University of Maryland Center for Environmental Science

For 90 years, the University of Maryland Center for Environmental Science has led the way toward better management of Maryland’s natural resources and the protection and restoration of the Chesapeake Bay. UMCES scientists provide sound advice to help state and national leaders manage the environment and prepare future scientists to meet the global challenges of the 21st century.

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TOPICS OF EXPERTISE

AGRICULTURAL RUNOFF

Eric Davidson, Director and Professor (AL): Biogeochemistry and nutrient cycling in terrestrial ecosystems, land use and climate change edavidson@umces.edu

Tom Fisher, Professor (HPL): Terrestrial and atmospheric nutrient inputs, TMDLs, cycling of nutrients, aquatic primary production fisher@umces.edu

AIR QUALITY

Mark Castro, Associate Professor (AL): Atmospheric-biosphere interactions, wet and dry deposition of air pollutants mcastro@umces.edu

COAL ASH—Christopher Rowe, Associate Professor (CBL): Impacts of sublethal exposure to pollution, ecotoxicology of coal ash, bioenergetics of aquatic animals rowe@umces.edu

“Nutrient and sediment pollution carried by stormwater are important factors in Chesapeake Bay health. It’s not the rain that affects the report card scores. It is what the rain carries.” —Bill Dennison
**ALGAE BLOOMS**

**Pat Glibert**, Professor (HPL): Phytoplankton ecology, nitrogen uptake and mineralization by plankton, primary production and photosynthesis
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**Judy O’Neil**, Research Associate Professor (HPL): Cyanobacteria ecophysiology and plankton trophodynamics
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**Diane Stoecker**, Professor (HPL): Physiological ecology and feeding biology of planktonic protists, polar and subpolar microzooplankton and algae
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TOXIC BLOOMS—**Allen Place**, Professor (IMET): Genomics of toxin producing dinoflagellates, mitigation of cyanobacteria blooms
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**ALTERNATIVE ENERGY**

**BIOFUEL—Feng Chen**, Associate Professor (IMET): Marine microbial ecology, genomics, functional genomics, phage-host interactions, clean green biotechnology
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**BIOFUEL—Yantao Li**, Assistant Professor (IMET): Algal molecular biology and biochemistry, engineering of biofuels and bioproducts, algal biotechnology
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**WIND ENERGY—Helen Bailey**, Research Assistant Professor (CBL): Movement and habitat use of marine animals, predator-prey interactions, impacts of offshore energy
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**CLIMATE CHANGE**

**Donald Boesch**, Professor and President: Marine and estuarine ecology, marine pollution, national and international marine policy
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**Victoria Coles**, Research Associate Professor (HPL): Ocean and estuarine circulation, climate change, ecosystem and genomic modeling
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**Greg Silsbe**, Assistant Research Professor (HPL): Ecology and physiology of algae and their impact on global carbon cycles
gsilsbe@umces.edu
“We’re combining tree rings with satellite data to find out the growth rate of trees. If trees are growing faster, then they are taking more carbon out of the atmosphere.” —Andrew Elmore

ARCTIC RESPONSE—Lee Cooper, Research Professor (CBL): Stable and radioisotope composition of organic materials in coastal waters, high latitude oceanography cooper@umces.edu

ARCTIC RESPONSE—Jacqueline Grebmeier, Research Professor (CBL): Pelagic-benthic coupling, benthic community structure, marine ecosystem dynamics jgrebmei@umces.edu

BIOLOGICAL INVASIONS/SPECIES MODELING — Matthew Fitzpatrick, Associate Professor (AL): Species distribution modeling, simulation modeling, climate change, biological invasions, biodiversity mfitzpatrick@umces.edu

PALEOCLIMATOLOGY—Hali Kilbourne, Research Assistant Professor (CBL): Paleoclimatology and paleoceanography, link ocean circulation and climate kilbourn@umces.edu

