msi

Marine Science Institute

University of California, Santa Barbara

2004-2005

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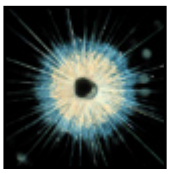
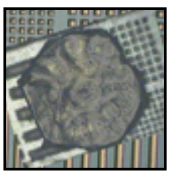
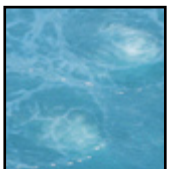


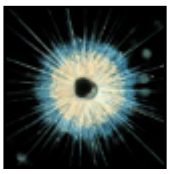



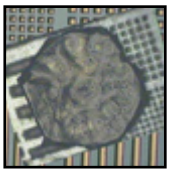



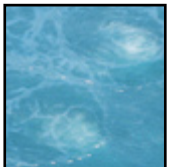
Director's Statement





Director's Statement

It has been a year of many changes at MSI. The Marine Science Building was completed this year and MSI has been in its new home since December 2004. The building is a great success. Not only have new synergies developed among the researchers occupying the building, but the building's conference rooms and auditorium have made the MSB an intellectual hub for Marine Scientists from across campus. The MSB is already fully occupied and abuzz with research, outreach and conference activity. We look forward to a bright future.

Our research programs continue to grow. Awards for the 2004-2005 fiscal year were over $19 million with the total awards administered by MSI reaching an all time high of over $84 million. Our researchers continue their history of groundbreaking research that continues to make MSI so successful. One example of the many new exciting research programs at MSI is a new Long-Term Ecological Research (LTER) program. The LTER program is a national network of 26 sites aimed at understanding ecological processes over broad spatial and long temporal scales. The new LTER focuses on studies of coral reef ecosystems in Moorea, French Polynesia. This new research effort joins the Santa Barbara Coastal LTER that was awarded to MSI scientists five years ago. Having two LTER's within MSI is a truly amazing accomplishment. There are only five LTER's with a marine focus within the national LTER network The fact that two of these are based at MSI is a real testament to the leadership role MSI researchers are taking in the future of marine ecological research.

MSI continues to expand and diversify its outreach program, *OceansAlive!* The number of K-12 students visiting MSI's Research Experience and Education Facility (commonly referred to as the REEF) has grown from 7,000 during its first year of operation to 12,681 this year. The REEF together with MSI's other outreach activities including the Science Fair Mentorship Program and the Environmental Education Diversity Program are helping to inspire a sense of wonder about the ocean in our children and are instilling in them the attitude that we all need to take responsibility for the health of our oceans.

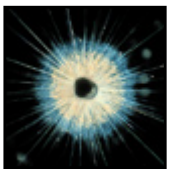
This will be my last Director's statement for MSI as our Director, Dr. Steven Gaines, will be returning to MSI after his tenure as the Vice Chancellor for Research. It has been a pleasure to watch MSI grow and to prosper over the past few years. My thanks to all of the researchers, students, post doctorals, volunteers and our extremely dedicated administrative staff for making MSI such a vibrant institution.

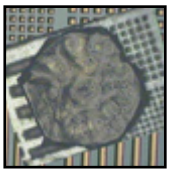
Mark Brzezinski
Deputy Director

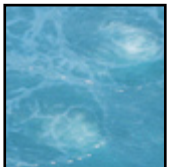
Organizational Charts



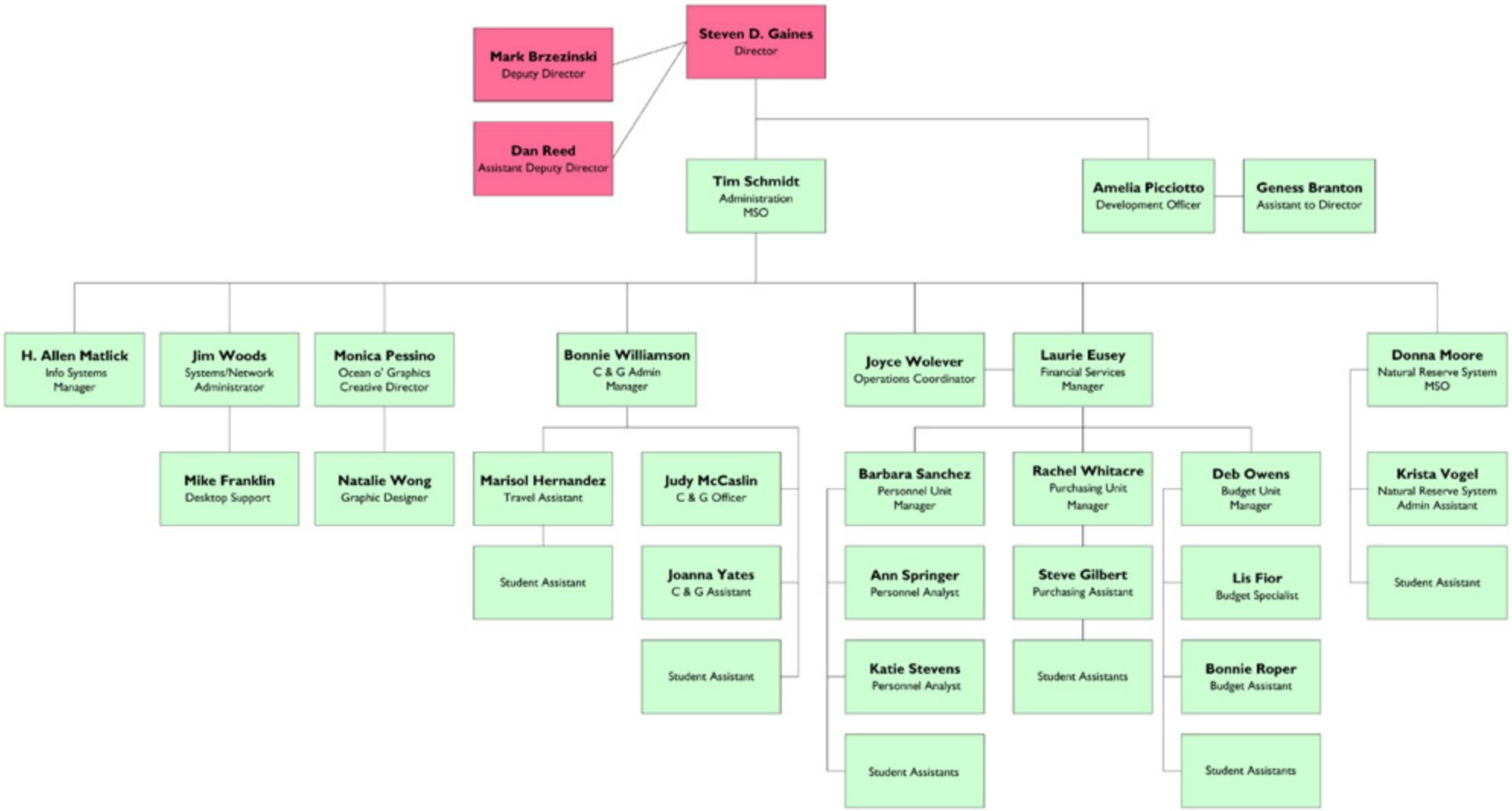


MARINE SCIENCE INSTITUTE
2004–2005 ORGANIZATIONAL CHART



MARINE SCIENCE INSTITUTE
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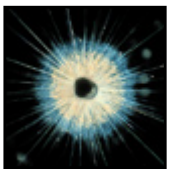
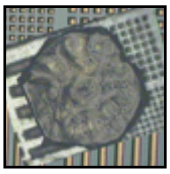
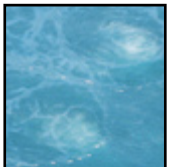
Other Projects and Activities





Seminars, Workshops, Conferences, and Meetings

The Marine Science Institute continues to support various seminars, workshops, conferences and meetings. During the 2004-2005 fiscal year 115 events took place, in which a wide range of marine science topics were highlighted.

Dates	Coordinator	Topic
July 12-16, 2004	Deborah McCullough* Sarah Reichard* Joseph Cavey*	Pathways of non-indigenous plant pest introductions: How exotic insects, pathogens and weeds arrive in the United States
July 20-21, 2004	Sandy Andelman	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems
July 22-26, 2004	Mark Harmon*	Analysis of long-term litter decomposition experiments: Synthesis at the site, regional, and global levels
July 23, 2004	Allison Whitmer	Workshop on integrating marine science topics into high school science programs
July 26-20, 2004	Laura Huenneke* Sandra Diaz* F. Chapin*	Analysis of diversity reduction experiments to address the ecosystem consequences of biodiversity loss
July 28, 2004	O. J. Reichman	National Biological Information Infrastructure (NBII)
August 12-13, 2004	John Alroy	Paleobiology Database
August 12-13, 2004	Allison Whitmer	Teacher Professional Development Workshop
August 13-17, 2004	Kim Cuddington* Jeb Byers*	Habitat modification in conservation problems: Modeling invasive ecosystem engineers
August 13-17, 2004	John Alroy	Paleobiology Database
August 18, 2004	Allison Whitmer	Teacher Professional Development Workshop
August 30- September 2, 2004	Jeff Houlahan* C. Scott Findlay* David Currie**	Spatial and temporal community dynamics: Sharing data to answer questions
September 2, 2004	EcoLunch Seminar Series	Pierre Legendre: Testing hypotheses about the causes of beta diversity (Seminar)

September 8-14, 2004	Gary N. Cherr*	Introduction to Coastal Toxicology Short Course
September 9, 2004	EcoLunch Seminar Series	Carl Simpson: Species selection and evolutionary trends in crinoids (Seminar)
September 14-16, 2004	Russell J. Schmitt	Annual Coastal Toxicology Retreat
September 16, 2004	EcoLunch Seminar Series	Jonathan Levine: The importance of competition-colonization tradeoffs and temporal fluctuations to coexistence in annual plant communities (Seminar)
September 23, 2004	EcoLunch Seminar Series	David Lodge: Biology and policy of invasive species(Seminar)
September 26-29, 2004	Mark Wilson Leslie Real*	Global change and infectious disease
September 27-28, 2004	Frank Davis	Coastal Reserves
September 28-30, 2004	O. J. Reichman James Brunt* John Helly* Matthew Jones Michael Willig*	A Knowledge Network for Biocomplexity: Building and evaluating a metadata-based framework for integrating heterogeneous scientific data
September 30, 2004	EcoLunch Seminar Series	Piet Verburg: Climate effect on lake circulation and its importance to the pelagic ecosystem in the deep tropical lake (Seminar)
September 30- October 4, 2004	Tia-Lynn Ashman* Tiffany Knight* Susan Mazer Martin Morgan*	Beyond hand-pollinations: Linking pollen limitation to plant population biology
October 1-3, 2004	John Alroy	Paleobiology Database
October 6-10, 2004	William Morris* Catherine Pfister* Shripad Tuljapurkar*	Stochastic demography for an increasingly variable world
October 7, 2004	EcoLunch Seminar Series	Steve Franks: Responses to natural enemy release and reintroduction in an invasive plant (Seminar)
October 8, 2004	Gretchen Hofmann Allison Whitmer	ADVANCE – Supporting Women in Science workshop
October 14-19, 2004	Mercedes Pascual* Andrew Dobson*	Seasonality and the population dynamics of infectious diseases
October 21, 2004	EcoLunch Seminar Series	Dov Sax: Patterns of exotic species diversity: A window into the mechanisms regulating diversity and a source of insight for conservation (Seminar)
October 28, 2004	EcoLunch Seminar Series	John Drake: Extinction in experimental populations (Seminar)

October 28-31, 2004	Josh Schimel	Can we now determine if, when, and how microbial community composition impacts ecosystem processes? Will that understanding yield critical new information about ecosystem function and response to change?
November 4, 2004	Sandy Andelman	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems
November 10-11, 2004	Steven Gaines Robert Warner	PISCO organizational workshop
November 12, 2004	Diana Rhoten* Edward Hackett*	Integrative, interdisciplinary graduate education: New concepts and approaches for assessment
November 18-22, 2004	Boris Worm* Enric Sala*	Linking marine biodiversity to ecosystem functions and services
December 1-5, 2004	John Silander*	Macro-ecology and biogeography: Hierarchical (Bayesian) model development using data from South Africa
December 2-3, 2004	Russell Schmitt Sally Holbrook	Moorea Coral Reef – Long Term Ecological Research workshop
December 4-9, 2005	Jonathon Cole* Carlos Duarte* Yves Praire*	Integrating the aquatic with the terrestrial component of the global carbon budget
December 5, 1004	Miriam Polne-Fuller	Young Marine Scientists Mentorship program
December 7-10, 2004	Robert C. Francis* James Kitchell*	Models of alternative management policies for marine ecosystems
December 5-9, 2004	A. Townsend Peterson* Craig Moritz*	Testing alternative methodologies for modeling species' ecological niches and predicting geographic distributions
December 10-14, 2004	Pamela Templer* Michelle Mack* Knute Nadelhoffer*	The fate of nitrogen inputs to terrestrial ecosystems
December 13-17, 2004	Michael Hochberg*	Analyzing pattern and process in human cultural diversity
December 13-17, 2004	Charles Mitchell* Alison Power*	The roles of natural enemies and mutualists in plant invasions
December 16, 2004	EcoLunch Seminar Series	Charles Mitchell: Pathogen control of plant community biomass, diversity and resource use (Seminar)
December 16, 2004	Allison Whitmer	Channel Islands Argonauts

January 6, 2004	EcoLunch Seminar Series	A. Townsend Peterson: Marshalling ecology and evolutionary biology to the challenge of finding the reservoir of filoviruses (Seminar)
January 13, 2005	Milton Love	California Dept of Fish and Game, Artificial Reefs
January 13, 2005	EcoLunch Seminar Series	Mark Vellend: Land-use history and forest plant biodiversity in Europe and eastern North America (Seminar)
January 14-15, 2005	Sandy Andelman	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems
January 17-20, 2005	Dov Sax Steven Gaines Jay Stachowicz*	Exotic species: A source of insight into ecology, evolution, and biogeography
January 20, 2005	EcoLunch Seminar Series	Ben Halpern: Gaps and mismatches between global conservation spending and priorities (Seminar)
January 20-23, 2005	Jason Hoeksema* Nancy Johnson* James Umbanhowar*	Narrowing the gap between theory and practice in mycorrhizal management
January 21, 2005	Gretchen Hofmann	WiSE: Women in Engineering and Science
January 21-22, 2005	Edward Hackett*	Ecology transformed: Social and intellectual change in ecological research
January 26-30, 2005	Ben Halpern Kimberly Selkoe Fiorenza* Hunter Lenihan	Putting ocean wilderness on the map: Building a global GIS atlas of pristine marine environments
January 27, 2005	EcoLunch Seminar Series	Sharon Harlan: Environmental complexity in urban neighborhoods (Seminar)
January 28-30, 2005	Rafe Sagarin*	Ecological and evolutionary models for homeland security strategy
February 1-4, 2005	Kim Cuddington* Jeb Byers*	Habitat modification in conservation problems: Modeling invasive ecosystem engineers
February 2, 2005	Steve Gaines	Aliens of the Deep
February 2-4, 2005	Leslie Real*	North American Rabies Database
February 2-4, 2005	O. J. Reichman James Brunt* John Helly* Matthew Jones Michael Willig*	A Knowledge Network for Biocomplexity: Building and evaluating a metadata-based framework for integrating heterogeneous scientific data

February 5-11, 2005	Sandy Andelman	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems
February 7-10, 2005	Mark Anderson	An Information Infrastructure for Vegetation Science
February 13-17, 2005	Stefan Schnitzer*	Lianas and tropical forest dynamics: Synthesis of Pan-tropical patterns from regional data sets
February 15-16, 2005	Russell Schmitt Sally Holbrook	Moorea Coral Reef – LTER meeting
February 15-17, 2005	Matthew Jones Mark Schildhauer James Beach* Bertram Ludaescher* William Michener*	Science Environment for Ecological Knowledge (SEEK)
February 17, 2005	EcoLunch Seminar Series	Mike McGinnis: Southern California's experiment in marine ecosystem-based planning (Seminar)
February 18-21, 2005	John Alroy	Paleobiology Database
February 23-26, 2005	David Lodge*	Integrated Systems for Invasive Species
February 24, 2005	EcoLunch Seminar Series	Jay Shogren: Habitat design by agglomeration bonus (Seminar)
February 25-27, 2005	John Alroy	Paleobiology Database
March 2, 2005	Russell J. Schmitt	Serge Planes: Estimating Dispersal of Marine Fish from Genetic Paternity Analysis (Seminar)
March 3, 2005	EcoLunch Seminar Series	Dianna Padilla: Aquatic invaders in marine reserves (Seminar)
March 4-8, 2005	William Morris* Christine Pfister* Shripad Tuljapurkar*	Stochastic demography for an increasingly variable world
March 4-6, 2005	John Alroy	Paleobiology Database
March 10, 2005	EcoLunch Seminar Series	Ed Hackett: Understanding peer review for fun and profit (Seminar)
March 10-15, 2005	Gail Osherenko Elliott Norse* Larry Crowder* Oran Young Satie Airame	Ecosystem-based management for the oceans: The role of zoning
March 13-16, 2005	Mark Wilson*	Global change and infectious disease
March 17, 2005	EcoLunch Seminar Series	Rick Reeves: Geospatial data and spatial analysis techniques for ecologists (Seminar)

March 17-19, 2005	Josh Schimel	Can we now determine if, when, and how microbial community composition impacts ecosystem processes? Will that understanding yield critical new information about ecosystem function and response to change?
March 18-19, 2005	Andy Brooks	California Estuarine Research Society Annual Meeting
March 18-21, 2005	John Alroy	Paleobiology Database
March 21-23, 2005	Robert C. Francis* James Kitchell*	Models of alternative management policies for marine ecosystems
March 23-24, 2005	Peter Kareiva	The Nature Conservancy Data Management
March 24, 2005	EcoLunch Seminar Series	Vlastimil Krivan: Animal behavior and populations dynamics (Seminar)
March 29-31, 2005	Ali Whitmer	LTER Planning Grant Committee and Advisory Committee
March 31, 2005	EcoLunch Seminar Series	Pete Buston: Cognitive processes underlying human mate choice (Seminar)
April 7, 2005	EcoLunch Seminar Series	Seth Riley: Cryptic impacts of urbanization and habitat fragmentation on carnivores: Reduction in gene flow and direct and indirect mortality from secondary poisoning (Seminar)
April 7-9, 2005	Alan Hastings* Louis Botsford*	Development of tools for the practical design of marine reserves
April 12-22, 2005	Sandy Andelman	Kruger National Park and NCEAS collaboration on the KNB
April 13-15, 2005	Evan Preisser* Daniel Bolnick	When, and how much, does fear matter? Quantitatively assessing the impact of predator intimidation of prey on community dynamics
April 14, 2005	EcoLunch Seminar Series	Chris Costello: Spatial bioeconomics under uncertainty (Seminar)
April 19-21, 2005	Rebecca Shaw*	Channel Island Fox Population Viability Analysis Workshop
April 21, 2005	EcoLunch Seminar Series	Jim Reichman: Open access to information (Seminar)
April 28, 2005	EcoLunch Seminar Series	Bill Murdoch: Biological control: experiments and models exploring stability (Seminar)
April 29-May 2, 2005	Brendan Bohannan* Peter Morin* Anna-Louise Reysenbach* Jennifer Hughes*	Patterns in microbial biodiversity

May 4, 2005	EcoLunch Seminar Series	Sean Connolly: Process-Based Models of Species Distributions: Mid-Domain Effects and Beyond (Seminar)
May 10-14, 2005	Sarah Abramson	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems: Graduate Seminars
May 10-13, 2005	Pamela Templer* Michelle Mack* Knute Nadelhoffer*	The fate of nitrogen inputs to terrestrial ecosystems
May 10-14, 2005	Charles Mitchell* Alison Power*	The roles of natural enemies and mutualists in plant invasions
May 16-20, 2005	Robin Chazdon* Daniel Griffith* Gretchen Daily*	Biodiversity and conservation value of agricultural landscapes of Mesoamerica
May 23-31, 2005	Christopher Lortie* Lonnie Aarssen* Julia Koricheva* Tom Tregenza*	A quantitative exploration of the role of publication-related biases in ecology
May 23-27, 2005	Jeff Houlahan* C. Scott Findlay David Currie*	Spatial and temporal community dynamics: Sharing data to answer questions
May 26, 2005	EcoLunch Seminar Series	Jason Pither: Fossil diatoms and landscape simulation models help reconcile niche and neutral perspectives on community assembly (Seminar)
June 2-8, 2005	Mercedes Pascual* Andrew Dobson*	Seasonality and the population dynamics of infectious diseases
June 15-18, 2005	Rafe Sagarin	Ecological and evolutionary models for homeland security strategy
June 16-17, 2005	Edward Hackett*	Ecology transformed: Social and intellectual change in ecological research
June 20-22, 2005	Miriam Polne-Fuller	Research Mentorship program
June 20-24, 2005	Claire Kremen* Neal Williams*	Restoring an ecosystem service to degraded landscapes: Native bees and crop pollination
June 20-25, 2005	Stephen Farber* Robert Costanza*	Understanding, valuing, and managing dynamic ecosystem services under stress: Synthesizing across the LTER Network
June 23-27, 2005	Matthew Jones Mark Schildhauer James Beach* Bertram Ludaescher* William Michener*	Science Environment for Ecological Knowledge (SEEK)

June 24, June 27, June 29, 2005	Miriam Polne-Fuller	Research Mentorship
June 27-30, 2005	Kim Cuddington* Jeb Byers*	Habitat modification in conservation problems: Modeling invasive ecosystem engineers
June 30, 2005	O. J. Reichman Sandy Andelman	Production implementation of the Knowledge Network for Biocomplexity

Coastal Research Center

The Coastal Research Center is an organizational unit within the Marine Science Institute at UCSB. The central theme of the Center is to develop scientific knowledge to gain a more complete understanding of coastal and island ecosystems, which is necessary for sound management of the natural resources within coastal and island regions. The Center links academic scientists from a wide variety of disciplines, enhancing the ability to address marine environmental issues.

While CRC scientists work in marine environments throughout the world, much effort is focused on coastal, sub-tidal, rocky reefs found in the Santa Barbara Channel region and the coral reefs surrounding the island of Moorea, French Polynesia. These two locations provide excellent model systems for the scientific exploration of a wide range of marine issues and scientists at UCSB have long valued these environments as natural laboratories for scientific study. Both areas are enjoyed by those seeking recreation, support important local fisheries and are faced with growing conflicts amongst different user groups as human population pressures increase; a trend that is common for many marine environments. The nearshore marine environments of California and the islands of French Polynesia are used increasingly as a disposal site for waste products. Renewed exploitation of oil and natural gas reserves has augmented the number of conflicting demands placed upon the Channel resources, while issues related to global climate change have increased concerns about the sustainability of coral reef ecosystems. Local issues related to the sustainability of commercial and sport fisheries in both regions mirror global concerns regarding management of exploited stocks. The cumulative effects of human activities on the natural resources of both of these regions are just beginning to be understood. It is imperative that we learn how to balance the multiple uses of nearshore ocean waters in an environmentally sound manner. Lessons learned by scientists in the Coastal Research Center have wide implications for understanding and resolving present and future problems, and will help local, regional and national regulators develop better management policies.

Development of sound management plans for areas such as the Santa Barbara Channel or the islands of French Polynesia is hampered by scientific uncertainty about the consequences of human activities. To understand and predict natural and anthropogenic disturbances, synthesis of new and existing knowledge of many scientific aspects of coastal marine systems - including biology, ecology, genetics, geology, chemistry and oceanography - will be necessary. Further, the development of new approaches and the use of emerging technologies are needed to resolve fundamental questions, some of which have remained unanswered for many years. Only with these advances will it be possible to make reliable predictions about the consequences of various activities, to develop the ability to restore degraded habitats and conserve valuable resources, and to foster development of environmentally sound policies for use of coastal or island regions in general.

The Center has four major objectives:

- To act as a center for production and integration of basic scientific information to more fully understand coastal and island ecosystems and their natural and exploited populations.
- To evaluate and predict effects of human activities on the marine environment, and to develop measures to ameliorate lost or degraded natural resources.
- To train students in basic research on marine environmental issues that may be applicable to decision-makers.
- To facilitate and promote interdisciplinary research initiatives.

