Annual Report

January 1 – December 31, 2023
Dean Thomas K. Frazer

2023

UNIVERSITY OF SOUTH FLORIDA
College of MARINE SCIENCE

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THE VIEW FROM THE BRIDGE

The annual report for the USF College of Marine Science serves as a valuable opportunity to celebrate our community's many accomplishments. In the 2023 edition, you will find stories that showcase the achievements of our graduate students, impact of our research, and continued engagement with the broader community. Key highlights in this report include:

- Spotlights on outstanding graduate students and their research
- Prestigious awards supporting the next generation of marine scientists
- Transformative scientific cruises
- Groundbreaking research on marine pathogens
- Advancements in the fields of ocean color and optics
- Updates and progress of the USF glider fleet
- Innovative studies on trace metals and the carbon cycle
- Explorations in Antarctica and the Southern Ocean
- Expanding research and education opportunities for undergraduates
- The successful return of the St. Pete Science Festival

I hope you find the following pages informative and join me in celebrating another outstanding year for the College of Marine Science.

COLLEGE OF MARINE SCIENCE LEADERSHIP TEAM

THOMAS K. FRAZER
Dean, College of Marine Science
PhD, UC Santa Barbara, 1995
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Dr. Thomas Frazer is a Professor and Dean of the College of Marine Science at the University of South Florida. Prior to his arrival at USF, Dr. Frazer was Director of the School of Natural Resources and Environment at the University of Florida and served also as Chief Science Officer for the State of Florida. Dr. Frazer holds a Bachelor's Degree in Fisheries Biology from Humboldt State University and a Master's Degree in Fisheries and Aquatic Sciences from the University of Florida. He earned his Ph.D. in Biological Sciences from the University of California, Santa Barbara. His research addresses contemporary and emerging environmental issues, and is, by nature, interdisciplinary. His work involves collaborators from disparate disciplines, and it includes sampling and experiments conducted across a wide range of spatial and temporal scales. Dr. Frazer has received research funding from a broad suite of granting entities to address topics pertaining to water quantity and quality, nutrient dynamics, biogeochemical processes, fish population dynamics, food web interactions, and ecological restoration of degraded ecosystems. He has conducted field research in both freshwater and marine systems around the globe, and he is intimately familiar with a broad suite of environmental and natural resource issues (e.g., eutrophication of fresh, estuarine, and coastal waters; invasive species; and the ecological impacts of contemporary environmental change, including coral bleaching, ocean acidification, and sea level rise). Dr. Frazer has authored and/or co-authored more than 175 peer-reviewed publications, technical reports, and book chapters. Dr. Frazer currently serves as a member of the Gulf of Mexico Fisheries Management Council and chairs multiple standing committees. He is also a member of Florida's Environmental Regulation Commission.

GARY MITCHUM
Associate Dean, College of Marine Science
PhD, Florida State University, 1984
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mitchum@usf.edu

Dr. Mitchum is the Associate Dean and Professor of Physical Oceanography. After receiving his PhD from the Department of Oceanography at the Florida State University in 1985, he spent 11 years in the Department of Oceanography at the University of Hawaii, first as a postdoctoral researcher and then as a member of the research faculty and as the Director of the University of Hawaii Sea Level Center. He came to the University of South Florida in 1996. His research interests emphasize short-term climate changes, ranging from interannual variations such as ENSO, to decadal processes, to the problem of long-term sea-level rise. He has also done work on continental shelf dynamics, mesoscale eddy interactions with mean flows, internal tide generation and propagation, physical controls on fisheries variables, and storminess changes in the southeastern United States. He is especially interested in analyses of tide gauge and satellite altimetric data, and notably proposed and developed the presently accepted method of estimating temporal drift in altimeters via comparisons with the global tide-gauge network. Mitchum serves on numerous local, national, and international committees, most notably he serves as Chair of the Global Sea Level Observing System (GLOSS) Group of Experts and is President of the IUGG/IAPSO Commission on Mean Sea Level and Tides.