PALEOCLIMATOLOGY—David Nelson, Assistant Professor (AL): Ecosystem ecology, paleoecology, microbial ecology, stable isotope ecology dnelson@umces.edu

REMOTE SENSING—Andrew Elmore, Associate Professor (AL): Land-use and land-cover change, hydrology, biogeochemistry, remote sensing and spatial analysis aelmore@umces.edu

SEA-LEVEL RISE—Ming Li, Professor (HPL): Physical oceanography, numerical ocean modeling, biological/physical interactions and marine pollution, coastal inundation, sea-level rise mingli@umces.edu

TERRESTRIAL ECOSYSTEM RESPONSE—Eric Davidson, Director and Professor (AL): Biogeochemistry and nutrient cycling in terrestrial ecosystems, land use and climate change edavidson@umces.edu

TERRESTRIAL ECOSYSTEM RESPONSE—Paul Gugger, Assistant Professor (AL): Molecular ecology, ecological genomics, population/landscape genomics, evolutionary responses to climate change, genetic basis of adaptation pgugger@umces.edu

TERRESTRIAL ECOSYSTEM RESPONSE—Xin Zhang, Assistant Professor (AL): Earth system models, nitrogen cycling, socioeconomic drivers of global change

COASTAL STUDIES

Hongsheng Bi, Assistant Professor: Population modeling, zooplankton ecology, spatial statistics hbi@umces.edu
Lora Harris, Assistant Professor (CBL): Systems ecology, primary producers from phytoplankton to macrophytes, ecosystem modeling harris@umces.edu

Cindy Palinkas, Associate Professor (HPL): Effect of coastal structures on nearshore sedimentation cpalinkas@umces.edu

Jeremy Testa, Assistant Professor (CBL): Estuarine biogeochemistry, dissolved oxygen cycling, numerical modeling, estuarine systems ecology jtesta@umces.edu

Ryan Woodland, Assistant Professor (CBL): Trophic and food web ecology, stable isotope ecology woodland@umces.edu

CRABS

Allen Place, Professor (IMET): Population biology and genetics of the blue crab place@umces.edu

POPULATION DYNAMICS—Michael Wilberg, Associate Professor (CBL): Stock assessment, dynamics of exploited populations, harvest policy development and application wilberg@umces.edu

REPRODUCTION—J. Sook Chung, Associate Professor (IMET): crustacean physiology of molting, growth, reproduction, sex differentiation and stress responses chung@umces.edu

SOFT SHELL CRAB DISEASE—Eric Schott, Research Assistant Professor (IMET): Molecular detection and characterization of aquatic invertebrates pathogens and viruses, soft-shell crabs schott@umces.edu

ECOLOGICAL MODELING

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Xin Zhang, Assistant Professor (AL): Earth system models, nitrogen cycling, socioeconomic drivers of global change

“Male crabs do a beautiful mating dance. He has to dance for her and show her he has good genes. He stands on tiptoe, spreads his claws and waves them like a fan.”—Sook Chung
ENVIRONMENTAL EDUCATION

K-12—William Dennison, Vice President for Science Applications and Professor: ecology of marine plants, assessing ecosystem health
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K-12—Laura Murray, Research Professor (HPL): Ecology of marine and estuarine wetland communities, research experiences for environmental education
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K-12—Cathlyn Stylinski, Senior Agent (AL): Public and K-12 engagement in science, lifelong and community learning about science and the environment, program evaluation
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MADE CLEAR (Maryland Delaware Climate Change Education Assessment and Research)—Donald Boesch, Professor and President: Marine and estuarine ecology, marine pollution, national and international marine policy
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GENOMICS/GENETICS

Katharina Engelhardt, Research Associate Professor (AL): Wetland ecosystem functioning and services, community ecology, aquatic botany
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Paul Gugger, Assistant Professor (AL): Molecular ecology, ecological genomics, population/landscape genomics, evolutionary responses to climate change, genetic basis of adaptation
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Robert Hilderbrand, Associate Professor (AL): Ecology, conservation biology, watershed, and stream habitat restoration, dynamic watershed modeling
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David Nelson, Assistant Professor (AL): Ecosystem ecology, paleoecology, microbial ecology, stable isotope ecology
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ENVIRONMENTAL STATISTICS

