ECOHAB: FLORIDA PROJECT SCIENTISTS
CONTACT INFORMATION AND RESEARCH INTERESTS

Dr. Gregory J. Doucette
Marine Biotoxins Program
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I am a research oceanographer in the Marine Biotoxins Program at the National Ocean Service/Center for Coastal Environmental Health and Biomolecular Research. My research focuses on the physiological ecology of harmful and toxic algae, especially the role of environmental factors in affecting toxin production and the role of bacteria as natural regulators of algal bloom dynamics. A second emphasis is on describing the trophic transfer of algal toxins in marine food webs and characterizing the distribution of these toxins between particulate and dissolved fractions. My primary aim within the ECOHAB project is to isolate, identify, and characterize algicidal bacteria targeting *Karenia brevis* from waters of the west Florida shelf and, ultimately, to assess their potential role in terminating *K. brevis* blooms.

Dr. Gary Fahnenstiel
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My research includes measuring species-specific rates of photosynthesis and growth of field populations of *Karenia brevis*. Additionally, I am interested in measuring the optical efficiency of single *K. brevis* cells in the field so that species-specific quantum and growth yields can be calculated.

Dr. Jack Fournie
EPA, National Health and Environmental Effects Research Laboratory
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I am a fishery biologist with the U.S. Environmental Protection Agency's Gulf Ecology Division in Gulf Breeze, Florida. My areas of expertise are fish histopathology, fish parasitology, toxicologic pathology, and experimental carcinogenesis in fishes. My research interests for the ECOHAB project are determining any sublethal effects in fishes and other aquatic organisms exposed to low levels of brevetoxin. I will be conducting histopathological evaluations of organisms from field collections and laboratory studies to characterize any pathological abnormalities and will utilize a newly developed immunocytochemical peroxidase assay to visualize the presence of brevetoxins in tissue sections.

Dr. Gerald Janowitz
North Carolina State University
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My research interests include geophysical fluid dynamics; computer modeling of estuarine, shelf-slope, and basin-scale circulation; and computer modeling of biophysical interactions.

Dr. Dan Kamykowski
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My primary research interest in phytoplankton physiology and behavior is currently directed toward detailed laboratory studies of the biochemical correlates associated with diel vertical migration by autotrophic dinoflagellates including *Karenia brevis*. These laboratory studies support the construction of adaptive behavioral models (with Hide and Atsuko Yamazaki) that will be placed in a hydrodynamic context and the formulation of hypotheses that will be tested on field populations of *K. brevis* during the ECOHAB: Florida program. A second interest is directed toward the revision of a previously developed matrix of nutrient depletion temperatures (with

Sara-Joan Zentara) that will be applied to improve ocean algorithms (with Ken Carder). A third interest deals with the small-scale modeling (with Jerry Janowitz) of mixotrophic *Pfiesteria*-like species in North Carolina's Neuse and Palmico Rivers (with JoAnn Burkholder and Howard Glasgow).

Dr. Gary Kirkpatrick
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My research focuses on phytoplankton behavior, photophysiology, and bloom dynamics. Studies include the use of remote sensing technology to monitor natural phytoplankton blooms as well as laboratory research to understand harmful marine algae at the cellular level.

Dr. Jan Landsberg
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I am interested in identifying various species of harmful algae and determining the potential role of biotoxins that are involved in both acute and chronic mortality of aquatic organisms. I have been involved in studying the role of *K. brevis* in marine mammal mortality; I have begun to look at the relationships between turtle strandings and red tide events. I want to determine the ecological and epizootical relationships between harmful algal blooms and mortality and disease in aquatic organisms. The determination of spatial and temporal trends in red tide distribution, in relation to mortality and disease in aquatic organisms, is an important, relatively unexplored area of research. I am interested in the long-term effects of chronic exposure of biotoxins on public health. Potential projects include documenting the distribution of dinoflagellates in Florida waters in relation to ulcerative diseases in fish; papillomas in turtles; tumors in fish and shellfish; and investigating the pathology, disease susceptibility, or immunosuppressive effects of biotoxin exposure in aquatic organisms.

Dr. Steven Lohrenz
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My current research interests focus on the study of marine phytoplankton ecology, physiology, primary production, and the role of phytoplankton in elemental cycles of carbon, nitrogen, phosphorus, and other materials. I am particularly interested in the applications of optical methods for high-resolution assessment of phytoplankton distributions and bio-optical properties. Current research involves the use of high-resolution multi-spectral techniques ranging from single-cell to *in situ* bulk measurements to access pigment concentrations and composition. I am also working with a hierarchy of optical models to support assessments of phytoplankton primary production through a combination of *in situ* and remote sensing approaches. This effort includes characterization of ambient light fields using inherent optical properties and radiative transfer models and the characterization of spectral absorption and quantum yield of phytoplankton. My interests in the ECOHAB project are to work with our team of principal investigators to apply these approaches to the assessment of harmful algal blooms off the west coast of Florida.