Russell J. Schmitt, Director and Professor of Biology

Faculty/Professional Research Participants: 2004-2005

Alice Alldredge, Professor of Biological Oceanography

Richard F. Ambrose, Associate Professor of Biology (UCLA)

Giacomo Bernardi, Associate Professor of Molecular Ecology (UCSC)

Andrew Brooks, Assistant Research Biologist

Douglas Bush, Associate Research Biologist

Craig Carlson, Associate Professor of Biology

Robert C. Carpenter, Professor of Biology (CSU-Northridge)

Dave Casper, Staff Research Associate (UCSC)

Gary Cherr, Professor of Environmental Toxicology and Nutrition (UCD)

James Childress, Professor of Biology

Joseph H. Connell, Research Professor of Zoology

Daniel Costa, Professor of Biology (UCSC)

Jenifer E. Dugan, Assistant Research Biologist

Peter J. Edmunds, Professor of Biology (CSU-Northridge)

John M. Engle, Associate Research Biologist

James Estes, Professor of Biology (UCSC)

A. Russell Flegal, Professor of Environmental Toxicology (UCSC)

Steven D. Gaines, Professor of Biology

Ruth D. Gates, Assistant Research Biologist (University of Hawaii)

Scott Hodges, Associate Professor of Biology

Gretchen Hofmann, Associate Professor of Biology

Sally J. Holbrook, Professor of Biology

Robert Jacobs, Professor of Biology

Jennifer A. Jay, Assistant Professor of Civil and Environmental Engineering (UCLA)

Arturo Keller, Associate Professor of Environmental Science

Edward A. Keller, Professor of Geological Sciences

David Lea, Professor of Oceanography

Michael I. Latz, Research Biologist, (Scripps - UCSD)

James J. Leichter, Assistant Professor of Oceanography, (Scripps -UCSD)

Ira Leifer, Assistant Research Chemical Engineer

Hunter Lenihan, Assistant Professor of Environmental Science

Bruce Luyendyk, Professor and Chair of Geological Sciences

Milton Love, Research Biologist

Sally MacIntyre, Professor of Limnology and Oceanography

Stéphane Maritorena, Assistant Researcher

Erik Muller, Assistant Research Biologist

Roger M. Nisbet, Professor of Biology

Steven Murray, Professor of Biology (CSU-Fullerton)

J. Carter Ohlmann, Assistant Research Geologist

Henry M. Page, Assistant Research Biologist

Brian Palenik, Associate Professor of Marine Biology (SIO-UCSD)

Linwood Pendleton, Assistant Professor of Civil and Environmental Engineering (UCLA)

Peter T. Raimondi, Associate Professor of Biology (UCSC)

Katherine Ralls, Senior Research Biologist (Smithsonian Institution)

Daniel C. Reed, Research Biologist

Daniel Schlenk, Professor of Aquatic Ecotoxicology (UCR)

Donna Schroeder, Research Biologist

Stephen C. Schroeter, Research Biologist

David Sedlak, Associate Professor of Civil and Environmental Engineering (UCB)

Mary Silver, Professor of Biology (UCSC)

Donald Siniff, Professor of Ecology (University of Minnesota)

Eric Smith, Associate Professor of Political Science

Bradley Tebo, Professor of Marine Microbiology, (Scripps - UCSD)

David Valentine, Assistant Professor of Geological Sciences

Libe Washburn, Professor of Geography

Allison Whitmer, Research Biologist

Susan Williams, Professor of Environmental Science and Policy (UCD)

Terrie Williams, Professor of Biology (UCSC)

Leslie Wilson, Professor of Biology

Fitnat Yildiz, Professor of Environmental Toxicology (UCSC)

EcoInformatics Center

Profound amounts of research directed toward identifying and understanding the natural world have been conducted, leading to the acquisition of monumental amounts of information. Yet, virtually none of that information is readily available to users, *including those who gathered it*. The lack of ready access to information is not surprising when considering the vast history of science or even the period since the dawn of the discipline of ecology barely 80 years ago. But it is also true for information garnered within the lifetime of the youngest ecologist, or even within the last five years. In fact, it will be true tomorrow for data gathered today. The unfortunate circumstance is that despite many years and dollars spent in pursuit of useful information about the environment, even the simplest forms of communication between providers and users of the information is impossible. Environmental data are highly distributed and exist in extremely heterogeneous forms. As a result, ecologists are now limited not only by a lack of information, but also by an inability to access the vast amount of information that exists.

The EcoInformatics Center (EIC) was established in July 2003 to address this situation by making what is already known available to potential users, from students and scientists to resource managers, regional planners, and policy makers. The EIC, which leverages information that is already available into understanding and knowledge, involves both the technical and human aspects of data acquisition, sharing, and utilization.

The EIC resides under the Marine Science Institute and is a partner Center to the National Center for Ecological Analysis and Synthesis (NCEAS). Approaches developed at NCEAS will be used to identify, develop, and test emerging concepts, technologies, and software.

The Mission of the EIC is:

- Develop and employ cutting edge technology to generate an Ecological Information Access System to locate and utilize the dispersed and heterogeneous information that characterizes data pertinent to ecological and environmental issues.
- Extend core data-access capability to develop and distribute contemporary information tools for scientists, students, conservationists, resource managers, policy makers, and planners.

To accomplish this mission, the EIC is composed of the following elements:

1. Research on tools to promote data acquisition, distributed access, and long term storage and archiving.
2. Analyses of the cultural and sociological aspects of information sharing
3. Training of students and scientists in the use of data management tools

Information is the raw material of knowledge. The research enterprise is designed to generate information – data – and facilitate its incorporation into higher order understanding and true knowledge of the system under consideration. Information has accumulated in a somewhat haphazard way for centuries. In certain focused areas, such as medicine, basic information has been turned into operational outcomes (diagnoses, treatments, pharmaceuticals) that have benefited humans. However, the geometric increase in information, and its availability in machine form, have made the amount of accessible information overwhelming; unfortunately it has not led to a commensurate increase in knowledge in most fields.

This is particularly true for ecological information, which is important for advancing the basic understanding of natural systems and for making wise management and policy decisions about natural resources. Within the universe of information, ecological data may be as dispersed and heterogeneous as any of interest to scientists and other users. Decisions commonly rely on integrating data as diverse as climatological records, spatial distributions of individuals, changes in biodiversity over space and time, responses of species to experimental manipulations, genetic structure of populations, patterns

of human alterations of ecosystems, and much more. The scope of information needed to understand ecological systems is enormous.

Ecological information is inherently diverse, and it grows more diverse each day as new types of relevant information emerge. As a result, a database designed for today would be exceedingly complex, and it would be outdated long before it could ever be developed. Thus, the environment needs a different data management model that provides generic access to information in place of a uniform database structure. Rather than standardizing inputs and outputs, the solution lies in an approach analogous to the Internet that standardizes how information is characterized (through metadata, or information about the data itself). Information, once characterized with metadata, can be made accessible in context-dependent ways that are both comprehensive and efficient. The key tools are an efficient, flexible, and standardized way to describe ecological information, and a powerful information searching capability.

An EcoInformatics Model – Given the need to understand the natural world, including our place in it and influence on it, it is imperative to develop generic solutions that provide access to the broad array of environmentally pertinent data. This an extraordinarily difficult task given what is arguably the most dispersed and heterogeneous suite of information of interest to scientists, resource managers, policy makers, planners, students, and teachers. Understanding complex ecological and environmental issues requires information across many scales and disciplines, from the molecular level to whole organisms and from genetics to global change.

To make environmental information available in a useful form to many communities of users will require a major effort that coordinates both technological and cultural aspects of information sharing. Accordingly, the EcoInformatics Center has been established, with its three primary research and implementation goals of developing technological tools, an understanding of information sharing, and education in the implementation of data management tools.

The primary faculty and research scientists associated with the Center include:

Dr. Richard Appelbaum, Department of Sociology and Director, Institute for Social, Behavioral, and Economic Research
Dr. Steven Gaines, Department of Ecology, Evolution, and Marine Biology and Director, Marine Science Institute
Matt Jones, Database and Information Specialist, National Center for Ecological Analysis and Synthesis
Chris Jones, Information Systems Coordinator, Marine Science Institute
Dr. Dan Reed, Research Biologist, Marine Science Institute
Dr. O. J. Reichman, Department of Ecology, Evolution, and Marine Biology and Director, National Center for Ecological Analysis and Synthesis
Dr. Mark Schildhauer, Director of Computing, National Center for Ecological Analysis and Synthesis
Dr. Robert Warner, Department of Ecology, Evolution, and Marine Biology

Marine Biotechnology Center

UCSB is recognized internationally for its leadership in Marine Biotechnology. This exciting field uses the latest breakthroughs in modern molecular biology, genetic engineering and cell science to solve basic problems in marine resource biology; to improve the production of medical, chemical, food, and energy resources from the ocean; and to develop new products and industries based on more efficient use of the ocean's resources.

The Marine Biotechnology Center is unique in the University of California system. It helps coordinate fifteen different research programs in this area at UCSB, and helps obtain funding for the vitally needed practical training of advanced students and professionals to help meet the future needs and changing requirements of the nation's marine and biotechnology industries. Close interactions with California's biotechnology, aquaculture and pharmaceutical industries provide new products and highly trained scientific personnel to the industrial sector, and provide support from industry for research and training in the University. The state-of-the-art Marine Biotechnology Laboratory Building - the first such facility of its kind in the United States - provides facilities needed to accommodate the rapid growth of research and teaching in Marine Biotechnology on the campus.

Research and training in Marine Biotechnology are focused at UCSB in three inter-related areas: (1) the development of new methods and approaches from molecular and cellular biology to investigate the basic mechanisms controlling life in the oceans and its responses to environmental change; (2) the development of new industries, resources and products from the oceans; and (3) the use of marine organisms as models for biomedical research. Recent progress in these areas is summarized below.

UCSB scientists are using the tools of biotechnology to unravel the ocean's mysteries in environments as diverse as the Antarctic, tropical seas and reefs, the great ocean depths, and California's resource-rich coastline. These investigations include pioneering studies of the molecular mechanisms of photosynthesis and carbon dioxide fixation by the ocean's phytoplankton, effects on these processes caused by the depletion of ozone in the Antarctic atmosphere, and effects of global warming, pollution and other environmental changes. UCSB scientists and students have discovered receptor molecules and chemical signals that control life in the ocean. The discovery of these signals, and of the receptors, transducing molecules and genes that respond to these signals, has shed new light on the underlying processes regulating the reproduction, development and growth of species ranging from tropical corals to valuable marine resources (urchins and abalones) in California waters and around the world.

Researchers in the Marine Biotechnology Center are developing the tools and techniques of molecular and cellular biology to better understand the biodiversity of marine organisms, and how they affect, and are affected by, physical, chemical and geochemical oceanic processes. Marine biota, particularly the microscopic plankton, are dominant mediators of geochemical change on Earth, yet the genetic diversity, abundance and function of these microorganisms in complex communities is still not completely understood. Researchers at the Marine Biotechnology Center are developing new ways to monitor these microscopic communities, and are discovering previously unsuspected diversity and population structure in globally distributed marine microbial populations. These studies are helping to reveal the influence of microorganisms on global biological and geochemical cycles, and are also providing the tools and baseline data necessary for realistically assessing the impacts of man-made and naturally-occurring environmental change. In addition, the recognition of previously unrecognized marine biodiversity is providing a rich resource for new development of biotechnological products and processes. Several teams are involved in an international effort to annotate the genome of the California purple sea urchin, an organism that serves as an excellent biomedical model system as well as being an integral component of the marine benthic community. Sea urchin genome consortium members at UCSB are helping to develop bioinformatic and functional genomic technologies that can be applied to genomic analyses of other marine organisms as well.

Research at UCSB in the development of new products and industries from marine resources has led to the discovery of promising new diagnostic and therapeutic agents for diseases including cancer, arthritis, epilepsy and Alzheimer's disease, and the development of powerful new enzyme catalysts, novel bioadhesives, and marine microorganisms capable of degrading and detoxifying chlorinated hydrocarbons and other pollutants. Members of the Marine Biotechnology Center are working with researchers in Chemistry, Physics and Engineering through UCSB's new Army-supported Institute for Collaborative Biotechnologies, and through the NSF-sponsored National Materials Research Laboratory, the California NanoSystems Institute and NASA's Biomolecular Materials program to develop valuable new materials based on the structures made by marine organisms which exhibit exceptional strength, resiliency, hardness and enhanced electrical and optical performance. With the help of the marine biotechnologists' skills in genetic and protein analysis and engineering, and close collaborations with colleagues in Chemistry, Physics and Engineering, the fundamental molecular structures and mechanisms underlying the enhanced performance of these natural materials made by marine organisms are being revealed, and translated into practical engineering solutions for the development of novel advanced materials. Teams are working with experts in the Department of Electrical and Computer Engineering to harness the mechanisms of low-temperature catalysis and molecular recognition of proteins that direct biomineralization in marine organisms to help direct the nanoscale fabrication of ultra-small crystals used for magnetic information storage and semiconductors, to help reduce the size and defect-density of electronic components, and to make new photovoltaic materials with improved efficiency to harness the sun's energy. A new generation of tough, water resistant adhesives and coatings has been inspired by sessile intertidal invertebrates, and the fangs and beaks of marine polychaetes and squids are the pointing the way to new lightweight polymeric materials with the hardness and wear resistance usually associated with ceramics. Research aimed at practical applications with economic value also has led to improvements in the economic efficiency and yield of cultivation of valuable marine fish, shellfish and plants grown for food and pharmaceuticals. These findings have led directly to the growth of new and "environmentally friendly" industries in Santa Barbara that now are producing abalones, urchins and marine algae using innovations in aquaculture technology developed at UCSB.

Research using marine organisms as model systems for biomedical research has led to a host of new and far-reaching discoveries at UCSB. Many marine invertebrates, because of their relatively simple design, and the ease of their maintenance and analysis in the laboratory, have provided a rich source of new information and serve as desirable, non-mammalian models for research. A major area of emphasis is in regard to the genetic control of normal development and of tumor formation. In addition, marine model systems have shed light on the mechanisms that nerve cells use to produce, store release and respond to chemical messengers and how the resulting regulation of these cells results in information processing, storage and memory. Many of these discoveries have had direct implications for human and other mammalian research. Discoveries first made at UCSB on the biological mechanisms controlling the nanofabrication and toughness of the abalone shell have now been extended to human bone, with profound implications for diseases such as osteoporosis and arthritis. Another area of research in which marine organisms have provided new information is of the study of oocyte maturation and fertilization; this fundamental biological process is easily studied using sea urchins, sea stars and ascidians, abundant coastal California organisms. Research in this area at UCSB has led to the discovery of the molecules on the surface of the sperm and egg that are responsible for gamete recognition, and the molecular signals, receptors and signal transducers that initiate development and regulate cellular differentiation. This research impacts on the design of contraceptives in mammals and has important implications for understanding stem-cell biology and cancer in terms of the mechanisms governing cell division.

Faculty/Professional Researcher Participants

Daniel E. Morse, Director, Professor of Molecular Genetics and Biochemistry
Mark A. Brzezinski, Professor of Marine Biology
Alison Butler, Professor of Chemistry and Biochemistry
Craig A. Carlson, Associate Professor, Ecology, Evolution and Marine Biology
Bradley F. Chmelka, Professor of Chemical Engineering
Steven DenBaars, Professor of Electrical and Computer Engineering
Evelyn Hu, Director of the California NanoSystems Institute and Professor of Electrical and Computer Engineering

Michael J. DeNiro, Professor of Geology
Kathleen R. Foltz, Professor of Molecular, Cellular and Developmental Biology
Paul K. Hansma, Professor of Physics
Kevin F. Lafferty, Assistant Research Biologist
Aileen N.C. Morse, Associate Research Biologist
Pierre M. Petroff. Professor of Materials
Galen D. Stucky, Professor of Chemistry
Matthew Tirrell, Dean of the College of Engineering and Professor of Chemical Engineering
J. Herbert Waite, Professor of Chemistry and Biochemistry
Leslie Wilson, Professor of Biochemistry

National Center for Ecological Analysis and Synthesis

The National Center for Ecological Analysis and Synthesis (NCEAS) was created in May 1995 with funding from NSF, the State of California, and UCSB. The Center focuses on the use of collaborative and synthetic approaches to solve fundamental ecological and environmental problems, and emphasizes application of up-to-date analytical and informatics tools to existing data sets and the development of new modeling approaches. NCEAS is associated with the Marine Science Institute and is located in downtown Santa Barbara.

NCEAS staffing includes the Director (O. J. Reichman), Deputy Director (Sandy Andelman), and ten full time personnel including five administrative and five technical support staff.

The Science Advisory Board (SAB) of 19 eminent ecologists met September 8-9, 2004 and March 2-3, 2005 to review proposals and provide guidance on the Center's mission and research directions.

Research activities focus on working groups, sabbatical fellows, postdoctoral associates and graduate student internships. During the 2004-2005 fiscal year, NCEAS hosted 15 meetings and 59 working group meetings, involving a total of 987 visits by 701 different scientists. In addition, the Center hosted 11 Center Fellows (sabbatical visitors), 17 postdoctoral fellows, nine graduate student interns and two undergraduate interns.

Several research areas have emerged as part of NCEAS activities, including analysis of large scale processes, complex population dynamics, interactions within and between ecological communities, analysis of broad biogeographical patterns, development of new analytical and statistical methods, projects related to resource management, particularly ecosystem-based management, and ecological informatics. Several projects have involved areas outside the core of ecology, such as human cultural diversity, evolutionary and security strategies, and urban ecology.

NCEAS has issued the first Call for Proposals and completed eight activities related to the Ecosystem-Based Management (EBM) project, involving the analysis and synthesis of existing data and development of new tools to address gaps in knowledge critical to successful implementation of ecosystem-based management. These activities, funded by the Packard Foundation, include working groups, postdoctoral fellowships, graduate student support, and a distributed graduate seminar.

NCEAS has become a leader in developing collaborations and technical solutions to overcome obstacles related to the dispersed and heterogeneous nature of ecological data. The Center has been involved with many collaborators to develop generic data access tools for more efficient and powerful analysis of ecological data by a broad user community, from student and resource managers to scientists. These ecoinformatics tools are reaching maturity and are being deployed in a number of settings; information about these tools can be found online at http://www.nceas.ucsb.edu/ecoinformatics.

Outreach efforts have focused on development of online ecological databases and information, and on a distributed graduate student research seminar. NCEAS' community outreach program, Kids Do Ecology (KDE), is intended to enhance student appreciation of ecology and the scientific process.

NCEAS relies almost exclusively on the Internet to disseminate Center-related information and findings, in addition to the usual peer-reviewed publications. The Center receives e-mail at nceas@nceas.ucsb.edu, and our World Wide Web URL is http://www.nceas.ucsb.edu. The NCEAS home page provides interactive access to a large array of information, including summaries of current and pending research, descriptions of computing resources at NCEAS and elsewhere, funding and employment opportunities at NCEAS, ecological data archives, and NCEAS reports and publications.

July 12-16, 2004	Deborah McCullough Sarah Reichard Joseph Cavey	3	Pathways of non-indigenous plant pest introductions: How exotic insects, pathogens and weeds arrive in the United States
July 20-21, 2004	Sandy Andelman	18	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems (EBM)
July 22-26, 2004	Mark Harmon	4	Analysis of long-term litter decomposition experiments: Synthesis at the site, regional, and global levels
July 26-20, 2004	Laura Huenneke Sandra Diaz F. Chapin	12	Analysis of diversity reduction experiments to address the ecosystem consequences of biodiversity loss
July 28, 2004	O. J. Reichman	10	National Biological Information Infrastructure (NBII) (Hosted by NCEAS)
August 12-13, 2004	John Alroy	15	Paleobiology Database (Hosted by NCEAS)
August 13-17, 2004	Kim Cuddington Jeb Byers	11	Habitat modification in conservation problems: Modeling invasive ecosystem engineers
August 13-17, 2004	John Alroy	16	Paleobiology Database (Hosted by NCEAS)
August 30- September 2, 2004	Jeff Houlahan C. Scott Findlay David Currie	13	Spatial and temporal community dynamics: Sharing data to answer questions
September 26-29, 2004	Mark Wilson Leslie Real	11	Global change and infectious disease
September 27-28, 2004	Frank Davis	28	Coastal Reserves (Hosted by NCEAS)
September 28-30, 2004	O. J. Reichman James Brunt John Helly Matthew Jones Michael Willig	40	A Knowledge Network for Biocomplexity: Building and evaluating a metadata-based framework for integrating heterogeneous scientific data (Hosted by NCEAS)
September 30- October 4, 2004	Tia-Lynn Ashman Tiffany Knight Susan Mazer Martin Morgan	12	Beyond hand-pollinations: Linking pollen limitation to plant population biology
October 1-3, 2004	John Alroy	8	Paleobiology Database (Hosted by NCEAS)
October 6-10, 2004	William Morris Catherine Pfister Shripad Tuljapurkar	14	Stochastic demography for an increasingly variable world

October 14-19, 2004	Mercedes Pascual Andrew Dobson	15	Seasonality and the population dynamics of infectious diseases
October 28-31, 2004	Josh Schimel	8	Can we now determine if, when, and how microbial community composition impacts ecosystem processes? Will that understanding yield critical new information about ecosystem function and response to change?
November 4, 2004	Sandy Andelman	10	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems (EBM)
November 12, 2004	Diana Rhoten Edward Hackett	9	Integrative, interdisciplinary graduate education: New concepts and approaches for assessment
November 18-22, 2004	Boris Worm Enric Sala	11	Linking marine biodiversity to ecosystem functions and services
December 1-5, 2004	John Silander	10	Macro-ecology and biogeography: Hierarchical (Bayesian) model development using data from South Africa
December 4-9, 2005	Jonathon Cole Carlos Duarte Yves Praire	11	Integrating the aquatic with the terrestrial component of the global carbon budget
December 7-10, 2004	Robert C. Francis James Kitchell	12	Models of alternative management policies for marine ecosystems
December 13-17, 2004	Charles Mitchell Alison Power	12	The roles of natural enemies and mutualists in plant invasions
December 13-17, 2004	Michael Hochberg	7	Analyzing pattern and process in human cultural diversity
December 5-9, 2004	A. Townsend Peterson Craig Moritz	15	Testing alternative methodologies for modeling species' ecological niches and predicting geographic distributions
December 10-14, 2004	Pamela Templer Michelle Mack Knute Nadelhoffer	7	The fate of nitrogen inputs to terrestrial ecosystems
January 14-15, 2005	Sandy Andelman	24	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems (EBM)
January 17-20, 2005	Dov Sax Steven Gaines Jay Stachowicz	17	Exotic species: A source of insight into ecology, evolution, and biogeography
January 20-23, 2005	Jason Hoeksema Nancy Johnson James Umbanhowar	15	Narrowing the gap between theory and practice in mycorrhizal management

January 21-22, 2004	Edward Hackett	3	Ecology transformed: Social and intellectual change in ecological research
January 26-30, 2005	Ben Halpern Kimberly Selkoe Fiorenza Hunter Lenihan	13	Putting ocean wilderness on the map: Building a global GIS atlas of pristine marine environments
January 28-30, 2005	Rafe Sagarin	10	Ecological and evolutionary models for homeland security strategy
February 1-4, 2005	Kim Cuddington Jeb Byers	9	Habitat modification in conservation problems: Modeling invasive ecosystem engineers
February 2-4, 2005	Leslie Real	13	North American Rabies Database
February 2-4, 2005	O. J. Reichman James Brunt John Helly Matthew Jones Michael Willig	27	A Knowledge Network for Biocomplexity: Building and evaluating a metadata-based framework for integrating heterogeneous scientific data (Hosted by NCEAS)
February 5-11, 2005	Sandy Andelman	42	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems (EBM)
February 13-17, 2005	Stefan Schnitzer	13	Lianas and tropical forest dynamics: Synthesis of Pan-tropical patterns from regional data sets
February 15-17, 2005	Matthew Jones Mark Schildhauer James Beach Bertram Ludaescher William Michener	12	Science Environment for Ecological Knowledge (SEEK) (Hosted by NCEAS)
February 18-21, 2005	John Alroy	13	Paleobiology Database (Hosted by NCEAS)
February 18-21, 2005	John Alroy	8	Paleobiology Database (Hosted by NCEAS)
February 23-26, 2005	David Lodge	24	IIntegrated Systems for Invasive Species (Hosted by NCEAS)
February 25-27, 2005	John Alroy	7	Paleobiology Database (Hosted by NCEAS)
March 4-8, 2005	William Morris Christine Pfister Shripad Tuljapurkar	17	Stochastic demography for an increasingly variable world
March 4-6, 2005	John Alroy	10	Paleobiology Database (Hosted by NCEAS)
March 10-15, 2005	Gail Osherenko Elliott Norse Larry Crowder Oran Young Satie Airame	15	Ecosystem-based management for the oceans: The role of zoning

March 13-16, 2005	Mark Wilson	6	Global change and infectious disease
March 17-19, 2005	Josh Schimel	4	Can we now determine if, when, and how microbial community composition impacts ecosystem processes? Will that understanding yield critical new information about ecosystem function and response to change?
March 18-21, 2005	John Alroy	12	Paleobiology Database (Hosted by NCEAS)
March 21-23, 2005	Robert C. Francis James Kitchell	9	Models of alternative management policies for marine ecosystems
March 23-24, 2005	Peter Kareiva	12	The Nature Conservancy Data Management (Hosted by NCEAS)
March 29-31, 2005	Ali Whitmer	18	LTER Planning Grant Committee and Advisory Committee
April 7-9, 2004	Alan Hastings Louis Botsford	10	Development of tools for the practical design of marine reserves
April 12-22, 2005	Sandy Andelman	4	Kruger National Park and NCEAS collaboration on the KNB (Hosted by NCEAS)
April 13-15, 2005	Evan Preisser Daniel Bolnick	15	When, and how much, does fear matter? Quantitatively assessing the impact of predator intimidation of prey on community dynamics
April 19-21, 2005	Rebecca Shaw	11	Channel Island Fox Population Viability Analysis Workshop
April 29-May 2, 2005	Brendan Bohannan Peter Morin Anna-Louise Reysenbach Jennifer Hughes	16	Patterns in microbial biodiversity (Extended)
May 10-14, 2005	Sarah Abramson	3	Knowledge and capacity-building to support ecosystem-based management for sustainable coastal-marine systems: Graduate Seminars
May 10-13, 2005	Pamela Templer Michelle Mack Knute Nadelhoffer	15	The fate of nitrogen inputs to terrestrial ecosystems
May 10-14, 2005	Charles Mitchell Alison Power	11	The roles of natural enemies and mutualists in plant invasions
May 16-20, 2005	Robin Chazdon Daniel Griffith Gretchen Daily	13	Biodiversity and conservation value of agricultural landscapes of Mesoamerica
May 23-31, 2005	Christoper Lortie Lonnie Aarssen Julia Koricheva Tom Tregenza	6	A quantitative exploration of the role of publication-related biases in ecology

May 23-27, 2005	Jeff Houlahan C. Scott Findlay David Currie	13	Spatial and temporal community dynamics: Sharing data to answer questions
June 2-8, 2005	Mercedes Pascual Andrew Dobson	16	Seasonality and the population dynamics of infectious diseases
June 15-18, 2005	Rafe Sagarin	11	Ecological and evolutionary models for homeland security strategy
June 16-17, 2005	Edward Hackett	4	Ecology transformed: Social and intellectual change in ecological research
June 20-24, 2005	Claire Kremen Neal Williams	17	Restoring an ecosystem service to degraded landscapes: Native bees and crop pollination
June 20-25, 2005	Stephen Farber Robert Costanza	11	Understanding, valuing, and managing dynamic ecosystem services under stress: Synthesizing across the LTER Network
June 23-27, 2005	Matthew Jones Mark Schildhauer James Beach Bertram Ludaescher William Michener	15	Science Environment for Ecological Knowledge (SEEK) (Hosted by NCEAS)
June 27-30, 2005	Kim Cuddington Jeb Byers	9	Habitat modification in conservation problems: Modeling invasive ecosystem engineers
June 30, 2005	O. J. Reichman Sandy Andelman	3	Production implementation of the Knowledge Network for Biocomplexity

Ocean and Coastal Policy Center

Ocean and coastal policy issues are becoming increasingly important in California, nationally, and internationally. The University of California, Santa Barbara is in a key position to make significant contributions in research and policy analyses of local, state, national, and international ocean management issues.