Robert Hilderbrand, Associate Professor (AL): Stream conservation and restoration ecology, stream health, trout
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“The digital age has transformed so much of the science we do. Some fish stay put and others don’t—it turns out it’s very common. It just hasn’t been fully appreciated for marine fish. Now we see them—with tracking and telemetry.”—Dave Secor
Dong Liang, Research Assistant Professor (CBL): Spatial statistics, spatiotemporal models, Bayesian methods, remote sensing applications to environment and health
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Viacheslav Lyubchich, Research Assistant Professor (CBL): Time series analysis, forecasting, applied statistics, non-parametric inference, bootstrap, environmental modeling, random networks
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FISHERIES

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Thomas Miller, Director and Professor (CBL): Recruitment and population dynamics of aquatic animals, fish and blue crabs early life history
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Genny Nesslage Research Assistant Professor (CBL): Stock assessment, fisheries management, wildlife management
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David Secor, Professor (CBL): Population ecology of fishes, analytical techniques for determining fish life histories and demographics, rockfish
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Michael Wilberg, Associate Professor (CBL): Oyster stock assessment, dynamics of exploited populations, harvest policy development and application
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FORESTS/ECOLOGY/LAND USE

Andrew Elmore, Associate Professor (AL): Land-use and land-cover change, hydrology, biogeochemistry, remote sensing and spatial analysis
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“We’re trying to predict when the storm comes in, which area will be flooded, which street will be flooded on a very fine scale. This will help emergency responder managers and people in the area of the predicted flooding make better choices as the storm nears.” —Ming Li
**Paul Gugger**, Assistant Professor (AL): Molecular ecology, ecological genomics, population/landscape genomics, evolutionary responses to climate change, genetic basis of adaptation  
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**David Nelson**, Associate Professor (AL): Stable isotope ecology, ecosystem ecology, paleoecology, microbial ecology  
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**Xin Zhang**, Assistant Professor (AL): Earth system models, nitrogen cycling, socioeconomic drivers of global change

**INVASIVE SPECIES**

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**Matthew Fitzpatrick**, Associate Professor (AL): Species distribution modeling, simulation modeling, climate change, biological invasions, biodiversity  
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**Lisa Wainger**, Research Professor (CBL): Ecological and economic modeling, assessment of invasive species, environmental economic indicators  
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**JELLYFISH**

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**Raleigh Hood**, Professor (HPL): Biological oceanography, jellyfish  
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**METHANE CYCLING**

**Mark Castro**, Associate Professor (AL): Atmospheric-biosphere interactions, impacts of land use on water quality  
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**Laura Lapham**, Assistant Professor (CBL): Gas hydrates, methane cycling, sediment biogeochemistry, carbon and nitrogen cycling, sulfate reduction  
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**MARINE LIFE**

**Helen Bailey**, Research Assistant Professor (CBL): Movement and habitat use of marine animals, predator-prey interactions, impacts of offshore energy  
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**MARINE MICROBIOLOGY**

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Russell Hill, Director and Professor (IMET): Marine microbiology and natural product development, symbiosis of marine sponges, marine bacteriophages
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Rose Jagus, Associate Professor (IMET): Regulation of gene activity during early development, host defense against virus infection
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Allen Place, Professor (IMET): Molecular mechanisms that permit organisms to adapt to unique diets, molecular, basis of sex determination, pfisteria, toxic algae blooms
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NUTRIENT CYCLING

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Michael Gonsior, Assistant Professor (CBL): Diversity of complex organic molecules in aquatic environments analyzed by modern analytical technology
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Xin Zhang, Assistant Professor (AL): Earth system models, nitrogen cycling, socioeconomic drivers of global change