DAVID NAAR
Associate Dean of Academic Affairs, College of Marine Science
PhD, Scripps Institution of Oceanography, UCSD, 1990
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Dr. Naar is the Associate Dean of Academic Affairs and Professor in Geological Oceanography. He has overseen the graduate academic program and graduate student matters since 2012. He received his bachelor's degree in Geology with an emphasis in Geophysics from University of California, Santa Barbara in 1982, and his PhD in Earth Sciences from Scripps Institution of Oceanography, at the University of California, San Diego in 1990.

Dr. Naar started as an assistant professor at the University of South Florida's Department/College of Marine Science in 1990. In 1996, he became an associate professor and in 2020, a full professor. His research interests include microplate tectonics, propagating rifts, plate motions, seamount chains, and seafloor mapping from deep ocean trenches to the shoreline, including mapping several marine protected areas from American Samoa to Florida. These interests and his role overseeing the graduate program have meshed well with the education component of the USF-NOAA Center for Ocean Mapping and Innovative Technologies. Dr. Naar has served on several panels and working groups for the National Science Foundation, Ocean Observatory Initiative, Ocean Drilling programs, NOAA, and on the United States Scientific Advisory Committee.

MEET OUR FACULTY & RESEARCHERS

BIOLOGICAL OCEANOGRAPHY

Dr. Maggi Brisbin, Assistant Professor: Microbiology, Phytoplankton ecology, Meta 'omics, Bioinformatics

Dr. Dreux Chappell, Associate Professor: Marine Microbial Ecology, Marine Microbiology and 'OMICs, Phytoplankton Physiology, Trace Metal Biogeochemistry, Nitrogen Fixation

Dr. Cameron Ainsworth, Associate Professor: Fisheries Biology, Ecosystem and Resource Management, Population Modeling

Dr. Mya Breitbart, Distinguished University Professor: Genomics, Marine Microbiology, Wastewater Microbiology, Marine Viruses

Dr. Kendra Daly, Professor: Zooplankton Ecology, Gulf of Mexico and Antarctic Ecosystems, Ocean Observatories, Sensor Technology

BIOLOGICAL OCEANOGRAPHY

Dr. Joshua Kilborn, Research Assistant Professor: Ecosystem-based Fisheries Management, Fish Ecology; Statistical Analyses, Data Visualization

Dr. Frank Muller-Karger, Distinguished University Professor: Marine Biodiversity, Marine Ecosystem Health, Satellite Remote Sensing, Climate Change

Dr. Steve Murawski, Research Professor and St. Petersburg Downtown Partnership Peter R. Betzer Endowed Chair: Fisheries Biology, Marine Ecology, Pollution Impacts, Ocean Mapping and Undersea Technologies

Dr. Ernst Peebles, Associate Professor: DNA Barcoding, Otolith Microchemistry, Stable Isotope Analysis

Dr. Brad Seibel, Professor: Physiological response of marine animals to extreme environments, ocean acidification, deoxygenation and warming, polar and deep-sea biology, biology of mollusks

BIOLOGICAL OCEANOGRAPHY

Dr. Chris Stallings, Associate Professor: Fish Ecology, Marine Conservation

CHEMICAL OCEANOGRAPHY

Dr. Ana Arellano, Assistant Professor of Instruction: Biogeochemistry, color dissolved organic matter, chemical biomarkers, estuaries and subterranean groundwater discharge

Dr. Kristen Buck, Associate Research Professor (and now at Oregon State University): Trace Metal Biogeochemistry

Dr. Robert Byrne, Distinguished University Professor: Ocean Acidification, Seawater Trace Element Chemistry, Seawater Chemistry Method Development

Dr. Tim Conway, Associate Professor: Marine Trace Metals, Metal Isotopes, Biogeochemistry, GEOTRACES

CHEMICAL OCEANOGRAPHY

Dr. Patrick Rafter, Assistant Professor: Marine Carbon Cycling, Isotope Geochemistry,Paleoclimate/ Paleoceanography, Marine Carbon Dioxide Removal

Dr. Isabel Romero, Research Assistant Professor: Organic Geochemistry, Environmental Chemistry, Deep Sea Ecosystems, Ecosystem Resilience

