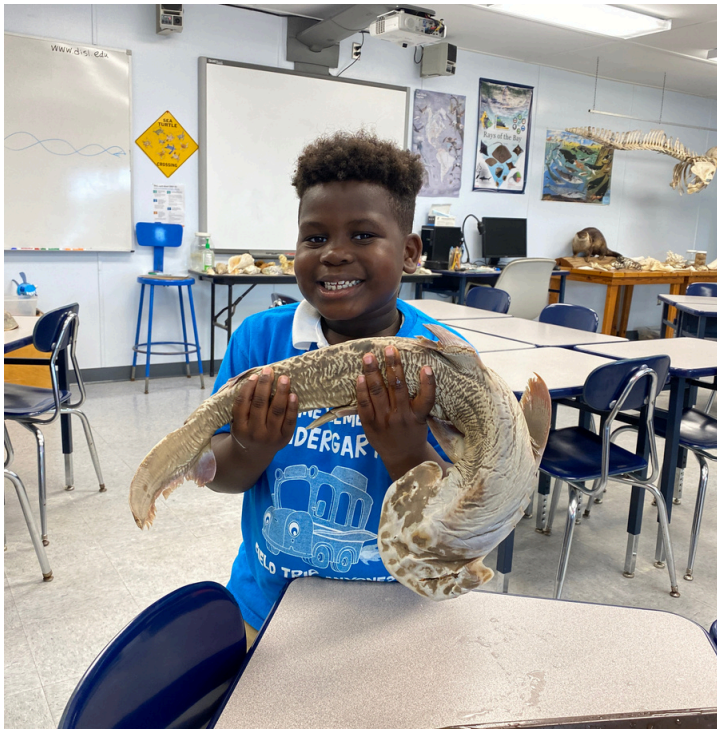
Dauphin Island Sea Lab

Annual Report 2021-2022



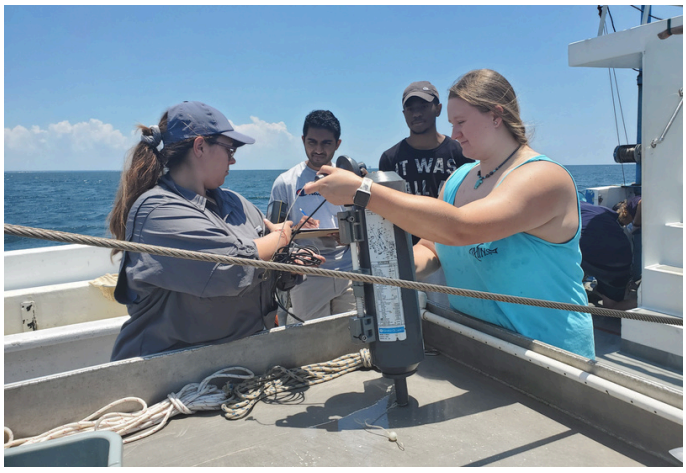
The Dauphin Island Sea Lab saw growth in programs in the years 2021 and 2022 despite the challenges posed by the 2020 COVID-19 pandemic. University Programs (UP) and Discovery Hall Programs (DHP) boasted pre-COVID enrollment. The Alabama Aquarium also saw its highest foot traffic in 2022.

Cleanup efforts from Hurricane Sally, which struck campus in September 2020, continued into late 2021. Offices, lab space, a storage building, and a dormitory were knocked offline by the storm. Areas that could be repaired included the offices and lab space in Marine Science Hall. The damaged storage building was earmarked for the new multi-stressor wet lab. The damaged dormitory was designated as a new storage area, and efforts began to design a new dormitory.

The first ten Alabama Center of Excellence awards were announced in 2021. The first ten awards focused on pollution and erosion multi-stressors, shoreline processes, wetlands, sea level rise in the Delta, and the study of hypoxia. These studies were seen as a benefit to the Alabama Department of Management (ADEM) and the Alabama Department of Conservation in creating management plans.

An economic impact analysis conducted in 2021 by the University of South Alabama Center for Real Estate and Economic Development determined that DISL generates an overall annual economic impact of $56 million for the state of Alabama and $54 million to the lower Alabama region.

The economic impact has three different components: direct impact, which is revenues earned by DISL in the form of admissions, tuition, and grants; indirect impact, which occurs when it pays for goods and services; and induced impact, when DISL employees spend their paychecks on things they need, such as food, clothing, and housing. As monies flow through the economy, it produces a multiplier effect. This analysis captured the essence of all of the DISL economic activity spurred by the original receipts.



The DISL joined the nonprofit American Solar Energy Society (ASES) and hundreds of homes, businesses, and organizations throughout America for the 2021 ASES National Solar Tour. The DISL campus encompasses 30-plus acres with 39 buildings. Seven of those buildings are powered by solar energy. Three of the seven solar PVs were added during 2021 as part of an Energy Savings Contract through Southland Energy.

The DISL campus also welcomed AmeriCorps teams in October 2021 and January 2022 to help with campus facilities improvements. AmeriCorps is the federal agency connecting individuals and organizations through service and volunteering to tackle the nation's most pressing challenges.

The DISL Public Relations Department unveiled a new logo and branding guidelines for the campus in 2021.

University Programs

University Programs (UP) oversees summer undergraduate and year-round graduate (M.S. and Ph.D.) education, as well as faculty research. While DISL is not a degree-granting institution, it does serve as a focal point of marine science in the state of Alabama through the Marine Environmental Sciences Consortium.

Enrollment in summer courses rebounded from the enrollment decrease during the COVID-19 pandemic. The 2021 enrollment was in line with 2019, and the 2022 enrollment was only slightly below. Overall, enrollment continues to show an upward trend in summer college credit hours for graduate and undergraduate students over the past decade.

Research

The Marine Mammal Research Program released the findings in the post-mortem exam of the sperm whale that stranded in Mobile Bay in November 2020. The sperm whale showed signs of chronic malnutrition. This finding suggests that the whale likely had not eaten during the weeks or even months before stranding. The post-mortem exam, also called a necropsy (animal autopsy), was conducted under MMPA/ESA permit no. 18786-04 by the Alabama Marine Mammal Stranding Network (ALMMSN) to determine why the whale, which typically inhabits deep ocean waters, stranded inside Mobile Bay.

The National Science Foundation (NSF) funded nine Research Experience for Undergraduates (REU) in 2021 and 2022. The program adds another level of expertise to students interested in research-based careers. Participating students gain experience in field and lab sampling, team and independent research, necropsy, molecular, genomics, analysis and statistics, and communication. The program provides students the opportunity to carry out an independent research project under the direction of a faculty mentor as part of a productive research laboratory.

