UCDAVIS
Coastal and Marine Sciences Institute

CMSI Academic Roadshow Participating Faculty

Marissa Baskett		I use mathematical modeling to understand and quantify ecological and evolutionary responses to environmental variability and change in space and time. In an ecological context I explore the drivers of ecological resilience to environmental change, and in an evolutionary context I explore the potential for rapid evolutionary responses on ecological time scales to affect population dynamics. To bridge basic and applied science, I focus on cases of human-driven global environmental change such as fisheries, artificial propagation, and climate change.
Rachael Bay		Our lab studies interactions between human-induced changes in the environment and evolutionary processes. This includes how animals respond to changes in their environment that are caused by humans as well as how evolution might mitigate some of the negative impacts of human-induced change. We use a combination of ecological and physiological experiments and large-scale genomic and environmental data. Understanding patterns of evolution associated with anthropogenic impacts across a wide range of non-model animals can ultimately be used to create forward-looking conservation management decisions.
Loo Botsford		Two areas of current concern in the marine environment are: (1) the effects of climate change on higher trophic levels, and (2) ecosystem management with marine protected areas (MPAs). Our current work on climate change addresses how population variability and the sensitivity of population to different frequencies of variability in the environment (e.g., the frequencies of ENSOs) change with fishing. Our current work on MPAs addresses the transient responses of populations to implementation of MPAs for the purpose of analyzing monitoring data for adaptive management of MPAs. This is focused on the MPAs recently implemented along the California coast in the Marine Life Protection Act (MLPA).

Ian Faloona		My research group is attempting to bridge the fields of geophysical turbulence and chemistry through observations on airplanes, sea vessels, and towers. Emphasis is placed on an interdisciplinary understanding of the physical and chemical principles that control trace gas concentrations and their fluctuations in the atmosphere and ocean. The turbulent planetary boundary layers that lie adjacent to the interfaces of the earth, ocean, and sky play host to a great variety of exchange processes that are critical to our understanding of the climate system. We are dedicated to the idea that the ability of the scientific community to advance our understanding at a rate that outpaces the environmental challenges we continue to encounter is strongly contingent upon active training in a multitude of scientific disciplines. We are therefore actively pursuing topics in atmospheric and oceanic photochemistry, boundary layer meteorology, and carbon cycling.
Nann Fangue		Research in the Fangue lab is focused on understanding the physiological specializations that allow animals to survive and thrive in complex environments. Using a combination of field- and laboratory-based studies, much of our research to date has centered on understanding how variation in the abiotic parameters (e.g. oxygen, temperature) of the natural environment translates into an animal's physiological performance. We study a variety of fish species, often those living in naturally extreme or anthropogenically-challenging habitats, to understand whether these organisms have sufficient physiological capacity or plasticity to maintain successful performance in the face of anthropogenic environmental perturbations such as climate change. The common goal in all of this work is to understand the environmental and physiological requirements of fishes at the mechanistic level (using molecular, cellular and whole-organism measures of physiological performance) in order to elucidate the connections between environment, physiology, and ecosystem function. A second important goal is to offer insight and provide recommendations to resource managers in support of fish conservation.

Brian Gaylord

The Gaylord lab conducts interdisciplinary research at the interface of marine ecology and ocean physics. Although the problems we tackle include a range of topics and span multiple disciplines, most have some connection to one or both of two core questions: *How do organisms with different sizes, shapes, and life histories cope with and/or benefit from their physical surroundings? How do aspects of the physical environment affect organism distributions and population characteristics over space and time?* Within the context of these two questions, we often focus on organismal and ecological problems where progress has been thwarted due to challenges in understanding linkages between biology and fluid flow and/or seawater chemistry. Most recently we have directed much of our attention to problems associated with ocean acidification.

Kirsten Gilardi

Kirsten Gilardi is Co-Director of the Karen C. Drayer Wildlife Health Center (WHC) and a Health Sciences Clinical Professor in the Department of Medicine & Epidemiology. She earned her DVM at UC Davis in 1993, completed a 3-year residency at the California National Primate Research Center and joined the staff of the WHC in 1998. She was board-certified by the American College of Zoological Medicine in 2001. She started the WHC's SeaDoc Society in 2000 and its California Lost Fishing Gear Project in 2006, was a co-Director of the Envirovet Summer institute from 2000 - 2010, and since 2009 has served as a co-director of Gorilla Doctors, a partnership between the WHC and the Mountain Gorilla Veterinary Project. She is a past President of the American Association of Wildlife Veterinarians, and was honored to receive the Emil P. Dolensek Award from the American Association of Zoo Veterinarians in 2015.