The need for programmatic attention on ocean and coastal policy in California has never been greater. California has one of the longest and most valuable coastlines in the nation. Offshore California, significant development of offshore resources takes place and the ocean and coastal zone are used, with increasing frequency, by a wide range of users - including offshore oil and gas extraction, recreation, marine transportation, fishing, and marine research. Offshore oil development and the attendant multiple-use controversies, in particular, have dramatized the need for better methods of ocean policy planning.

The Ocean and Coastal Policy Center (OCPC) is oriented toward problem-solving of significant coastal and ocean policy issues. Work at the center is interdisciplinary, involving perspectives from the different social science disciplines (broadly defined as political science, economics, law, history, anthropology, sociology, geography and aspects of environmental studies) and from the natural and physical sciences. In addition to interdisciplinary research, the Center engages in applied projects which directly relate research to specific marine policy problems. The OCPC is one of the few centers in California focusing on these issues.

Major themes of the center include:

- Coastal watershed management and ecosystem planning
- California marine and coastal policy
- Aquatic and marine biodiversity conservation policymaking
- Studies in ecological restoration

The OCPC has received support from the National Science Foundation, U.S. Department of the Interior, and other governmental agencies. The Center has also produced a "White Paper Series" that includes several essays devoted to ecological and policy-related activities of the Southern California Bight and associated coastal watersheds and wetlands. The special series is available on the center's webpage.

<u>Academic Participants</u>
Michael McGinnis, Deputy Director
Keith Clarke, Professor of Geography
Gail Osherenko, Research Scientist
Robert Wilkinson, Director, Water Policy Program
Oran Young, Professor of Environmental Science and Management

UC Natural Reserve System

The mission of the UC Natural Reserve System is to contribute to the understanding and wise management of the Earth and its natural systems by supporting university-level teaching, research, and public service at protected natural areas throughout California.

The University of California administers 35 natural reserves throughout the state which serve as outdoor classrooms and research laboratories for faculty, researchers, and college students in the field sciences and humanities. Community groups and K-12 classes also benefit from the reserve system through field trips and outreach programs. The reserves are natural areas that represent the ecological diversity of California. Most of the major habitats of California are included in the NRS. Each reserve is managed by a UC campus. UC Santa Barbara oversees seven of these reserve sites with habitats as diverse as coastal wetlands, coastal dunes, rocky intertidal, oak woodlands, grasslands, Monterey pine forest, island marine and terrestrial environments, and the mountain and Great Basin environments of the eastern Sierra. Unlike wilderness areas that are available for recreation, the University reserves are devoted entirely to teaching and research. The reserves serve as "living laboratories," where researchers, teachers, and students can pose questions of the natural world that can only be answered by studying the natural environment.

- **Carpinteria Salt Marsh Reserve** is a significant coastal wetland reserve located 20 miles east of UCSB. It consists of 120 acres of south coast estuary, mudflats, beach and intertidal habitats, providing areas for studies on wildlife and fisheries biology, botany, and ornithology (site of several endangered species).

Reserve Staff
Andrew J. Brooks. Reserve Director
William Rice, Faculty Advisor

- **Coal Oil Point Natural Reserve** is located on the West Campus of UCSB and is composed of 158 acres of vulnerable and valuable coastal dunes, coastal terrace, south coastal estuarine lagoon, vernal pools, mudflats, beach and rocky intertidal habitats. This reserve is an ideal location for studies of migratory shorebirds and waterfowl, estuarine plants and animals, water quality and the impacts of human activities on coastal environments. Because of its close proximity to the main campus, the Coal Oil Point Natural Reserve provides a unique and accessible research and teaching resource.

Reserve Staff
Cristina Sandoval, Resident Reserve Director
Russell J. Schmitt, Faculty Advisor

- **Kenneth S. Norris Rancho Marino Reserve** lies along the Cambria coast. This 500 acre reserve offers access to giant kelp forests, as well as rocky shore, coastal terrace grassland, soft chaparral, and Monterey pine forest. Overnight facilities available.

Reserve Staff
Don Canestro, Resident Reserve Director
Steven Gaines, Faculty Advisor

- **Santa Cruz Island Reserve** comprises 46,020 acres of the largest and most topographically diverse of Southern California's offshore islands. It is located 24 miles offshore from Santa Barbara and facilitates research and teaching at all the northern Channel Islands, especially Santa Cruz Island. The reserve provides housing, laboratories, collections, information, and transportation for research and teaching on and around the island, and a GIS/database center.

Reserve Staff
Lyndal Laughrin, Resident Reserve Director
Sally J. Holbrook, Faculty Advisor

• **Sedgwick Reserve** is located less than one hour from the UCSB campus and is an excellent natural study area for classes in biology, botany, zoology, geography, geology, anthropology, agroecology, and environmental studies. Situated in the Santa Ynez Valley, the 5,860 acre reserve includes coast live oak forest, blue oak woodland, valley oak savannah, Ceanothus chaparral, coastal sage scrub, grassland, and willow riparian forest, plus a variety of wetland types, including vernal pools. The reserve's large size and environmental heterogeneity provide an exceptional opportunity for teaching and research on biodiversity and landscape ecology. The extensive repetition of small drainages, distinct geologic and soil regimes (including large areas of unique serpentines), and complete drainage systems make the site uniquely suitable for replicated experimental studies. At least one significant Chumash archeological site is located on the property.

Reserve Staff
Michael P. Williams, Resident Reserve Director
Joshua Schimel, Faculty Advisor

• **The Valentine Eastern Sierra Reserve** has two field sites in the Mammoth Lakes area, SNARL and Valentine Camp.

The Sierra Nevada Aquatic Research Laboratory (SNARL) is located on 51 acres of the eastern slope of the Sierra Nevada and is an ideal base for field research throughout the ecologically and geologically diverse eastern Sierra and Owens Valley. The reserve offers modern housing, including dormitory accommodations for short and long-term use by researchers and classes. Office space and laboratory facilities, including wet labs, controlled-environment rooms, chemistry and radio-isotope labs, and experimental stream channels, as well as meeting and classroom facilities, are offered on a year-around basis. An extensive GIS database, a library, and a computer/communications center are also available.

Valentine Camp encompasses 152 acres and contains one of the region's few pristine montane meadows. It provides varied habitats, including coniferous forest, chaparral, and sagebrush plains in which to conduct observational and experimental studies. The considerable ecological diversity within the reserve makes it an excellent teaching resource. The facilities include housing and laboratories which are open in the summer and early fall and, on a limited basis, in the winter. A system of foot trails provides access to all of the site's major habitats.

Reserve Staff
Daniel R. Dawson, Resident Reserve Director
John M. Melack, Faculty Advisor
Leslie Dawson, K-12 Education Coordinator

UCSB Natural Reserve System Administration
William W. Murdoch, Director
Susan L. Swarbrick, Associate Director
Donna Moore, MSO

Analytical Laboratory

The MSI Analytical Lab is a professionally managed shared-use instrumentation and chemical analysis facility, with the objectives of improving the quality and efficiency of present marine-related research efforts, and of providing advanced capabilities for new and expanded research programs. Originally established in 1977 to serve the needs of UCSB marine researchers, the facility is now recognized campus wide as well as nationally as a resource for high-quality analytical services, with a regular user base of over 50 faculty and professional researchers. Major capabilities of the Lab include elemental analysis, both inorganic (via flame and furnace atomic absorption spectrometry) and organic (CHN combustion analysis); stable isotope ratio determination of light isotopes (C, N, O, H, S) in biological and geological materials (continuous-flow IRMS); and automated determination of nutrients in natural waters (5-channel flow injection analyzer). Most of the Lab's current instrumentation was obtained with extramural funding, from grants submitted by the Lab manager in conjunction with interested faculty and researchers. The Lab operation is supported largely through user fees (recharges). Please visit our Web site at www.msi.ucsb.edu/Analab/index.html for more information.

OceansAlive!
MSI Education and Outreach

This year has seen MSI's Education and Outreach Program, *OceansAlive!* expand dramatically. From the development of collaborations with a number of campus, local, state and national organizations and institutions, to last year's opening of the University's interactive aquarium facility, better know as the REEF (Research Experience and Education Facility).

Science Fair Mentorship Program: Through OceansAlive! MSI has worked in collaboration with UCSB departments that include the California NanoSystems Institute (CNSI), Physics and EEMB to provide local junior high, middle school and high school students with UCSB undergraduate and graduate student mentors for science fair projects. These secondary school students then compete at the local level with the opportunity to progress to the state and national levels.

This year, San Marcos High School Senior, Sarah-Marie Amiri, was awarded the California Science Center's "California State Science Fair Student of the Year" for her project on *"The Effects of Upwelling, Eutrophication, and Trace Metals on the Bloom Dynamics of Pseudo-nitzschia."* She began this project as one of the pilot students for this program.

Katie Kinsella and Anna Messier, 10th graders also from San Marcos High, placed 3rd in the SB County Science Fair Competition and advanced to the State Fair competition in Los Angeles, with their project on *"Parasitic Barnacle Loads on the Spider Crab, Loxorhynchus crispatus."*

In the year 2006 the University is planning to host the Santa Barbara County Science Fair.

Another newly piloted program was the Environmental Education Diversity program. This program was a 2-week residential environmental science program for 20 underserved middle school students from inner-city Los Angeles. The program introduced students to marine science through a series of hands-on, inquiry based activities and supported them in a group research project. Students presented their results in a poster symposium for participants, mentors and parents.

Other collaborations include:

- Continued support, both financially and programmatically, in bringing the JASON Project to Santa Barbara and Ventura County schools.
- The establishment of a NOAA Channel Islands National Marine Sanctuary (CINMS) LiMPETS Monitoring site at Campus Point that will support CINMS Education and Outreach and will be linked with visits to the REEF.
- A collaboration with the Chumash education program *Camp Kalawashaq'* to introduce young people to the *OceansAlive!* Floating Lab Program aboard the local whale-watching vessel *Condor Express.*

Though only in its first year of operation, the REEF has significantly increased the degree of Marine Science education and outreach both on and off campus. Last year saw over 7,000 visitors. This year that number increased by over 80% to 12,681! This included visits from primary and secondary schools from King City in Monterey Co., to Sacramento and San Diego. The REEF also serves as a marine lab for many colleges including Cal Lutheran Thousand Oaks, CSU Channel Islands and Oceanography, Geology and Intro Bio courses here at UCSB. As has always been the case, REEF tours are hosted by dozens of undergraduate students giving them a first hand experience in teaching and communicating research to a broader audience.

The Young Marine Scientist Program 2004-2005

The goal of the Young Marine Scientists Program (YMS) is to familiarize students and their teachers with scientific and social aspects of the marine ecosystems. Science and its research are presented as everyday common sense investigative activities, which we all utilize for survival. Thus, every surviving creature is in a sense a scientist, and the scientific method of investigation is a process of logical problem solving and critical thinking, used to solve sophisticated research questions.

The YMS program provides research opportunities to university undergraduate students, pre-professional student-teachers, K-12 teachers and their students, as well as parents and siblings of those who join the Young Scientists. The YMS students bring their experiences to the entire household, classroom and school. Hands-on/Minds-on activities, and creative, practical materials, have been developed for teaching science, aimed at appealing to every participant's natural fascination with the marine environment, and Nature, through all disciplines. Important YMS goals are to make updated and recent university research accessible to teachers in the community in order to encourage them to become involved in inquiry and classroom research. The teacher workshops we offer help teachers gain confidence in their approach to teaching the sciences and integrating them into as many disciplines as they are capable of, especially reading and math. The teachers and their students are offered direct exposure to working scientists from a variety of disciplines who share their research questions, methods and tools, answer questions and provide guidance for research projects and enriched teaching at the individual, small group, class or whole school levels.

Dr. Miriam Polne-Fuller is the creator and director of the YMS program. She has shared her own research with teachers and students for more than twenty years. With the volunteered help of UCSB students and faculty from various departments, a number of research groups have been interacting with the local community of learners of all ages. Her personal research activities during the past year have focused on four topics: 1. Using extracts from brown seaweeds to study the effect of pharmaceutically active compounds on *eukaryotic* cell division. 2. The intracellular interactions between the marine amoeba *Trichosphaerium* and symbiotic zooxanthelle. 3. Study of the marine amoeba *Trichosphaerium* and the presence of complex hydrocarbon degrading enzymes in isolates from around the world. 4. The effects of low concentration of ethyl alcohol on living cells.

Dr. Polne-Fuller has continued to work with UCSB graduate and undergraduate students, UCSB student teachers, high school teachers and students, as well as elementary school teachers and students. She expanded on the development of marine science curricula, original lesson plans, and creative activities and research projects for elementary and secondary classrooms. Dr. Polne-Fuller's classroom tools include current cutting-edge research and discoveries, as well as science stories she has written, and original marine and land focused poems and music to enrich and integrate with the teaching of science. During this year, she worked with student-teachers from the UCSB Graduate School of Education class of 2005, helping them to prepare for teaching K-6 science, and supported middle school teachers in their quest of research experience and the development of creative, original, and Science Standard based teaching kits. Again this year Dr. Polne-Fuller worked with the "Youth Enrichment Program" through the Gevirtz Graduate School of Education, and with the Young Writers Institute through the South Coast Writing Program.

In support of science education in the community, Dr. Polne-Fuller has been working with groups of junior high and high school science teachers in the Santa Barbara, Lompoc, Oxnard and Ventura School Districts. She presented family science evenings in the UCSB Partnership Schools and in local retirement homes. She also presented marine science programs for the annual JASON Project teachers at the Santa Barbara Maritime Museum. Other educational activities were as follows:

CAMPUS TEACHING AND EDUCATION WORK:

UCSB Undergraduate Students:

- **Undergraduate Research** - Dr. Polne-Fuller worked with UCSB undergraduate students studying the toxicity of low alcohol on living cells
- **Welcoming Freshman Group** - Hosted groups of freshman students at the lab, sharing research projects and potential future involvement
- **Welcoming Freshman Summer Start students** - Participated in the Freshmen Summer Start Program lunch-hours to answer questions and share experiences about higher education, influences of college life, and maintaining a once-strong personal value system.

- **Research Mentorship Program (RMP)**: Celebrating its 11th anniversary, Dr. Polne-Fuller continues to teach and direct a UCSB Summer Session program for excelling high school students (Interdisciplinary 93S and 93SL, Research Mentorship Program 2005). This year, nine MSI researchers served as mentors in this program, where 54 outstanding high school students participated and presented a high quality Research Symposium July 26-28, 2005, at the Bren School Conference Room.

- **Shoreline Preservation ES-20**: Re-offered a course she developed entitled "Shoreline and Watershed Preservation Issues: From Watersheds to the Channel Islands," providing undergraduate students from campus-wide departments with hands-on views of environmental research taking place at UCSB, and developing an awareness of pending environmental issues affecting UCSB and the surrounding communities .

- **EEMB-4FS:** Taught a Freshman Seminar – Introduction to Research at UCSB.

- **Planned and co-taught "The Saturday with Scientists Program":** Developed and presented by Dr. Polne-Fuller, this program hosts large numbers of high school students from under-served high schools. Buses bring 80 high school students, counselors and teachers to spend a Saturday at UCSB visiting labs, experiencing research tools, and learning about the professional lives of researchers in a wide range of disciplines. The students come from a wide variety of under-served high schools, some among the UCSB Partnership Schools, and others from the vaster area of Inner City Los Angeles, and East and Central LA. The day-long program ends with a visit to the touch tanks maintained by the Marine Science Institute and the Department of Biological Sciences.

DONORS:

- She also hosted individuals, and small groups of donors and potential donors, with interests in education.

NEW INITIATIVES:

- Participation in an MSI project to support the San Roque School in developing their integrated science program.

RESEARCH and PRESENTATIONS for pre-college groups:

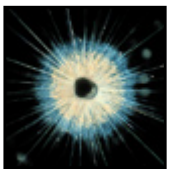
- **Jason Project**: Dr. Polne-Fuller has maintained her involvement with the teacher-enrichment aspects of the JASON-XV project and participated in the JASON-XV teacher preparation workshop at the Santa Barbara Maritime Museum, co-sponsored by the Marine Science Institute Outreach programs at UCSB.
- **Translating Research Into Education**: During the 2004-05 academic year she worked with local high school students, middle school students and primary school students, engaging all in scientific research and supporting Science Fair projects.
- **Pre-K Kelp Forest exposures -** Presented science in the kelp forest to Pre-K students at the Orfalea Family Children's Center
- **K-3 Ecology Exposures** - Presented "Life cycles", and Ecosystems at the Montessori School Green Door
- **High School Research Exposures** - Presented "Research as an Inquiry Experience" at the Laguna Blanca High School assembly
- **Instructor Enrichment Informal Education** - Worked with the instructors and children of the local Boys and Girls Club chapters

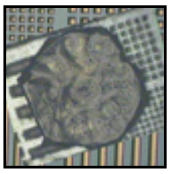
- **Grunion Midnight Field Trips** – Organized and guided Grunion Greeting Midnight Beach Walks for donors and their families
- **Participated in Beach Walks** – for the TechTrek program supported by the American Women in Science Association and servicing 13-14 year old girls from under-served schools throughout California
- **Science Curriculum for Boys and Girls Clubs**: During the Summer of 2005 Dr. Polne-Fuller worked for the 3nd year with five chapters of Boys and Girls Clubs. With our guidance the Clubs have been developing science experiences for their students.
- **High School Visits**: Hosted six visiting high school groups from Dana Point, Bakersfield, and LA who came for an annual visit to UCSB to learn about research and the marine environment.

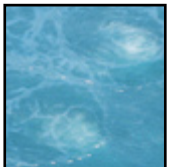
Awards Administered



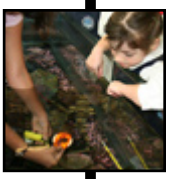


Awards Administered



Advanced Technology Institute

E. Matthys, D. Chapman
2003-619 (Task 0) 6/23/03-12/22/04 $0
Development of a Bioengineering-based Technology for the Reduction of Hull Drag and Fouling

Advanced Technology Institute Subtotal **$0**

American Chemical Society

I. Leifer
PRF 40726-AC8 4/1/04-8/31/06 $40,000
A Turbine Seep-Tent Network to Study Hydrocarbon Migration

American Chemical Society Subtotal **$40,000**

Andrew W. Mellon Foundation

O. Reichman, S. Andelman
SB050085 3/23/05-3/31/07 $300,000
Deploying Information Management Tools and Increasing Analytical Capabilities of Scientists through the National Center for Ecological Analysis and Synthesis

Andrew W. Mellon Foundation Subtotal **$300,000**

California Artificial Reef Enhancement

M. S. Love
SB020084 7/1/04-12/31/05 $17,000
The Ecological Role of Natural Reefs and Oil and Gas Production Platforms on Rocky Reef Fishes in Southern California

M. S. Love
SB020084 1/1/06-12/31/06 $115,714
The Ecological Role of Natural Reefs and Oil and Gas Production Platforms on Rocky Reef Fishes in Southern California

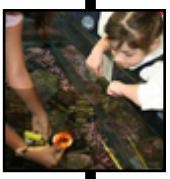
California Artificial Reef Enhancement Subtotal **$132,714**

California Department of Fish and Game

J. Caselle, M. Love
P0370013 5/1/04-4/30/05 $319,334
CRANE Santa Barbara Channel: A Proposal to Conduct SCUBA Surveys in Nearshore Areas of the Santa Barbara Channel and Northern Channel Islands

I. Leifer
P0375021 3/1/04-6/30/05 $51,412
Natural and Human Oil and Gas Seepage at Summerland: Assessing Risks with Potential Mitigation Strategies

California Department of Fish and Game Subtotal **$370,746**



California Regional Water Quality Control Board

D. Herbst
04-157-256-0 10/15/04-3/31/07 $160,000
Bioindicators of Water and Habitat Quality in Streams of the Lahontan Region Eastern Sierra

California Regional Water Quality Control Board Subtotal **$160,000**

California Trout

D. Herbst
SB050057 7/7/04-9/30/05 $10,000
Stream Condition Inventory, Golden Trout Wilderness

California Trout Subtotal **$10,000**

Center for Invasive Plant Management, Montana State University

O. Reichman
GC257-04-Z1138 4/23/04-3/31/05 $5,000
Do Native Consumers and Patch Shape Affect the Dominance of Invasive Plants?

Center for Invasive Plant Management Subtotal **$5,000**

City of Santa Barbara

P. Holden
21429 6/15/04-12/31/05 $130,007
DNA-Based Source Tracking of Human Fecal Material: A Proposal to the City of Santa Barbara

City of Santa Barbara Subtotal **$130,007**

David and Lucile Packard Foundation

J. Levine
2004-27672 10/21/04-10/20/09 $625,000
Understanding Biological Invasions from Introduction through Impact

O. Reichman, S. Andelman
2004-27169 6/20/04-6/20/07 $534,795
Knowledge and Capacity-Building to Support Ecosystem-Based Management for Sustainable Coastal-Marine Systems

David and Lucile Packard Foundation Subtotal **$1,159,795**

Gordon and Betty Moore Foundation

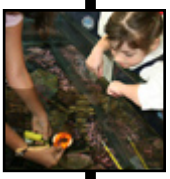
R. Schmitt, S. Holbrook
SB050036 11/16/04-9/30/05 $1,391,737
Initial Instrumentation of the Moorea Coral Reef Long-Term Ecological Research Site

Gordon and Betty Moore Foundation Subtotal **$1,391,737**

Harvard University

J. Alroy
SB020042 9/1/04-8/31/05 $301,214
The Co-Evolution of Biodiversity and the Environment Through Geologic Time

Harvard University Subtotal **$301,214**



Martin V. & Martha K. Smith Foundation

L. Laughrin, S. Swarbrick
05002 3/1/05-3/1/06 $5,000
Solving Invasive Plant Problems Through Habitat Restoration: A Teacher-Student Workshop

Martin V. & Martha K. Smith Foundation Subtotal **$5,000**

National Aeronautics and Space Administration

C. Anderson, D. Siegel
NNG04GQ34H 9/1/04-8/31/05 $24,000
A Model for Remotely Detecting the Dynamics and Toxicity Of Pseudo-nitzchia Blooms in the Santa Barbarb Channel

B. Campbell, D. Valentine
NGT5-50468 9/1/04-8/31/05 $24,000
Hydrogen Isotope Systematics of Lipid Biomarkers from Sulfate-Reducing Bacteria

National Aeronautics and Space Administration Subtotal **$48,000**

National Science Foundation

C. Carlson
MCB-0237725 4/1/05-3/31/06 $119,816
Collaborative Research: Linking Microbial Discovery to Biogeochemical Processes in an Oligotrophic Oceanic Microbial Observatory

C. Carlson
OCE-0425615 7/1/04-6/30/07 $342,038
The Effect of Mesoscale Eddy Perturbations on Microbial Processes and Community Structure in the Sargasso Sea

C. Carlson
OCE-0446987 12/1/04-11/30/05 $25,901
SGER: DOM on U.S. Global Repeat Hydrographic Survey: Line P16S

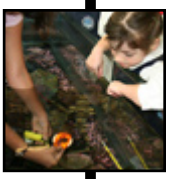
K. Foltz
IOB-0415581 9/1/04-8/31/05 $125,000
Understanding the Fertilization Signalsome

K. Foltz
IOB-0415581 9/1/05-8/31/06 $125,000
Understanding the Fertilization Signalsome

R. Haymon, P. Holden
MCB 0406999 8/1/04-7/31/05 $85,131
SGER: Developing Metal-tagged DNA Probes for High Resolution Imaging of Microbial Phylotype Distributions and Nanoscale Mineral/Microbe Associations in Environmental Samples

G. Hofmann
OCE-0425107 7/15/04-6/30/07 $368,534
Finding the Genes that Matter: Profiling Gene Expression in Strongylocentrotid Sea Urchins with Different Biogeographic and Temperature Distributions

G. Hofmann
ANT-0440799 5/1/05-4/30/06 $193,121
Towards an Understanding of Protein Homeostatis in Cold-adapted Antarctic Fish



National Science Foundation cont'd

J. P. Kennett
NSF OCE-0242041 2/1/05-1/31/06 $95,000
Abrupt Climatic Transitions: Surface to Deep-water Response from High-resolution Sediment Records, Santa Barbara, California

A. M. Kuris, K. D. Lafferty
NSF EF-0224565 6/1/05-5/31/06 $439,545
Anthropogenic Effects on Host-Trematode Dynamics

A. M. Kuris, K. D. Lafferty
NSF EF-0224565 6/1/04-5/31/05 $9,000
Anthropogenic Effects on Host-Trematode Dynamics

S. MacIntyre
OCE 0235238 5/1/05-4/30/06 $72,693
Collaborative Research: Physical Limnology for the Parasite Ecologist

C. Nicholson, J. Kennett, C. Sorlien
OCE 0350573 4/1/05-3/31/06 $147,119
A Test for Extending the High-Resolution Climate History Back to ~450ka: The Interface Between Climate, Tectonics, and Sea-level Change in Santa Barbara Basin

T. Oakley
DGE 0411712 10/1/04-9/30/05 $37,200
Post Doctoral Research Fellowship

T. Oakley, N. Schizas
0316330 1/1/05-12/31/05 $11,300
A Multi-Gene Phylogeny of Maxillopod Crustaceans to Facilitate Comparative Study of Eye Evolution

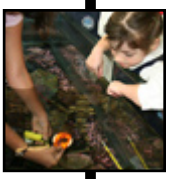
J. Orrock, O. Reichman
DEB-0502069 12/15/04-11/30/05 $43,571
SGER: Does Manipulation of Top Predators Lead to Rapid Shifts in the Structure of Ecological Communities?