2022 NSF-REU Participants
Claire Legaspi/Texas A&M University
Yasmine Hall/Auburn University
Ellie Jata/University of West Florida
Rebecca Carwithen/University of Santa Cruz
Anika Cho/University of Alabama
Kenneth Murage/Talladega College
Alexes Cleveland/Alabama State University
Evan Marth/Athens State University
D. Julian Hodges/Barry University

2021 NSF-REU Participants
Charlie Dvergsten/Carleton College
Jordan King/SUNY Maritime College
Eli Kemp/Lyon College
Che'Isha Johnson/Talladega College
Kahylin Nesbitt/Oakwood University
Shelby Blair/Rogers State College
Sophie Wong/University of Virginia
Mimi Eason/Northern Arizona University
Elexuzz Davis/Alabama State University

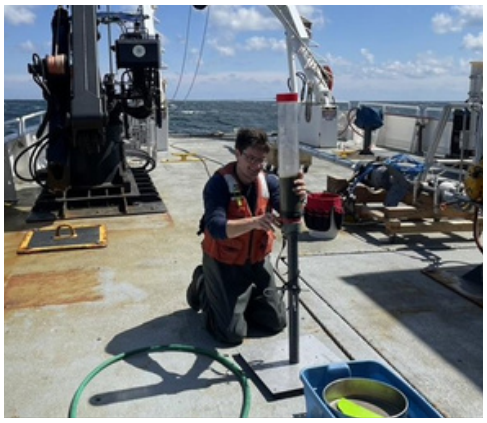
In 2022, the Mississippi-Alabama Sea Grant Consortium funded two projects led by DISL research teams, which focused on living shorelines and oyster aquaculture. The projects received funding in the 2022-2024 funding cycle. Dr. Ronald Baker earned funding to evaluate breakwater designs and their relation to fish habitats. The research efforts can be used in the project management of shoreline restoration efforts.

Dr. Lee Smee will lead a project on the costs and benefits of nursery techniques to improve oyster aquaculture and restoration. Collaborators in the project include PJ Waters with the Auburn University Marine Extension and Research Center and Rusty Grice, Mississippi-Alabama Sea Grant Consortium.

Several labs participated in research cruises during 2022. In April, Graduate students Cy Clemo and Madeline Frey in Dr. Kelly Dorgan's Lab traveled to Massachusetts for a research expedition with scientists from the University of Texas at Austin and the United States Geological Survey (USGS) on the New England shelf. They traveled to the edge of the continental shelf on the University of Rhode Island's Research Vessel Endeavor to study how acoustic signals are affected by the physical and biological properties of seafloor sediment.

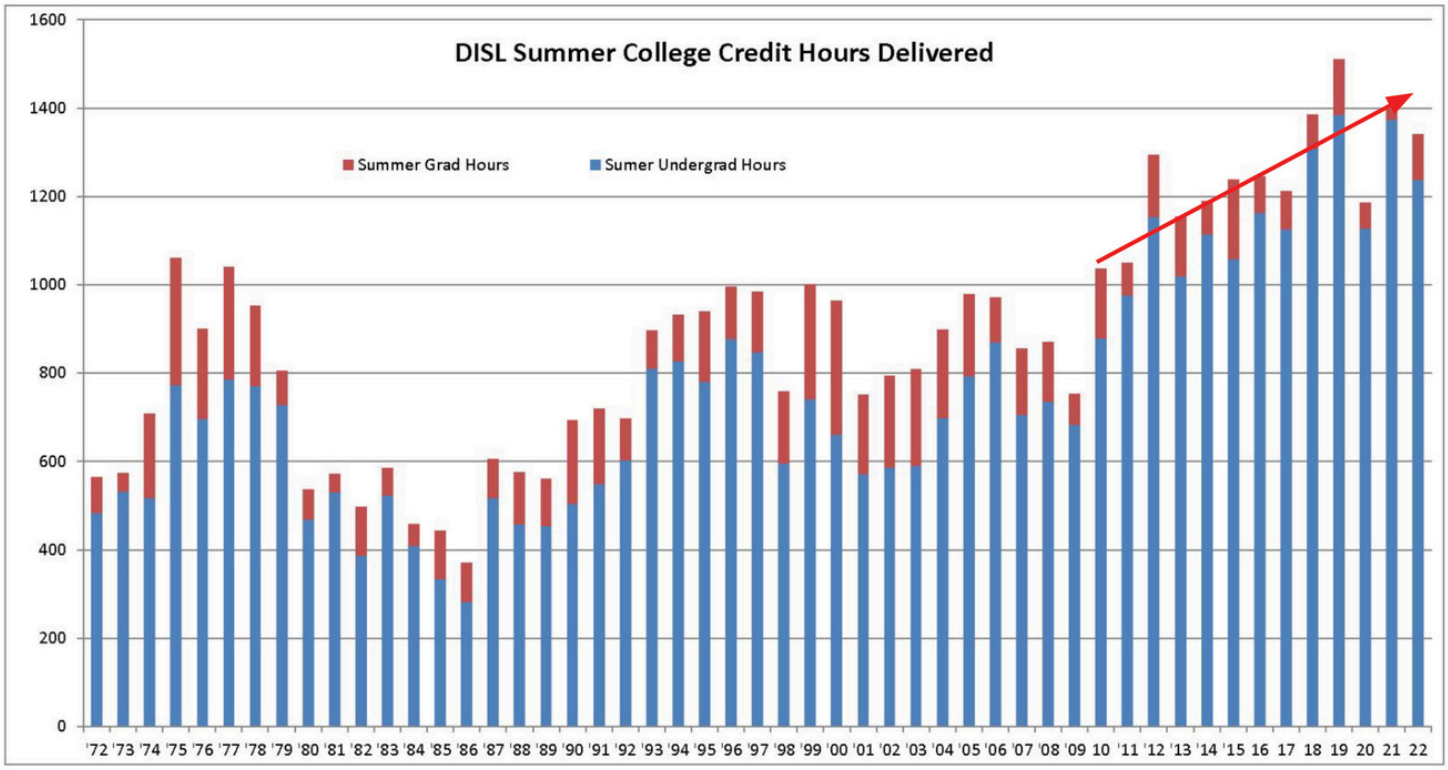
Then, in May, Dr. Jeffrey Krause led a team of seven DISL students for a three-day research expedition on the Research Vessel Pelican out of the Louisiana Universities Marine Consortium. The team included Lindsey Lemke, Allie Smith, Dev Mallick, Ryan Roseburrough, and Blair Morrison. The group collected sediment samples in the northern Gulf of Mexico.

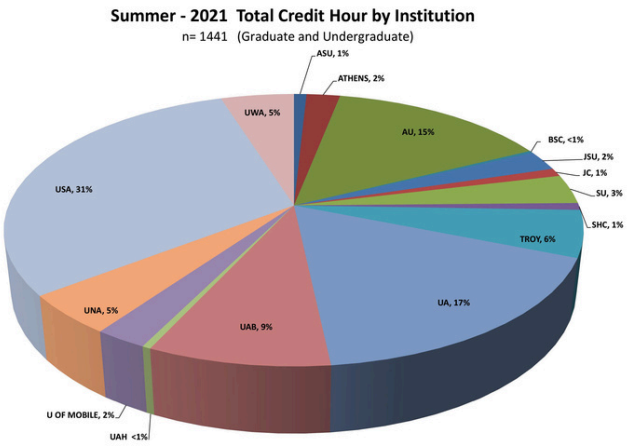
Graduate student Lydia Hayes, who is a part of the Kiel Reese Geomicrobiology Lab, took part in a research expedition to the Mariana Trench in November. Her focus was to study microbial life in extreme environments.

