HOLLINGS MARINE LAB

End of the Year Highlights

2025

Hollings Marine Lab Mission: Provide science and biotechnology applications to sustain, protect, and restore coastal ecosystems with emphasis on links between environmental condition and the health of marine organisms and humans.

Hollings Marine Lab Vision: Hollings Marine Laboratory is the leading institution for research and science for understanding and preserving community health and coastal ecosystems.

Hollings Marine Lab Partner Updates

All Partners

- A recent paper in the Journal of Proteome Research entitled "Proteomic Characterization of Bottlenose Dolphin (*Tursiops truncatus*) Urine" highlights the strength of the Hollings Marine Laboratory (HML) partnership. Led by a College of Charleston faculty member (Dr. Michael Janech) and graduate student (Kelly Cusick), the study leveraged HML's shared research infrastructure, long-standing marine mammal health assessment programs (led by Wayne McFee), and expertise from National Institute of Standards and Technology (NIST) in measurement science (Dr. Ben Neely) to produce the first comprehensive characterization of the urinary proteome of free-ranging bottlenose dolphins. The resulting diagnostic framework supports NCCOS SMART Objectives related to Ecological Assessments, Contaminant Impacts, and Data Science & Decision Support by advancing biomarker-based approaches for detecting sublethal stress and disease in sentinel species, thereby strengthening the capacity to translate individual-level health indicators to help support future population- and ecosystem-scale assessments.

NOAA

- The Northwest Fisheries Science Center (NWFSC) issued case reports identifying evidence items from 28 species, spanning 13 taxonomic orders. In addition to their regular casework, the laboratory is busy helping plan the 2026 Society for Wildlife Forensic Science Meeting, which will be held March 20-26 in downtown Charleston. This biennial meeting draws wildlife forensic scientists from across the globe. Contact: Kathy Moore
- Scanning electron microscopy coupled with a solid-state electron dispersive spectroscopy system was used to detect elements vanadium and nickel, commonly found in crude oil at relatively high levels in the teeth of bottlenose dolphins that stranded during the Deepwater Horizon (DWH) oil spill. Teeth were analyzed from 10 animals pre-DWH, during DWH, and post DWH each from the northern Gulf of America (NGOA), Sarasota region, and South Carolina. Sixty percent of the dolphins stranded during DWH showed detection of crude oil elements in the NGOA, whereas no

animal showed exposure in any other time period from any other location with the exception of two dolphins from Sarasota post DWH. This study has the potential to aid Natural Resource Damage Assessments in the early detection of oil exposure in dolphins and potentially other marine species. The analysis is cost and time effective, and is non-destructive to the tooth allowing for age analysis of the same teeth to determine when in the lifetime of a dolphin the animal was exposed to oil. This project was performed at the NCCOS Hollings Marine lab in the HABs microscopy lab and in the Coastal Marine mammal Assessments lab with partnerships from the National Marine Fisheries Service, the Audubon Society, Mote Marine Laboratory, and Texas State University.