D. C. Reed, S. D. Cooper, S. D. Gaines, S. J. Holbrook, J. M. Melack
NSF OCE 9982105 4/1/05-3/31/06 $700,000
LTER: Land/Ocean Interactions and the Dynamics of Kelp Forest Communities

O. J. Reichman, S. J. Andelman
NSF DEB 0072909 8/1/04-7/31/05 $3,147,815
National Center for Ecological Analysis and Synthesis

O. Reichman, J. Orrock
DEB-0444217 3/15/05-2/29/08 $199,324
CRB: The Role of Apparent Competition and Patch Geometry in Mediating the Invasion and Restoration of Grassland Communities

O. J. Reichman, M. P. Schildhauer, M. Jones
NSF EF-0225676 10/1/05-9/30/06 $475,971
ITR Collaborative Research: Enabling the Science Environment for Ecological Knowledge



National Science Foundation cont'd

W. R. Rice
NSF DEB-0128780 2/1/05-1/31/06 $120,000
Gender-Specific Fitness and Intersexual Developmental Conflict in a Drosophila Model System

R. Schmitt, S. Holbrook
OCE-0417412 9/1/04-8/31/05 $820,000
LTER: Long-Term Dynamics of a Coral Reef Ecosystem

R. Schmitt, S. Holbrook
OCE-0417412 9/1/04-8/31/05 $820,002
LTER: Long-Term Dynamics of a Coral Reef Ecosystem

D. Valentine
0447395 4/15/05-3/31/06 $133,240
CAREER: Microbial Geochemistry of Natural Marine Gas Seeps - A Research and Education Plan

National Science Foundation Subtotal **$8,656,321**

Oak Ridge National Laboratory

D. Morse
ORNL 4000025240 10/1/04-9/30/05 $30,000
Silicateins and Carbon Nanotubes

D. Morse
4000034927 8/18/04-8/23/05 $3,500
CNMS RS 2003-04S: Scaffolding of Biosynthetic Enzyme Systems to Nanostructured Electrodics for Controlled Synthesis of Inorganic Materials

Oak Ridge National Laboratory Subtotal **$33,500**

Oregon State University

S. Gaines, R. Warner, L. Washburn, G. Hofmann
F0395A-C 1/1/05-3/31/06 $2,060,104
Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) (Renewal)

Oregon State University Subtotal **$2,060,104**

Princeton University

D. E. Morse, P. Hansma, G. D. Stucky, J. Waite
00000532 8/19/04-8/18/05 $308,692
Synthetic Self-Healing Structural Materials

D. E. Morse, P. Hansma, G. D. Stucky, J. Waite
00000532 8/19/04-8/18/05 $32,500
Synthetic Self-Healing Structural Materials

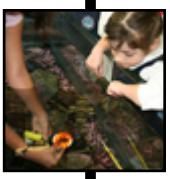
D. E. Morse, P. Hansma, G. D. Stucky, J. Waite
00000532 8/19/04-8/18/05 $305,058
Synthetic Self-Healing Structural Materials

Princeton University Subtotal **$646,250**

Public Health Service

J. Waite, G. Stucky, F. Zok
R01 DE014672 6/1/05-5/31/06 $795,207
Biomimetic Blades: Mincing with Less Mineral

Public Health Service Subtotal **$795,207**



Shoreline Preservation Fund - Associated Students UCSB

J. Dugan
SPRING04-09 7/1/04-12/31/04 $6,013
Expansion of the Coastal Component of the Joint UCSB - MMS Pacific OCS Student Internship Program: Renewal (Renewal)

J. Dugan
Spring05-12 6/1/05-1/31/06 $6,000
Investigating the Ecological Impacts of Coastal Armoring on Sandy Beaches

I. Leifer
FALL4-04 12/10/04-6/30/05 $4,680
Determining Variations and Sources of Tar Accumulation at COPR

M. McGinnis
Spring05-04 6/1/05-3/31/06 $4,537
Coastal Marine Processes and Management: A Profile of the Southern California Marine Ecosystem

C. Sandoval, S. Swarbrick
Fall04-09 1/1/05-6/30/05 $9,625
Buffer Protection and Restoration at Coal Oil Point Reserve (Renewal)

J. Thorsch
SPF SPRING04-11 6/24/04-12/31/04 $2,130
Lagoon Park Enhancement Plan - Phase II

A. Whitmer
FALL4-01 10/15/04-5/31/05 $13,837
Education and Outreach Internship (Renewal)

A. Whitmer
FALL4-01 9/1/04-5/31/05 $6,162
Education and Outreach Internship (Renewal)

A. Whitmer
Spring05-08 6/1/05-1/31/06 $7,712
Education and Outreach Internship (Renewal)

Shoreline Preservation Fund - Associated Students UCSB Subtotal **$60,696**

SRS Technologies

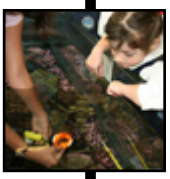
J. Dugan
ISD-04-PO-00 792 7/1/04-9/30/04 $49,767
Assessing Habitat and Prey Resources for Western Snowy Plovers on Exposed Sandy Beaches of Vandenberg Air Force Base

SRS Technologies Subtotal **$49,767**

The Nature Conservancy

B. Halpern, S. Andelman
SB050084 4/1/05-3/31/06 $53,405
Predicting Community-level Responses to Marine Reserve Protection: The Causes of Food Web Stability

The Nature Conservancy Subtotal **$53,405**



The New Media Studio

C. Blanchette, A. Whitmer, V. Herrity
NNN04AA02A 2/1/05-1/31/06 $56,710
Adding Ocean Science Content and Embedded Assessment Tool Capabilities to the Satellite Observations in Science Education (SOSE) REASoN Project

O. Young
Berkman NSF-DUE-0329044 9/1/04-8/31/06 $37,016
Marine Mammal Commission Digital Library of International Environmental and Ecosystem Policy Documents

The New Media Studio Subtotal **$93,726**

UC Davis

J. H. Goddard, C. A. Blanchette
SA6608 9/1/04-8/31/05 $47,118
Impacts and Control of an Invasive Seaweed in California Marine Protected Areas

J. M. Melack
UCD 005230 9/1/02-8/31/05 $50,000
Western Center for Estuarine Ecosystem Indicator Research

R. M. Nisbet, A. J. Brooks, B. Kendall, P. A. Holden, K. D. Lafferty, E. Muller, H. M. Page, A. Stewart-Oaten
UCD R-82867601 3/31/05-2/28/06 $26,000
Western Center for Estuarine Ecosystem Indicator Research

D. Reed
UCD 013981-02 11/1/04-1/31/06 $40,352
Mechanical Consequences of Flexibility for Benthic Marine Organisms

UC Davis Subtotal **$163,470**

UC Irvine

P. Holden
UCI-2003-1374 9/1/04-8/31/05 $50,000
Dynamics of Point and Non-point Source Fecal Pollution from an Urban Watershed in Southern California

UC Irvine Subtotal **$50,000**

UC Office of the President

D. Reed, S. MacIntyre, M. Brzezinski, S. Holbrook
UCOP 012856-01 7/1/04-6/30/05 $176,016
Ecosystem Functioning in Giant Kelp Forests: Linking Hydrodynamics to an Essential Forage Species and its Benthos

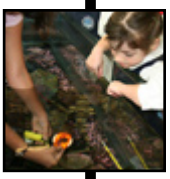
UC Office of the President Subtotal **$176,016**

UC San Diego

L. Washburn
0478.01SB 2/1/05-12/31/05 $342,928
Short-Medium Range Resolution/Long Range HF Radars-Task A.1

L. Washburn
0478.03SB 2/1/05-12/31/05 $41,509
Two Bight-Scale Sections Using an Underway CTD-Task C.1

UC San Diego Subtotal **$384,437**



UC Santa Cruz

B. Prézelin
03-T-CEQI-07-0062 7/1/04-6/30/05 $106,202
Toxic Phytoplankton Along the California Coast: A 500-Mile Perspective

UC Santa Cruz Subtotal **$106,202**

UC Sea Grant

A. Butler
R/MP-94-F-3/3 3/1/04-2/28/05 $57,075
Molecular Approaches in Marine Pharmacology (Renewal)

A. Butler
R/MP-94-TR-3/3 3/1/04-2/28/05 $24,778
Molecular Approaches in Marine Pharmacology (Renewal)

I. Leifer, B. Luyendyk, J. Boles, J. Clark, J. Ohlmann, D. Valentine, L. Washburn
Xx check award no in GUS 20050962 3/1/05-2/28/06 $10,000
Responding to an Extreme Storm Driven Increase in Oil and Gas Seepage from Natural Seeps along the California Coast

D. Morse
R/MP-95-TR-1/3 3/1/04-2/28/05 $24,713
Marine Bio-Nanotechnology: High-Performance Materials from Sponge Silicatein (Renewal)

D. Morse
R/MP-95-F-1/3 3/1/04-2/28/07 $95,604
Marine Bio-Nanotechnology: High-Performance Materials from Sponge Silicatein (Renewal)

UC Sea Grant Subtotal **$212,170**

UC Toxic Substances Research and Teaching Program

R. J. Schmitt
Xx award no. 7/1/04-6/30/05 $270,000
Coastal Toxicology Component of the UC TSR &TP

UC Toxic Substances Research and Teaching Program Subtotal **$270,000**

UC Water Resources Center

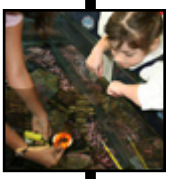
J. Melack, C. Carlson
SB050002 7/1/04-6/30/06 $58,000
Nutrient Deposition and Alteration of Food Web Structure in High Sierran Lakes: Response by Microbial Communities

UC Water Resources Center Subtotal **$58,000**

University of Miami

C. Carlson
UNIV MIAMI SB030082 1/1/05-12/31/05 $72,756
Collaborative Research: Global Ocean Repeat Hydrography, Carbon, and Tracer Measurements

University of Miami Subtotal **$72,756**



University of Washington

W. Rice
UW 806099 8/1/04-7/31/05 $82,763
IRCEB: The Origin of Barriers to Fertilization and Their Role in Speciation: From Populations to Proteins

University of Washington Subtotal **$82,763**

US Department of Energy

P. Holden
DE-FG02-05ER63949 11/15/04-11/14/05 $83,211
Stabilization of Plutonium in Subsurface Environments via Microbial Reduction and Biofilm Formation

J. Kennett
DE-FG02-03ER63696 9/15/04-9/14/05 $132,448
Effects of Oceanic Disposal of Carbon Dioxide on Benthic Microfauna: Foraminfera as Indicators of Dissolution and Ecosystem Health

US Department of Energy Subtotal **$215,659**

US Department of the Navy

J. Case
N00014-05-1-0046 12/1/04-10/31/06 $19,716
Coastal Bioluminescence: A Collaboration Dealing with Sources, Population Dynamics and Instrumentation

J. Case
N00014-05-1-0046 12/1/04-10/31/06 $108,954
Coastal Bioluminescence: A Collaboration Dealing with Sources, Population Dynamics and Instrumentation

US Department of the Navy Subtotal **$128,670**

US Environmental Protection Agency

P. Holden
RD-83171201 7/1/04-6/30/07 $332,099
Transformation of Biologically-Conjuaged CdSe Quantum Dots Released into Water and Biofilms

US Environmental Protection Agency Subtotal **$332,099**

US Fish & Wildlife Service

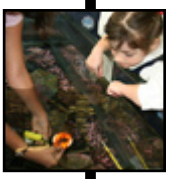
C. Culver, J. Dugan
113324G006 9/21/04-8/31/05 $18,581
Early Detection, Monitoring and Year Class Strength of the Chinese Mitten Crab, *Eriocheir sinensis*: Evaluating Recruitment Dynamics

US Fish & Wildlife Service Subtotal **$18,581**

US Forest Service

D. Herbst
SB040105 7/1/04-9/30/05 $17,118
Stream Condition Inventory and Macroinvertebrate Bioassessment of Stream-Reaches in Grazed and Presently Ungrazed Portions of the Golden Trout Wilderness

US Forest Service Subtotal **$17,118**



US Geological Survey

M. Love
03WRAG0037 10/1/04-9/30/05 $41,214
Rocky Reef Fish and Trophic Interactions Associated with Offshore Oil and Gas Platforms in Southern California

M. Love
03WRAG0037 1/1/05-9/30/05 $7,874
Rocky Reef Fish and Trophic Interactions Associated with Offshore Oil and Gas Platforms in Southern California

M. Love
03WRAG0037 10/1/04-9/30/05 $16,051
Rocky Reef Fish and Trophic Interactions Associated with Offshore Oil and Gas Platforms in Southern California

US Geological Survey Subtotal **$65,139**

USDC - National Oceanic & Atmospheric Administration

R. Haymon, K. Macdonald
NA04OAR600049 4/1/05-4/30/06 $106,937
Exploring Hydrothermal System Response to Magma Supply & Crustal Thickness Gradients Along the Galapagos Spreading Center, 89.5°-94°

W M. Steele
CMRC-03-NRME-01-O4A 2/1/04-1/31/05 $31,736
Density Dependence in Exploited Marine Fish: An Experimental Test and Theoretical Exploration of the Implications for Fisheries Enhancement via Marine Protected Areas

USDC - National Oceanic & Atmospheric Administration Subtotal **$138,673**

USDI - Minerals Management Service

M. Love
MMS 1435-0104CA-35031 6/2/04-6/1/06 $150,000
Assessing the Fate of Juvenile Rockfishes at Offshore Platforms and Natural Reefs in the Santa Barbara Channel

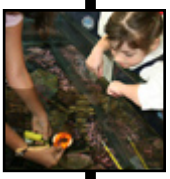
USDI - Minerals Management Service Subtotal **$150,000**

USDI - National Park Service

D. Herbst
J8C07030003 7/1/04-6/30/05 $20,000
Evaluating Recovery of Stream Invertebrate Communities following Removal of Introduced Trout in Kings Canyon National Park

J. Melack
H8C0703001 7/1/05-10/28/06 $90,000
Assessment of Coastal Water Resources and Watershed Conditions in and Adjacent to Channel Islands National Park and Cabrillo National Monument

USDI - National Park Service Subtotal **$110,000**



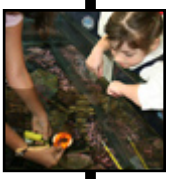
Virginia Institute of Marine Science

L. B. Quetin, R. M. Ross
518606/1247 10/1/04-9/30/05 $96,000
LTER: Palmer Antarctica LTER: Climate Change, Ecosystem Migration and Teleconnections in an Ice-Dominated Environment

L. B. Quetin, R. M. Ross
518606/1247 10/1/04-9/30/05 $8,520
LTER: Palmer Antarctica LTER: Climate Change, Ecosystem Migration and Teleconnections in an Ice-Dominated Environment

Virginia Institute of Marine Science Subtotal **$104,520**

Research Summaries
(Contracts/Grants Administered)
July 2004 – 2005



Alice Alldredge **11/1/99-10/31/04** **$251,726**
National Science Foundation, NSF OCE99-06827

Collaborative Research: Fragmentation of Marine Snow by Swimming Macrozooplankton

Processes which alter the sizes and abundances of large, rapidly sinking detrital particles, known as marine snow, in the ocean can dramatically impact the flux of carbon and its availability to various components of the pelagic ecosystem. Consumption by animals, bacterial decomposition, solubilization, and disaggregation by physical mixing and current shear have all been proposed as processes by which large particles are consumed or transformed into smaller more slowly sinking forms. However, recent compelling evidence from both the lab and the field indicates that a fifth, previously unconsidered process may be highly significant in reducing carbon flux and altering particle dynamics in the ocean. Evidence from California waters indicates that the vertically migrating common krill, Euphausia pacifica, fragments marine snow in the water column through its swimming activities alone. The collaborators for this project will investigate this hypothesis.

John Alroy **9/1/00-8/31/05** **$1,457,615**
Harvard University, SB020042

The Co-Evolution of Biodiversity and the Environment Through Geologic Time

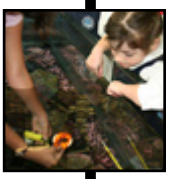
The UCSB investigator and UCSB's National Center for Ecological Analysis and Synthesis will provide computational resources, meeting facilities and project coordination for a five-institution, multidisciplinary collaborative research endeavor. Major scientific objectives include building a comprehensive locality-level paleoecological database of Phanerozoic marine and terrestrial organisms; linking these data with geochemical time series to be provided by one of the other co-investigators; developing web-based database management and analysis software; building a web site that will provide public access to the database; and performing statistical analyses that will make corrections for sampling artifacts and quantify intrinsic biotic dynamics, extrinsic environmental forcings of biotic dynamics, and the effects of geographic scale, biogeography, and paleoenvironment on our view of the Earth's evolutionary history.

Sandy Andelman **9/1/02-9/30/05** **$30,000**
Andrew W. Mellon Foundation, SB030037

Using a Knowledge Network to Expand NCEAS-South Africa Collaboration: Scale-Dependence in the Relationship Between Biodiversity and Ecosystem Function

The National Center for Ecological Analysis and Synthesis (NCEAS) is involved in several large projects designed to develop software tools to facilitate remote access and management of ecological data. Ecological data are profoundly heterogeneous and highly distributed, making them difficult to locate and assimilate. To test the tools as they are developed, and to involve the ecological community in the design and refinement of the tools, NCEAS has employed a distributed graduate seminar approach that has been used at the Center to address other topics. In this approach, graduate seminars are conducted simultaneously at multiple universities around the country. All participating universities collaborate remotely to address a common central research theme, but each individual seminar also focuses on a form of that question targeting its own local geographic area. At the end of the semester, some of the students and faculty from each seminar come to NCEAS to conduct a grand synthesis of the information and ideas that emerged from each individual seminar. This has many benefits as both a pedagogical and intellectual instrument.

Sandy Andelman **2/1/04-1/31/06** **$37,000**
Andrew W. Mellon Foundation, SB040051



A Unified Framework for Management and Dissemination of Heterogeneous Data and Metadata from Kruger National Park

The Kruger National Park (KNP) is renowned for long-term ecological datasets generated from plant and animal monitoring programs. Some of these data comprise time series spanning more than five decades. Several major thematic layers, such as vegetation cover, plant composition, vertebrate herbivore counts, fire records, and the concomitant rainfall and hydrology are maintained in geo-referenced databases. In addition, the several hundred research projects registered in the Park generate further data, which also are catalogued. The potential benefits of these data for advancing ecological knowledge are significant, but have not been fully realized. The National Center for Ecological Analysis and Synthesis (NCEAS) is engaged in several major informatics research initiatives, and is developing tools for access, management and analysis of heterogeneous ecological data. To facilitate use of these tools by ecologists, and to obtain input into the evolution of the tools, NCEAS is coordinating a distributed graduate seminar series involving the use of new informatics tools and methods at multiple universities. With funding from the Mellon Foundation, NCEAS has expanded this distributed research and training model to involve collaboration with scientists from Kruger and elsewhere in South Africa.

Sandy Andelman **10/1/03-6/30/05** **$70,867**
Conservation International Foundation, SB040033

Monitoring Biodiversity in Tropical Forests: Using Models to Evaluate Sampling Protocols and Customizing Ecological Metadata Language (EML) for use with TEAM and Regional and Central Databases

The TEAM initiative will produce unprecedented quantities of ecological and environmental data, from sources distributed around the globe. In addition, TEAM's mission calls for making these data broadly available to the conservation and scientific communities. To maximize the utility of the data to the broadest community of users, and to minimize the need to respond to individual requests for information, a process is needed for creating and incorporating comprehensive and structured metadata into the data collection, management and dissemination process.

Clarissa Anderson **9/1/04-8/31/05** **$24,000**
David Siegel
National Aeronautics and Space Administration, NNG04GQ34H

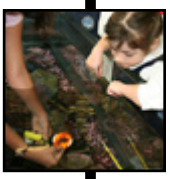
A Model for Remotely Detecting the Dynamics and Toxicity Of Pseudo-nitzchia Blooms in the Santa Barbarba Channel

Environmental controls of harmful algal blooms are variable at the regional level and not always anthropogenic. In the Santa Barbara Channel the highest concentrations of the toxic diatom group, Pseudo-nitzschia, coincide with periods of strong upwelling and minimal run-off from land. This project addresses bloom dynamics and toxicity of Pseudo-nitschia using the existing framework of the NASA supported Plumes and Blooms project and the SBC-LTER research site. These programs will provide many of the physical, chemical, and biological parameters necessary to parameterize bloom formation and toxin production. In situ data will be incorporated into a predictive model that assesses toxic bloom probabilities for this site. The model will be applied to the remote estimation of blooms using satellite ocean color (MODIS-Aqua & SeaWiFS), sea surface temperature (AVHRR), and high frequency radar determinations of surface currents to develop predictive tools for the onset and toxicity of Pseudo-nitzschia bloom dynamics.

Carol Blanchette **9/30/03-6/30/05** **$61,851**
The Nature Conservancy, SB040043

Community-Based Eelgrass Restoration at Santa Cruz Island, CA

This is a community-based cooperative effort with Santa Barbara Channelkeeper and the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) to restore eelgrass at Santa Cruz Island, California. Eelgrass beds are regarded worldwide as one of the most productive marine habitats,



and have been identified locally as a critical habitat by the science panel of the Sanctuary Advisory Council in their recent efforts to locate marine reserves around the California Channel Islands. Eelgrass beds are threatened by activities associated with development in many areas and are locally at risk in relatively pristine habitats, such as Santa Cruz Island. Storms, sediment movement, pollution and disturbances from visiting boats have all contributed to decline. Additionally, the altered trophic structure in many of these nearshore communities due to decades of fishing pressure has resulted in removal of natural urchin predators and booms in urchin abundances resulting in severe overgrazing. The investigators' long-term goal is to train and mobilize teams of volunteer community divers to help restore eelgrass beds along northern Santa Cruz Island, where they have historical and preliminary data on eelgrass abundance and density from several locations.

Carol Blanchette **2/1/05-1/31/06** **$56,710**
Alison Whitmer
Vishna Herrity
The New Media Studio, NNN04AA02A

Adding Ocean Science Content and Embedded Assessment Tool Capabilities to the Satellite Observations in Science Education (SOSE) REASoN Project

The investigators will develop a curricular module focusing on ocean science, and a java-based software and learning evaluation tool designed to be integrated into the data access and visualization toolbox of the NASA SOSE REASoN project. The ocean science curricular module (Patterns and Processes in the Ocean) will be designed as a reusable content object (RCO) to be integrated into the SOSE internet-based toolbox. This will provide an incredibly valuable test ot the «re-usability» of the RCE framework being developed through the SOSE project. This RCO will be based on NASA ocean-related datasets from several sources and will incorporate data-rich topics that span large scales in time and space. The primary data of interest are ocean temperature (SST), ocean color (chlorophyll), ocean winds and sea surface height. These datasets are perfect for illustrating and exploring physical relationships driving patterns and processes in the oceans across large scales in space ant time. This module will allow students to explore relationships among many physical and biological variables and begin to understand the physical processes influencing the distribution of organisms throughout the oceans.

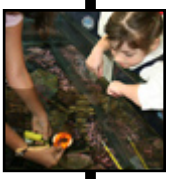
Mark Brzezinski **6/15/01-5/31/05** **$310,000**
National Science Foundation, NSF OCE99-85887

Iron Limitation of Silica Production in the Southern Ocean: A Companion Proposal to the SO FeX Experiment

The results of iron enrichment experiments in the high nitrate, low chlorophyll (HNLC) waters of the Equatorial Pacific, the Subarctic Pacific and most recently in the Southern Ocean demonstrate that phytoplankton growth and biomass in those areas is limited by low concentrations of available iron. A key result common to almost all shipboard Fe enrichment experiments from all Fe-limited regions is that diatoms are stimulated to a greater degree than other phytoplankton taxa. The same preferential stimulation of diatoms over other taxa was observed during IronEx II where in situ iron fertilization in the equatorial produced a bloom dominated by diatoms. Despite such a consistent strong response of diatoms to iron addition, the effects of Fe limitation on diatom silica production in situ remains unexamined. This study will assess the effect of in situ iron fertilization on silica production and the kinetics of Si(OH)4 use in the Polar Front region of the Southern Ocean in conjunction with the SO FeX project led by Moss Landing Marine Laboratory. Of all the HNLC areas, diatoms are likely to be important in the Southern Ocean as over half of modern global accumulation of siliceous sediment occurs there, forming the Great Sedimentary Opal Belt that girdles most of the Southern Ocean.

Mark Brzezinski **4/1/04-3/31/08** **$594,338**
National Science Foundation, OCE-0350576

Testing the Utility of Natural Variations in Isotopes of Si as a Proxy for Silica Production in the Sea



In the mid 1990's it was discovered that diatoms fractionate isotopes of silicon during silicon biomineralization opening the possibility of using natural variations in isotopes of silicon in dissolved Si and in diatom frustules as a tool for assessing silica production in both the past and present day ocean. Diatoms with their silica ballast are key vectors of organic matter out of the euphotic zone. Their obligate need for Si means that their contribution to primary productivity and the biological carbon pump can be controlled by the availability of silicic acid in ocean surface waters. Natural variations in isotopes of Si in diatoms and silicic acid offer a possible means of assessing relative silicic acid use on longer time scales and larger spatial scales than any other technique currently available. This project proposes to continue evaluating and calibrating the ∂30 Si proxy.