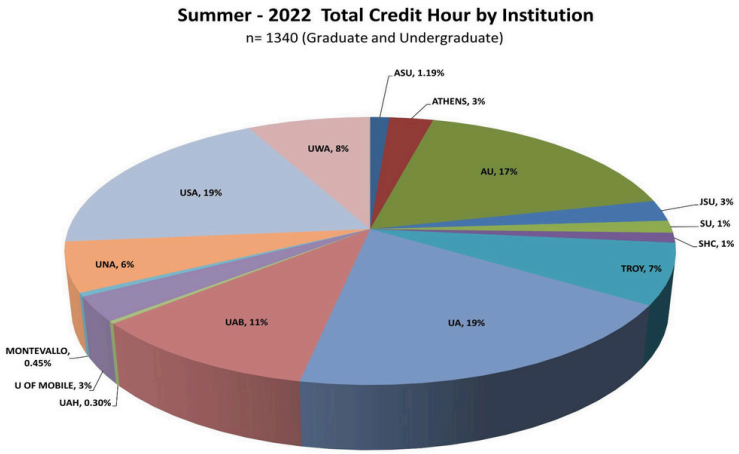


During the 2022 summer sessions, students taking courses at DISL helped build a living shoreline on the bayfront in Mobile. Murphy High School teacher Sharon Delchamps led the project, which is a partnership between the Alabama Coastal Foundation, U.S. Fish and Wildlife Service, and the University of South Alabama. A National Fish and Wildlife Foundation grant funded the project, and the project is permitted through the U.S. Army Corps of Engineers. The team included DISL/REU students Rebecca Carwithen and Kenneth Murage, South Alabama students Cadie Barnes, Katie West, Georgia Vaughn, Houston Huges, Andrew Mills, Tabor Smith, and Nathaniel Roy, Fisheries Ecology Lab Research Assistant Trey Spearman, Bishop State's Dr. Kathleen Roberts, and South Alabama Instructor Dr. Amy Sprinkle.

Two DISL graduate students were named finalists as part of the 2023 John A. Knauss Marine Policy Fellow. Ph.D. Candidate Jesse Gwinn earned the opportunity to work in the NOAA Oceanic and Atmospheric Research (OAR) Division and Ph.D. Candidate Matthew Hodanbosi will work as a Science & Technology Ocean and Coastal Enterprise Fellow for the U.S. Integrated Ocean Observing System Office.



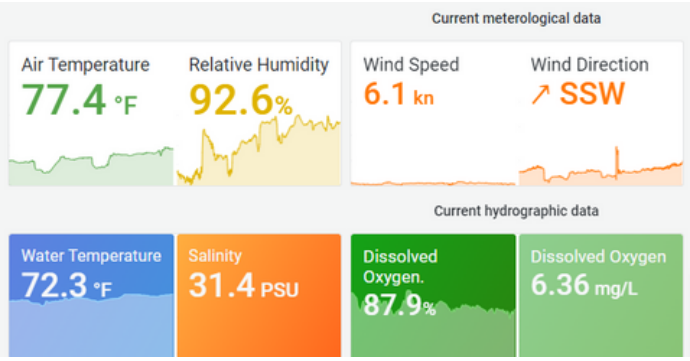




Alabama Real Time Coastal Observing System (ARCOS)

The Dauphin Island Sea Lab's marine weather center, damaged during Hurricane Sally in 2020, was back online by 2022 with an upgrade. ARCOS includes 13 weather stations, with eight of those stations managed by the Dauphin Island Sea Lab. These stations provide marine weather information to everyone interested in current and historical conditions in Mobile Bay.

Through the hard work of the ARCOS technical team and support from the Alabama Center of Excellence, the network is back to pre-Hurricane Sally levels with a new user-friendly design. Responsive and interactive graphs plot live data with updates every thirty minutes. This includes air and water temperature, relative humidity, wind speed and direction, and current salinity levels.



The Dauphin Island Sea Lab brought ARCOS online in 2003 to collect real-time data at weather stations placed in and around Mobile Bay. This information assists in forming effective strategies when faced with natural and man-made disasters, as well as enhancing the economy, and protecting the environment.

Discovery Hall Programs

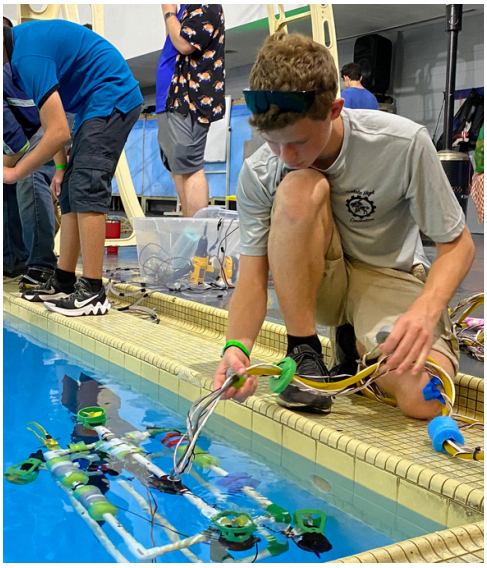
Discovery Hall Programs (DHP) delivers K-12 educational programs during the academic year, summer camps, a marine science high school residential summer course, professional development workshops, and a traveling classroom known as the BayMobile. The offerings focus on experiential learning and science literacy, with a focus on Alabama students and residents.

DHP pivoted efforts in the wake of the COVID-19 pandemic to continue an exponential reach throughout the state of Alabama. Programs expanded the focus to homeschool groups, families, and people interested in learning more about the ocean. Added programs included family camp, grandparents camp, and sea lab science Fridays.

To grow STEM programming related to remotely operated vehicles (ROV), DHP introduced a ROV Loaner Kit Program in 2021 with the support of a $5,000 grant from Ingalls Shipbuilding for STEM activities in virtual settings. The free loaner program was designed for teachers, STEM instructors, and robotics coaches across the state of Alabama who are interested in diving into ROVs with their students. Kits contain all the materials needed to build ROVs with their students.

The program also aided efforts to attract more participation in the ROV competitions hosted by DISL. The Northern Gulf Coast Regional MATE ROV Competition was held in 2021 and 2022, while the Alabama Regional SeaPerch Competition took a year off and returned in 2022. Both competitions challenge the student teams to design and build a ROV to apply science, technology, engineering, and math to solve real-world problems. The competitions are less about winning and more about strengthening students' critical thinking, collaboration, entrepreneurship, and innovation skills.

In 2021, DHP hosted the Sea Stars camp for students with special needs and their parents/caretakers. Participants explored Dauphin Island's marine habitats, including Mobile Bay, the salt marsh, and the beach by boat, bus, and walking. The program sponsors included the Rotary Children's Foundation, Austal, and the Krewe of Kindness. The program will be offered again in 2023.



Alabama Aquarium

The Alabama Aquarium broke records in 2022 with 110,879 visitors stopping by to learn about the Alabama watershed. Plans are underway to renovate the Aquarium in 2023.