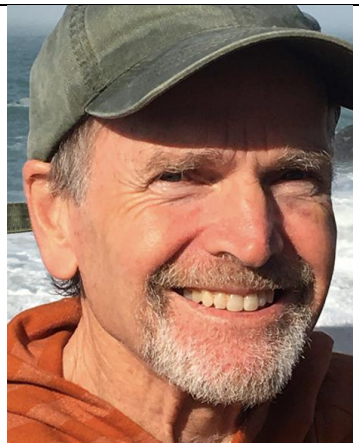
Tracey Goldstein		Tracey Goldstein, PhD, is a Professor in the Department of Pathology, Immunology and Microbiology and Associate Director of the One Health Institute. She oversees the One Health Institute Laboratory and the Marine Ecosystem Health Diagnostic and Surveillance Laboratory, the latter of which she developed in 2007. Dr. Goldstein is Co-Principal Investigator on the USAID-funded PREDICT project and leads the pathogen detection and laboratory capacity-building objectives for the project. She is a member of the NOAA Fisheries Working Group on Marine Mammal Unusual Mortality Events and continues to study diseases in marine mammal and other wildlife populations. earned her B.S in Aquatic Biology at UC Santa Barbara and her PhD in Comparative Pathology at UC Davis.
Rick Grosberg		Evolution of allorecognition and kin recognition in aquatic invertebrates, including colonial sea squirts and sea anemones. Effect of recognition systems on intraspecific aggression and cooperation. Evolution of complex life cycles. Ecological and behavioral genetics. Levels of selection and the emergence of novel evolutionary units.

Ted Grosholz		My research program broadly addresses ecology, conservation and restoration of marine and estuarine systems. My work addresses questions at the intersection of community and ecosystem ecology that specifically include the impacts of human activities. The approaches I take reflect my training as a marine community ecologist, and ultimately I am interested in what determines the abundance and diversity of species in coastal systems. I am particularly interested in how human impacts have shaped community and ecosystem processes and how we can ensure the future health of coastal ecosystems through enlightened management based on good science. My lab currently focuses on 1) Salt Marsh Restoration following Eradication of an Ecosystem Engineer; 2) Climate Change and Biological Invasions; 3) Restoration of Native Olympia Oysters Under Climate Change; 4) Human Enterprise and Vectors of Marine Invasions.
Jackson Adam Gross		The driving force in my current research program is to be at the forefront of environmental and production sustainability and ecological integrity. To achieve this vision my research is focused into three distinct, yet overlapping applied research themes; (1) Aquaculture, (2) Invasion Biology and (3) Environmental/Ecological Toxicology. This research usually addresses data gaps and provides scientific solutions, determined through rigorous experimentation, meeting the immediate biological and engineering needs of the aquaculture industry and natural resource community. My research is historically a mix of laboratory and field experimentation. However, there are many times where the research is not exclusively one or the other, but instead, a blend where controlled laboratory experimentation is brought into the field. Other areas of interest include aquaponic production systems.

Alan Hastings		Alan Hastings is a theoretical ecologist with broad interests. Current research focuses on invasive species, marine ecology and fisheries, transient dynamics in ecology, spatial ecology and experiments with Tribolium. He is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the Ecological Society of America, and the Society for Industrial and Applied Mathematics. He is also a recipient of the Robert H. MacArthur Award from the Ecological Society of America.
Tessa Hill		Dr. Hill's research focuses on four main areas: 1) Ocean acidification and coastal carbon flux- Projects include studying the impact of ocean acidification on West Coast ecosystems and native species, understanding sea grass ecosystems and how they modify estuarine biogeochemistry, store carbon, and ameliorate ocean acidification, and collaborative studies with social, natural and physical scientists to understand the geographic patterns of ocean acidification and how they will impact communities along the coast. California margin climate records, and deep sea corals as climate archives 2) California margin climate records- utilizing past climate events to understand how ocean currents, temperatures, oxygenation and marine ecosystems respond and linkages to current modern climate issues; 3) Deep sea corals- Utilizing coral archive to understand impacts of global change; 4) Oceanic methane rich environments- identifying methane rich environments in the paleo record.