Mark Brzezinski **12/1/03-11/30/07** **$155,755**
Oregon State University, OSU S0793A-G

Plankton Dynamics and Carbon Cycling in the Equatorial Pacific Ocean: Control by Fe, Si, and Grazing

In collaboration with investigators at Oregon State University, as part of a grant from the NSF Biocomplexity Program, the UCSB PI will participate on two cruises to the Equatorial Pacific Ocean. Dr. Brzezinski's primary responsibility is to make measurements of silica dissolution rates. UCSB's research team will also assist in measuring silicic acid concentration, biogenic silica concentration and silica production rates. Additionally, the UCSB researchers will participate in K-12 outreach workshops related to this project in Oregon and Maine.

Jennifer Burnaford **9/1/02-7/31/04** **$39,122**
Gretchen Hofmann
National Science Foundation, NSF INT02-43518

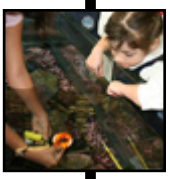
The Ecological and Physiological Significance of Thermal Stress: Characterization of the Heat-Shock Response in Marine Snails

This integrative project combines physiological studies of molecular chaperone biology with ecological studies of field populations of herbivorous marine snails in the Northern Gulf of California. The heat-shock response (HSR), in which gene expression is activated in response to stressors, is a powerful mechanism to increase tolerance to physiological stress. Although the HSR has been well characterized in laboratory studies of model organisms, few studies have addressed this mechanism in populations in their natural environment. As a result, we know very little about how this potentially powerful protective response functions under real conditions. The aim of this project is to examine the interaction between the physiology of the HSR and the distribution, behavior and fitness of natural populations, with emphasis on three specific questions: 1) How important and effective are behavioral strategies for avoiding thermal stress in the field? 2) How frequently do intertidal organisms experience HSR inducing stress in the field? 3) How does the timing of the HSR vary during recovery from thermal stress?

Alison Butler **3/1/04-8/31/05** **$241,036**
UC Sea Grant, R/MP-94-

Molecular Approaches in Marine Pharmacology

Many marine natural products and enzymes have important medical applications in the diagnostic, pharmaceutical and biotechnological industries. These compounds and enzymes are at various stages of development, ranging from evaluation of their biological activities, to testing in clinical trials, to their incorporation into commercial products. Notwithstanding this success, the rise in drug-resistant infections demands new drugs and strategies for eradication or control of invading pathogenic organisms. In addition, early disease detection requires new or more sensitive biochemical diagnostic tools. Solutions to these problems can be provided through discovery of new bioactive compounds, studies of their biogenesis, including endogenous biosynthetic enzyme investigations, and elucidation of their molecular mechanisms of action. Such strategies will allow chemists and pharmacologists, working in a collaborative effort, to pursue the development of novel drugs and diagnostics.



Bria n Campbell **9/1/03-8/30/06** **$48,000**
David Valentine
National Aeronautics and Space Administration, NGT5-50468

Hydrogen Isotope Systematics of Lipid Biomarkers from Sulfate-Reducing Bacteria

This graduate student research project will examine hydrogen isotope fractionation by sulfate-reducing bacteria (SRB). One objective is to understand deuterium/hydrogen (D/H) systematics in SRB. Pure cultures of SRB will be grown in media of varying _D/ lipids and metabolites will be monitored for D/H response. Another objective is to develop lipid biomarker proxies for anoxia. Compound-specific _D analyses will be conducted on lipid biomarkers from oxic and anoxic environments (e.g., Black Sea). A viable proxy (associating anoxia with _D of a particular compound) could place constraints on redox conditions of Proterozoic oceans, thereby contributing to the understanding of biological-planetary interactions.

Craig Carlson **4/1/03-3/31/06** **$358,424**
National Science Foundation, MCB-0237725

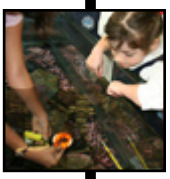
Collaborative Research: Linking Microbial Discovery to Biogeochemical Processes in an Oligotrophic Oceanic Microbial Observatory

This renewal project focuses on microorganisms that live in the ocean surface layer (0-300 m), one of the largest habitats on earth. Microorganisms in the ocean surface layer play an integral role in carbon transport from the atmosphere to the deep ocean. Small perturbations in the metabolism of DOC by microorganisms could strongly impact the balance between oceanic and atmospheric Co2. Thus, the microbial processes that determine DOM production, consumption and distribution in the oceans are important to the global carbon cycle. A relatively small set of microbial groups dominates the ocean surface. Most of these organisms have never been cultured for study in scientific laboratories. The goal of this project is to understand the cell biology and biogeochemical activities of the major bacterioplankton groups by applying new high throughput technologies for cell culturing, and studying the metabolism of these organisms in nature and their interactions with organic matter in the oceans. This effort will be focused on the Bermuda Atlantic Time-series Study (BATS) site, a subtropical gyre characterized by winter time convective overturn, spring phytoplankton blooms, and regular patterns of DOC cycling.

Craig Carlson **7/1/04-6/30/07** **$342,038**
National Science Foundation, OCE-0425615

The Effect of Mesoscale Eddy Perturbations on Microbial Processes and Community Structure in the Sargasso Sea

This is a companion project to the «EDDIES» (EDdy Dynamics, mixing Export, and Species composition) project funded by NSF Biological, Chemical and Physical Oceanography. This interdisciplinary field program was initiated in the Sargasso Sea during the summers of 2004 and 2005. Recent evidence suggests that mesoscale eddies are an important nutrient transport mechanism in the oligotrophic waters of the main subtropical gyres. Numerical simulations and satellite-based statistical estimates indicate that the magnitude of the eddy-driven nutrient flux could be sufficient to balance geochemical estimates of new production. Relatively few direct observations of this process are available, owing to the spatial and temporal intermittency of the events that drive it. Available data demonstrate that isopycnal displacements associated with certain types of eddies can transport nutrients into the euphotic zone, resulting in the accumulation of chlorophyll in overlying waters. Preliminary data indicate that coincident with the passage of a cyclonic eddy at the BATS site, bacterial production rates were significantly enhanced relative to the monthly mean values. However, the extent of the prokaryotic heterotrophic response and their impact on coupled biogeochemical cycles and export has yet to be elucidated. The principal investigator will sample parameters relevant to heterotrophic prokaryotes across mesoscale eddies documenting how these parameters vary inside the eddy through time and space (horizontal and vertical) relative to outside («control») waters.



Craig Carlson **12/1/04-11/30/05** **$25,901**
National Science Foundation, OCE-0446987

SGER: DOM on U.S. Global Repeat Hydrographic Survey: Line P16S

The PI will conduct dissolved organic carbon (DOC) and nitrogen (DON) measurements on an ocean-basin-crossing section, as part of the US Repeat Hydrographic Survey project. The line is the southern half or a meridional section that runs the full length of the Pacific Ocean. The PI's laboratory occupied the northern section of the Atlantic A20 and A22 lines in 2003. The data collected displayed incredible information on the export of DOC with the formation of North Atlantic Deep Water, and the introduction to the North Atlantic of low DOC water from the south in Antarctic Bottom Water and Antarctic Intermediate water. The paucity of DOC and DON data in the South Pacific preclude understanding of how the introduction of Antarctic Bottom and Antarctic Intermediate water impact DOC transport and distribution in the South Pacific. DOM measurements on the P16S line must be made to complement the other funded carbon system measurements and to fully understant the processes controlling the abundance of this very large pool of carbon.

Craig Carlson **1/1/03-12/31/05** **$246,537**
University of Miami, UNIV MIAMI SB030082

Collaborative Research: Global Ocean Repeat Hydrography, Carbon, and Tracer Measurements

Dissolved organic matter (DOM), represents one of the largest exchangeable carbon reservoirs on earth. The global dissolved organic carbon (DOC) pool is estimated to be 685 Pg C (Pg = 1015 g C; Hansell and Carlson, 1998a), a value comparable to the mass of inorganic C in the atmosphere. Small perturbations in the production or sink therms of the oceanic DOC pool could strongly impact the balance between oceanic and atmosphericCO2. In this global ocean repeat hydrograph, carbon and tracer program, D. Hansell (University of Miami) and C. Carlson of UCSB will be responsible for at sea sampling and analyses of dissolved organic carbon (DOC) and nitrogen (DON) measurements. This program includes 17 legs of 10 cruises conducted in various ocean basins from 2003 - 2008.

Craig Carlson **9/1/02-8/31/07** **$253,359**
Virginia Institute of Marine Science, 519207/1248

Quantification and Modeling of DOC and DON Release in Marine Systems: A Study of Increasing Trophic Complexity

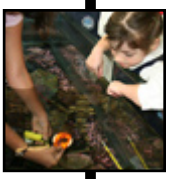
This project complements and expands the PI's ongoing work examining interactions between microbial communities and bioavailability of DOM. He will be responsible for measurements of the microbial dynamics community and selected characterization of the DOM pool. He will provide expertise towards the microbial dynamics and processing of organic matter, and will be responsible for measuring microbial biomass and production in both experimental and field work. Other tasks for the UCSB PI are to oversee the experimental design of the bioavailability study and bacterial growth efficiency experiments; to measure bulk DOM (DOC and DON) concentrations for the oceanic component of the project and for bioavailability studies; to characterize the dissolved combined neutral sugars and dissolved free amino acids in the field and in experimental studies using HPLC technologies; and to participate in data reduction and analysis and publication of papers and reports.

James Case **12/1/04-10/31/06** **$128,670**
US Department of the Navy, N00014-05-1-0046

Coastal Bioluminescence: A Collaboration Dealing with Sources, Population Dynamics and Instrumentation

The goal of this project is to complete a major line of ONR-supported research that received its initial impetus in 1983. As a result of his involvement as a member of the BIDS committee reporting to the Submarine Security Division of the Johns Hopkins Applied Physics Laboratory, the PI developed ideas leading to this line of research. For several years BIDS regularly reviewed ASW/SSN Security field tests dealing with bioluminescence related to submarine security and detection, followed development of an airborne system for detecting submarines at operational depths from their

bioluminescence, and evaluated reports of related work by researchers from other sources, primarily the USSR. The PI's work has focused on development of an adequate bioluminescence detector to reliably sample the bioluminescent biota in the open sea to depths relevant to the Navy.



James Case **3/1/97-6/30/05** **$820,726**
US Department of the Navy, N00014-97-1-0424

Marine Bioluminescence: Mechanisms and Evaluation

Long-term research on marine bioluminescence conducted by the investigator and his students has focused extensively on the role of bioluminescence in marine ecosystems and has advanced understanding of the physiology of marine bioluminescence systems. Three major instrumentation systems (HIDEX, TOWDEX, MOORDEX) have been developed for quantifying marine bioluminescence. The UCSB investigator will complete a comprehensive analysis of all previous work devoted to understanding the impact of bioluminescence on naval operations. Research will continue on three central themes which are reaching culmination: counter-illumination, excitation mechanisms in bioluminescence, and bioluminescence in nutrient cycling and population biology.

Jennifer Caselle **5/1/04-4/30/05** **$319,334**
Milton Love
California Department of Fish and Game, P0370013

CRANE Santa Barbara Channel: A Proposal to Conduct SCUBA Surveys in Nearshore Areas of the Santa Barbara Channel and Northern Channel Islands

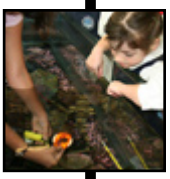
Biological surveys of nearshore marine communities are necessary to fulfill CA Department of Fish and Game management mandates outlined by the MLMA and the MLPA. Characterization of nearshore communities is also necessary to address the goals and objectives outlined by stakeholder groups in CINMS marine reserve working group process. One of the most pressing management needs is for fishery-independent estimates of density and size structure of commercially and ecologically important species, which in turn can be used for stock assessment, ecosystem monitoring, and assessment of marine protected area effectiveness. The investigators will conduct comprehensive nearshore surveys of the Channel Islands National Marine Sanctuary (CINMS) and nearby mainland region. This work focuses on the use of scuba diver visual surveys in shallow rocky reef ecosystems, using survey methods developed by the focus group entitled Cooperative Research and Assessment of Nearshore Ecosystems (CRANE). Collected data will become part of a larger database currently being developed by the DF&G.

Jennifer Caselle **6/1/05-6/1/06** **$19,561**
California Department of Fish and Game, P0470012

California Sheephead Stock Assessment

Since its development in the 1980's, the premium live-finfish fishery in California has expanded greatly. In Southern California, the main target species is the California sheephead (Semicossyphus pulcher), and the primary method of capture is trapping. Southern California commercial sheephead landings have increased from approximately 33,000 lbs. in 1989 to 360,000 lbs in 1997. California sheephead are also an important recreational species in Southern California. Surveys conducted in 1998 revealed that the size distributions of both males and females have shifted towards smaller fish since the advent of the live fish fishery, which targets small fish and lands mostly young females. This type of harvesting on a hermaphroditic species such as sheephead is likely to have effects on not only population densities and individual sizes, but also on sex ratios and the social system. A comprehensive stock assessment during 2004 identified a need for improved information on changes in age, growth, and sex-ratios over time to reduce uncertainty in the estimates of the level of catch that the stock can safely support. This study takes the first step to address those data needs.

James Childress **8/15/03-7/31/06** **$248,007**
National Science Foundation, NSF OCE-0240982



Collaborative Research: Site Evaluations and Background Studies of Interactions Among Fluid Chemistry, Physiology, and Community Ecology for Ridge 2000 Lau Basin Integrated Studies

Two cruises to the East Lau Spreading Center (ELSC) are proposed to evaluate sites for selection as the Integrated Study Site (ISS) bull's eye for the Ridge 2000 program and to carry out studies necessary for further interdisciplinary research in this area. In addition to exploration and biological mapping, the sites will be carefully evaluated in terms of the relation between the chemistry of the diffuse flow vents and the macrobiology. This is especially important to do at this time because the only available water chemistry data for this region is from high temperature vents and indicates that Zn is very high and sulfide and methane are very low; this is not consistent with the abundant communities of sulfide and perhaps methane-oxidizing symbioses reported in diffuse flow. This work is complementary to, and will follow upon, the first two major ISS evaluation cruises outlined in the Implementation Plan for the site.

James Childress **9/1/00-8/31/04** **$540,000**
National Science Foundation, NSF OCE00-02464

Collaborative Research: Studies on the Physiological Ecology of Hydrothermal Vent Chemoautotrophic Symbioses

The vent fauna is a largely ancient fauna of global distribution in the deep-sea. Hydrothermal vents are one of the major ecosystem types on the earth, but probably the least known. The high biomasses of these communities largely reflect the ability of a few invertebrate/bacteria symbioses to oxidize reduced chemical species (sulfide or methane) from the vents using oxygen from the surrounding deep-sea water to power primary production. The central objective of this project is to quantify the major vent symbioses' chemical interactions with the vent fluids and the abundances of those symbioses in such a way that primary and secondary production and other chemical exchanges can be modeled for entire assemblages of symbiotic animals. This work will greatly increase the understanding of the nature of the interactions between the vent animals and their chemical environments and enable the first solid estimates of production and other exchanges by the symbiotic components of vent communities, making a major contribution to the understanding of the functioning of vent and other chemoautotrophically supported ecosystems.

James Childress **8/15/03-7/31/04** **$99,981**
National Science Foundation, OCE 0343561

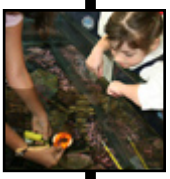
SGER: Studies on the Physiological Ecology of Hydrothermal Vent Chemoautrophic Symbioses

The PI and his research team participated in a cruise of the RV Keldysh and the two Mir submersibles to the hydrothermal vents of the East Pacific Rise off Mexico in the Fall of 2003. One purpose of the cruise was to make an IMAX film about the hydrothermal vents and research on these vents, directed by James Cameron. Dr. Childress and his team conducted research to measure the metabolic fluxes of major vent species as part of their overall program to estimate the production of the East Pacific Rise vent communities. The work involved bringing the animals to the surface alive and then placing them in high pressure respirometer systems which simulate conditions at depth. Using this system, the researchers measured the fluxes of oxygen, carbon dioxide, sulfide, protons, and nitrate as a function of these variables as well as temperature. The UCSB group collaborated on research with the other Russian and US scientists on the cruise and contributed to the film production.

Joseph Connell **7/1/00-6/30/05** **$441,969**
National Science Foundation, NSF OCE 9986129

Population and Community Dynamics of Corals: A Long-Term Study

This project extends the detailed long-term monitoring of ecological communities of corals and algae on the Great Barrier Reef, Australia, which has been carried on continuously over the past 36 years, the longest such study on any coral reef. A major focus is to analyze spatial patterns and dynamics of corals and algae at several scales, from mm to kilometers, both during the course of colonization of patches (opened by disturbances) and after most of the surface has become crowded by many



colonies. These analyses should reveal the long-term effects of a variety of mechanisms operating on many different scales in time and space that may be crucial in determining how natural communities are structured. The research team will build mathematical models and computer simulations of the dynamics of these populations and communities of corals and algae. These models will be used to assess the degree to which community structure and dynamics may or may not be influenced by details of spatial relationships and interactions. This research will help to predict the effect of environmental changes, including those caused by human activity, on these natural communities.

Carrie Culver **9/16/03-8/31/05** **$14,531**
US Fish & Wildlife Service, 113323J013

Assessing the Potential for Chinese Mitten Crab Predation on Eggs and Larvae of Salmonids

The Chinese mitten crab, Eriocheir sinensis, is a relatively new inhabitant of the San Francisco Bay and associated watersheds. A catadromous species, it lives primarily in freshwater, but requires estuarine conditions to reproduce. Prior to introduction, large predatory decapods were virtually non-existent in the freshwater areas now inhabited by mitten crabs. Importantly, many of these areas represent spawning habitat for several threatened and endangered species, including salmonids. In fact, large numbers of mitten crabs have been sighted in Adobe and Coyote Creeks in areas with spawning pools of steelhead and salmon. While mitten crabs are known to consume both animal and plant matter, becoming more carnivorous as they grow, it is unknown whether this species preys upon the eggs and/or larvae of fishes. Limited laboratory observations indicate that mitten crabs readily eat 'bait» salmon eggs. Further, crabs burrowing into gravel in laboratory aquaria have been observed to push the gravel around with their bodies and limbs, and to pick up individual pieces of gravel. Taken together, this suggests that mitten crabs could potentially disturb salmonid redds and/or prey upon demersal fish eggs/larvae, indicating the need to evaluate the palatability and detectability of salmonid eggs and larvae to mitten crabs. The goal of this project is to assess whether salmonids may be at risk to predation by E. sinensis.

Carrie Culver **9/21/04-8/31/05** **$18,581**
Jenifer Dugan
US Fish & Wildlife Service, 113324G006

Early Detection, Monitoring and Year Class Strength of the Chinese Mitten Crab, Eriocheir sinensis: Evaluating Recruitment Dynamics

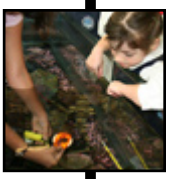
The Chinese mitten crab, Eriocheir sinensis, is formally recognized as a harmful aquatic species by the National Aquatic Nuisance Species Task Force. A successful invader of the San Francisco Estuary (SFE), it has caused numerous economic and ecological impacts. A National Management Plan (NMP) has been prepared (Aquatic Nuisance Species Task Force 2002). However, as stated within this plan, current management of E. sinensis is hindered by the lack of biological information for the SFE mitten crab population. Most notably, there is a lack of basic information on population dynamics, and specifically recruitment dynamics. This information is needed not only for the evaluation of control measures, but also for the development of early detection and monitoring strategies.

Frank Davis **9/1/03-9/30/04** **$55,992**
Packard Foundation - Resources Legacy Fund Foundation, 2003-0154

Conservation Planning for Coupled Terrestrial and Marine Ecosystems

The California Coastal and Marine Initiative (CCMI), supported by the Resources Legacy Foundation with funds from the David and Lucile Packard Foundation, promotes coastal conservation transactions, policy development, planning, building organizational capacity, education and outreach, advocacy, and applied social and biological research. CCMI is currently engaged in designing and implementing a coastal reserve system for California's Central Coast. Systematic conservation planning in marine environments has generally operated independently of land conservation planning, despite potentially strong coupling between land use, watershed processes, and coastal riverine, estuarine and marine ecosystems. There is increasing recognition of the impacts of human activities in the coastal zone and the need for conservation policy and coastal reserve

design to account for these impacts. The UCSB investigator's goal is to convene a working group of scientific experts to identify key principles and research needs for a scientifically credible approach to conservation site prioritization, design, and management in coastal environments, focusing on conservation planning for coupled terrestrial and marine ecosystems in Central Coastal California.



Daniel Dawson **7/12/02-11/30/06** **$50,000**
US Department of Agriculture, USDA02DG11050464-022

Fuel Reduction, Product Utilization, and Low-Impact Forest Management in an Ecological Reserve at the Urban/Wildland Interface

Valentine Eastern Sierra Reserve, an ecological reserve and research station owned and operated by the University of California, is located at the urban/wildland interface between the town of Mammoth Lakes and the Inyo National Forest. Wildfire has been suppressed on the Reserve for approximately 150 years. Research shows that fire average recurrence intervals before that time were as frequent as nine years. Very high loading of fuel has accumulated, and the forest is in a very unhealthy condition with excessive stand density. The University has been engaged in a low level of forest management and fuel reduction since 1997 and has employed as a consultant Dr. John Tappeiner, former Chief Silvaculturist of Region Five of the USFS. Dr. Tappeiner has identified a desired future condition for the forest and outlined the management steps necessary to achieve it. Reserve personnel will work with him to prepare a Timber Harvest Plan to meet the requirements of the CA Forest Practices Act. The project will require significant reduction in stand density and methods to remove stems and slash from the forest without compromising the ecological integrity of the Reserve.

Jenifer Dugan **7/1/04-3/31/05** **$6,013**
Shoreline Preservation Fund - Associated Students UCSB, SPRING04-09

Expansion of the Coastal Component of the Joint UCSB - MMS Pacific OCS Student Internship Program: Renewal

The investigator will continue to augment, diversify and expand the coastal component of the ongoing UCSB-MMS Pacific OCS student internship program by increasing the involvement of undergraduate students from the University of California at Santa Barbara, professionals at the POCS regional office of the Minerals Management Service and researchers at the Marine Science Institute at UC Santa Barbara. Undergraduate students will be funded as interns to assist with ongoing research and activities on topics of academic interest that address local coastal issues of concern.

Jenifer Dugan **6/1/05-1/31/06** **$6,000**
Shoreline Preservation Fund - Associated Students UCSB, Spring05-12

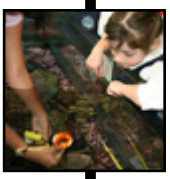
Investigating the Ecological Impacts of Coastal Armoring on Sandy Beaches

The ecological effects of seawalls on sandy beaches are little studied and poorly understood. As a consequence of this lack of knowledge, potential ecological impacts of seawalls are not generally considered in decisions regarding seawalls. As sea level rises and coastal erosion accelerates, the need to understand the ecological consequences of coastal armoring on sandy beach ecosystems is increasingly urgent. This research project will inventory and investigate the ecological effects of seawalls on sandy beaches located between Gaviota and Hope Ranch on the coast of Santa Barbara County.

Jenifer Dugan **7/1/04-6/30/05** **$49,767**
SRS Technologies, ISD-04-PO-00 792

Assessing Habitat and Prey Resources for Western Snowy Plovers on Exposed Sandy Beaches of Vandenberg Air Force Base

Sandy beaches comprise three-quarters of the world's shorelines, including much of the California coast. Exposed sandy beaches compose 43% of the mainland coast of Santa Barbara County and are



thus likely to receive the majority of contamination from a spill, leak, or other impact associated with human activities. Recently, the primary sites affected by a number of significant oil spills in central and southern California have been sandy beaches (Avila Beach, Guadalupe Dunes, Surf Beach and Huntington Beach). Despite their importance as a major component of the coast, recipients of ocean and land-based pollutants, and ecological, recreational and economic resources, beaches are the least understood and studied intertidal habitat on the California coast. The PI will produce a detailed description of the intertidal and supralittoral sandy beach habitat used by Western Snowy Plover for nesting and rearing chicks on Vandenberg Air Force Base exposed sandy beaches. The resulting report will include recommendations for incorporating prey and habitat measurements into the snowy plover monitoring program for VAFB.

Jenifer Dugan **7/11/03-6/30/05** **$23,852**
Stephen Schroeter
John Dixon
USDC - National Oceanic & Atmospheric Administration, DG133C-03-SE-0826

Comparison of the Sandy Beach Community at Sites Contaminated by Petroleum Hydrocarbons and at Matched Control Sites

Sandy beaches comprise approximately three-quarters of the world's shorelines, including much of the California coast. They are thus likely to receive the majority of contamination from a spill, leak or other impact associated with oil and gas activities. Recently, the primary sites affected by a number of significant oil spills in central and southern California have been sandy beaches (Avila Beach, Guadalupe Dunes, Surf Beach and Huntington Beach). The ecological importance of sandy beaches is generally unappreciated, probably because of the lack of vegetative cover and the cryptic nature of the invertebrate community. This community is predominantly comprised of insects, crustaceans, polychaetes, and bivalve molluscs, which dwell beneath the surface or emerge at night, and hence sandy beaches can appear uninhabited to most visitors. On the other hand, invertebrates that are evident, such as insects like flies, are generally viewed as pests by beach goers.