In May 2021, Alabama Governor Kay Ivey signed HB136 designating the aquarium as the official Aquarium of Alabama, highlighting its importance to education and research conducted by DISL. This Aquarium highlights the importance of each habitat, introducing you to the animals and plants that live in each, and it describes the research conducted by DISL scientists to ensure the health of our state's remarkable coastal resources.

Since 1998, more than one million students and visitors have walked through the doors of the aquarium. The visual and interactive exhibits take visitors on a journey through the Mobile Tensaw-Delta and Mobile Bay, along the barrier islands, and into the northern Gulf of Mexico. The aquarium was created to improve ocean literacy and enhance the public understanding and wise stewardship of our coastal resources.

The docent/volunteer program at the aquarium took a hit during the COVID-19 pandemic. The program encourages those interested in sharing their enthusiasm for the environment with visitors and students at the Aquarium's touch table and during special events. Volunteer gardeners are also invited to help with beautifying the campus throughout the year. By 2022, the program bounced back with 63 volunteers and 3,050 volunteer hours logged.

In March of 2022, a snack shop opened at the Alabama Aquarium, offering ice cream and other island treats throughout the year. The snack shop quickly became a favorite among visitors.

DISL Foundation

The Dauphin Island Sea Lab Foundation (DISLF) provides funds to sustain the activities of the Sea Lab and promotes awareness of the Sea Lab and its environmental issues. The Foundation raises funds and promotes the Sea Lab through various means.

The primary fundraising event for DISLF is “Cocktails with the Critters” (CWC). The event in years past featured an in-person silent auction. However, COVID-19 moved the silent auction to the virtual world, which proved to increase success in raising money through sponsorships and donations. The 2022 event was the highest-grossing CWC to date.

The DISLF also held the first employee campaign in 2021, and followed the success of the first year with a successful second year. Each year saw 100 percent participation, and helped to build an outdoor pavilion and fund scholarships.

The Foundation’s second fundraising event of the year is the Marine Environmental Awards Luncheon. The 2021 event featured keynote speaker marine ecologist Dr. Neil Hammerschlag, who is the director of the shark research & conservation program. Walter Ernest and the Mobile County Commission were recognized for their outstanding contributions to marine environmental sustainability. In 2022, American oceanographer Dr. Dave Gallo was the keynote speaker, along with Angus R. Cooper, III, and the Alabama Wildlife Federation, who were recognized for their outstanding contributions to marine environmental sustainability.