GEOLOGICAL OCEANOGRAPHY

Dr. Jackie Dixon, Professor: Geochemistry, Igneous Petrology, Marine Volcanology

Dr. Alastair Graham, Associate Professor: Antarctic Climate History, Seafloor Exploration, Polar Marine Geology, Remotely Operated and Autonomous Instruments for Sea-Floor Exploration

Dr. Pamela Hallock Muller, Professor: Bioindicators, Coral Reef Ecology, Foraminifera, Sediment Cores

GEOLOGICAL OCEANOGRAPHY

Dr. Cheryl Hapke, Research Professor: Coastal Erosion, Coastal Resiliency, Seafloor Mapping, Hurricane Impacts

Dr. David Naar, Professor and Associate Dean: Sea Floor Mapping, Plate Tectonics

Dr. Brad Rosenheim, Professor: Paleoceanography/Paleoclimate, stable isotopes, carbon cycling, Antarctica

Dr. Amelia Shevenell, Professor: Paleoceanography/Paleoclimate; ice sheet instability, Antarctica, Sediment Cores, Sea Level Rise

PHYSICAL OCEANOGRAPHY

Dr. Brian Barnes, Research Assistant Professor: Satellite Remote Sensing, Ocean Optics, Coastal Water Quality

Dr. Don Chambers, Professor: Using satellite observations to understand climate change and ocean dynamics, Sea Level Rise, Ocean Circulation, Glaciers

Dr. Boris Galperin, Associate Professor: Atmospheric, Oceanic and Planetary Turbulence; Theory, Modeling, Experiments; Geophysics

Dr. Chuanmin Hu, Professor: Ocean Optics, Remote Sensing, Harmful Algal Blooms, Coastal Water Quality and Pollution

Chad Lembke, Assistant Research Professor: Ocean engineering, AUVs/ROVs, Sensors, Gliders to study ocean circulation, harmful algal blooms, fish biomass, seafloor mapping

PHYSICAL OCEANOGRAPHY

Dr. Yonggang Liu, Research Associate Professor: Ocean Circulation (Focus: Gulf of Mexico, Tampa Bay), Coastal Oceanography, Computer Modeling, Storm Surge, Florida Red Tides

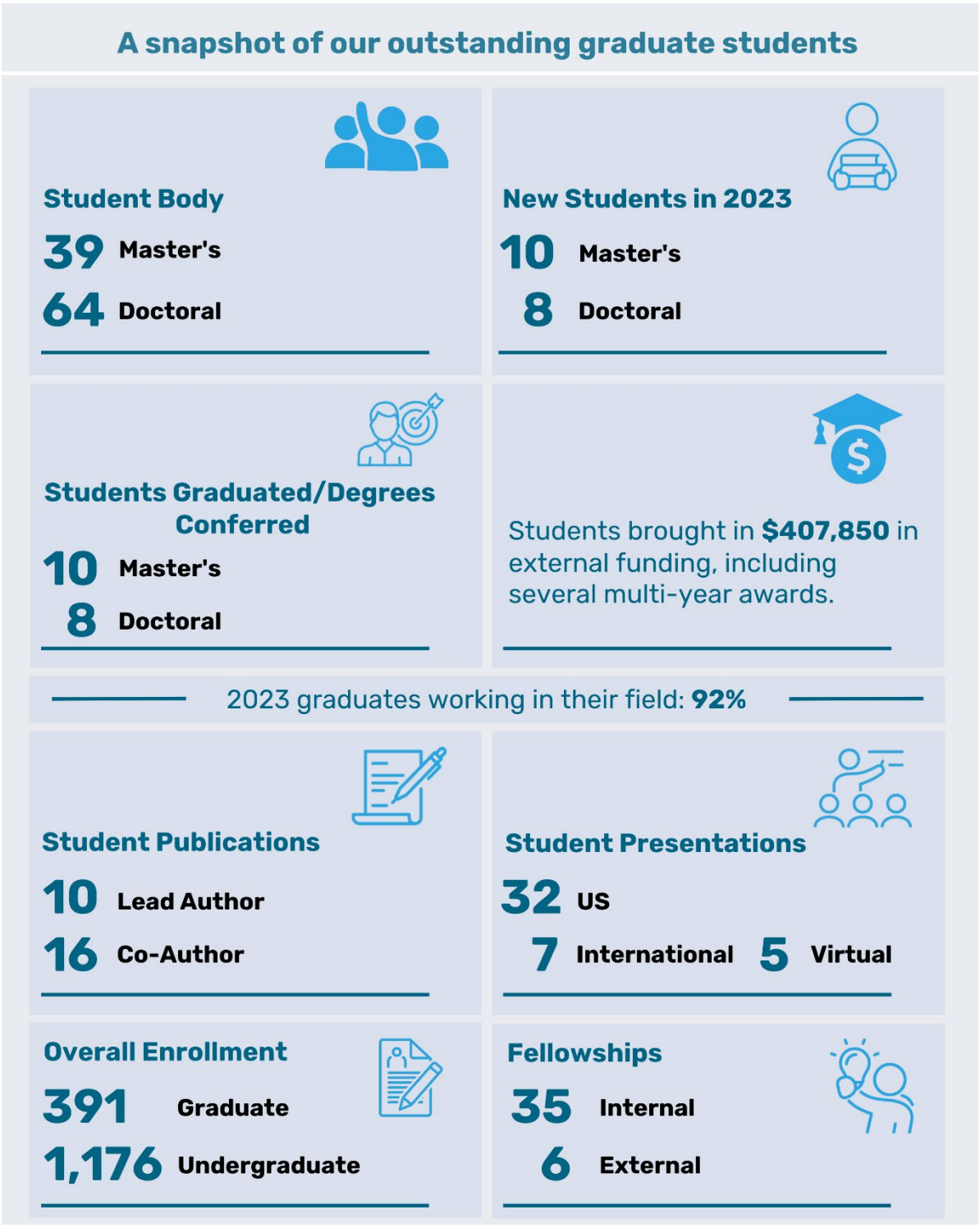
Dr. Mark Luther, Associate Professor: Maritime Safety and Security; Real-Time Ocean Observation Systems; Numerical Models of Ocean Circulation