Christine Kreuder Johnson		Christine Kreuder Johnson is Professor of Epidemiology and Ecosystem Health and Associate Director of the One Health Institute in the School of Veterinary Medicine at UC Davis where she directs the EpiCenter for Disease Dynamics. Her research activities focus on disease spillover and spread, epidemiologic drivers of zoonotic disease transmission, ecosystem level processes that impact wildlife population health and emerging infectious diseases, and mechanisms underlying wildlife species declines. She provides epidemiologic support to state and national agencies to understand epidemic threats to wildlife and she has developed risk-based approaches for surveillance and risk characterization across a range of field studies from the local to global scale. Professor Johnson currently directs animal and human surveillance activities for USAID's Emerging Pandemic Threats PREDICT project to detect disease spillover, amplification, and spread and inform risk mitigation. At UC Davis, she has designed core didactic instruction in one health and ecosystem health for graduate and professional degree programs and trains graduate students and post-doctoral scholars in wildlife epidemiology and disease ecology.
John Largier		My research is centered on the role of transport in ocean, bay, nearshore and estuarine waters – how moving waters connects ecosystems and people in the coastal ocean. Work in my group has addressed transport of plankton, larvae, contaminants, pathogens, heat, salt, nutrients, dissolved oxygen, and sediment. We place this work in the context of issues as diverse as marine reserves, fisheries, aquaculture, beach pollution, wastewater discharge, wildlife health, coastal flooding, desalination, river plumes, coastal power plants, kelp forests, wetlands, marine mining, coastal zone management and impacts of coastal development. This research and public engagement is guided by the perspective of "environmental oceanography", which links traditional oceanographic study to critical environmental issues.

Mark Lubell		My research focuses on human behavior and the role of governance institutions in solving collective action problems and facilitating cooperation. The collective action problems associated with environmental policy provide a laboratory for my research. My current projects include watershed management, environmental activism, agricultural best management practices, and institutional change in local governments. I also dabble in experimental economics and simulation techniques to further explore collective action theory.
Ryan Meyer		I direct the Center for Community and Citizen Science at the UC Davis School of Education. Our mission is to help scientists, communities, and citizens collaborate on science to address environmental problems as a part of civic life. My background is in science and technology policy, with a focus on science funding institutions, and the role of science in decision making. Areas of past work include climate science, climate adaptation, ocean and coastal resources, and citizen science.

Elizabeth Middleton		Beth Rose's research centers on Native environmental policy and Native activism for site protection using conservation tools. She is engaged in participatory action research on Maidu land rights history and contemporary land claims in northeastern California. Beth Rose applies theories from coloniality of power, indigeneity, community development, political ecology, participatory methodologies, and geography. She has received research support from the National Science Foundation, the UC Berkeley Center for Race and Gender, the UC Office of the President, and the Community Forestry and Environmental Research Partnerships program. Beth Rose's ongoing and future research directions include California Native green entrepreneurship, using environmental statutes for cultural preservation, qualitative GIS mapping of Indian allotment lands, Afro-indigenous populations, the effects of hydropower development on Native lands, tribal resource conservation districts, and indigenizing natural resource policy and planning.
Steven Morgan		We specialize in determining how critical linkages in the complex life cycles of marine invertebrates and fishes regulate populations and communities in a dynamic coastal ocean. By coupling state-of-the-art approaches in ecology and oceanography, we determine the underestimated role of behavior in enhancing survival of microscopic larvae at sea, including timing the release of gametes and larvae into the water column, regulating the extent of larval transport, returning to suitable settlement sites and surviving encounters with predators and competitors after settlement. By conducting long-term studies over species' ranges, we investigate the impact of selective forces on life histories and climate change on marine populations and communities. We put this hard-won knowledge into action for informing the conservation and management of marine resources by marine protected areas and developing the next generation of ecological indicators for assessing the health of marine ecosystems, such as the ongoing California Collaborative Fisheries Research Program.

Peter Moyle		I have been studying the ecology and conservation of freshwater and estuarine fishes in California for over 50 years. My loose research team has documented the biology, management and status of native freshwater and estuarine fishes in California, including salmon and other anadromous fishes. The team has created fish data bases which are publicly available, as well data and publications on California dams and their impacts on fishes, especially through altered flows. Part of this research is quantifying effects of climate change on status and distribution of both native and alien fishes of California. We have documented that the 125+ native fish species face high risks of extinction in not-too-distant future, while the 50+ alien fishes will mostly expand their ranges. Another research focus focuses on fishes of the San Francisco Estuary, that includes 40 years of monthly fish and macro-invertebrate sampling at multiple locations in Suisun Marsh, the largest tidal marsh on the west coast of North America.
Kiva Oken		My lab's research develops cutting edge mathematical models and statistical tools to study the ecology, conservation, and management of marine fisheries. We incorporate complex factors such as species interactions, fleet dynamics, and climate change into population and community models of fisheries, studying both ecological and social outcomes. We draw from theory in ecology and population dynamics to tackle applied problems and develop models that are custom-built for the question at hand. A major challenge in fisheries management today is to better anticipate changes in productivity across time and space and to develop management strategies that are robust to these changes and continue providing ecosystem services across a range of possible ecological scenarios. Our research seeks to address this challenge. We also collaborate with others to develop and test statistical methods across the fields of fisheries and marine ecology.