Publications

- Zerebecki, R.A., K.L. Heck Jr., J.F. Valentine. Biodiversity influences the effects of oil disturbance on coastal ecosystems. Ecol. Evolution 12 (1), e8532. https://doi.org/10.1002/ece3.8532
- Martin, C.W and J. F. Valentine. Climate-Induced Expansion of Consumers in Seagrass Ecosystems: Lessons From Invasion Ecology. Front. Mar. Sci. 9:867173.
- Blackmon, D.C. and J. F. Valentine. Predator-Induced Nocturnal Benthic Emergence: Field and Experimental Evidence for an Unknown Behavioral Escape Mechanism along the Coral Reef–Seagrass Interface. Diversity. 14(9), 762.
- Lewis, K.A., R.R. Christian, C.W. Martin, K.L. Allen, A.M. McDonald, V.M. Roberts, M.N. Shaffer, and J.F. Valentine. Complexities of disturbance response in a marine food web. Limnol. Oceanogr.67, 2022, S352–S364.
- Hodges, D.J., A. Eason, and D.L. Smee. Burrowing behavior of marsh periwinkles Littoraria irrorata in response to predator cues. Gulf and Caribbean Research. SC7-SC9. https://doi.org/10.18785/gcr.3301.10
- Correia, K.M., S.B. Alford, B.A. Belgrad, K.M. Darnell, M.Z. Darnell, B.T. Furman, M.O. Hall, C.W. Martin, A. McDonald, and D.L. Smee. Drift macroalgae distribution in northern Gulf of Mexico seagrass meadows. PeerJ.
- Correia, K.M. and D.L.Smee. Habitat suitability of drift macroalgae in two shallow coastal estuaries of the northern Gulf of Mexico. Journal of Experimental Marine Biology and Ecology, Volume 557, 151808, ISSN 0022-0981,
- Hayes, T.H, S.B. Alford, B.A. Belgrad1, K.C. Correia, M.Z. Darnell, B.T. Furman, C.W. Martin, A.M. McDonald, D.L. Smee, and K.M. Darnell. Regional variation in seagrass complexity drives blue crab (Callinectes sapidus) mortality and growth across the northern Gulf of Mexico. Marine Ecology Progress Series. 693: 141-155.
- Osland, M.J. et al. 21 authors including D.L. Smee. The impacts of mangrove range expansion on wetland ecosystem services in the southeastern United States: Current understanding, knowledge gaps, and emerging research needs. Global Change Biology. Volume 28, Issue 10 p. 3163-3187.
- Correia, K.M. and D.L. Smee. A Meta-analysis of Tropical Cyclone Effects on Seagrass Meadows. Wetlands.42:108.
- Belgrad, B.A., D.L. Smee, and M.J. Weissburg. Simultaneous predator signaling of prey on multiple trophic levels produces complex patterns of NCEs on basal prey. Ecology 104:6.
- Patrick, C.J. et al. 50 authors including D.L. Smee. A universal pattern of trade-offs between ecosystem resistance and resilience to tropical cyclones. Sciences Advances. 8, eabl9155.
- Eason, A., A.B. Powell, S.H. Roney, C. Lin, C. M. Russell, B.A. Belgrad, and D.L. Smee. Timing of predation risk during early development influences oyster shell morphology. Gulf and Caribbean Research. 31: SC1-SC5.
- Rue, C.R, J.D. Selwyn, P.M. Crockett, B. Gillis, L. Gurski, P. Jose, B.L. Kutil, S.F. Magnuson, L.A. Lopez de Mesa, R.D. Overath, D.L. Smee and C.E. Bird. Genetic diversity across the mitochondrial genome of eastern oysters (Crassostrea virginica) in the northern Gulf of Mexico. Peer J: e12205.
- Belgrad, B.A., E.M. Combs, W.C. Walton and D.L. Smee. Use of predator cues to bolster oyster resilience for aquaculture and reef restoration. Aquaculture. 538: 736553.
- Baker, R. , D. Bilbrey, A. Bland, F. D'Alonzo III, H. Ehrmann, S. Havard, Z. Porter, S. Ramsden, and A. R. Rodriguez. Underwater Video as a Tool to Quantify Fish Density in Complex Coastal Habitats. Habitats. Diversity 2022, 14, 50.
- Bradley M, Nagelkerken I, Baker R, Travers M, Sheaves M. Local environmental context structures animal-habitat associations across biogeographic regions. Ecosystems 25:237-251.
- Ziegler, S.L., R. Baker, S.C. Crosby, D.D. Colombano, M.A. Barbeau, J. Cebrian, R.M. Connolly, L.A. Deegan, B.L. Gilby, D. Mallick, C.W. Martin, J.A. Nelson, J. F. Reinhardt, C.A. Simenstad, N.J. Waltham, T.A. Worthington, and L.P. Rozas. Geographic Variation in Salt Marsh Structure and Function for Nekton: a Guide to Finding Commonality Across Multiple Scales. Estuaries and Coasts. 44, pages1497–1507.
- R. Baker and M. Sheaves. Predation in littoral habitats is a complex process: Comment on Whitfield. Mar Ecol Prog Ser. 662:205-208.
- Defforey D., B.J. Tully, J.B. Sylvan, B.J. Cade-Menun, B. Kiel Reese, L. Zinke, A. Paytan. 2022. Potential Phosphorus Uptake Mechanisms in the Deep Sedimentary Biosphere. Frontiers in Marine Science. 9.
- zu Ermgassen, P.S.E., DeAngelis, B., Gair, J.R. et al. Estimating and Applying Fish and Invertebrate Density and Production Enhancement from Seagrass, Salt Marsh Edge, and Oyster Reef Nursery Habitats in the Gulf of Mexico. Estuaries and Coasts. 44, 1588–1603.
- Gilby, B.L., M. P. Weinstein. R. Baker, J. Cebrian, S.B. Alford, A. Chelsky, D. Colombano, R.M. Connolly, C. A. Currin, I.C. Feller, A. Frank, J.A. Goeke, L.A. Goodridge Gaines, F. E. Hardcastle, C. J. Henderson, C. W. Martin, A. E. McDonald, B. H. Morrison, A. D. Olds, J. S. Rehage, N.J. Waltham, and S.L. Ziegler. Human Actions Alter Tidal Marsh Seascapes and the Provision of Ecosystem Services. Estuaries and Coasts. 44, 1628–1636.
- zu Ermgassen, P.S.E., Baker, R., Beck, M.W. et al. Ecosystem Services: Delivering Decision-Making for Salt Marshes. Estuaries and Coasts. 44, 1691–1698.
- Baker, R., K. Abrantes, and I.C. Feller. Stable Isotopes Suggest Limited Role of Wetland Macrophyte Production Supporting Aquatic Food Webs Across a Mangrove-Salt Marsh Ecotone. Estuaries and Coasts. 44, pages1619–1627.
- Taylor, M.D., R. Baker, C. Simenstad, and M. P. Weinstein. Concepts and Controversies in Tidal Marsh Ecology Revisited. Estuaries and Coasts.
- Colombano, D.D., S.Y. Litvin, S.L. Ziegler, S.B. Alford, R. Baker, M.A. Barbeau, J. Cebrian, R.M. Connolly, C.A. Currin, L. A Deegan, J. S. Lesser, C. W. Martin, A. E. McDonald, C. McLuckie, B. H. Morrison, J.W. Pahl, L.M. Risse, J.A.M. Smith, L. W. Staver, R.E. Turner, and N. J. Waltham. Climate Change Implications for Tidal Marshes and Food Web Linkages to Estuarine and Coastal Nekton. Estuaries and Coasts. 44, 1637–1648.
- Russell, M.L., J.C.G. Bloodgood, and R.H. Carmichael. Spatial, temporal, and demographic patterns of cetacean strandings in the northcentral Gulf of Mexico. Journal of Cetacean Research and Management. 23 (p. 171-182).
- Carmichael, R.H., M.R. Hodanbosi, M. L. Russell, and N. L. Wingers. Human influence on bottlenose dolphin (Tursiops truncatus) strandings in the northern Gulf of Mexico. Front. Environ. Sci. 10:951329.
- Cloyed, C.S., E.E. Hieb, K.P. DaCosta, M. Ross, and R.H. Carmichael. Habitat selection and abundance of West Indian manatees Trichechus manatus at the margins of their expanding range. Mar Ecol Prog Ser. Vol. 696: 151–167.