Dr. Peter McGuire
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Mitigation strategies for Florida red tide events can best be developed and implemented when the origin of a bloom can be determined and the organism's growth and dispersal can be monitored. A major focus of my work is to develop specific probes to identify, quantify, and examine red tide organisms found at traditional bloom sites and, with this information, to locate the origins and monitor the dynamics of blooms.

Dr. David Millie
Florida Fish and Wildlife Conservation Commission
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My research concerns the characterization of factors that force the initiation, establishment, and persistence of noxious and toxic microalgal blooms within aquaculture and dynamic natural systems. Because the occurrence of blooms can be best understood by identifying factors that regulate cell growth and photosynthetic production, a significant portion of my research deals with the regulation of physiological processes within bloom-forming microalgae. For the ECOHAB: Florida project, I am investigating the photophysiological properties of *Karenia brevis* to clarify the bio-optical methodologies required to delineate harmful algal blooms. This research will provide essential information concerning taxon and phylogenetic group-level responses to system-level processes, improve the effective temporal/spatial coverage of multi-platform assessment programs relevant to fisheries resource management and public health, and may provide for predicting the occurrence of problematic bloom-forming taxa.

Dr. Frank Muller-Karger
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When red tides occur, the USF Remote Sensing Lab is careful to download real-time images that may be analyzed for visual identification in a red tide region. We are examining current algorithms used to detect red tide and then modifying these algorithms to produce more accurate results. The goal is to quantify oceanographic and environmental processes that affect the initiation, bloom, and dispersion of red tide organisms.

Dr. Richard Pierce
Mote Marine Laboratory
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I am a senior scientist and director of the Center for Ecotoxicology at Mote Marine Laboratory in Sarasota, Florida. My area of expertise is chemical oceanography, with an emphasis on the fate and effects of toxic substances, including pesticides, petroleum, and natural biotoxins (harmful algal toxins), in the marine environment. My research focuses on analytical methods for detecting and identifying biotoxins in the marine environment to understand their production, transport, and fate in organisms, water, and air. I am also interested in aquatic toxicology and the environmental hazards associated with exposure. As project director for ECOHAB, I design and coordinate laboratory and field studies to determine the fate and effects of brevetoxins along the Florida gulf coast. These studies include the composition of brevetoxins produced during *Karenia brevis* blooms, persistence and changes in toxin composition during and following bloom events, bioaccumulation, trophic transfer, and bubble-mediated production of biotoxin-containing marine aerosol.

Dr. Donald Redalje
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My major research interests include phytoplankton ecology, physiology, bio-optics, biochemistry, primary production, and taxonomy with particular emphasis on the effects of environmental factors on carbon and nitrogen metabolism, cellular composition, and growth at the species and population levels of both laboratory cultures and natural populations. Additional areas of interest include the biogeochemical cycling of organic materials in the upper layers of the ocean, in both coastal and oceanic environments, and the effects of various dissolved and/or suspended components on the light absorption characteristics of marine phytoplankton. Another area of research interest is the mass culture of marine and freshwater microalgae for the production of various commercially important materials, including plant pigments and compounds with anti-cancer activity. Additionally, I have experience in the field of marine policy, with particular emphasis on policies involving resource assessment and use, and eutrophication or water quality issues. In the ECOHAB: Florida project, I will work with co-investigators to examine the bio-optical and physiological characteristics of *K. brevis* from bloom inception through the eventual decline of the bloom. My part will focus on measuring carbon-specific growth rates and biomass and determining nitrogen assimilation rates throughout the evolution of a bloom.

Dr. Oscar Schofield
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I am a biological oceanographer at the Institute of Marine and Coastal Sciences at Rutgers University. My research interests focus on how physical and chemical factors regulate overall phytoplankton productivity and community composition. My research also focuses on the development of optical techniques to provide biological data over ecologically relevant spatial and temporal scales. My ongoing projects include: (1) the physiological ecology of red tides in the Gulf of Mexico, (2) the physical forcing of the spring phytoplankton blooms in Lake Michigan due to episodic sediment resuspension, (3) the impact of differential nitrogen loading on the Neuse River Estuary, and (4) the development of a coupled *in situ* observational network and regional data assimilation model off the coast of New Jersey.

Dr. Karen Steidinger
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My experience is in: (1) dinoflagellate taxonomy, life cycles, and ecology, particularly with respect to toxic species; and (2) management of shellfish resources. My interests include harmful algal bloom dynamics and how life cycle strategies and species adaptations allow certain dinoflagellates to exploit their environment on temporal-spatial scales. Other interests include working toward the development of management options and approaches to lower the risk of living marine resources and humans to harmful algal blooms or biotoxin exposure.