- The collection of blow exhalations from uncrewed aerial systems (UAS, or drones) has been successfully performed on large whales for a number of years though met with limited success on smaller dolphin species like the bottlenose dolphin. Poor respiratory health is one of the leading causes of mortality in cetaceans. Obtaining blow microbiome samples from free-ranging dolphins, especially in an estuarine environment where dolphins are exposed to multiple stressors, can help elucidate causes of disease and provide important information on the environment they live in, particularly in urban environments. The Coastal Marine Mammal Assessments Program recently completed a blow exhalation study on a well-known estuarine population of bottlenose dolphins in the Charleston Estuary System (CES), Charleston, South Carolina. This study successfully collected air, water, and 43 blow samples from 29 unique dolphin groups in the CES. In the dolphin blow dataset, 43 classes making up 528 genera of bacteria were identified, some of which raised concerns regarding the environment they live in, as some are indicative of poor-quality environments. In addition, another 30 were potentially pathogenic.
- Bonnie Ertel (on contract with NCCOS), a doctoral candidate at the University of South Carolina, gave a platform presentation on her research conducted with the Key Species & Bioinformatics Branch titled “Exposure Pathways of Microplastics in a Local Population of Bottlenose Dolphins (*Tursiops erebennus*)” at the Society of Environmental Toxicology and Chemistry (SETAC) North America 46th Annual Meeting. As the Chair of the North America Student Advisory Council and a member of the SETAC NA Board of Directors, Bonnie played an integral role in coordinating student events at the meeting. In addition, Alexandra Larson, a graduate student at the College of Charleston, and Sophie Welch, an undergraduate Hollings Scholar attending NOVA Southeastern University, presented research conducted with the Ecotoxicology Branch. Their poster presentations were: “From Tire to Toxic? Assessing Lethal and Developmental Effects of Tire Wear Chemicals on Sheepshead Minnow and Spotted Seatrout” (Alex) and “Assessment of Heavy Metal Contamination in Atlantic Sargassum” (Sophie).
- A new StoryMap, Passive Sampling for Pollutants in Charleston, South Carolina, highlights the use of a novel passive sampler, silicone bands, for contaminant monitoring in estuarine environments. The project samples the waters around the greater Charleston area seasonally and quantifies chemical contaminants, including polycyclic aromatic hydrocarbons (PAHs), pesticides, and per- and poly-flurorinated compounds (PFAS). Scientists with NOAA’s National Centers for Coastal Ocean Science (NCCOS) have been partnering with Charleston Waterkeeper – a nonprofit organization whose mission is to protect, defend, and restore the health and integrity of Charleston’s waterways – since 2020 in this effort.
- Kelly Cusick (on contract with NCCOS) and Tod Leighfield (NCCOS) conducted a week-long training at HML for three scientists from the Metlakatla Indian Community (MIC). As the only Indian Reserve in Alaska, the MIC received critical resources and knowledge for the detection of saxitoxins and the successful implementation of the testing method. The MIC will implement the NCCOS-developed, FDA-approved saxitoxin receptor binding assay into its newly created laboratory, which is dedicated to algal toxins and invasive species. This effort will enable rapid, point-of-need detection of toxins to protect the community's subsistence foods from Paralytic Shellfish Poisoning.
- Coral Health and Disease Program researchers on contract with NCCOS conducted experiments examining gamete compatibility, turbidity exposure, and nutrient effects on coral sexual reproduction and settlement. In Key Largo, Florida, researchers partnered with Dr. Dana Williams (NMFS/University of Miami) to collect gametes from field-based colonies of two ESA-listed

species, *Orbicella faveolata* and *Acropora palmata*. Drs. Janet Saunders and Leah Davis (ORISE) tested interventions to improve fertilization success and early offspring performance, a key limitation to reef recovery. Through a collaboration with Justin Zimmerman (SeaWorld), captive spawns from five species—*Orbicella faveolata, Montastraea cavernosa, Orbicella franksi, Pseudodiploria strigosa*, and *Colpophyllia natans*—were made available for early-life stage research. Turbidity experiments were led by Zac Moffitt, Courtney Saldaña and Emily Videtto, and Dr. Janet Saunders while nutrient experiments, evaluating varying nitrogen-to-phosphate ratios, were led by Dr. Peter Lee (College of Charleston) and E. Murphy McDonald. Further gamete compatibility studies on these species were led by Dr. Janet Saunders, Kimberly Burgess, and Emily Videtto. Larvae from all five species were transported to the HML facility and reared by Zac Moffitt and Ray Raddick for continued turbidity, nutrient, and toxicology studies. Additionally, extensive porewater sample collection efforts from over 230 sites throughout the Florida Keys and Port Everglades using a novel collection device were led by Nathan Greenslit and Kimberly Burgess, in support of essential toxicological studies for Mission Iconic Reefs and Florida DEP. All in all, the team completed a staggering 40 individual experiments using these species for different objectives, amounting to a total of over 160,000 coral larvae used in early life stage research!