Dr. Gary Mitchum, Professor and Associate Dean: Climate Change, Ocean Eddies, Satellite Remote Sensing, Sea Level Rise

SEE ALSO:

- Researchers, Researchers | USF College of Marine Science
- Postdoctoral Researchers, Postdoctoral Researchers | USF College of Marine Science
- Courtesy Professors, Courtesy Professor | USF College of Marine Science

STUDENT SUCCESS



View Fellowship Recipients online

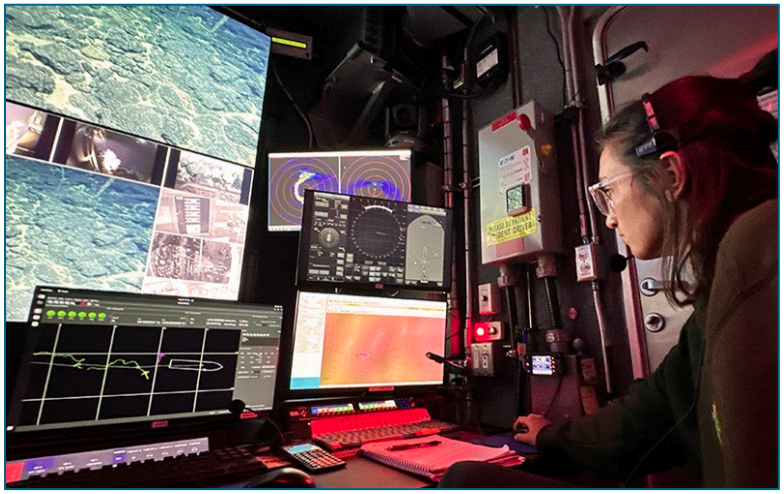
Carrying on a college tradition

Fifteen graduate students delivered oral or poster presentations summarizing their research projects as part of the USF College of Marine Science's 39th annual Graduate Student Symposium held on Friday, January 27th. The student presentations followed a helpful "lessons I've learned" kickoff keynote by CMS alum, Kara Radabaugh (Class of 2013), who manages habitat and oyster mapping and monitoring programs at the Florida Fish and Wildlife Conservation Commission in St. Petersburg.