Jenifer Dugan **9/6/00-6/30/06** **$259,724**
USDI - Minerals Management Service, Task 17610 MMS-31063

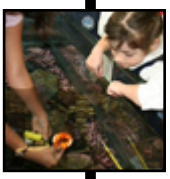
Joint UCSB-MMS OCS Student Internship Program

The purpose is to develop a sustained student internship program involving the joint cooperation of the MMS-Pacific Outer Continental Shelf (POCS) regional office, the UC MMS Coastal Marine Institute, and the Environmental Studies Program at UC Santa Barbara. This program provides the MMS-POCS regional office with qualified student interns who have a demonstrated interest in POCS-identified issues and offers the students an opportunity for work experience in the processes by which the MMS-POCS office manages offshore resources. Overall objectives are to increase the number of students exposed directly to CMI-funded research projects, to generally strengthen discourse between the UC and MMS, to provide students with a forum for presenting and discussing their research interests as they relate to the interests of MMS, and to keep the MMS-POCS staff abreast of marine research at UCSB and the progress of CMI projects, as well as to expose them to topics of particular interest.

Jessica Dutton **7/1/04-6/30/06** **$50,000**
Gretchen Hofmann
UC Toxic Substances Research and Teaching Program, SB040104

Interspecific Stress Expression in a Native/Invasive Pair: Independent and Additive Effects of Temperature and Chemical Exposure in the Invasive Mussel Mytilus galloprovincialis and its native Cogener *Mytilus trossulus*

Chemical pollution has become a significant characteristic shaping many coastal habitats and communities and likely exerts a selective force upon organisms therein by redefining the parameters of physiological stress for those areas. It has been suggested that invasive organisms may be successful at inflitrating new environments in some part due to relatively robust stress tolerance



capabilities. This suggestion can be tested by comparing the relative physiological responses to cumulative environmental stressors in a native and invasive species pair, the bay mussels *Mytilus trossulus* and *M. galloprovincialis* respectively. By examining field and laboratory relationships between contaminant exposure, biological uptake, thermotolerance capabilities and physiological stress in the two species, this study will elucidate some of the physiological differences that may have helped M. galloprovincialis successfully invade the west coast of the United States and elsewhere. This research should contribute to our understanding about the role of environmental pollution in biological invasions, and will also reveal much about the relative merits of the two study organisms as sentinel species for monitoring purposes.

John Engle **10/1/02-9/30/05** **$47,726**
AMEC Environmental and Energy Services Co., Inc., AMEC 01-32S-71160

Rocky Intertidal Monitoring in San Diego County: Cardiff and La Jolla

The investigator's objectives are: 1) to identify, quantify and determine the condition and trend over time of key rocky intertidal resources at Cardiff Reef and compare findings to a control site at La Jolla and two sites on Point Loma separately monitored for the U.S. Navy; 2) to assist AMEC in determining effects (beneficial or detrimental) in relationship to AMEC Beach Replenishment Project, 3) to maintain permanent monitoring sites at Cardiff and La Jolla in order to help assess and reduce human impacts and to document long-term climatic changes, 4) to increase understanding of population dynamics of important rocky intertidal species by comparing key species abundance changes among plots, seasons, years, and sites throughout central and southern California; 5) to provide relevant information to resource agencies that will lead to more effective management of rocky intertidal ecosystems.

John Engle **5/30/02-4/30/06** **$124,957**
UC Santa Cruz, UCSC 14350102CA85144

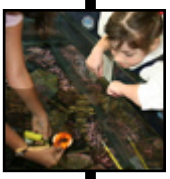
Coordination of Database Development, Protocol Standardization, and Regional Activities Between Minerals Management Service and Others in the Multi-Agency Rocky Intertidal Monitoring Network

The UCSB portion of the multi-campus Minerals Management Service (MMS) program, «Shoreline Assessment of Changes in the Rocky Intertidal in the Southern California Bight,» consists of coordination of database development and maintenance, protocol standardization, and other regional activities between MMS and the additional agency members of the Multi-Agency Rocky Intertidal Network (MARINE). The program includes principal investigators from UC Santa Cruz, UC Los Angeles, UC Santa Barbara, and California State University, Fullerton. The primary Cooperative Agreement is arranged between MMS and UCSC, with subcontracts extended to the other California institutions.

John Engle **6/15/97-9/30/05** **$150,000**
US Department of the Navy, NAV N68711-97LT70034

Rocky Intertidal Monitoring of San Diego County Intertidal Reefs at SPAWAR, Point Loma

The objectives of this project are to: 1) determine the conditions and trends over time of key rocky intertidal resources at Cardiff Reef and compare findings to three control sites at La Jolla and Point Loma; 2) assist the Navy in determining possible effects from the Navy Beach Replenishment Project; 3) maintain permanent monitoring sites at Cardiff, La Jolla, and Point Loma in order to help assess and reduce human impacts and to document long-term climatic changes; 4) increase understanding of population dynamics of important rocky intertidal species by comparing key species abundance changes among plots, seasons, years and sites throughout central and southern California; 5) provide relevant information to resource agencies that will lead to more effective management of rocky intertidal ecosystems. To date, periodic surveys carried out prior to beach replenishment have revealed seasonal, El Niño, and La Niña patterns in key species abundances.



Kathleen Foltz **9/1/04-8/31/05** **$125,000**
National Science Foundation, IOB-0415581

Understanding the Fertilization Signalsome

The activation of the quiescent egg during fertilization is the remarkable first step in the development of a new organism. Despite a long history of descriptions of the process, surprisingly little is known about the molecular details of fertilization in any system. In the eggs of all multicellular animals studied to date, a rise in intracellular calcium plays a key role in egg activation. The PI will conduct experiments designed to test hypotheses about the molecular mechanisms of the very early events of egg activation to examine how the rise in calcium is mediated and what triggers opening of calcium gates in the egg's endoplasmic reticulum. These studies are conducted on echinoderms (sea urchin and starfish), the best-understood model system currently in place for dissecting the egg activation pathway. Eggs (especially the highly synchronous echinoderm eggs) offer an exciting example of digital signaling, based on protein-protein interactions, that toggle the cell from «off» to «on» in seconds. Understanding the details of fertilization will provide insight into the general phenomenon of signal transduction as well.

Steven Gaines **2/15/02-1/31/06** **$892,340**
Carol Blanchette
Christopher Jones
Mark Schildhauer
Matthew B. Jones
National Science Foundation, NSF DBI01-31178

Capturing Data in the Field: An Application Framework for Easily Creating Custom Data and Metadata Entry Forms on Handheld and Desktop Computers

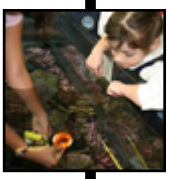
The investigators will develop a set of software tools that will enable researchers to easily and powerfully configure custom data capture applications for use on handheld devices in the field, and desktop PCs in the lab. These applications will simultaneously enable researchers to provide critical, structured metadata necessary for their work to participate in a distributed «Knowledge Network for Biocomplexity,» while also providing immediate benefit in terms of permitting greater ease, accuracy and efficiency in capturing original data in the field. This work is fully compatible with approaches involved in the Knowledge Network for Biocomplexity, while significantly extending the scope of those efforts by attempting to address informatics issues at their source: the point of data capture in the field. These tools should have broad applicability throughout the discipline, with potential ramifications to any context where researchers need to rapidly and easily develop customized data collection forms for handheld computers, with the added benefit that the resultant data sets will adhere to existing standards for metadata documentation and sound data set design.

Steven Gaines **6/1/04-5/31/06** **$26,172**
National Science Foundation, OISE-0402589

International: Dissertation Enhancement: Marine Population Connectivity Across the US/Mexican Border: A Genetic Approach to Dispersal Dynamics in Kelp Bass

As fisheries around the world continue to crash, there is an urgent need to better understand the population dynamics of marine species. Empirical knowledge of population dynamics in the sea is basic at best, largely due to the challenge of studying the pelagic larval phase that provides the link between generations and across locations. The question of the scale and variability of larval dispersal, and consequently the degree of connectivity among populations, remains largely unanswered. Successful fisheries management will depend on knowing accurate scales of population connectivity and the effects of flow dynamics on these scales through time and space. While efforts to incorporate complex flow and realistic propagule dispersion into analytical models of connectivity are progressing rapidly, empirical approaches to measuring marine larval dispersal patterns lag behind. This thesis project takes a genetic approach called genotype assignment (GA) to estimate dispersal patterns in the kelp bass Paralabrax clathratus. GA is a statistical clustering technique that can identify source populations of individuals based on multilocus genotype data.

Steven Gaines **1/1/05-3/31/06** **$2,060,104**
Robert Warner
Libe Washburn
Gretchen Hofmann
Oregon State University, F0395A-C



Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)

The Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) is a collaboration of scientists at four universities - Oregon State University, University of California at Santa Cruz, University of California at Santa Barbara, and Stanford University - with the goals of understanding the dynamics of the ocean ecosystem along the U.S. west coast, producing a new generation of scientists trained in interdisciplinary collaborative approaches, and sharing knowledge for science-based decisions regarding coastal and marine management and stewardship. Over the next five years, PISCO will address major scientific, technological, and cultural challenges to provide the information and tools that are essential for effective management and conservation of the ocean. Ultimately, PISCO will help society to enjoy the many benefits of intact, functioning marine ecosystems, including abundant ocean wildlife, sustainable commercial and recreational fisheries, and vibrant coastal economies.

Steven Gaines **1/1/99-2/28/05** **$7,753,757**
Robert Warner
Libe Washburn
Gretchen Hofmann
Oregon State University, OSU F0153A-03

A Consortium of Centers of Excellence in Marine Conservation (PISCO)

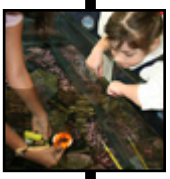
Two major impediments to conserving marine ecosystems are 1) a lack of understanding of the basic processes governing the essential features of these systems and 2) ineffective transfer of new scientific knowledge to the public and to policy makers. Recent breakthroughs in numerous disciplines have made possible larger spatial- and temporal-scale studies and new syntheses across related disciplines -- all of which show much promise for providing better guidance for management and conservation. For example, although it is recognized that marine reserves will play a key role in marine conservation efforts, basic information about the transport of organisms and materials in and out of reserves is not yet in hand -- but is within reach. Accomplishing this new integration (across scientific disciplines and between science and policy) will require new institutional models. This award establishes an integrated Consortium of three premier academic programs whose expertise has immediate relevance for developing the knowledge base and policy links needed for marine conservation. The Consortium is predicated on the assumption that research, education and policy should be intimately linked, not separate activities.

Steven Gaines **9/1/03-8/31/06** **$150,000**
The Pew Charitable Trusts, SB030106

A New Conceptual Framework for Marine Reserve Networks

Even when legislation mandates a science-based process in policy-making, science frequently gets marginalized. Two problems commonly limit the role of science: 1) existing science often does not support clear answers, and even when it does, 2) scientists are often unwilling to be advocates for the science. If the underlying science is poorly developed, science will either be silent altogether on key issues, or scientists will interpret the limited information in conflicting ways. In either case, science is unlikely to play any substantive role in decision-making. In addition, even where science supports clear choices, the message is often not communicated forcefully and effectively. Scientists scrupulously guard their perceived objectivity. As a result, their fear of being tarnished with the advocate label often leaves the science to advocate for itself. The investigator's approach is to reduce these bottlenecks to the effective integration of conservation science into policy decisions. His strategy, developed as a result of his involvement with the Channel Islands marine reserve process in California, includes measures to: anticipate key questions, respond opportunistically to new chllenges, promote collaborative efforts, share the science, and advocate for science.

Steven Gaines **6/1/99-6/30/05** **$49,208**
US Geological Survey, USGS 99WRAG0040



Channel Islands Field Station Marine Ecology Cooperative Agreement

This contract from the USGS Biological Resources Division provides a Field Station at UCSB for research on marine species and their ecosystems. The UCSB investigator will direct studies on problems affecting marine ecosystem patterns and processes in the Channel Islands and along the Pacific Coast of California.

Brian Gaylord **2/1/03-10/31/04** **$348,026**
National Science Foundation, OCE-0241447

Mechanical Consequences of Flexibility for Benthic Marine Organisms

Mechanically flexible, benthic plants and animals are ubiquitous members of coastal communities in nearly all marine systems. Such organisms move passively in response to flow as water moves past them. However, the full effects of this motion, and in particular the way it influences an organism's vulnerability to flow-driven disturbance, are poorly understood. The traditional view has been that a compliant construction enhances the ability of sessile plants or animals to cope structurally with time-varying water motion. However, more recent research has noted that passive movement in flow can also have subtler consequences. For instance, an attached organism that is swept back and forth by ocean waves acquires momentum that can impose a subsequent inertial force when the mass of the organism is eventually decelerated upon reaching the limits of its range of motion. Such complexities demonstrate the need for a more complete and consistent examination of the biomechanical and survivorship implications of flexibility for intertidal and subtidal organisms. This research aims to examine these factors in order to develop effective quantitative and mechanistic predictions of the mortality consequences of flow (long recognized as a dominant agent of disturbance and as a critical factor influencing population dynamics in these communities).

Jeffrey Goddard **9/1/02-8/31/05** **$130,177**
Carol Blanchette
UC Davis, SA6608

Impacts and Control of an Invasive Seaweed in California Marine Protected Areas

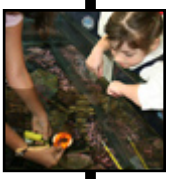
Accidentally introduced with oysters in the 1940's, Sargassum muticum is now the most conspicuous and abundant non-indigenous species on the outer Pacific coast of North America. It is especially abundant in tidepools and shallow subtidal zone in southern California. The investigators will: 1) experimentally investigate the ecological impacts of this large, canopy-forming brown alga on native tidepool biota in two popular intertidal Marine Protected Areas in southern California, and 2) study the efficacy of reducing its abundance and mitigating its impacts in these reserves. Using a randomized block experimental design, with replicated control and removal plots in the field, the investigators will test the hypothesis that removal of S. muticum results in increases in the abundance and species richness of native tidepool biota. They will also determine if manual removal of the alga, two or three times per year and timed to fall between the peak growing season of the alga and the onset of its sexual reproduction, keeps S. muticum suppressed to ecologically insignificant levels.

Jeffrey Goddard **6/22/04-12/22/05** **$50,000**
Milton Love
USDI - Minerals Management Service, 1435-01-04-CA-34806

Benthic Invertebrate Communities on Shell Mounds Beneath Oil and Gas Platforms in the Santa Barbara Channel and Santa Maria Basin

The Minerals Management Service (MMS) defines decommissioning as the process of ending oil, gas, or sulfur operations and returning the lease or pipeline right-of-way to a condition that meets regulartory requirements. As part of this process MMS conducts detailed environmental reviews of any proposed decommissioning projects to evaluate the impacts from platform removal on local and regional invertebrate populations. Assessing habitat quality bears upon platform decommissioning

issues, as questions about habitat and the ecological role of Pacific OCS platforms are still unresolved. For example, removing platforms also removes useful habitat, kills numerous associated shellfish, and may have adverse impacts on regional populations of some species on the Pacific OCS. The primary goal of this study is to quantitatively investigate and characterize the macro-invertebrate community on shell mounds under currently operating platforms. The research may be able to detect geographic, bathymetric and temporal variability in abundance and composition of the invertebrate communities.



Benjamin Halpern **4/1/05-3/31/06** **$53,405**
Sandy Andelman
The Nature Conservancy, SB050084

Predicting Community-level Responses to Marine Reserve Protection: The Causes of Food Web Stability

The Nature Conservancy is providing additional support for Dr. Benjamin Halpern, recently appointed Program Manager for the Packard Foundation-funded project on «Ecosystem-based Management of Coastal-Marine Systems,» housed at the National Center for Ecological Analysis and Synthesis (NCEAS). This award enhances four distinct projects that are all directly or closely related to Dr. Halpern's post-doctoral research project, including funding for graduate and undergraduate student interns, as well as incidental costs for data access and travel expenses. These projects have the potential for broad impact on marine conservation and marine ecology.

Rachel Haymon **5/1/04-4/30/07** **$229,028**
Ken Macdonald
National Science Foundation, 0324668

Collaborative Research: Hydrothermal System Response to Magma Supply and Crustal Thickness Gradients along the Galapagos Spreading Center, 89.5°-94° W

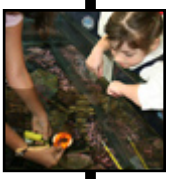
A field experiment is proposed along the Galapagos Spreading Center (GSC) to investigate the response of the hydrothermal-geological-biological system along the ridge crest to large, hotspot-induced, along-strike gradients in magma supply and crustal thickness/structure. Unlike the East Pacific Rise (EPR) and other mid-ocean ridges (MOR's) where variations in magma supply along strike are much debated, the GSC is known to exhibit increases in magma supply and crustal thickness toward the center of the Galapagos mantle plume (GMP) influence at 91.5°W. The GSC is thus an ideal natural experiment for which the observations have yet to be made, on how magma supply and crustal thickness affect the nature, abundance, and distribution of ridge crest hydrothermal activity, and interactions between hydrothermal, volcanic, tectonic, and biological processes.

Rachel Haymon **8/1/04-7/31/05** **$85,131**
Patricia Holden
National Science Foundation, MCB 0406999

SGER: Developing Metal-tagged DNA Probes for High Resolution Imaging of Microbial Phylotype Distributions and Nanoscale Mineral/Microbe Associations in Environmental Samples

Envrionmental electron microscopy (ESEM) is a powerful means of imaging morphologically-intact microbes and examining their nano-scale spatial relationships to one another, to substrates, and to associated minerals. However, use of electron microscopy for such purposes has been restricted to indiscriminate imaging of microbe morphology, with no ability to distinguish between different phylotypes, or to zoom out and observe the overall abundance, distribution and spatial relationships of microbes throughout the larger sample. A means of visually distinguishing targeted microbes in ESEM images must be invented to fully exploit the potential of electron microscopy for learning about in situ microbial activity in the envrionment. The investigators seek to develop a new technique involving metal-tagged DNA probes that will emit X-rays of uniquely-identifiable spectra when targeted microbes are excited by an electron beam. Detection of the probe spectra will allow unequivocal identification of the host phylotypes, and will permit the distributions and

spatial relationships of the targeted phylotypes to be mapped at the micro-to-nano-scale, using any conventional ESEM equipped with an x-ray energy dispersive spectrometer (EDS) and/or cathodoluminescence detector system.



Rachel Haymon **10/1/00-11/30/04** **$166,270**
National Science Foundation, NSF OCE00-02816

Collaborative Research: Chimneys Forming from Vent Fluids at 231° to 405°C: Examination of Critical Point Phenomena, Mineral Assemblages, and Implications for Microbial Habitats

This research makes use of a valuable set of samples collected along the southern East Pacific Rise (EPR) to examine the range of mineral assemblages and possible microbial environments present within seafloor hydrothermal vent deposits, and to observe how mineral precipitation in hydrothermal systems is affected at near-critical point conditions. Objectives of the project are to 1) Determine how mineral deposition and potential microbial habitats within chimneys are affected by differences in the temperature and composition of the vent fluid that exits the seafloor, and to examine variations in mixing styles between vent fluid and seawater. 2) Map out the zones in chimneys where different groups of microbes can thrive, and specify the P-T-X conditions in these microhabitats to guide future microbial culturing experiments. 3) Document effects of phase separation near the critical point of seawater on mineral deposition. 4) Test whether existing thermodynamic data can be extrapolated successfully to model the full range of conditions, including near-critical P-T, that exist in seafloor deposits. This test will allow a better assessment of whether such data can be used to model processes occurring at similar p-T conditions within the ocean crust. 5) Characterize the nature of hydrothermal deposition over the full range of geologic settings characteristic of superfast spreading ridges.

Rachel Haymon **5/1/04-4/30/06** **$367,143**
Ken Macdonald
USDC - National Oceanic & Atmospheric Administration, NA04OAR600049

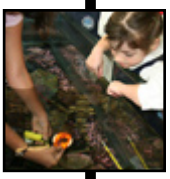
Exploring Hydrothermal System Response to Magma Supply & Crustal Thickness Gradients Along the Galapagos Spreading Center, 89.5°-94°W

A field experiment is proposed along the Galapagos Spreading Center (GSC) to explore the response of the hydrothermal-geological-biological system along the ridge crest to large, hotspot-induced, along-strike gradients in magma supply and crustal thickness/structure. Unlike the East Pacific Rise (EPR) and other mid-ocean ridges (MOR's) where variations in magma supply along strike are much debated, the GSC is known to exhibit increases in magma supply and crustal thickness/structure toward the center of the Galapagos mantle plume (GMP) influence at 91.5°W. However, almost no hydrothermal exploration of the GSC has been done. The GSC is thus an ideal natural experiment, for which the observations have yet to be made, on how magma supply and crustal thickness affect the nature, abundance, and distribution of ridge crest hydrothermal activity, and interactions between hydrothermal, volcanic, tectonic, and biological processes.

David Herbst **11/1/02-3/30/05** **$177,000**
California Regional Water Quality Control Board, 02-103-160-0

Development of an Index of Biological Integrity for Streams of the Eastern Sierra Nevada and Lake Tahoe Basin Using Invertebrates and Algae as Indicators

The objectives of this project are to provide baseline and trend monitoring information to assist the Regional Water Quality Control Board in determining the ambient quality of the Region's waters. The project consists of: 1) collection of data on the geomorphic features and associated physical habitat of stream systems throughout the Lahontan Region, including data on instream assemblages of benthic macroinvertebrates and algae; and 2) compilation and evaluation of existing data to facilitate the development of indices of biological integrity.



David Herbst **1/15/04-3/31/06** **$175,000**
California Regional Water Quality Control Board, 03-149-160-0

Bioindicators of Water and Habitat Quality in Streams of the Lahontan Region, Eastern Sierra

The California Regional Water Quality Control Board, Lahontan Region (RWQCB), is the State agency responsible for protection of water quality within the Lahontan Region of California. Its jurisdiction extends from the Oregon border to the northern Mojave desert, including all of California east of the Sierra crest. The RWQCB desires to establish baseline (or «reference») biological conditions within its jurisdiction in order to judge the integrity of aquatic communities. The UCSB investigator's objectives are to provide baseline and trend monitoring information to assist the RWQCB in determining the ambient quality of the Region's waters. The project will consist of: 1) collection of data on instream assemblages of benthic macroinvertebrates and algae throughout the Lahontan Region, including data on the geomorphic features and associated physical habitat of stream systems; and 2) compilation and evaluation of existing data to facilitate the development and/or refinement of indices of biological integrity.

David Herbst **3/1/04-3/31/06** **$75,000**
California Regional Water Quality Control Board, 03-173-256-0

Evaluation of the Biological Effects of Sediment Inputs Along the Middle Truckee River

The California Regional Water Quality Control Board, Lahontan Region (RWQCB), is the State agency responsible for protection of water quality within the Lahontan Region of California. The RWQCB desires to assess the biological conditions within the Truckee River watershed in order to judge the integrity of aquatic communities and verify their impairment due to excessive sedimentation as part of the Truckee River total maximum daily load (TMDL). The objectives of this project are to provide baseline and trend monitoring information to assist the RWQCB in determining the ambient quality of the Truckee River's waters and the degree of sediment impairment. The investigator will develop a study plan to determine whether sedimentation in the Truckee River is violating numeric or narrative standards set for the protection of beneficial uses. He will also conduct field investigations established in the study plan, which will include collection of data on the geomorphic features, physical habitat, and in-stream assemblages of benthic macroinvertebrates.

David Herbst **10/15/04-3/31/07** **$160,000**
California Regional Water Quality Control Board, 04-157-256-0

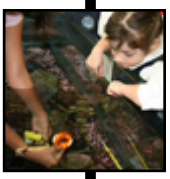
Bioindicators of Water and Habitat Quality in Streams of the Lahontan Region-Eastern Sierra

The objectives of this project are to provide baseline and trend monitoring information to assist the California Regional Water Quality Control Board in determining the ambient quality of the Lahontan Region's waters. The work consists on: 1) collecting data on instream assemblages of benthic macroinvertebrates and algae throughout the Lahontan Region, including data on the geomorphic features and associated physical habitat of stream systems; 2) compiling and evaluating existing data to facilitate the development and/or refinement of impairment thresholds, tolerance values, and indices of biological integrity; and 3) providing technical assistance regarding bioassessment.

David Herbst **7/7/04-9/30/05** **$10,000**
California Trout, SB050057

Stream Condition Inventory, Golden Trout Wilderness

The U.S. Forest Service has teamed with CalTrout/Orvis and the California Department of Fish and Game to support this independent and objective study to assess stream condition and trend and their links to grazing in the Golden Trout Wilderness. The objectives are 1) To compare grazed and ungrazed areas to determine if there is a difference in «rate of change toward improved riparian habitat conditions» in the riparian meadow environment and in the stream/aquatic environment; 2) To compare grazed and ungrazed areas to determine if there is a difference in «rate of change in erosion features»; and 3) Based on 1 and 2, to determine whether maintaining grazing on the rested allotments could have achieved adequate progress toward the desired conditions.



David Herbst **8/23/01-9/30/04** **$32,000**
Scott Cooper
US Department of Agriculture, USDA01CA11272164-171

Aquatic Invertebrate Research for Kings River Experimental Watershed

The Kings River Sustainable Forest Ecosystem Project added the Kings River Experimental Watershed to the Project in 1999. Stream invertebrates are considered to be an important biological indicator of stream condition in the Sierra Nevada and elsewhere in the United States. The objectives of this project are: to develop a long-term research plan for the use of aquatic invertebrates as indicator species for stream ecosystem conditions in the Kings River Experimental Watershed, begin three-year baseline sampling on ten perennial streams in Providence Creek and Bull Creek watershed groups, determine if it is necessary to perform spring and fall sampling or just fall sampling, and finalize protocols for research on aquatic invertebrates in the Kings River Experimental Watershed.

David Herbst **7/1/04-9/30/05** **$17,118**
US Forest Service, SB040105

Stream Condition Inventory and Macroinvertebrate Bioassessment of Stream-Reaches in Grazed and Presently Ungrazed Portions of the Golden Trout Wilderness

The purpose of this project is to carry out an expanded Modified Stream Condition Inventory (MSCI) protocol («Riley» protocol plus macroinvertebrate sampling) in order to acquire sufficient stream condition information to 1) independently assess the validity of the February, 2001 decision to vacate the Whitney and Templeton grazing allotments in the Golden Trout Wilderness (GTW), and 2) develop a statistically rigorous set of trend data that may be used to follow grazing impacts on GTW streams over the long-term.