South Carolina Department of Natural Resources

- Dr. Nichelle Van Tassel was selected as the new Assistant Marine Scientist with the South Carolina Department of Natural Resources (SCDNR) Population Genetics Team.
- Dr. Tanya Darden and Marine Resources Division Deputy Director Blaik Keppler had a wonderful visit to the Woods Hole Oceanographic Institution (WHOI) to discuss common challenges marine labs are facing today with the WHOI leadership team, and of course had the opportunity to see their cool engineering gadgets for deep sea exploration. Tanya also provided an overview presentation of SCDNR's 20+ years of cobia research and conservation efforts.
- SCDNR Genetics and Mariculture Teams have been deploying and validating a previously published qPCR assay for *Amyloodinium* (dinoflagellate parasite) for in-house detection and monitoring in their mariculture facilities. They are optimistic that this tool will soon be available for rapid routine testing of their systems, and hopefully be useful for early detection of high parasite presence to minimize impacts of outbreaks.
- SCDNR teams have several new publications out:
    - Comparing and Improving Different Methods to Quantify Silt and Clay in Abundance Within Estuarine Sediments
    - Summer and Autumn Movement of Endemic Bartram's Bass, Invasive Alabama Bass and Hybrid Congeners in an Upper Savannah River Tributary
    - Stress Physiology of Scalloped and Great Hammerhead Sharks from a Bottom Longline Fishery
    - Multi-decade Declines of White Shrimp *Penaeus setiferus* Size in Open Water Estuarine Habitats of the Southeastern US
    - Using Multi-State Occupancy Models to Quantify Distribution and Detection of Endemic Bartram's Bass and Congeners
    - The Hidden Forests Below: A Review of the Ecology and Evolution of Wood Falls on the Deep Seafloor

College of Charleston

- A Seal AA5000 automated nutrient analyzer was purchased as part of a 5-year NOAA grant awarded to College of Charleston that started on March 1, 2025. The instrument will be installed in the second week of January 2026 and will be in D-112. The NOAA grant is entitled "Land to Sea: Assessing Urban Impacts on Coastal Water Quality in Charleston, South Carolina." The project summary can be found at: Land to Sea: Assessing Urban Impacts on Coastal Water Quality in Charleston, South Carolina - NCCOS - National Centers for Coastal Ocean Science.
- In partnership with Charleston Waterkeeper, samples for hydrographic and microbial

community analyses were collected for the fifth consecutive year from 20 sites in Charleston Harbor.

- Graduate students, Piper Zola and Schuyler Wilson, were awarded first and second place, respectively, for their oral presentations at the GPMB Colloquium which convened in October. Published articles include:
    - Zussy et al., 2025. Genome-resolved biogeography of Phaeocystales, cosmopolitan bloom-forming algae. Nature Communications, 16:8559; https://doi.org/10.1038/s41467-025-63565-1
    - Kell, R. M., Subhas, A. V., Schanke, N. L., Lees, L. E., Chmiel, R. J., Rao, D., Brisbin, M. M., Moran, D. M., McIlvin, M. R., Bolinesi, F., Mangoni, O., Casotti, R., Balestra, C., Horner, T. J., Dunbar, R. B., Allen, A. E., DiTullio, G. R., and Saito, M.2025. Zinc stimulat ion of phytoplankton in a low-carbon-dioxide, coastal Antarctic environment: evidence for the Zn hypothesis, Biogeosciences, 22, 5877–5896, https://doi.org/10.5194/bg-22-5877-2025