Dr. Rick Stumpf
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I am currently involved in the routine processing of satellite imagery for the Florida coast for temperature and water clarity. My red tide research involves integration of satellite, field, and coastal meteorological observations to monitor and document the movement of red tide blooms with the goal of predicting the transport of red tides.

Dr. Tony Sturges
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I am a professor of oceanography at Florida State University. My contribution to the ECOHAB: Florida project consists of ocean circulation data from buoys moored in the Gulf of Mexico. My research interests include sea-surface topography, surface slope of the Gulf Stream and Pacific coast waters, ocean currents, wind-forced and deep-water renewal circulation, and global climate change including changes in relative mean sea level.

Dr. Patricia Tester
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Karenia brevis blooms are closely coupled to physical processes, and while there is a conceptual model of bloom initiation, transport, maintenance, and dissipation, much of the biological-physical coupling remains unsubstantiated. The temporal and spatial scales of the research questions pertaining to the coupling of physical and biological processes vary widely. At one end of the spatial scale, the physical processes dominating the midshelf region of the west Florida shelf seem key to understanding a critical phase in the development and growth of blooms and the potential for their shoreward transport. Information on upwelling, vertical migration of *K. brevis*, and water column nutrient profiles is critical to physical-biological coupling. I am interested in all of these processes.

Dr. Carmelo Tomas
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I am presently working on the dynamics of algal blooms and the environmental regulation of toxin production. This has included species such as *Karenia brevis*, *Prorocentrum hoffmannianum*, *Gambierdiscus toxicus*, and most recently *Chattonella subsalsa*, *Fibrocapsa japonica*, and *Heterosigma akashiwo*. Major toxins studied are brevetoxins by ELISA assays and okadaic acid by HPLC via external collaboration. In the past, I have extensively studied the autoecology of *Heterosigma akashiwo* (formerly known as *Olisthodiscus luteus*) and its physiology in relation to its seasonal and regional abundance and distribution in Narragansett Bay. I also have extensive experience with algal blooms, including *K. brevis* on the west Florida shelf, and detection of brevetoxins in seawater as markers of bloom formation.

Dr. Frances Van Dolah
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My participation in the ECOHAB:Florida program involves the study of endogenous cellular rhythms in regulating the accumulation growth phase and decline of *Karenia brevis* blooms. Laboratory studies were conducted to identify cell cycle regulatory mechanisms in *K. brevis* and to determine their relative levels of expression in actively growing versus stationary phase populations. Studies also characterized cell cycle phases during the course of the circadian day. Field studies used flow cytometry to determine *in situ* growth rates of blooms during the yearly ECOHAB process cruises to establish a multiyear record of growth rates in early and late bloom stages.

Dr. Gabe Vargo
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My research interests are varied but center around the population dynamics of phytoplankton communities. Chemical (nutrient) and physical interactions with growth and production rates of diatom and dinoflagellate populations, particularly in estuaries, are of special interest. My research programs over the past several years have included: (1) red tide bloom dynamics and the role of phosphorus in bloom maintenance; (2) primary production and potential nutrient limitation in Tampa Bay and its tributaries; (3) nitrogen utilization in Tampa Bay phytoplankton populations; and (4) the use of cage cultures to establish growth dynamics of individual species in phytoplankton communities in estuarine, coastal, and oceanic waters. There is increasing evidence that the species composition of phytoplankton communities can be determined by the frequency and ratio of nutrient inputs. The presence or absence of particular groups or individual species may also determine the success of year classes of a variety of fish populations. Therefore, the factors that regulate species composition in phytoplankton communities are a principal focus of my current and future research.

Dr. John Walsh
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My research involves system analyses of biogeochemical cycling of elements within continental margin ecosystems. Specific regions of study are the Gulf of Mexico, the western North Atlantic, and the Arctic Ocean. Coupled physical/biochemical models are used to simulate carbon, nitrogen, and oxygen fluxes through the food webs of continental shelves and slopes with respect to global cycles of greenhouse gases. The present emphasis of my research involves the role of dissolved organic matter and phytoplankton functional groups in unraveling color signals sensed by satellites and fluorescence signals sensed by moored fluorometers.

Dr. Georges Weatherly
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My research interests are sub-thermocline circulation, bottom boundary layers, and coastal oceanography. I am primarily an observationalist, but I also do some numerical modeling. The observations I make are mostly made with current meters; the numerical modeling is associated with studying the bottom boundary layer.

Dr. Bob Weisberg
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As a physical oceanographer, my studies are focused on the dynamics of ocean circulation. My research interests include the equatorial regions of the world's oceans, where the processes that affect both the annual and the inter-annual variations in sea surface temperature are important for global climate. Additionally, I have active programs on the coastal circulation of the west Florida continental shelf and its estuaries. My students and I use moored instrumentation to acquire long-term, *in situ* time series of ocean currents and related variables for the purposes of describing, analyzing, and modeling the ocean's behavior in response to the mechanisms that are forcing that behavior.