- Bloodgood, J.C.G., M.L. Russell, C. D. Clark, E.E. Hieb, D. P. Mooe, T.R. Madgrigal, S. Carmichael, and R. H. Carmichael. From Monitoring to Final Disposition: Collaborative Response to the First Live Sperm Whale (Physeter macrocephalus) Stranding in Alabama, USA. Aquatic Mammals, 48(6), 485-494.
- Botton, M. L., B. A. John, R. H. Carmichael, F. Mohamad, P. Bhadury, J. Zaldivar-Rae, P. K. S. Shin, J. T. Tanacredi, and S. G. Cheung. Horseshoe crabs: 'Living fossils' imperiled in the Anthropocene. In: D. A. DellaSala and M. I. Goldstein (eds.), Imperiled: The Encyclopedia of Conservation. Reference Module in Earth Systems and Environmental Sciences, Elsevier.
- Cloyed, Carl S., B.C. Balmer, L.H. Schwacke, R.S. Wells, E.J. Berens McCabe, A.A. Barleycorn, J.B. Allen, T.K. Rowles, C.R. Smith, R. Takeshita, F.I. Townsend, M.C. Tumlin, E.S. Zolman, and R.H. Carmichael. Interaction between dietary and habitat niche breadth influences cetacean vulnerability to environmental disturbance. Ecosphere. 12 (9):e03759.
- Cloyed, C.S., E. E. Hieb, K. DaCosta, M.Ross, and R. H. Carmichael. West Indian Manatees Use Partial Migration to Expand Their Geographic Range Into the Northern Gulf of Mexico. Front. Mar. Sci.
- Estes, Jr, M.G., R.H. Carmichael, X. Chen, and S.C. Carter. Environmental factors and occurrence of horseshoe crabs in the northcentral Gulf of Mexico PLoS ONE 16(1): e0243478.
- Gancel, H. N., R. H. Carmichael, J. Du, and K. Park. Use of settlement patterns and geochemical tagging to test population connectivity of eastern oysters Crassostrea virginica. Mar Ecol Prog. Ser 673:85-105.
- Hieb, E.E., E.A. Eniang, L.W. Keith-Diagne, and R.H. Carmichael. In-Water Bridge Construction Effects on Manatees with Implications for Marine Megafauna Species. The Journal of Wildlife Management 1–12; 2021.
- Cloyed, C.S., R.M. Wilson, B.C. Balmer, A.A. Hohn, L.H. Schwacke, E.S. Zolman, M.C. Tumlin, R.S. Wells, A.A. Barleycorn, J.B. Allen, and R.H. Carmichael. Specialization of a mobile, apex predator affects trophic coupling among adjacent habitats. Sci Rep 11, 19611.
- Cloyed, C.S., B.C. Balmer, L.H. Schwacke, R. Takeshita, A. Hohn, R.S. Wells, T.K. Rowles, J.T. Saliki, C.R. Smith, M.C. Tumlin, E.S. Zolman, D.A. Fauquier, and R.H. Carmichael. Linking morbillivirus exposure to individual habitat use of common bottlenose dolphins (Tursiops truncatus) between geographically different sites. J Anim Ecol. 2021;00:1–14.
- Frith, A., J. Henseler, S. Badri, K.R. Calci, A. Stenson, and R.H. Carmichael. Multiple Indicators of Wastewater Contamination to Shellfish Farms Near a Tidal River. Estuaries and Coasts.
- Groet, T.M., E. E. Hieb, E. S. Darrow, and R. H. Carmichael. Our Wastewater Footprint: Protecting Water Quality Through Comprehensive Coproduction of Knowledge. Case Studies in the Environment (2021) 5 (1): 1425563.
- Grace, M.K., H.R. Akcakaya, E.L. Bennett, T.M. Brooks, A. Heath, et al. Testing a global standard for quantifying species recovery and assessing conservation impact. Conservation Biology. 2021;1–17.
- Liu, Z., J. Lehrter, B. Dzwonkowski, L. Lowe, and J. Coogan. Using Dissolved Oxygen Variance to Investigate the Influence of Nonextreme Wind Events on Hypoxia in Mobile Bay, a Shallow Stratified Estuary, Frontiers in Marine Science. (9).
- Dzwonkowski, B. S. Fourier, G. Lockridge, Z. Liu, J. Coogan, and K. Park. Hurricane Sally (2020) shifts the ocean thermal structure across the inner core during rapid intensification over the shelf, Journal of Physical Oceanography, 52(11), 2841-2852.
- Dykstra*, S.L., B. Dzwonkowski, and R. Torres. The role of river discharge and geometric structure on diurnal tidal dynamics, Alabama, USA. Journal of Geophysical Research – Oceans. 127.e2021JC018007.
- Dzwonkowski, B. S. Fourier, G. Lockridge, Z. Liu+, J. Coogan, and K. Park. Cascading weather events amplify the coastal ocean thermal conditions prior to the shelf transit of Hurricane Sally (2020). Journal of Geophysical Research - Oceans. 126(12), 1-13.
- Dykstra, S.L. and B. Dzwonkowski. The role of intensifying precipitation on coastal river flooding and compound fluvial-marine events Water Resources Research. 52(11), p.e2020WR029363.
- Strickland, B.A., C.J. Patrick, F.R. Carvallo, S.K. Kinard, A.T. Solis, B. Kiel Reese, J.D. Hogan. Local climate and hydrology shape stream invertebrate community susceptibility to a major storm disturbance. Freshwater Biology.
- Justic, D., V. Kourafalou, G. Mariotti, S. He, R. Weisberg, Y. Androulidakis, C. Barker, A. Bracco, B. Dzwonkowski, C. Hu, G. Jacobs, M. Le Henaff, Y. Liu, S. Morey, J. Nittrouer, E. Overton, C. Paris, B. Roberts, K. Rose, A. Valle-Levinson, J. Wiggert. A review of transport processes in the Gulf of Mexico along the river-estuary-shelf-ocean continuum and their relevance for ecological connectivity and oil transport and fate. Estuaries and Coasts. 1-37.
- Coogan*, J., B. Dzwonkowski, J. Lehrter, K. Park and R. Collini. Observations of dissolved oxygen and physical drivers in a shallow highly stratified estuary, Estuarine, Coastal and Shelf Science. Estuarine, Coastal and Shelf Science.
- Gadeken, K., W. Clemo, K.M. Dorgan, M. Fung, W. Ballintine, A. Hagemayer, S. Dykstra*and B. Dzwonkowski. Transport of biodeposits and benthic footprint around an oyster farm, Damariscotta Estuary, Maine. PeerJ.
- Hoadley KD, Poirier CL, Choi CJ, Yung CM, Worden AZ. Coral clearance rates reveal picoplankton selective size barrier. Accepted in Applied and Environmental Microbiology
- Dobson K, S. Levas, V. Schoepf, M. Warner, W. Cai, K.D. Hoadley, X. Yuan, Y. Matsui, T. Melman, and. A. Grottoli. Moderate nutrient concentrations are not detrimental to corals under future ocean conditions. Marine Biology. Vol. 168(98).
- Hoadley K.D., A. Lewis, D. Wham, D.T. Pettay, C. Grasso, R. Smith, D. Kemp, T. Lajeunesse, and M.E. Warner. Disparity in functional phenotypes among closely-related Cladocopium living in Pacific corals Porites rus and Porites cylindrica from inshore and offshore reefs. Glob Chang Biol. 27(20):5295-5309.
- Mullis, M.M.*, J.D. Selwyn, R. Kevorkian, E.D. Tague, H.F. Castro, S.R. Campagna, K.G. Lloyd, B. Kiel Reese. Microbial survival mechanisms within serpentinizing Mariana forearc sediments. FEMS Microbiology Ecology.
- Carvallo, F.R, B.A. Strickland, S.K. Kinard, B. Kiel Reese, J.D. Hogan, C.J. Patrick. 2022. Structure and functional composition of macroinvertebrate communities in coastal plain streams across a precipitation gradient. Freshwater Biology.