“Underwater robot gliders will be deployed as storms approach the Atlantic Coast. The gliders will relay water temperatures back to hurricane forecasters to improve storm predictions.”—Bill Boicourt
NUTRIENT POLLUTION/DEAD ZONES

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Victoria Coles, Research Associate Professor (HPL): Observation and modeling of large scale ocean circulation, biogeochemical tracer distributions
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OYSTERS

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Kennedy Paynter, Associate Professor (CBL): Comparative physiology of estuarine organisms, oyster disease biochemistry paynter@umces.edu

Louis Plough, Assistant Professor (HPL): Experimental breeding of shellfish, oyster biology, genomics of stress adaptation in marine animals lplough@umces.edu

AQUACULTURE—Don Meritt, Principal Agent (HPL): Aquaculture, oyster and invertebrate ecology dmeritt@umces.edu

STOCK ASSESSMENT—Michael Wilberg, Associate Professor (CBL): Oyster stock assessment, dynamics of exploited populations, harvest policy development and application wilberg@umces.edu

ROCKFISH

Edward Houde, Vice President for Education and Professor (CBL): Fisheries science, management, ecology, larval fish ecology, resource assessment, menhaden ehoude@umces.edu

Allen Place, Professor (IMET): Development of a fish-free diet for aquaculture place@umces.edu

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SEAGRASSES

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“Invasive species is an enormous problem. It can change habitats and cause crashes of fisheries. The biggest transporter is ships—ballast water or what’s growing on the side. Our job is to test ballast water treatment systems on ships to see how reliable they are.”—Mario Tamburri
Lora Harris, Assistant Professor (CBL): Systems ecology, primary producers from phytoplankton to macrophytes, ecosystem modeling
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SEA LEVEL RISE
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Cindy Palinkas, Associate Professor (HPL): Sea-level rise effect on ecosystems, response of tidal marshes
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COASTAL INUNDATION/MODELING—Ming Li, Professor (HPL): Physical oceanography, biological/physical interactions and marine pollution
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EFFECT ON COASTAL ECOSYSTEMS—
Court Stevenson, Professor (HPL): Ecology of marsh and sea-grass communities, effects of sea-level rise on coastal ecosystems, wetland restoration at Poplar Island and creation of “living shorelines” in Chesapeake Bay.
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SEDIMENT
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Sariah Malkin, Assistant Professor (HPL): Food web interactions and cycling in bottom waters
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Cindy Palinkas, Associate Professor (HPL): Field-based observations of sediment transport and deposition in intertidal, fluvial, and estuarine environments; feedbacks between sediment and vegetation dynamics
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Larry Sanford, Professor (HPL): Coastal physical oceanography, sediment transport, waves, and physical/biological interactions
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SOCIOECONOMIC MODELING
Lisa Wainger, Research Professor (CBL): Ecological and economic modeling, assessment of invasive species, environmental economic indicators
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Xin Zhang, Assistant Professor (AL): Earth system models, nitrogen cycling, socioeconomic drivers of global change

STREAM HEALTH
Katharina Engelhardt, Research Associate Professor (AL): Wetland ecosystem functioning and services, community ecology, aquatic botany
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“As the number and size of offshore wind developments increases, there is a growing need to consider the consequences on marine species. It is essential to identify where whales, dolphins and other species occur to help avoid adverse impacts.”
—Helen Bailey
WILDLIFE ECOLOGY

J. Edward Gates, Professor (AL): Wildlife and conservation ecology and management, impact of land alteration/connectivity/boundary dynamics egates@umces.edu

John Hoogland, Professor (AL): Evolution of social behavior, wildlife ecology, evolutionary ecology and behavior or prairie dog populations hoogland@umces.edu

ZOOPLANKTON

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FACULTY EXPERTS

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Walter Boynton, Professor (CBL): Systems ecology, nutrient cycling in estuarine systems, food web dynamics boynton@umces.edu