NIST

- NIST employees, Carolyn Burdette, Jared Ragland, and Jessica Reiner, attended and presented at the North American Chemical Residue Workshop in July. The meeting in Charleston, SC is a forum for scientists interested in chemical analysis in food, animal feed, and environmental samples.
- Benjamin Neely coauthored "Genomic infrastructure for cetacean research and conservation: reference genomes for eight families spanning the cetacean tree of life" published in the Frontiers in Marine Science Journal. This paper was led by NOAA and utilized samples from the NIST National Marine Mammal Tissue Bank located at HML.
- NIST NMR upgrades for the 700 MHz instrument were delivered in October. Installation is expected to begin early 2026.
- Tracey Schock served as lead organizer for the scientific program at the 7th annual Metabolomics Association of North America (MANA) conference, held September 2-5, 2025, in Banff, Alberta, Canada. As the MANA Awards Committee Chair, she emceed the Awards Ceremony, recognizing 22 early-career researchers for their outstanding achievements in metabolomics.
- Tracey Schock served on the Scientific Organizing Committee for the International Society for Magnetic Resonance in Medicine Workshop on Frontiers in Metabolomics & Metabolomic Imaging in Medicine: Challenges & Opportunities that occurred in Padua, Italy, October 16-18, 2025.
- The NIST NMR team co-lead a publication defining best practices for NMR-based Metabolomics: Andersson ER, et al. Securing the Future of NMR Metabolomics Reproducibility: A Call for Standardized Reporting. Anal. Chem., Volume 97, Issue 38, 2025. https://doi.org/10.1021/acs.analchem.5c03274
- Carolyn Burdette, Jacolin Murray, and Jessica Reiner visited o2si's complex organic solution reference materials manufacturing site on Tuesday, July 29, 2025. They were given a tour of the production facility by Daniel Biggerstaff, the technical director, and discussed production of SRMs.
- Jennifer Ness, Jennifer Hoguet, and Rebecca Pugh, Biospecimen Science Group (BSG), attended the NIST Standards Coordination Office (SCO) Workshop entitled "Fundamentals of Standards and Conformity Assessment" held on July 22 – 23, 2025.
- Jennifer Ness and Rebecca Pugh (BSG) attended training for the TC276 – Biotechnology, US TAG on the new OSD commenting and submission system for ISO.
- Amanda Moors (BSG) along with members of the BSG and staff from NMFS Headquarters published a NIST Internal Report (NISTIR), The National Marine Mammal Tissue Bank: Updated Collection, Processing, and Archival Protocols. https://doi.org/10.6028/NIST.IR.8555
- The BSG processed biospecimens from 23 Alaskan marine mammals from 9 different species for the Alaska Marine Mammal Tissue Archival Project (AMMTAP), including the first Dall's porpoise archived and 4 animals from three different northern Atlantic species for the Marine

Mammal Health and Stranding Response Program (MMHSRP).

- Debra Ellisor (BSG) traveled to Woods Hole, MA to present a talk and training to members of the Marine Mammal Stranding Network in the Greater Atlantic Region for collection and contribution of specimens to the National Marine Mammal Tissue Bank. (July 21-23, 2025)
- Debra Ellisor (BSG) attended and presented at the virtual Greater Atlantic Region Stranding Network biannual meeting (September 15-18, 2025). An update on recent specimens collected and research conducted using specimens from stranding network participants was given.
- Deb Ellisor, BSG, along with collaborators in Alaska published a Note: 'Recognizing the Need to Connect: Encouraging Interdisciplinary Engagement with the International Society for Biological and Environmental Repositories.' in Biopreservation and Biobanking. 2025. https://doi.org/10.1089/bio.2025.0063
- Rebecca Pugh (BSG) presented, 'Cradle to Grave: Specimens from the NIST Biorepository Support a One Health Approach' at the Joint Biobanking Conference hosted by ISBER and GGBN, at the Kirstenbosch National Botanical Garden, Cape Town, South Africa, Sep. 29–Oct. 3, 2025.
- Jennifer Ness (BSG) attended the ISO TC 276 Biotechnology Working Group 2 (Biobanking and Bioresources) meetings in late November/early December.
- Jennifer Ness (BSG) completed the NIST MIDAS Data entry for the National Marine Mammal Tissue Bank (NMMTB) database, which provides a full inventory of NMMTB samples archived at the NIST Biorepository that started in 1987: https://data.nist.gov/od/id/mds2-3986

Medical University of South Carolina

- HML scientists Drs. George Hanna and Mark Hamann recently published research on the potential therapeutic applications of the natural product, Aleutianamine B, derived from a sponge found off of the coast of the Aleutian Islands. This compound has shown promise in selectivity and potency for certain cancer cell groups! https://pubs.acs.org/doi/full/10.1021/acs.jnatprod.5c01094

More Questions?

Current Science Board Member Contact Information

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