- Nesbitt, K. *, J. Bloodgood, M.M. Mullis, A.C. Deming, K. Colegrove, B. Kiel Reese. Draft genome sequences of Erysipelothrix sp. isolated from stranded septic bottlenose dolphins in Alabama, USA. Microbiology Resource Announcements.
- Kiel Reese, B., M.S. Sobol*, M. Bowles, K.-U. Hinrichs. Redefining the subsurface biosphere: Characterization of fungi isolated from energy-limited marine deep subsurface sediment. Frontiers in Fungal Biology.
- Akam, S.*, T.W. Lyons, R.B. Coffin, D. McGee, T.H. Naehr, S.M. Bates, C. Clarkson, B. Kiel Reese. Carbon-sulfur signals of methane versus crude oil diagenetic decomposition and U-Th age relationships for authigenic carbonates from asphalt seeps, southern Gulf of Mexico. Chemical Geology 581:120395.
- Mullis M.M. *, R.E. Weisend*, B. Kiel Reese. Draft genome sequences of Idiomarina abyssalis strain KJE, Marinobacter salarius strain NP2017, and Marinobacter salarius strain AT3901, isolated from deep-sea sediment near the western flank of the Mid-Atlantic Ridge. Microbiology Resource Announcements.
- Ward, J.P.J., Hendry, K.R., Arndt, S., Faust, J.C., Freitas, F.S., Henley, S.F., Krause, J.W., März, C, Tessin, A.C., Airs, R. 2022. Benthic Silicon Cycling in the Arctic Barents Sea: a Reaction-Transport Model Study. Biogeosciences 19, 3445-3467.
- Ward, J.P.J., Hendry, K.R., Arndt, S., Faust, J.C., Freitas, F.S., Henley, S.F., Krause, J.W., März, C, Ng, H.C., Pickering, R.A., Tessin, A.C. 2022. Stable Silicon Isotopes Uncover a Mineralogical Control on the Benthic Silicon Cycle in the Arctic Barents Sea. Geochimica et Cosmochimica Acta.
- Kemp, E.J., Roseburrough, R.R., Elliot, E.A., Krause, J.W. 2021. Spatial variability of sediment amorphous silica and its reactivity in a Northern Gulf of Mexico Estuary and Coastal Zone. Gulf and Caribbean Research 32 (1): SC6-SC11.
- Krause, J.W., Lomas, M.W., Danielson, S.L. Direct to consumers: reduced nutrient limitation and microzooplankton losses enable efficient passage of diatom production to higher trophic levels or export during spring. Deep-Sea Research II.
- Closset, I., McNair, H.M., Brzezinski, Krause, J.W., Thamatrakoln, K., Jones, J. Diatom response to alterations in upwelling and nutrient dynamics associated with climate forcing in the California Current System. Limnology and Oceanography. 66(4): 1578-1593.
- Fung, M., Phipps, S., Lehrter, J., (2022), Abrupt chlorophyll shift driven by a phosphorus threshold in a small subtropical estuary. Frontiers in Marine Science, p. 1949.
- Jarvis, B., Pauer, J., Melendez, W., Wan, Y., Lehrter, J., Lowe, L., and Simmons, C. (2022). Inter-model comparison of simulated Gulf of Mexico hypoxia in response to reduced nutrient loads: effects of phytoplankton and organic matter parameterization. Environmental Modelling and Software 151:104365.
- Le, C., Chen, Y., Lehrter, J., Hu, C., Bouman, H., Cai, W.J. and Qi, L., (2021). Greenland blocking promotes subtropical North Atlantic spring blooms. Geophysical Research Letters, 48(13), p.e2020GL092252.
- Wang, F., D. Tian, L. Lowe, L. Kalin, J. Lehrter (2021). Deep learning for daily precipitation and temperature downscaling. Water Resources Research 57, e2020WR029308 https://doi.org/10.1029/2020WR029308.
- Jarvis, B., R. Greene, Y. Wan, J. Lehrter, L. Lowe, D.S. Ko (2021), Contiguous formation of low oxygen waters between the continental shelf hypoxic zone and nearshore coastal waters of Louisiana, USA. Environmental Science and Technology.
- Thomas, T., W.W. Boone, M.S. Allen, C.W. Martin, S.A. Johnson (2022) Occupancy of the diamondback terrapin Malaclemys terrapin on coastal islands in the Suwannee estuary. Herpetological Conservation and Biology 17(3):560–566.
- Rohal, C.B., C.R. Adams, C.W. Martin, S. Tevlin, L.K. Reynolds (2022) Intraspecific variation in Potamogeton illinoensis life history and seed germination has implications for restoration in eutrophic lakes. Hydrobiologia 849(16):3481-3500.
- Looby, A., K.D. Cox, S. Bravo, R. Rountree, F. Juanes, L.K. Reynolds, C.W Martin (2022) A quantitative inventory of global soniferous fish diversity. Reviews in Fish Biology and Fisheries. 32:581-595.
- Walters, K., C.W. Martin, T. Funk (2022) Differences in habitat structure and resident prey survival on newly restored and established natural intertidal oyster reefs. Restoration Ecology. 30(7):e13630.
- McDonald, A.M., C.W. Martin, G.R. Rieucau, B.J. Roberts (2022) Prior exposure to weathered oil influences foraging of an ecologically important saltmarsh resident fish. PeerJ 10:e12593.
- Martin, C.W., L.K. Reynolds, W.A. Scheffel, S. Tiffany, S. Kopetman (2021) Diel variability and influence of artificial light on fish and macroinvertebrate communities in Gulf of Mexico seagrass beds. Estuaries and Coasts 44(2):431-441.
- Keppeler, F., J.A. Olin, P.C. Lopez-Duarte, M.J. Polito, L.M. Hooper-Bui, S.S. Taylor, N.N. Rabalais, F.J. Fodrie, B.J. Roberts, R.E. Turner, C.W. Martin, O.P. Jensen (2021) Body size, trophic position, and the coupling of different energy pathways across a saltmarsh landscape. Limnology and Oceanography Letters 6(6):360-368.
- Rohal, C.B., L.K. Reynolds, C.R. Adams, C.W. Martin, S.B. Gorham (2021) A preliminary investigation of umbellate inflorescences in Vallisneria americana populations of Central Florida. Aquatic Botany 175(2021):103436.
- Reynolds, L.K., W.A. Scheffel, C.R. Adams, C.W. Martin, C.B. Rohal, J. Slater (2021) Submerged aquatic vegetation species and cultivars within species respond differently to common environmental stressors. Environmental Management 68:477-490.
- Looby, A., L.K. Reynolds, C.R. Adams, S.J. Walsh, C.W. Martin (2021) Submerged aquatic vegetation habitat use of age-0 largemouth bass Micropterus salmoides. Environmental Biology of Fishes 104:947-958. **Editor's Choice**
- Looby, A., L.K. Reynolds, C.R. Adams, C.W. Martin (2021) Submerged aquatic vegetation patch size affects fish communities in a turbid-algal lake. Frontiers in Conservation Science 2:657691.
- Sullivan, C.R., A.R. Smyth, C.W. Martin, L.K. Reynolds (2021) How does mangrove expansion affect structure and function of adjacent seagrass meadows? Estuaries and Coasts 44(2):453-467.
- Rohal, C.B., L.K. Reynolds, C.R. Adams, C.W. Martin, E. Latimer, S.J. Walsh, J. Slater (2021) Biological and practical tradeoffs in planting techniques for submerged aquatic vegetation. Aquatic Botany 170(2021):103347.
- Jefferson, A.E., M. B. Jargowsky, G. M Ivec, P.T. Cooper*, J. Carroll, C. L. Gervasi, J. S. Rehage, J. F. Mareska, S. P. Powers, J. M. Drymon. Age, growth, and diet of crevalle jack (Caranx hippos) in the Gulf of Mexico. Fisheries Management and Ecology 29: 608-626.
- Boyle, K. S., C. L. Hightower and S. P. Powers. Evaluation of factors contributing post-release mortality of greater amberjack (Seriola dumerili) in the northern Gulf of Mexico using depth and acceleration acoustic sensor tags. Fishery Bulletin 120: 218-233.
- Hightower, C.L., J. M. Drymon, A. E. Jefferson, M. B. Jargowsky, E. A. Seubert, S. Dedman, J. F. Mareska, and S. P. Powers. Population dynamics, abundance, and habitat suitability of adult red drum (Sciaenops ocellatus) in nearshore waters of the north central Gulf of Mexico. Fishery Bulletin 120:162–175.