“In aquaculture the typical fish diet are smaller fish that are turned into fishmeal and oil. You can make a commercially viable diet with plant proteins—and with the right quantity of omega three fatty acids, you can make a diet that works.” —Allen Place
Mark Castro, Associate Professor (AL): Atmospheric-biosphere interactions, wet and dry deposition of air pollutants
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Katharina Engelhardt, Research Associate Professor (AL): Effects of genetic and species diversity on ecosystems, wetland ecology, restoration
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Keith Eshleman, Professor (AL): Watershed ecology, biogeochemistry of freshwater and groundwater, mathematical modeling of hydrological systems
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“Adult American chestnut trees have been nearly wiped out from a blight. We’re trying to discover if there is disease resistance so we are giving saplings to citizens to plant and monitor growth. Ultimately we want to advance restoration and research the genetics of the trees.”
—Katharina Engelhardt
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**Todd Kana**, Research Associate Professor (HPL): Regulation of photosynthesis, light respiration, applications of mass spectrometry  
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**Thomas Miller**, Director and Professor (CBL): Recruitment and population dynamics of aquatic animals, fish and blue crabs early life history  
miller@umces.edu

“It’s important to understand how climate variability impacts the food chain. Understanding changes in zooplankton can help explain changes in fish populations that rely on these small crustaceans, particularly during their early life stages.”  
—Hongsheng Bi
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Ray Morgan, Professor (AL): Ecology of fish, fishery genetics, aquatic pollution ecology
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Laura Murray, Research Professor (HPL): Ecology of marine and estuarine wetland communities, research experiences for environmental education
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James Pierson, Research Assistant Professor (CBL): Zooplankton ecology, plankton food webs, climate impacts on plankton, biological oceanography
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Louis Plough, Assistant Professor (HPL): Experimental breeding of shellfish, oyster biology, genomics of stress adaptation in marine animals
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Michael Roman, Director and Professor (HPL): Zooplankton ecology, biological oceanography
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Christopher Rowe, Associate Professor (CBL): Impacts of sublethal exposure to pollution, ecotoxicology of coal ash, bioenergetics of aquatic animals
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Larry Sanford, Professor (HPL): Coastal physical oceanography, sediment transport, waves, and physical/biological interactions
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Johan Schijf, Associate Professor (CBL): Aqueous biogeochemistry of trace metals
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Eric Schott, Research Assistant Professor (IMET): Molecular detection and characterization of aquatic invertebrates pathogens and viruses, soft-shell crabs
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“Over time, half of the peeler crabs would die in shedding houses and scientists didn’t know why. But in the absence of water quality issues, we found that it’s always viruses. An infected crab in your tank of 200 can affect the survivorship.” —Eric Schott

David Secor, Professor (CBL): Population ecology of fishes, analytical techniques for determining fish life histories and demographics, rockfish
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Greg Silsbe, Assistant Research Professor (HPL): ecology and physiology of algae and their impact on clonal carbon cycles.
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Court Stevenson, Professor (HPL): Ecology of marsh and sea-grass communities, effects of sea-level rise on coastal ecosystems, wetland restoration at Poplar Island and creation of “living shorelines” in Chesapeake Bay.
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Diane Stoecker, Professor (HPL): Physiological ecology and feeding biology of planktonic protists, polar and subpolar microzooplankton and algae
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Mario Tamburri, Research Professor (CBL): Larval settlement and recruitment of non-native species, environmental sensor/green ship technologies
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Lisa Wainger, Research Professor (CBL): Ecological and economic modeling, assessment of invasive species, environmental economic indicators
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Michael Wilberg, Associate Professor (CBL): Oyster stock assessment, dynamics of exploited populations, harvest policy development and application
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Ryan Woodland, Assistant Professor (CBL): Trophic and food web ecology, stable isotope ecology
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Xin Zhang, Assistant Professor (AL): Earth system models, nitrogen cycling, socioeconomic drivers of global change