Award promotes graduate research

Graduate students Lydia Ruggle and Emma Grave who received the 2023 Vembu Subramanian Ocean Scholars Award. The Vembu Subramanian Ocean Scholars Award helps foster the growth and development of the next generation of ocean experts by providing opportunities for undergraduate students, graduate students, and early career professionals to connect with fellow experts in their field and showcase their work at meetings and conferences.

Spotlight on an outstanding grad



CMS alum Catalina Rubiano was highlighted in a Boundless Bulls profile series, which featured students who earned degrees during Fall 2023 commencement. She is part of the first cohort to graduate with the new hydrography (seafloor mapping) concentration, designed to develop skills for careers outside of academia.

Tracking seagrass from satellite

Luis Lizcano Sandoval, a PhD student in the lab of Frank Muller-Karger, used an algorithm to select high-quality satellite images for seagrass coverage in Tampa Bay from 1990-2021.

Enhancing biological data

Savannah, who earned her PhD from the College of Marine Science in the lab of Frank Muller-Karger, used the global, open-access data archive called Ocean Biodiversity Information System to demonstrate that data for sea- and shorebirds of the Americas can and should be enhanced.

All aboard for hydrography

Several students joined NOAA's *R/V Nancy Foster* for a cruise focusing on hydrography. The Center for Ocean Mapping and Innovative Technologies published a series of summer blogs written by these students and detailing their experiences aboard this esteemed research vessel.

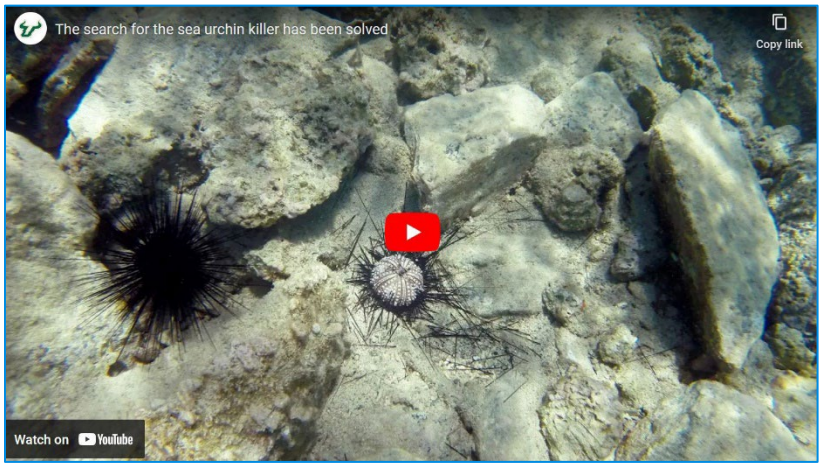
Shevenell Lab returns to the Ross Sea

Emily Kaiser, a PhD student in Amelia Shevenell's Antarctic Paleoclimate Lab, documented her experience as a member of the scientific team on board the *Research Vessel/Icebreaker Nathaniel B. Palmer*, which sailed to Antarctica's Ross Sea, through a series of blog posts about the research cruise.

RESEARCH HIGHLIGHTS

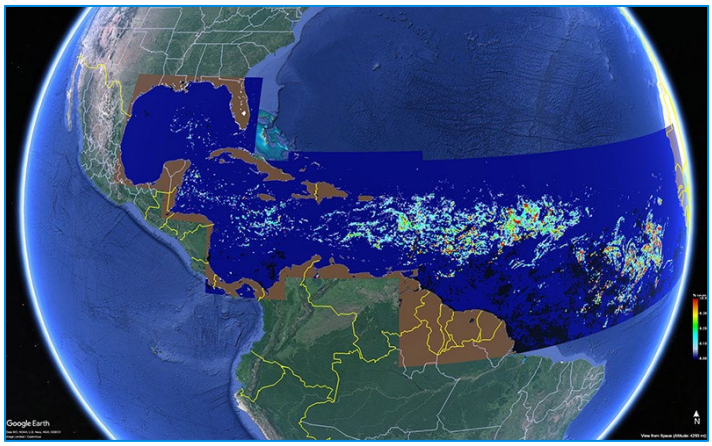
View Faculty Publications online
View Faculty Presentations online

A sea urchin mystery solved



A team of scientists organized by Mya Breitbart, Distinguished University Professor at the College of Marine Science, determined that a single-celled organism called a ciliate was the cause of a die-off of sea urchins in the Caribbean and along Florida's East coast in 2022. The scientists, which included Breitbart's doctoral student Isabella Ritchie, reported the results in *Science Advances*.