David Herbst **9/1/03-6/30/05** **$40,000**
USDI - National Park Service, J8C07030003

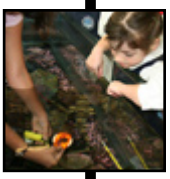
Evaluating Recovery of Stream Invertebrate Communities following Removal of Introduced Trout in Kings Canyon National Park

One of the most useful ecological indicators of the status and recovery of aquatic habitats is the diverse and abundant invertebrates found in streams. Sequoia and Kings Canyon National Parks (SEKI) have hundreds of miles of streams, including several Wild and Scenic Rivers, that provide habitat for native invertebrate communities. The fauna of the high-elevation habitat in these streams is dominated by aquatic invertebrates which have evolved in a region that was fishless until trout introductions began in the 1860's. These stream communities harbor high proportions of endemic species in insect groups such as the stoneflies and caddisflies that are now vulnerable to direct and indirect effects of fish predation. Recent research in Yosemite National Park suggests that introduced trout cause significant changes in the ecology of high-elevation streams. Although removing introduced trout from high-elevation lakes has been shown to reverse their effects on native amphibians, we do not know if removing trout from high-elevation streams will reverse their effect on native invertebrate communities. Planned management actions in SEKI provide an opportunity to evaluate the potential for recovery of streams after the removal of introduced trout. This project will conduct two seasons of both pre-treatment and post-treatment invertebrate sampling to evaluate recovery.

Gretchen Hofmann **5/1/05-4/30/06** **$193,121**
National Science Foundation, ANT-0440799

Towards an Understanding of Protein Homeostatis in Cold-adapted Antarctic Fish

The central objective of this project is to examine the process of protein homeostasis in the cells of Antarctic notothenioid fishes. Prior results suggested that proteins in Antarctic fish may be subject to a great deal of misfolding at the subzero temperatures typical of Antarctic coastal waters. The two main observations that will define this new set of experiments are: 1) the observation that a normally stress-inducible molecular chaperone, Hsp70, has been recruited into constitutive expression, and



2) in pilot experiments, high levels of ubiquitinated proteins have been measured in tissue of two Antarctic species. The planned experiments will continue with a comparative approach using temperate New Zealand notothenioid fishes to highlight the differences in Antarctic fish physiology. Specific aims include use of ubiquitin conjugate analysis to measure the levels of damaged proteins in cells of Antarctic fishes; estimation of the efficiency of protein synthesis in cold-adapted Antarctic fish cells by measuring the levels of defective ribosomal products (DRiPs); measurement of relative 26S proteasome activity in cells of Antarctic fishes; and assessment of the nature of cold-adapted gene expression in Atartic fish as compared to their temperate New Zealand relatives.

Gretchen Hofmann **9/1/02-5/31/05** **$338,618**
National Science Foundation, NSF OPP 0301927

Evolutionary Loss of the Heat Shock Response in Antarctic Fishes

The heat-shock response (HSR), the enhanced expression of one or more classes of molecular chaperones termed heat-shock proteins (Hsps) in response to stress induced by high temperatures, is commonly viewed as a «universal» characteristic of organisms. In previous studies, the investigator examined the occurrence of the heat-shock response in a highly cold-adapted stenothermal Antarctic teleost fish, *Trematomus bernacchii*, to determine whether this response has persisted in a lineage of fish that has encountered very low and stable temperatures for at least the past 14-25 million years. The results demonstrated that the HSR has been lost in *T. bernacchii*, and this project is designed to extend this initial and evolutionary significant observation. The primary objectives are: 1) to establish how widespread the loss of the HSR might be in the suborder Notothenioioidi, including Antarctic and non-Antarctic members of the group; and 2) to determine the nature of the lesion in gene expression that accounts for the loss of the expression of stress-inducible genes in Antarctic species. For both objectives, experiments will be conducted on closely related cold temperate species from New Zealand waters in order to gain phylogenetic and comparative insight into the nature of this profound change in environmental regulation of gene expression.

Gretchen Hofmann **9/1/02-1/31/05** **$139,141**
Alison Whitmer
National Science Foundation, NSF SBE03-03651

ADVANCE Leadership Award

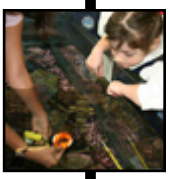
The goal of this project is to create a self-sustaining mentoring program for women undergraduates in biology. This program, Supporting Women in Science (SWIS), is based on a vertical integration scheme where faculty, postdoctoral fellows, graduate students and undergraduates work together in a mentoring network to foster the advancement of women in biological research careers. There are two components: the development of a mentoring network through a seminar series and invited seminar speakers, and the development of a mentoring workshop focused on issues pertaining to the successful recruiting and retaining of women in science careers. The first is a mechanism to concentrate the efforts of individual women in their academic departments, and the second is a mechanism to promote permanent cultural exchange.

Gretchen Hofmann **7/15/04-6/30/07** **$368,534**
National Science Foundation, OCE-0425107

Finding the Genes that Matter: Profiling Gene Expression in Strongylocentrotid Sea Urchins with Different Biogeographic and Temperature Distributions

The goal of this project is: 1) to test the hypothesis that temperature contributes to setting species distribution patterns in marine ecosystems and 2) to employ genomic approaches and other molecular techniques to assess changes in gene expression in congeneric sea urchins that are adapted to different temperatures and have different biogeographical distributions in nature. The project uses four congeneric species of temperate sea urchin (genus *Strongylocentrotus*) as study organisms: *S. purpuratus*, *S. droebachiensis*, *S. franciscanus*, and *S. pallidus*. Gene expression profiles will be assessed in order to address how the differentially thermally adapted sea urchin species respond to ecologically relevant temperatures at the genomic level. The strategy for the genomics approach

entails using DNA macroarrays to screen for differentially expressed genes that will then be analyzed using other genomics techniques -- DNA microarrays and real time PCR.



Patricia Holden **6/15/04-12/31/05** **$130,007**
City of Santa Barbara, 21429

DNA-Based Source Tracking of Human Fecal Material: A Proposal to the City of Santa Barbara

The overarching goal of this research is to determine the presence and potential origins of human waste in creaks, extending into the surf zone at the coastal ocean, in Santa Barbara. The geographical focus of this study will be in three areas: 1) old Mission creak from Bohnett Park into the new Mission Creek concretized channel, 2) mid and lower Mission Creek extending to the ocean and including the lagoon, 3) lower Arroyo Burro Creek with an emphasis on lagoon and beach processes. The work will be conducted in two phases. Phase I will determine the efficacy of two DNA-based tests for discerning human from animal fecal material in environmental matrices. Phase II will apply the demonstrated assays to understanding the origins and fates of human fecal material in the study areas.

Patricia Holden **9/1/03-8/31/05** **$100,000**
UC Irvine, UCI-2003-1374

Dynamics of Point and Non-point Source Fecal Pollution from an Urban Watershed in Southern California

A growing number of the nation's rivers, estuaries, and coastlines are impaired for fecal indicator bacteria (FIB). This problem is particularly acute in southern California, where the shedding of FIB and pathogens from urbanized watersheds routinely triggers swimming advisories at coastal and inland freshwater beaches, and the closure of shellfish harvesting areas in estuarine and coastal systems. Identification and mitigation of FIB pollution is complicated by the many human and non-human non-point sources of these organisms, and the complex and interrelated physicochemical, transport and ecological processes that control their spatial and temporal distributions in watersheds. This project funds field measurements and modeling studies aimed at understanding how storms affect FIB sources, ecology, and transport within several sub-drainages of the Santa Ana River watershed in southern California.

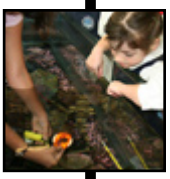
Patricia Holden **11/15/04-11/14/05** **$83,211**
US Department of Energy, DE-FG02-05ER63949

Stabilization of Plutonium in Subsurface Environments via Microbial Reduction and Biofilm Formation

Actinide contamination of subsurface sediments and groundwaters at DOE sites that have varying geochemistry and hydrology is a long-term problem. The investigator's hypothesis is that plutonium (Pu) solubility, speciation and resultant (im)mobilization are susceptible to both metal reduction and biofilm formation by common, well-studied subsurface bacteria. To prove this hypothesis, the PI will study enzymatic metal reduction, bacterial accumulation, and mineral sorption/desorption processes by examining the Pu-bacteria and Pu-mineral-bacteria interactions. Because Pu has complicated geochemistry and a range of oxidation states that are relevant to subsurface and vadose environments, this research will focus on both anaerobic and aerobic mechanisms. The objective of the project is to understand how biotransformation and biogeochemical processes known to affect the behavior of major redox-active transition metals, Fe and Mn, can affect the mobility of Pu in the environment. Results will fill significant gaps in the scientific basis for monitored natural attenuation and *in situ* stabilization of widespread and problematic radionuclide contamination.

Patricia Holden **7/1/04-6/30/07** **$332,099**
US Environmental Protection Agency, RD-83171201

Transformation of Biologically-Conjuaged CdSe Quantum Dots Released into Water and Biofilms



Semiconductor nanocrystals (quantum dots) differ in important ways from bulk semiconductor materials. Their increased band gap means that they function as strong oxidizing and/or reducing agents, and their small size allows them to pass into living cells. Conjugation of biomolecules to the crystal surface can alter any or all of these properties. In preliminary experiments, the investigators have observed that nucleobase-conjugated CdSe quantum dots were actively taken up by soil and water bacteria (for example, *Bacillus subtilis* and *Escherichia coli*). Effects on microbial viability attributed to the presence of the quantum dots included slower doubling times, heavy metal sequestration, and "blebbing" of metals into the environment. The PIs aim to quantify these effects using a variety of biologically-conjugated quantum dots and an assortment of microbial species, monitoring the process of quantum dot uptake and breakdown and characterizing the breakdown products that result from bacterial metabolism of these particles.

Kristina Hufford **1/1/02-7/31/05** **$150,000**
Susan Mazer
US Department of the Interior - National Park Service, USDI SB020091

Ecological and Genetic Variation Among Channel Island and Mainland Native Grass Populations

Islands have long been recognized as natural laboratories for ecology and evolution. Researchers have focused on the isolation of island ecosystems to test theories of adaptive speciation among large groups of taxa and rare or endemic organisms. However, the adaptive evolution of organisms to island habitats may occur at a much more subtle level ? within a single species common to both island and mainland sites. The investigators will examine the ecological and genetic variation of populations of three native grass species on the California Channel Islands. They will compare data collected at the Channel Islands National Park with data collected from representative mainland sites in Santa Barbara County. A unique combination of genetic analyses and ecological field studies will allow them to characterize local adaptation within populations of a single species. As a result, this research will provide new insights in ecological genetics and the island biogeography of plant populations.

Robert Jellison **5/1/05-12/31/06** **$54,315**
David Herbst
California Department of Fish and Game, 0460003

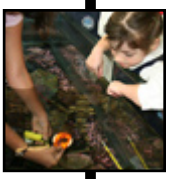
Biological Stressor Identification at Hot Creek Fish Hatchery

The investigators will assist the California Department of Fish and Game (DFG) to develop a workplan to investigate impacts of Hot Creek Hatchery discharge on downstream water quality. The UCSB PI will lead the research team of two DFG scientists and two UCSB scientists. Based on review of the bioassessment survey reports, the team will perform the following tasks: 1) description of biological impairment; 2) listing of candidate causes; 3) workplan to address the data gaps and how to fill them; 4) draft characterization of causes and final written report.

Robert Jellison **1/15/97-6/30/08** **$1,397,427**
John Melack
Los Angeles Department of Water and Power, LADWP 8062

Monitoring of Limnology and Plankton in Mono Lake

Mono Lake is a large, hypersaline, highly productive alkaline lake lying just east of the Sierra Nevada. In addition to its recreational, scenic, and water resource values, it contains large populations of an endemic brine shrimp and the alkali fly, which are important food sources for migrating birds. Although saline lakes are common throughout the world and provide important ecological resources for many species, they are much less studied than freshwater ecosystems. Limnological monitoring conducted from 1982-1996 represents one of the longest continuous studies of any hypersaline lake. Rapid lake level rise in 1995 resulted in the onset of meromixis (persistent salinity stratification) and disruption of internal nutrient cycles. This monitoring program will assess whether long-term changes are occurring and if the hypothesized benefits of higher lake levels will take place.



Robert Jellison **1/15/02-12/31/04** **$37,914**
National Science Foundation, NSF DEB01-29160

Collaborative Research: Ecology of Viruses in an Alkaline, Hypersaline Lake, Mono Lake, California

This research focuses on the role of viruses in an alkaline, hypersaline environment at Mono Lake, California. Studies over the past decade have shown that viruses are generally the most abundant microorganisms in aquatic environments and that viral infections can be a significant source of mortality for planktonic bacteria and algae. Although the importance of viruses in typical marine and freshwater environments has been investigated over the past decade, almost nothing is known about their properties, ecology or impact on food webs in alkaline hypersaline environments. Mono Lake has a relatively simple food web with very high phytoplankton production and brine shrimp as the sole macrozooplankton grazer. Pronounced physical and chemical gradients in the lake resulting from meromixis also shape the structure of the microbial community over space and time. Therefore, it is an exceptionally attractive system for comparative studies of microbial ecological process.

Robert Jellison **10/1/99-9/30/05** **$166,784**
National Science Foundation, NSF MCB99-77901

Collaborative Research: Microbial Observatory at an Alkaline, Hypersaline, Meromictic Lake (Mono Lake, California)

The primary goal of this project is to examine the distributions of Mono Lake microbes and to understand the response of microbial assemblages to the gradients of physical and chemical variables in relation to temporal changes driven by hydrodynamics. The specific objectives are to: 1) Identify and characterize the microbial assemblages in the unique Mono Lake ecosystem. 2) Determine the spatial and temporal variation of the Mono Lake microbial assemblage, particularly in reference to evolving meromixis. 3) Determine the response of the microbial community to physical processes, especially short-term and small-scale variation in mixing (for example, enhanced vertical diffusion as a result of boundary mixing or localized gravitational circulation). 4) Provide a mechanistic understanding of the interactions between the physical/chemical structure and microbial assemblages as the basis for predictive (long-term) modeling of the relationship between microbial processes, lake biogeochemistry and primary production.

Edward A. Keller **9/1/03-12/31/04** **$20,000**
California Trout, 20031616

Santa Monica Mountains Steelhead Habitat Assessment: Hydrogeomorphic Analysis

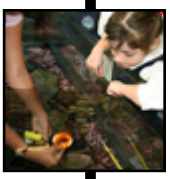
Working in conjunction with CalTrout, the UCSB group will assist in the hydrologic assessment of steelhead trout habitat in the Santa Monica Mountains. The primary goal is to identify which streams in this region are capable of supporting trout populations, based on the assumption that summer low flow is a major limiting factor. This will allow for prioritization of steelhead habitat restoration for the 23 coastal watersheds within the range. After initial site assessment and hydrologic analysis, the UCSB researchers plan to work in conjunction with fisheries biologists to perform more detailed hydrologic and geomorphic habitat analyses.

James Kennett **7/1/01-8/31/04** **$59,233**
American Chemical Society, ACS37303-AC2

Ecology and Stable Isotopic Composition of Modern Methane Seep Foraminifera: Santa Barbara, California

This study will quantitatively analyze foraminiferal assemblages and their carbon and oxygen isotopic composition in sediment sequences collected in and about deep modern methane seeps in Santa Barbara Channel, Southern California. The following hypotheses will be tested: 1) that distinctive benthic foraminiferal assemblages are associated with environments containing high methane concentrations; 2) that highly negative ∂13C signatures of benthic foraminifera may reflect high concentrations of environmental methane; 3) that highly negative ∂13C signatures of planktonic

foraminifera indicate that methane reached surface waters and the atmosphere, and does not merely record post-depositional diagenesis; and 4) that regional pockmarks represent potential source-points of catastrophically released methane as inferred from late Quaternary episodes in drilled sediment sequences. This research is of importance in furthering understanding of the potential role of gas hydrates in Quaternary climate change.



James Kennett **2/15/03-1/31/06** **$330,000**
National Science Foundation, NSF OCE-0242041

Abrupt Climatic Transitions: Surface to Deep-water Response from High-resolution Sediment Records, Santa Barbara, California

Understanding mechanisms behind abrupt climate change during the late Quarternary remains a major challenge in Earth Sciences. The oceans clearly have played a major role in such change, although specific components of the ocean system have responded and contributed differently. While differences in timing between these responses appear to be small (as brief as decades), the sequencing of change is key in understanding processes and forcing mechanisms of climate change. Unfortunately, few areas in the world contain records of sufficient temporal resolution to resolve such change on the short time scales at which these remarkable climatic shifts occurred. One such area is Santa Barbara Basin, providing one of the highest resolution marine records of late Quaternary climate change at the required decadal resolution.

James Kennett **3/1/03-2/28/06** **$111,093**
National Science Foundation, NSF OPP02-29898

The Middle Miocene Antarctic Climate Transition: Investigating Magnitude, Phasing, and Processes Involving Cryosphere Expansion and Global Cooling

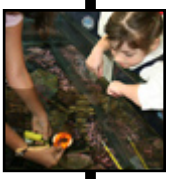
Understanding mechanisms forcing abrupt climate change is a major challenge in Earth Sciences. Middle Miocene (~15 Ma) geologic records describe significant global ocean/atmosphere cooling coincident with Antarctic cryosphere expansion and a lack of appreciable Northern Hemisphere ice sheets. This suggests that Antarctic climate and cryosphere evolution played a central role in late Cenozoic climate development. Given the complexity of traditional proxies (e.g., ∂18O), fundamental questions exist concerning the magnitude, phasing, and processes driving mid-Miocene ice volume and temperature change. The primary objectives of this mid-Miocene investigation are to better understand: 1) magnitude and phasing of global cooling and Antarctic cryosphere expansion across this interval; 2) processes forcing Antarctic climate/cryosphere evolution at this time; and 3) effects of an expanding, increasingly stable Antarctic cryosphere on climate feedbacks at orbital periods. This research will provide an unprecedented opportunity to examine the magnitude, phasing, and processes influencing middle Miocene Antarctic cryosphere expansion and global cooling at orbital time scales. The studies will focus the view of Cenozoic climate evolution, including processes and feedbacks influencing Earth's systems across abrupt climate transitions.

James Kennett **8/1/03-7/31/05** **$215,980**
David Lea
National Science Foundation, OCE-0320723

Acquisition of an Automated Light Gas Stable Isotope Mass Spectrometer for Dedicated Carbonate Analysis

Stable isotope variations in both marine and terrestrial carbonates are the backbone of paleoclimatic and paleoceanographic research. Oxygen isotopic variations track ocean and atmosphere temperatures, sea level/glacial history, and other environmental parameters. Carbon isotopic variations track biogeochemical cycles, land-sea reservoir changes, and CO2 and CH4 exchange between the ocean and atmosphere. Stable isotopic stratigraphy is also central to global correlation. A major question in the earth and ocean sciences today is the character and cause of climate change and abrupt warmings in the recent geological past. UCSB has established an enviable reputation for research in this area over the past 15 years. This grant provides a major upgrade of stable isotope

instrumentation to modern standards through the acquisition of a Finnigan MAT 253 coupled to a «Kiel» automatic carbonate preparation device, with 37% matching support from the campus.



James Kennett **10/1/03-9/30/06** **$279,663**
US Department of Energy, DE-FG02-03ER63696

Effects of Oceanic Disposal of Carbon Dioxide on Benthic Microfauna: Foraminfera as Indicators of Dissolution and Ecosystem Health

Carbon dioxide (CO_2) sequestration is currently being considered as a mechanism for reducing the release of carbon dioxide to the atmosphere. Because direct infection of CO_2 at the seafloor provides certain advantages to other disposal venues, a crucial part of investigating oceanic CO_2 sequestration is to determine the biological and geochemical effects on the benthic realm. Work is ongoing to determine the effects of dissolving carbon dioxide hydrate on benthic megafauna. However, little work has been conducted to quantify the effects of CO_2 sequestration on microorganisms in surface sediments. The investigator will conduct a number of studies on foraminifera, a well-known group of diverse protists that are typically abundant, and sometimes dominant, in marine sediments. Many foraminifera precipitate shells composed of calcium carbonate, making them an ideal indicator to assess the effects of dissolving CO_2 hydrate, which increases pCO_2 levels and also decreases pH in the surrounding waters. Because of their shell composition, significant proportions of foraminifera are dependent on a stable, relatively high pH. Foraminifera live both epifaunally at the sediment/water interface as well as burrowing infaunally, and thus can be used to determine the extent of environmental change both on and within the sediments.

David Kisailus **1/1/04-4/30/05** **$15,000**
Daniel Morse
Santa Barbara Cottage Hospital, 177

Improving Bone Implant Stability: In Vitro Studies of Self-Assembled Monolayer Templated Growth of Calcium Hydroxyapatite Coatings on Ti6A14V Substrates

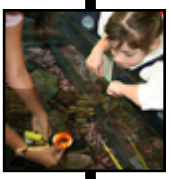
Titanium alloys (e.g., Ti6A14V) used in bone implant materials require immediate fixation and long-term interfacial stability to function predictably in the human body. Reliability is directly related to the interfacial strength between implant and bone. The overall goal of this project is to produce strong metal support / ceramic coating interfaces that can be used for long-standing bone implant materials by improving the conditions under which the coating is adhered to its support. The research is separated into three stages: 1. Preparation and evaluation of self-assembled monolayers (SAMs) tethered to the metal support; 2. Calcium Hydroxyapatite (CP) growth studies on various functionalized SAM modified metal supports; and 3. Evaluation of CP coating integrity.

Roland Knapp **12/1/02-11/30/05** **$99,601**
California State University - Sacramento, 506411A

Airborne Agricultural Contaminants, Disease, and Amphibian Declines: Using Landscape-Scale Patterns to Evaluate the Severity of an Emerging Environmental Problem

The investigator will work closely with Dr. Davidson at CSUS to develop the pesticide use database, combine the pesticide use information with his existing database of lake-specific habitat information, amphibian presence/absence, and amphibian disease presence/absence, and develop statistical models to evaluate the influence of upwind pesticide use on the distribution of amphibians and chytridiomycosis. The UCSB investigator's expertise with database management, generalized additive models, and classification and regression trees (CART) make him uniquely qualified to carry out the tasks associated with analyzing pesticide effects on amphibians.

Roland Knapp **9/1/00-2/28/05** **$6,075**
National Science Foundation, NSF DEB 0075448



Collaborative Research: Recovery of Ecosystem Structure and Function Following Exotic Species Eradication

Invasions of exotic species into ecosystems worldwide have exploded during the past several decades, often causing large alterations to community structure and ecosystem function. This project examines how ecosystems respond, not to invasion, but to the elimination of an exotic species. Study of exotic eradication provides a rare opportunity to explore the fundamental ecological process of community assembly in nature. The investigator will examine the recovery of alpine lake systems in the Sierra Nevada, California, after the eradication of exotic trout. A multi-faceted approach will utilize long-term whole-lake experiments, small-scale species manipulations, paleoecological analyses, and bioenergetics/mass balance modeling. Combined with a recently completed large-scale study of lake recovery (200 lakes), this method will allow the quantification of ecological responses to release from perturbation over a wide range of spatial and temporal scales.

Roland Knapp **9/1/00-2/28/05** **$200,000**
National Science Foundation, NSF DEB 0075448

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Roland Knapp **6/1/02-5/31/05** **$251,106**
UC Berkeley, MCSA3624

Amphibian Disease Dynamics in a Fragmented Landscape

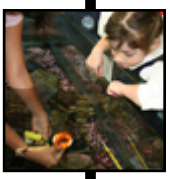
The UCSB investigator will be primarily responsible for two aspects of the overall research project awarded to Dr. Briggs at UCB: 1) conducting field surveys of mountain yellow-legged from (*Rana muscosa*) populations to describe the pattern of spread by chytrid fungus and the effect of chytridiomycosis on frog population dynamics and age structure, and 2) building a statistical model to predict the landscape-scale distribution of chytrid fungus infections as a function of habitat variables and contaminant concentrations. These aspects of chytrid fungus infections remain poorly understood but are critical to predicting the dynamics of this disease. To conduct field surveys, the UCSB investigator will lead a three-person crew into remote backcountry locations, assist with and oversee data collection, ensure compliance with a quality-control protocol, and maintain crew safety. He will also be responsible for entry of these data into a database, and for statistical analysis of collected data. He will use a series of statistical techniques, including regression trees, generalized additive models, and autologistic regression to describe the factors associated with chytrid infections and to develop a predictive model of these infections.

Roland Knapp **3/1/04-12/31/05** **$100,000**
USDI - National Park Service, NPD J8C07040002

Amphibian Resurvey of Select Lakes in the San Joaquin and Upper Kings River Drainages

Mountain yellow-legged frogs (*Rana muscosa*) were once the common frog of the upper elevations of the Sierra Nevada, but now they appear to be declining precipitously from their historic abundance, and they are in danger of becoming extinct. Many different causes have been proposed for amphibian declines: increases in UV-B radiation, acidic deposition, pesticides, introduced diseases, global

warming, human disturbance, and introduced predators. To date, the best-documented cause of decline for mountain yellow-legged frogs is predation by introduced trout. In recent years, however, significant population losses were caused by the chytrid fungus, Batrachochytrium dendrobatidis, and other diseases. In addition, patterns of population declines and limited toxicological data suggest that pesticide drift may be contributing to their decline, especially in the Kaweah River drainage where the mountain yellow-legged frog is now believed extirpated. While introduced trout, disease, and pesticides may all have independent effects on amphibian populations, these stressors may also act synergistically.