Matthew Reimer		My research focuses on the design and evaluation of public policies for managing natural resources. I employ a diverse set of methodological tools, ranging from reduced-form and structural econometrics, to dynamic numerical analysis and simulation, integrated bioeconomic modeling, and field experiments. Recent topics include predictive models of commercial fishing behavior, retrospective evaluation of fishery policies, contributions of commercial fisheries to local economies, economic impacts of marine protected areas, policy-induced spillovers across fisheries, and decision support tools for adaptive management of marine resources.
Jim Sanchirico		Jim's research applies quantitative empirical and theoretical methods to study the conservation of natural resources. Topics include marine reserves, land-use and biodiversity conservation, invasive species management, provision of ecosystem services, rebuilding marine populations, resilience of coral reef ecosystems, household energy use, land use and non-point source pollution, open space referendum, design of market based policies, New Zealand’s individual fishing quota system, and U.S. fishery policy. Areas of interest include environmental and natural resource economics, ecology, spatial and dynamic bioeconomic modeling, and policy analysis. Recent projects analyze the economic, ecological and socioeconomic impacts of marine reserves, the control strategies for invasive alien species, the plans for rebuilding marine populations, the provision of ecosystem services, and the performance of incentive-based policy instruments.

Eric Sanford		The Sanford Lab is interested in how marine populations and communities vary in response to both natural oceanographic variation and anthropogenic climate change. Our research seeks to integrate ecology, evolution, and biogeography to understand the processes that shape marine communities: both over large distances along coastlines, and in an era of accelerating climate change. We seek mechanistic understanding of these processes through coordinated field and laboratory experiments centered at Bodega Marine Laboratory. Much of our work focuses on marine intertidal communities, where organisms and their interactions are diverse and easily studied. Ongoing research projects lie primarily in five areas: 1) Local adaptation in the sea; 2) Eco-evolutionary dynamics; 3) Geographic range limits; 4) Ocean acidification; 5) Invertebrate biology.
Andrea Schreier		In the Genomic Variation Laboratory, we apply genetic and genomic techniques to 1) answer ecological and evolutionary questions of conservation and management concern, 2) increase the sustainability of conservation and commercial aquaculture, and 3) investigate the role of polyploidy in vertebrate evolution.

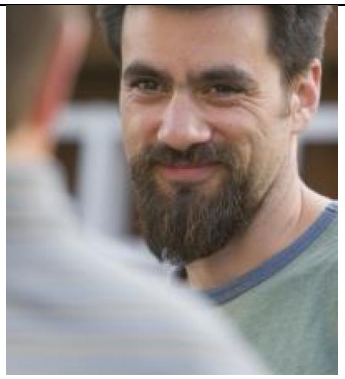
Jay Stachowicz

I am interested in the causes of patterns of biodiversity and the consequences of variation in biodiversity for the structure and functioning of shallow water marine ecosystems from kelp forests to seagrass beds. A major current emphasis in my lab is on genetic diversity within eelgrass and its importance in buffering entire ecosystems against stresses such as rising temperature, seagrass wasting disease, and other disturbances. I also study the role that the microbiome associated with seagrass plays in ensuring seagrass health. I co-lead a global consortium of seagrass researchers (ZEN, the Zostera Experimental Network) whose goal is to understand the structure and functioning of seagrass ecosystems in California and around the world, including the services these ecosystems provide including coastal productivity and biodiversity, fishery support and carbon sequestration.

Anne Todgham

I am an environmental physiologist with an interest in understanding the molecular, biochemical and physiological mechanisms that underlie an animal's capacity to cope with environmental change. I am fascinated by the diversity of physiological specializations (or strategies) used by animals to tolerate particular habitats that others would find very challenging. This interest has led my research to investigate how an animal's physiology and environment interact to structure organismal stress tolerance. Global climate change is altering aquatic environments at unprecedented rates and policy and management decisions about conservation and culture of aquatic species are increasingly reliant on a fundamental understanding of organismal responses. My research aims to understand the impacts of multiple concurrent climate change stressors on the physiological performance of organisms in their natural environments and the importance of incorporating environmental complexity into laboratory experiments to increase our accuracy for projecting the effects of change. It is apparent that these anthropogenic environmental changes are also affecting the production of animals for agriculture and aquaculture. Therefore, since arriving at UC Davis, I have expanded my research program to contribute to this relatively new field of study.

Andrew Whitehead



Activities in the Whitehead lab revolve around Environmental, Ecological, and Evolutionary Genomics research. These lines of research seek to understand how genomes integrate cues from, respond to, and are shaped by the external environment. We examine genomic responses to stress that occur over physiological timescales (acclimation responses) and over evolutionary timescales (adaptive responses). Many complementary approaches are integrated into our program, including genome expression profiling, population genetics/genomics and phylogenetics, and physiology, to study how individuals and species respond to and adapt to environmental stress. Stressors of interest include those that are natural (temperature, salinity) or of human origin (pollutants, climate change). We have both a basic science angle to our research program, and also an applied angle that leverages genomic information to diagnose and solve environmental problems.