting of seedlings during Restoration Days.

This network of agencies catalyzes the ability for the S2S program to be offered statewide by increasing the capacity to serve the participating schools and ultimately resulting in a higher amount of salt marsh restored. During the 2017-2018 school year, 28,182 stalks of *S. alterniflorus* were transplanted by 1,274 students for a total of 1,888 linear feet of salt marsh restored during their participation in the program.

The S.C. Sea Grant Consortium's BioDiscovery Program Launches Pilot With a \$20,000 Grant from Bosch

E.V. Bell, S.C. Sea Grant Consortium

A \$20,000 grant from Bosch enabled the pilot of the BioDiscovery Program to be conducted with 10 teachers, resulting in the creation of a data portal and development of a website (www.scbiodiscovery.com).

Maryland Sea Grant's program, Biofilms and Biodiversity, serves as a STEM (science-technology-engineering-math) opportunity for students to examine the microscopic and fouling communities in local coastal waters. The program's framework is centered around the deployment of a biorack, which is a 3-meter-long rope with acrylic discs evenly spaced along the length and submerged in a brackish or salt water environment for a period of time. Removal of the biorack allows students to observe stages of colonization on the discs including bacteria, algae, invertebrate, and vertebrate species. Extensions to this program include calculation of species diversity and abundance, water quality parameters, and species identification.

In 2017, Maryland Sea Grant, the S.C. Sea Grant Consortium, Clemson University Cooperative Extension Service, and the College of Charleston's Grice Marine Lab, collaborated on replicating the Biofilms and Biodiversity program in South Carolina. As a starting point, bioracks were constructed, deployed, and monitored by Grice Marine Lab in an effort to test the design and logistics. In 2017, the Charleston County Park and Recreation Commission partnered with the S.C. Sea Grant Consortium, Grice Marine Lab, and Clemson to submit a funding request to Bosch to support a pilot program in South Carolina. This funding request would support teacher training, supplies (digital microscope and biorack supplies), and the development of educational materials and resources, including a teacher manual, species identification guide, and data portal.

In 2017, Bosch awarded \$20,000 to the Charleston County Park and Recreation Commission for the pilot of the BioDiscovery Program. In 2018, 10 teachers from coastal and inland counties participated in a one-day teacher workshop in which they learned how to construct and deploy their

biobank, and to use the data portal to find educational extensions on grade-level specific lessons and resources as well as for species identification and photo submissions. Additional plans to continue and expand the BioDiscovery Program are underway based on the results from the pilot.

The S.C. Sea Grant Consortium offers third consecutive year of Educator Science Café Series

E.V. Bell, S.C. Sea Grant Consortium

Through funding from the Yorktown Foundation, the S.C. Sea Grant Consortium, in partnership with Patriots Point Naval and Maritime Museum, offered its third Educator Science Café Series, reaching 45 educators and 10 scientists.

In 2016, the Center for Ocean Sciences Education Excellence-Southeast (COSEE SE) piloted an educator science café, “Horsin’ Around on the Yorktown,” in partnership with the Patriots Point Naval and Maritime Museum and the S.C. Department of Natural Resources. The café was designed to bring together educators and scientists in an informal, casual setting to learn about horseshoe crabs: their ecology, current research, and stewardship efforts. The café was intended to be a one-time event; however, based on exit surveys distributed to the participants, the results were overwhelmingly in favor (>95%) of continuing this type of professional development. Based on this feedback, Patriots Point and the S.C. Sea Grant Consortium scheduled additional Educator Science Cafés in 2017, with all events free-of-charge for participating teachers and scientists.

In 2018, the Yorktown Foundation provided funding support for the café series, which allowed for new venues to serve as café hosts, provision of educational resources and materials, light appetizers for participants, and support for the invited guest scientists. Three cafes were hosted free-of-charge in 2018 and early 2019 for a total of 45 educators and 10 invited scientists. Topics for the cafés were under the umbrella of climate change impacts, specifically addressing flooding and city infrastructure, biological adaptations, and communication strategies.

The S.C. Sea Grant Consortium’s Marine Education Specialist Receives STEM Award

E.V. Bell, S.C. Sea Grant Consortium

The Lowcountry STEM (Science-Technology-Engineering-Math) Collaborative is a non-profit organization that serves to leverage partnership and organizational capacity for transformative educational opportunities and career development. Of note, the Lowcountry STEM Collaborative organizes the annual Charleston STEM Festival, which is a free, one-day festival that averages between 10,000 and 12,000 attendees.

Among other efforts, the STEM Collaborative makes a monthly award to formal and nonformal educators who provide STEM education opportunities to students and teachers. E.V. Bell, the S.C. Sea Grant Consortium's Marine Education Specialist, was the June 2018 recipient of the STEM Educator of the Month award. This award was presented by a local TV meteorologist, and a news clip of the award was shown on the evening news and a story posted on the station's website. This marked the first time a non-classroom teacher won the award.

Consortium Assistant Director for Development and Extension Receives Award for Diversity and Inclusion

Susan Lovelace, S.C. Sea Grant Consortium

Susan Lovelace, S.C. Sea Grant Consortium's assistant director for development and extension, received the Outstanding Faculty Award for the Graduate School, College of Charleston on March 29, 2018.

The Excellence in Collegiate Education and Leadership (ExCEL) award acknowledges a commitment to creating a campus environment that promotes diversity and excellence. Lovelace teaches the Core Seminar course for the Environmental Studies Program, a class that introduces students to the concepts of interdisciplinary thinking as well as the many disciplines needed to develop applied research projects. She seeks to broaden knowledge and ability of students to engage with diverse audiences from problem formulation to use of results in decision-making.

S.C. Sea Grant Consortium Fosters Student Support Through Internships, Fellowships, and Research Opportunities

Susannah Sheldon, S.C. Sea Grant Consortium

Supporting undergraduate and graduate students and early career professionals leads to an informed, engaged, and well-trained workforce. The S.C. Sea Grant Consortium is involved in several initiatives that support education and professional development for these individuals.

Fifty-two Knauss fellows have been selected from South Carolina since 1984, and 20 Coastal Management fellows from South Carolina have been placed with various state agencies nationally since 1997. In addition, the Consortium partners with the S.C. Space Grant Consortium to support the annual Kathryn D. Sullivan Earth and Marine Science Fellowship, designed to increase the number of highly trained earth and marine scientists and to enable graduate students to conduct NASA- and NOAA-related Earth/marine science research.

In 2018, S.C. Sea Grant Consortium supported 10 undergraduates, 18 master's-level students, and 13 Ph.D. students in conjunction with Consortium-funded research, projects, and fellowships. Of these, 26 were new to Sea Grant support and 15 were continuing to receive support. Five of the

graduate students were Sea Grant extension, education, and administration interns for the Consortium. Two Sea Grant-nominated students were selected for the Knauss fellowship, one for the Coastal Management fellowship, and one for the Sullivan award.

Sea Grant student support has improved ocean and coastal literacy among university students and early professionals and encouraged their success in securing coastal and marine-related employment.