Advancing ocean color science



Hundreds of scientists from around the world gathered in St. Petersburg to discuss the latest advances in the fields of ocean optics and remote sensing. Hosted for the first time by the College of Marine Science, the International Ocean Colour Science Meeting 2023 (IOCS-2023) saw space agencies and other attendees share innovative new research, collaborate on technical reports, and nurture a strong global community for applied ocean color science.

Sargassum forecasting system

Brian Barnes, assistant research professor of physical oceanography at the College of Marine Science, was selected to lead the development of a *Sargassum* forecasting system. The college will receive about half of a five-year, $3.2-million grant from the NOAA Monitoring and Event Response for Harmful Algal Blooms program, which aims to better track *Sargassum* blooms and prevent them from plaguing coastal communities.

Satellite views of aquatic algae

Chuanmin Hu, professor of physical oceanography at the College of Marine Science, contributed to several articles on aquatic algae. One study identified nutrients as a driver of the Great Atlantic *Sargassum* Belt, while another details the satellite imagery to study large masses of algae.

Study identifies nutrients as driver of the Great Atlantic Sargassum Belt

Ocean optics illuminates aquatic algae

Glider program expands

The Ocean Technology Group's glider program celebrated another banner year, continuing its red tide and launching a two-year, $200,000 partnership with NOAA to monitor ocean conditions in the eastern Gulf of Mexico and along the South Atlantic Bight, which stretches from North Carolina to the Florida Keys. Through its partnership with NOAA, the glider team helps experts better forecast hurricanes by gathering key ocean data such as temperature and salinity.

Deep-diving gliders capture key ocean data for hurricane forecasting

Stella and Sam: a pair of gliders on a mission

Glider Fleet: Update

High-impact research

Faculty from the College of Marine Science were featured in a report by Elsevier and Stanford University that details high-impact researchers from around the world. The study identifies the top two percent of researchers worldwide across all fields of study, based on their citation impact through 2022. Nine current faculty and two emeritus faculty made the list, which includes career-long and single-year citations.

Protecting ocean ecosystems

Frank Muller-Karger, Distinguished University Professor at the College of Marine Science, continued to advance his research into biodiversity. Muller-Karger joined colleagues in proposing a Global Biodiversity Observing System, received an award to research stressors on South Florida's coastal ecosystems, and spearheaded an effort for the college to join NOAA's Caribbean Climate Adaptation Network.

Researchers propose a global observatory to monitor Earth's biodiversity

CMS receives award to research stressors on South Florida's coastal ecosystems

USF CMS joins NOAA's Caribbean Climate Adaptation Network

All Hands on Deck

Preserving Venezuela's scientific data

Ana Carolina Peralta Brichtova, a postdoctoral scholar in the lab of Frank Muller-Karger, co-authored a collection of marine biodiversity data from her home country of Venezuela, where political unrest has compromised the preservation of scientific data.

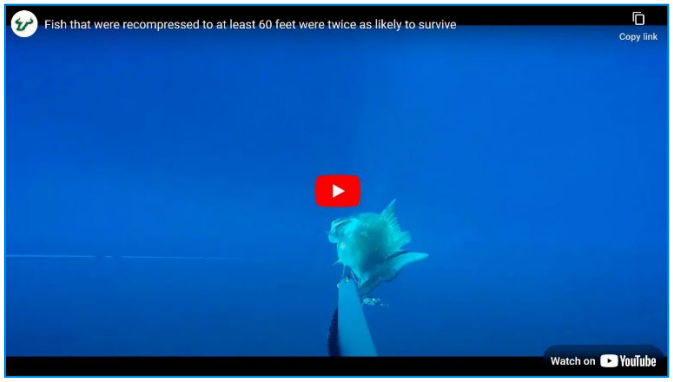
Innovative approach to algae cultivation

The College of Marine Science prides itself on promoting creative, out-of-the-box thinking. Case in point, a new proposal by senior research Cliff Merz, who, in a recent article, envisioned repurposing aircushion packaging that protects products during shipping into photobioreactors, systems used to cultivate photosynthesizing algae.