- Boyle, K., C.L. Hightower T. R. Nelson and S. P. Powers. Use of passive acoustic monitoring to estimate fishing effort on artificial reefs in Alabama during the recreational red snapper fishing season. Fisheries Research 249: e106262.
- Grabowski, J.H., C. J. Baillie, A. Baukus, J. Fodrie, R. K. Gittman, A. R. Hughes, D. L. Kimbro, H. Lenihan, S. P. Powers, K. Sullivan, and R. Wagaman. Fish and invertebrate use of restored vs. natural oyster reefs in North Carolina. Ecosphere 13: e4035.
- Nelson T. R.*, C. L. Hightower, J. Coogan, B. D. Walther, and S. P. Powers. Patterns and consequences of life history diversity in salinity exposure of an estuarine dependent fish. Environmental Biology of Fishes 104: 419-436.
- Nelson, T. R., C. L. Hightower, S.P. Powers. Red Drum and Spotted Seatrout live-release tournament mortality and dispersal. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 13:320–331.
- Jefferson, A.E., M. B. Jargowsky, M. N. Schrandt, P. T. Cooper*, S. P. Powers, J. J. Dindo, J. M. Drymon. Age, growth, and mortality of Atlantic Tripletail in the north-central Gulf of Mexico. Marine and Coastal Fisheries 13:183–199.
- Mudge, E.M., A. Robertson, A.K. Leynse, P. McCarron, and C.O. Miles. Selective extraction of gambierone and related metabolites in Gambierdiscus silvae using m-aminophenylboronic acid–agarose gel and liquid chromatography–high-resolution mass spectrometric detection. Journal of Chromatography B, Vol. 1188. 123014. 1570-0232.
- Kryuchkov, F., A. Robertson, E.M. Mudge, C.O. Miles, S.V. Gothem, and S. Uhlig. Reductive Amination for LC–MS Signal Enhancement and Confirmation of the Presence of Caribbean Ciguatoxin-1 in Fish. Toxins 2022, 14(6), 399.
- Mudge, E.M., J. Meija, S. Uhlig, A. Robertson, P. McCarron, and C.O. Miles. Production and stability of Oxygen-18 labeled Caribbean ciguatoxins and gambierones. Toxicon 2022, 211(11-20).
- Mudge, E.M.; Robertson, A.; McCarron, P.; Miles, C.O. Selective and Efficient Capture and Release of vic-Diol-Containing Pacific and Caribbean Ciguatoxins from Fish Extracts with a Boronate Affinity Polymer. Journal of Agricultural and Food Chemistry 2022, 70, 12946-12952.
- Kryuchkov, F.; Robertson, A.; Mudge, E.M.; Miles, C.O.; Van Gothem, S.; Uhlig, S. Reductive Amination for LC-MS Signal Enhancement and Confirmation of the Presence of Caribbean Ciguatoxin-1 in Fish. Toxins 2022, 14, 399.
- Dahl, K.A.; Fields, A.; Robertson, A.; Portnoy, D.S.; Grieme, A.; Lockridge, G.; Patterson, W.F. Factors affecting DNA barcoding classification accuracy for piscine prey: An experimental assessment with invasive lionfish. Journal of Experimental Marine Biology and Ecology 2022, 547, 151675,
- Mudge, E.M., A. Robertson, A. Leynse, P. McCarron, and C.O. Miles. Selective Extraction of Gambierone and Related Metabolites in Gambierdiscus silvae using m-Aminophenylboronic Acid–Agarose Gel and Liquid Chromatography–High-Resolution Mass Spectrometric Detection Journal of Chromatography B 2021, 123014.
- Gwinn, JK., S. Uhlig, L. Ivanova, C.K.Faest, F. Kryuchkov, A. Robertson. In Vitro Glucuronidation of Caribbean Ciguatoxins in Fish: First Report of Conjugative Ciguatoxin Metabolites. Chemical Research in Toxicology. 34 (8), 1910-1925.
- Liefer, J.D.; M.L. Richlen, T.B. Smith, J.L. DeBose, Y. Xu, D.M. Anderson, A. Robertson. Asynchrony of Gambierdiscus spp. Abundance and Toxicity in the U.S. Virgin Islands: Implications for Monitoring and Management of Ciguatera. Toxins. 13, 413.
- Hancock, TL., S.L. Blonder, A.A. Bury, R. A. Smolinski, M.L. Parsons, A. Robertson, H. Urakawa. Succession pattern and phylotype analysis of microphytobenthic communities in a simulated oil spill seagrass mesocosm experiment. Science of The Total Environment. 784, 47053.
- Dahl, K.A., A. Fields, A. Robertson, D.S. Portnoy, A. Grieme, G. Lockridge, and W.F. Patterson. Factors affecting DNA barcoding classification accuracy for piscine prey: An experimental assessment with invasive lionfish. Journal of Experimental Marine Biology and Ecology. 547. p. 151675.
- Bennett, C.T. and A. Robertson. Depuration kinetics and growth dilution of Caribbean CTX in the omnivore Lagodon rhomboides: Implications for trophic transfer and ciguatera risk. Toxins 2021, 13(11).774.
- O'Donnell, K.L., Tomiczek, T. and Scyphers, S.B. Resident Perceptions and Parcel-Level Performance Outcomes of Mangroves, Beaches, and Hardened Shorelines After Hurricane Irma in the Lower Florida Keys. Frontiers in Environmental Science, 10, p.734993.
- Aminpour, Payam, Steven A. Gray, Michael W. Beck, Kelsi L. Furman, Ismini Tsakiri, Rachel K. Gittman, Jonathan H. Grabowski et al. 'Urbanized knowledge syndrome—erosion of diversity and systems thinking in urbanites' mental models.' npj Urban Sustainability 2, no. 1 (2022): 11.
- Aminpour, P., S.A. Gray, A. Singer, S.B. Scyphers, A.J. Jetter, R. Jordan, R. Murphy, and J.H. Grabowski. The diversity bonus in pooling local knowledge about complex problems. Proceedings of the National Academies of Sciences.
- Furman, K., P. Aminpour, S.A. Gray, and S.B. Scyphers. Mental models for assessing social-ecological systems following disasters: a case study contextualizing natural and built shorelines after Hurricane Irma. Marine Policy. Volume 125, 104334.
- Scyphers, S.B., J.M. Drymon, K.L. Furman, E. Conley, Y. Niwa, A. Jefferson, and G.W. Stunz. Understanding and enhancing angler satisfaction with fisheries management: insights from the "Great Red Snapper Count". North American Journal of Fisheries Management.
- Tarnecki, A.M., C. Miller, T.A. Sherwood, R.J. Griffitt, R.W. Schloesser, and D. Wetzel. Dispersed Crude Oil Induces Dysbiosis in the Red Snapper Lutjanus campechanus External Microbiota. Microbiology Spectrum 10: e00587-21.
- Rodgers, M.L., T.A. Sherwood, A.M. Tarnecki, R.J. Griffitt, and D.L. Wetzel. Characterization of transcriptomic responses and transcriptional pathways of southern flounder (Paralichthys lethostigma) chronically exposed to Deepwater Horizon oiled sediments. Aquatic Toxicology 230: 105716.
- Tarnecki, A.M., N. Levi, M. Resley, and K. Main. Effects of copper sulfate on the external microbiome of common snook (Centropomus undecimalis). Animal Microbiome 3: 21.
- Sherwood, T.A., M.L. Rodgers, A.M. Tarnecki, R.J. Griffitt, and D.L. Wetzel. Characterization of the differential expressed genes and transcriptomic pathway analysis in the liver of sub-adult red drum (Sciaenops ocellatus) exposed to Deepwater Horizon chemically dispersed oil. Ecotoxicology and Environmental Safety 214: 112098.
- Glon, H., Quattrini, A., Rodriguez, E., Titus, B.M., Daly, M. Comparison of sequence-capture and ddRAD approaches in resolving species and populations in hexacorallian anthozoans. Molecular Phylogenetics and Evolution 163, 107233.
- Titus, B.M., Gibbs, H.L., Simoes, N., Daly, M. . Topology testing and demographic modeling reveal a novel diversification pathway in the Caribbean Sea following the formation of the Isthmus of Panama. Biorxiv preprint. 427733.