Antarctica's giant underwater landslides

An international team of researchers, including Amelia Shevenell, professor of geological oceanography at CMS, discovered the cause of giant underwater landslides in Antarctica, which they believe could have generated tsunami waves that stretched across the Southern Ocean. The team uncovered layers of weak, fossilized biologically rich sediments hundreds of meters beneath the seafloor, forming beneath extensive areas of underwater landslides, many of which cut more than 100 meters into the seabed.

A safe approach to catch and release



Researchers led by Chris Stallings, associate professor of biological oceanography at the College of Marine Science, found that a descending device is the best way for recreational fishers to release red snapper and red grouper caught in the deeper waters of the Gulf of Mexico — and physically traumatized from the pressure change experienced during the ascent. This method ensures the greatest likelihood of survival when a fish is let go because it's out of season or too small.

Celebrating Southern Ocean science

Antarctica might seem like another world away, but what happens on the icy continent has repercussions globally. Former Dean Jackie Dixon and other researchers involved in the Southern Ocean Science faculty group at the College of Marine Science helped illuminate the importance of studying this region and its impact on systems around the globe.

Carbon cycle in a subglacial freshwater lake

Surprising results from an historic study suggest the shrinking West Antarctic Ice Sheet, a major threat to global sea level rise, was smaller and more dynamic in the recent geologic past than previously thought. The research was led by Ryan Ventrurelli, assistant professor at the Colorado School of Mines, who performed the work with her former PhD advisor, Brad Rosenheim, professor of geological oceanography at the College of Marine Science.

Marine trace metals

Tim Conway, associate professor of chemical oceanography at the College of Marine Science, continued to bring greater clarity to our understanding of marine trace metals through a series of articles about zinc and cadmium, and a comprehensive review about iron.

Trace metals in the North Pacific

How to pump up your iron: hit the gym, eat spinach, or talk to Tim Conway

EDUCATION AND OUTREACH

Our community engagement by the numbers.

Elementary Students

618

Middle/High School Students

1,088

College Students

363

Parents, Teachers, and Working Professionals

182

$105,000

Awards for Education and Outreach

Hands-on science experience

Organized by researchers at the USF College of Marine Science, the Collaborative Oceanographic Research & Education cruise gave students from the USF St. Petersburg campus and St. Petersburg College the opportunity to apply their skills aboard a five-day cruise on the Florida Institute of Oceanography's *R/V Weatherbird II*.

Ocean research cruise trains tomorrow's marine scientists through hands-on fieldwork

Students conduct science at sea

Welcome to the R/V Western Flyer

After a 4,000-mile journey, a 117-foot twin-hulled ship granted to the University of South Florida docked at its new home port in St. Petersburg, where it will be operated by the Florida Institute of Oceanography to offer transformative opportunities for students to explore and advance the field of ocean science.

Scientists at Sea

Three members of the College of Marine Science community recently participated in the "Scientists at Sea" program led by Eckerd College and funded by the National Science Foundation. This program offers Eckerd undergrads the unique opportunity to participate in a signature research cruise that not only exposes them to cruise-based field science but helps continue research efforts in the response to the historic Deepwater Horizon oil spill.

Guardians of the Gulf

Nearly 25 youth from the Royal Theater Boys & Girls Club of the Suncoast spent three days of their spring break with Guardians of the Gulf, a STEAM program (Science, Technology, Engineering, Arts, Mathematics) about coastal and human resiliency run by the College of Marine Science.

Return of the Science Festival

It was the first time since 2018 that the annual St. Petersburg Science Festival was held in person on the USF St. Petersburg campus, and the College of Marine Science was front and center in the action. More labs participated this year than ever before.

Launch of the Bay Watershed Education & Training website

Fundraising

Empowering our community through fundraising and charitable giving.

FY23 Gifts

$2,822,384

Endowment Fund Total

$27,800,000

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