Armand Kuris **6/1/02-9/30/04** **$15,352**
Coastal Resources Alliance, SB030005

Preliminary Detection and Evaluation of Potential Natural Enemies for Augmentative Control of Ghost Shrimp in the Pacific Northwest

Aquaculture of oysters (*Crassostrea gigas*) in the Pacific Northwest is greatly impeded by the activities of the ghost shrimp, *Neotrypaea californiensis*, and to a lesser extent, the mudshrimp, *Upogebia pugettensis*. These burrowing thalassinids, when abundant, reduce substrate compaction and release fine particulate matter into the water column to the extent that oysters, and some other organisms, may sink into the sediment or be smothered. For the past 37 years, the Washington State oyster industry has controlled this problem by aerial spraying of the pesticide, carbaryl, on critical intertidal flats near the prime oystering grounds of Willapa Bay and Grays Harbor. This has been highly successful in terms of oyster culture, an important component of the local economy on the outer coast of the state. Although the use of carbaryl has proven to be a highly effective method of shrimp control, it is environmentally damaging to some non-target organisms, including dungeness crabs. Mounting environmental concerns have intensified the search for alternative control options and the need to develop an Integrated Pest Management Plan (IPM) for long term burrowing shrimp control.

Armand Kuris **6/1/02-5/31/06** **$1,787,666**
Kevin Lafferty
National Science Foundation, NSF EF-0224565

Anthropogenic Effects on Host-Trematode Dynamics

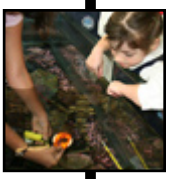
Disease interacts with the environment in a variety of ways. This is particularly true for diseases with complex life cycles. A basic understanding of the way that parasites with complex life cycles interact with man-made changes to the environment will help to anticipate future changes in such diseases. This project will use a variety of experimental, observational and theoretical approaches to develop a comprehensive and synthetic understanding of the interactions between man-made environmental change, parasite communities, and the extent to which these changes affect host communities. Salt marshes are a useful model ecosystem to address the role of diseases, since these wetlands are subject to a wide range of man-made impacts and support a diverse community of trematode worm parasites. Examples of changes that can affect parasite communities include losses to biodiversity, pollution, introduced species and climate change. The effects of these impacts are not likely to be the same for all diseases. Because some parasitic diseases can alter the community of hosts that they infect (such as by altering the flow of energy through an ecosystem or by changing predator-prey relationships) there may be complex feedback between changes in the environment, diseases and ecosystems.

Lyndal Laughrin **3/1/05-3/1/06** **$5,000**
Susan Swarbrick
Martin V. & Martha K. Smith Foundation, 05002

Solving Invasive Plant Problems Through Habitat Restoration: A Teacher-Student Workshop

A teacher-student workshop held on Santa Cruz Island at UCSB's Santa Cruz Island Reserve (SCIR) field station will focus on the problems of invasive exotic plant species on the California Channel Islands. The ability to target and solve major ecological problems is rarely addressed directly by high school science teachers in California schools. Many leading scientists now consider the

spread of exotic species into natural ecosystems to be the «number one» threat faced by natural environments in Mediterranean regions. The workshop will give teachers and students from Ventura high schools the opportunity to study the issues related to the spread of exotic plants and to learn effective methods for addressing the problems in a combination of classroom activities and hands-on field training. Teachers and students will participate in restoration activities that will demonstrate the implementation of a variety of techniques utilized in the fast-growing field of environmental restoration.



David Lea **6/15/05-5/31/08** **$342,117**
National Science Foundation, OCE-0502609

Testing the Tropical Greenhouse Forcing Hypothesis Using a Halmahera Proxy SST Record

This project will test a new hypothesis: tropical ocean temperature variability over the last several hundred thousand years is dominantly driven by changes in greenhouse forcing (the *tropical greenhouse forcing hypothesis*). This hypothesis will be tested by developing a new proxy sea surface temperature (SST) record from a site in the western equatorial Pacific warm pool lying just east of Halmahera, Indonesia. A high sedimentation rate core (~15 cm/ky) from this site taken by collaborators from Tongji University in Shanghai, China will be targeted for development of a ~30-140 y resolution proxy SST record. SSTs will be reconstructed using the Mg content of the surface-dwelling planktonic foraminifera *Globigerinoides ruber*, a methodology that has been validated in many different settings and timescales throughout the tropics. Results from this study will advance independent determinations of climate sensitivity from paleoclimatic data. Climate sensitivity is considered the most significant uncertainty in global climate change predictions.

Ira Leifer **4/1/04-8/31/06** **$80,000**
American Chemical Society, PRF 40726-AC8

A Turbine Seep-Tent Network to Study Hydrocarbon Migration

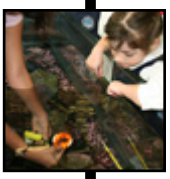
Hydrocarbon migration in a fracture network presents an extremely challenging problem with significant implications to issues such as reservoir recharge and seep contribution to global climate. Since non-destructive, in-situ studies are difficult, great uncertainties remain. Marine seeps provide a unique opportunity to study this migration process as the seabed is a transecting surface through the network, and measuring gas flux is simpler as bubbles locate seepage. Close to UCSB lies one of the most active seep fields in the world. Thanks to numerous current and past research projects, a historical picture of seepage has been built up over the last decade. Deployment of a 40-unit turbine-seep tent network will measure spatio-temporal variations in seep flux in two disparate active seepage areas. Turbines are spun by rising bubbles; measuring flux and calibration showed insensitivity to bubble size and a fast (0.25s) response. Data analysis will discriminate between factors controlling hydrocarbon flux, including temperature, hydrostatic (tides, swell, barometric), and tar in the fractures. Deployment at two separate seeps will test the hypothesis that seeps respond to small earthquakes. Also tested is whether larger seeps are less oily, a conclusion based on a limited data set from the Gulf of Mexico. This research will also allow discrimination between the mechanisms behind ejections and blowouts.

Ira Leifer **10/1/03-6/30/05** **$72,657**
California Department of Fish and Game, P0375021

Natural and Human Oil and Gas Seepage at Summerland: Assessing Risks with Potential Mitigation Strategies

This research to sample the oil-gas emissions from the onshore seep involves testing of several different approaches. The seepage arises from a bowl-shaped depression on a tar mound and is located at about 0 ft tidal height. The main sampling difficulty is that most oil collection approaches will leave an unknown quantity of oil on the tar mound, leading to great uncertainty and estimates only being lower estimates. Thus a bubble tube method is proposed. Basically, a clear acrylic tube ~ 12» to 18» in diameter is placed into a clay ring base that surrounds the mound and seals it. The tube is filled with water, and the upper 5 cm is lined with stainless to prevent oil from adhering to

the acrylic. The gas is collected from an inverted funnel connected to a syringe, while the oil can be sampled without concern that it will be lost on walls. Video can also observe the bubble/oil droplets through the clear side walls.



Ira Leifer **5/1/02-4/30/05** **$6,722**
National Science Foundation, NSF INT01-40027

International Scaling Bubble Behavior Between the Deep Sea and Laboratory

The research goal is to improve understanding of the behavior of deep-sea bubbles by intercomparing field observations with laboratory studies. Currently, few studies exist in the literature on these bubbles, and thus incorporation of appropriate parameterizations of deep-sea bubble behavior (chemico-hydrodynamic) into numerical simulations requires potentially unjustified assumptions. Research to generate more realistic parameterizations will improve the accuracy of numerical models of processes such as hydrocarbon seepage bubble-mediated gas transfer into the ocean and atmosphere. The collaborators on this project have experience and expertise in laboratory research on bubble hydrodynamics at atmospheric and high pressure, field bubble observations, theoretical expertise on bubbles and bubble wake hydrodynamics, and direct numerical simulation of two-phase flows. Their collaboration will improve laboratory-field scaling and interpretation of field observations. This research applies to important areas such as oceanic carbon dioxide injection to counter human emissions, studying the fate of seep oil and hydrocarbons in the environment, and the use of rising seep bubbles for location of marine petroleum resources.

Ira Leifer **12/10/04-6/30/05** **$4,680**
Shoreline Preservation Fund - Associated Students UCSB, FALL4-04

Determining Variations and Sources of Tar Accumulation at COPR

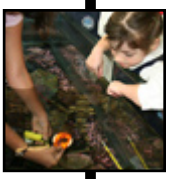
The purpose of this project is to locate some of the sources of tar in the Santa Barbara Channel and to identify the factors controlling the spatial and temporal variations of tar distribution on Coal Oil Point. The research includes the collection and mass determination of tarballs, weekly tarball counts, and oil spill modeling. This research will be conducted for six months by UC Santa Barbara undergraduate interns who will also help educate the local community as to the many sources of tar and the environmental factors that control the variability of its distribution. These environmental factors include tides, currents, swell, wind, storm activity, and kelp harvesting. The interns will be responsible for developing a public brochure and cd rom of the results to be distributed to the local community. In addition, the interns and the PI will make in-class presentations and invite local schools and organizations to participate in the research at the beach. Ultimately, this research will allow further protection of the endangered Snowy Plover habitat located on the Coal Oil Point Reserve (COPR) by developing a method in which tar accumulation can be predicted.

Ira Leifer **3/1/05-2/28/06** **$10,000**
Bruce Luyendyk
James Boles
Jordan Clark
J. Carter Ohlmann
David Valentine
Libe Washburn
UC Sea Grant, 20050962

Responding to an Extreme Storm Driven Increase in Oil and Gas Seepage from Natural Seeps along the California Coast

This study seeks to document quantitatively the increase in oil seepage after the massive rains that pummeled Southern California. To quantify gas emissions, a sonar survey will be conducted, calibrated with a direct flux measurement buoy in select areas of seepage. To quantify oil emissions, a series of boom deployments and oil collection studies will be done in select areas of seepage. The oil to gas ratios measured will be used to scale the field gas emissions to the field oil emissions. To study the relationship between aquifer recharge and seepage, pressure data series in wells will be obtained,

and fluid samples escaping from seeps at the seabed will be analyzed for salinity and terrestrial hydrocarbons. To understand the fate of the oil, numerical models will be run for the study days and compared with aerial surveys.



Ira Leifer **8/29/01-8/31/04** **$172,000**
Jordan Clark
Bruce Luyendyk
US Department of the Interior - Minerals Management Service, Task 18211 MMS-31063

Oil Slicks in the Ocean: Predicting Their Release Points Using the Natural Laboratory of the Santa Barbara Channel

The Santa Barbara Channel, CA, contains one of the world's most active areas of natural marine hydrocarbon seepage. Due to their accessibility, permanence, and variability in size (flux) and oiliness, these seeps are ideal for studying hydrocarbon transport from the sea floor to the surface in the marine environment. Important questions that can be addressed in this field location are: How fast do hydrocarbon plumes rise in the ocean? How much oil and gas dissolve during the rise? What fraction of the oil is carried by hydrocarbon bubbles? How do rising bubble-oil plumes effect the local physical environment? The project objective is to develop and validate a physically based numerical model of hydrocarbon gas and oil transport from the sea floor to the surface that explicitly accounts for oil/bubble plume dynamics. The approach is to combine detailed field observations of the hydrocarbon plumes with a theoretical description of mass transport. A validated numerical model of rising hydrocarbon plumes can be applied to a variety of problems including oil spill preparedness, disaster response, management of the impact of natural seeps on fragile marine ecosystems, and linking ocean surface expressions of seep oil to sea floor vents for petroleum exploration.

Hunter Lenihan **9/16/02-9/30/05** **$112,348**
Andrew Brooks
USDI - Minerals Management Service, Task 85340 MMS-31063

Relative Importance of POCS Oil Platforms on the Population Dynamics of Two Reef Fishes in the Eastern Santa Barbara Channel

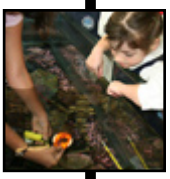
In October 2000, MMS sponsored the Select Scientific Advisory Committee on Decommissioning in an effort to gather, evaluate, and synthesize all available scientific data on the ecological role played by Pacific Outer Continental Shelf (POCS) oil platforms. The committee identified the lack of studies comparing the ecological performance of local populations on natural reefs with those on platforms through an assessment of demographic rates as the critical information gap that must be addressed before the larger question concerning the ecological role played by POCS platforms can be answered. As large, physically complex structures occupying the entire water column, platforms attract a myriad of marine species in high abundances. It is unclear how much POCS oil platforms contribute to population abundances and biomass at the larger, more ecologically pertinent regional scale relative to natural reef habitat. This uncertainty about the relative contributions of POCS platforms to the overall regional biota is the fundamental question facing officials charged with deciding the fate of decommissioned platforms. The investigators will address this critical question by comparing estimates of the demographic rates measured in populations of fishes found on POCS oil platforms with those measured in populations residing on nearby, natural rocky reefs.

Jonathan Levine **10/21/04-10/20/09** **625,000**
David and Lucile Packard Foundation, 2004-27672

Understanding Biological Invasions from Introduction through Impact

Biological invasions are a leading threat to natural ecosystems and cost the American economy tens of billions of dollars annually. At the same time, invasions can be regarded as large scale perturbations to ecological communities, providing unique opportunities to understand how these systems are structured. This project will undertake a research program applying principles of population, community, and ecosystem ecology to understand the factors controlling the success and impacts of biological invasions. The research couples mathematical models with field experiments to understand

such fundamental questions as how many new invaders can be expected over the coming decades, and what factors regulate the impact of invaders once they have established. By examining key questions at the introduction, establishment, spread, and impact stages, this research aggressively pursues a rigorous understanding of the entire invasion process.



Milton Love **6/1/01-12/31/05** **$899,682**
California Artificial Reef Enhancement, SB020084

The Ecological Role of Natural Reefs and Oil and Gas Production Platforms on Rocky Reef Fishes in Southern California

In response to a recognized need for the development of scientific understanding of the biology and ecology of fish assemblages living around offshore oil/gas platforms, the PI is involved in a regional approach to research addressing questions about how fishery productivity at the platforms and natural reefs has contributed to key reef fish populations in southern California. A major focus is on determining the relative habitat values of oil/gas platforms and reefs and how ocean influences affect survival and recruitment in the study area. MMS is using the results for environmental assessments associated with oil/gas exploration on existing offshore leases and platform decommissioning in the Santa Barbara Channel and Santa Maria Basin (e.g., oil spill risk assessments and effects of habitat modifications). Other federal, state and private agencies are using the data to assist in decision-making on issues pertaining to fishery management, conservation biology, marine refuges, and artificial reefs. The study addresses the relative contribution of Platforms in supplying hard substrate to reef fish populations, length of time fishes reside at offshore platforms, comparison of daily growth rates of rockfishes from platforms and natural reefs, habitat value of offshore platforms, description of associated biological communities, and role of oil/gas pipelines as fish habitat.

Milton Love **7/1/02-3/31/05** **$250,000**
David and Lucile Packard Foundation, PACKARD 2001-18125

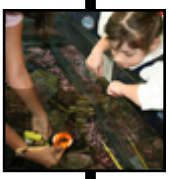
A Fish and Habitat Survey Essential to the Rebuilding of Overfished Groundfish Populations along the West Coast of North America

Along much of the Pacific Coast, the populations of many groundfish species are at historically low levels. Overfishing by both recreational anglers and commercial fishers and poor oceanographic conditions are primarily responsible for these severe population declines, which have decimated a multimillion-dollar industry. Alteration and destruction of habitats also could play a role in diminishing populations of some species, although less is known about the impact of benthic disturbances to groundfish habitats. The investigator will conduct underwater surveys of rockfish/lingcod populations and their habitats off southern California and northern-central Baja California using non-extractive methodologies from an occupied research submersible. This research is essential in order to: 1) establish baseline data on the size and location of the current benthic fish populations in order to proceed with stock rebuilding plans inside and around the Cowcod Conservation Areas, 2) determine the extent and use of rockfish/lingcod habitats, and 3) identify and assess candidate sites for marine reserves. The surveys off Baja California, to be carried out in cooperation with Mexican scientists, will be the first of their kind, and will be extremely valuable in determining the status of rockfish resources in an area that historically has received less fishing pressure than areas directly to the north.

Milton Love **8/27/03-9/30/05** **$215,139**
US Geological Survey, 03WRAG0037

Rocky Reef Fish and Trophic Interactions Associated with Offshore Oil and Gas Platforms in Southern California

The goal of this research is to develop information to understand how offshore oil/gas platforms contribute to regional fish populations and fishery productivity in the Santa Maria Basin and Santa Barbara Channel. The study involves broad scale sampling at numerous oil/gas platforms and natural reefs in the Southern California Bight, in cooperation with researchers and resource managers of the National Oceanic and Atmospheric Administration's National Ocean Service (Channel Island



Marine Sanctuary), NOAA Fisheries, California Sea Grant Program, Minerals Management Service, California Department of Fish and Game and various other state agencies involved in fisheries management and conservation biology Although the coordination and cooperation of research effort has been great, there continues to be a need for greater compilation and integration of biological and physical data to develop process understanding and comparisons of fishery productivity at natural reefs and man-made structures. An important task for this research team is the completion of an inventory of all of the marine fishes occurring between the Alaskan - Canadian border in the southeastern Beaufort Sea and Cabo San Lucas, southern Baja California..

Milton Love **6/1/03-5/31/05** **$175,000**
USDI - Minerals Management Service, 1435-01-03-CA-72694

Ecological Performance of OCS Platforms as Fish Habitat off California: A Pilot Study

Decommissioning is the process of ending oil, gas, or sulfur operations and returning the lease or pipeline right-of-way to a condition that meets regulatory requirements. Along with measures to minimize pollution, the MMS will conduct detailed environmental reviews of proposed decommissioning projects to evaluate the impacts from platform removal on regional fish populations. Assessment of habitat quality greatly bears upon platform decommissioning issues, as questions about Essential Fish Habitat and the ecological role of Pacific OCS platforms are still unresolved. Unfortunately, removing platforms also removes useful habitat, kills numerous fish, and may have adverse impacts on regional populations of some rockfish species on the Pacific OCS. This investigation will define the ecological performance and role that platforms off California may play in the recovery of rockfish populations in southern California. A recent MMS-funded study has revealed that some of the platforms hold reproductively mature bocaccio and cowcod in numbers far greater than any natural reefs that have been surveyed. Rates of reproduction, growth, and mortality of local populations are often intricately related to habitat quality (value and abundance of food and shelter). Evaluation of the ecological performance of platforms versus natural reefs can be accomplished through the assessment of these factors.

Milton Love **6/2/04-6/1/06** **$250,000**
USDI - Minerals Management Service, MMS 1435-0104CA-35031

Assessing the Fate of Juvenile Rockfishes at Offshore Platforms and Natural Reefs in the Santa Barbara Channel

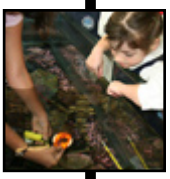
In some years, juvenile rockfishes recruit to some oil/gas production platforms in the Santa Barbara Channel/Santa Maria Basin region in astounding numbers, and the survivorship and growth of fishes residing around these structures are traceable over time as demonstrated in previous MMS-funded research. Given the role of platforms as nursery habitats, it is important to assess the fate of juvenile rockfishes that settle on platforms and natural reefs, and to understand what processes affect the temporal and spatial variability of recruitment. This study, the first of its kind, is aimed at 1) directly linking ocean current patterns to the timing of delivery of juvenile rockfishes settling on offshore platforms; and 2) estimating the proportion of these juvenile fishes that, if the platforms did not exist, would have been transported to natural reef habitat.

Ken Macdonald **3/1/02-2/28/05** **$195,716**
National Science Foundation, NSF OCE98-16021

ABR: Using Existing ALVIN Data to Study Volcanic Growth Faults and the Importance of Sheet Flows vs. Pillow Lavas on Mid-Ocean Ridges

There is much to learn about the structure of oceanic crust from a careful analysis of existing high resolution data sets. The focus of this work is on two aspects of the architecture of the volcanic section: the role of volcanic growth faults on slow-spreading ridges, and the relative abundance of different types of lava flow morphologies as a function of spreading rate, and within spreading segments (at a given spreading rate). The investigator will mine a potentially rich but underutilized existing data set: ALVIN traverses across scarps on the Mid-Atlantic Ridge, the Galapagos Spreading Center, the East Pacific Rise, the Cayman Trough, and the Juan de Fuca/Gorda Ridge. The existing

data sets will be used to address new problems. With over 100 dives in useful locations, new insights are assured. 1. Volcanic growth faults are created by a complex interplay between faulting and syntectonic volcanism, and are an important aspect of the architecture of the volcanic section on fast-spreading ridges. To date, however, they are only documented on fast-spreading ridges. 2. The relative abundance of different types of lava flows is an important, first-order observation concerning volcanic crustal architecture that will be useful for inferring volcanic effusion rates under different circumstances (spreading-rate, magmatic budget, proximity to segment boundary).



Sally MacIntyre **8/1/01-7/31/05** **$439,956**
National Science Foundation, NSF DEB 0108572

Turbulent Mixing: Effects on Resource Supply and Primary Production in Lakes

The long term goal is to develop a predictive understanding of how physical forcings in lakes affect and control ecosystem function. Knowledge of hydrodynamic processes in lakes has increased dramatically in the last decade, and linking these processes to biological ones on the same temporal and spatial scales is essential for fully understanding controls of ecosystem function. Previous studies have correlated turbulence production with the destabilization of basin scale internal waves due to wind forcing and have linked turbulence production to lake size and bathymetry. This knowledge will be used in the current work to design experiments on spatial/temporal variation of turbulent mixing and its consequences for nutrient fluxes, primary productivity, and spatial heterogeneity of community structure in lakes ranging from 0.1 to 100 km2. The PI will conduct experiments on time scales relevant to changes in bacterial and phytoplankton physiology and growth over several seasons to determine the effect of natural variability on responses. New insights at the process level will allow scientists to make better predictions of changes in lacustrine ecosystems due to physical forcing. Extrapolation based on the new understandings of the relation of turbulent mixing to the internal wave field will allow predictions to longer time scales and to other lakes.

Sally MacIntyre **5/1/03-4/30/06** **$299,064**
National Science Foundation, OCE 0235238

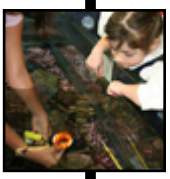
Collaborative Research: Physical Limnology for the Parasite Ecologist

How infectious diseases influence population dynamics and community interactions is an understudied aspect of aquatic ecology. This research focuses on the ecological interaction between a common microparasitic fungus and its Daphnia host species, and the consequences to coexisting zooplankton and their phytoplankton prey. The collaborators will merge three disciplines (community ecology, physical limnology and epidemiological modeling) in explaining spatial and temporal patterns of host-parasite dynamics. Comparative and manipulative experiments will be conducted in parallel with modeling to couple physical mixing with host-parasite population dynamics in a broad set of lakes. The coupling of ecological and physical-mixing processes is a generally important goal since most aquatic microparasites, unlike their animal hosts, do not swim. Hence, sinking and resuspension of parasite spores from the sediment may limit horizontal transmission and spread of diseases in lakes and oceans.

Eric Matthys **6/23/03-6/22/05** **$349,947**
David Chapman
Advanced Technology Institute, 2003-619 (Task 0 & Task 1)

Development of a Bioengineering-based Technology for the Reduction of Hull Drag and Fouling

The investigators will conduct a study of the feasibility of using marine organisms to generate in-situ production of natural drag-reducing compounds on the surface of ship hulls, as well as to inhibit the formation of secondary macrofoulers. Both effects will reduce the drag experienced by the ship, resulting in higher speeds or reduced energy usage. This work will be conducted through a series of bioengineering experiments aimed at 1) optimizing and characterizing the organisms, 2) measuring their drag-reducing behavior, and 3) evaluating their anti-fouling characteristics.



Michael McGinnis **6/1/05-3/31/06** **$4,537**
Shoreline Preservation Fund - Associated Students UCSB, Spring05-04

Coastal Marine Processes and Mangement: A Profile of the Southern California Marine Ecosystem

This project provides funds to teach Environmental Studies 134, which has not been offered at UCSB for over five years. The course includes a profile of the ecology and human uses of the Southern California Bight, a recognized coastal marine ecosystem in southern California. The project includes: 1) the production of five powerpoint presentations with original illustrations and photographs that document the ecology and use of the coastal and marine ecosystems of the south coast, which will be placed on the Ocean and Coastal Policy Center's webpage (via the Marine Science Institute); 2) salary support to teach Environmental Studies 134 (Coastal Marine Processes and Management); and 3) salary support for two undergraduate interns.

John Melack **9/1/01-8/31/05** **$200,000**
UC Davis, UCD 005230

Western Center for Estuarine Ecosystem Indicator Research

As part of the Western Center for Estuarine Ecosystem Research, the PI is responsible for flying high-resolution videography over selected targets for comparisons with indicators of ecological health. The measurements at UCSB will be coordinated with field studies conducted under the EPA Center program.

John Melack **1/1/02-12/31/04** **$50,000**
Timothy Robinson
UC Office of the President, UCOP 02T-CEQI0800097

Understanding Nutrient Loading to the Coastal Zone from Urban Watershed

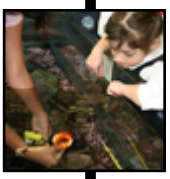
Nutrient loading from urban development and intensive agriculture can have a significant adverse impact on coastal environments. The focus of this research is to 1) measure and characterize nutrient loading by landuse on a watershed scale to the near-shore coastal environment using representative watersheds in southern California; and 2) develop a model to predict future nutrient export from these watersheds resulting from projected changes in landuse. The model will be based on an integrated modular framework and should prove a useful tool in watershed planning and management. The selected study watersheds drained by Carpinteria and Franklin creeks are distinctive but regionally characteristic catchments. Santa Monica Creek, draining an adjacent catchment, will be used to test the portability of the model. Both Franklin and Santa Monica Creeks carry a high nutrient load from urbanization and intensive agriculture to one of southern California's few remaining wetlands, the Carpinteria Salt Marsh.

John Melack **7/1/04-6/30/06** **$58,000**
Craig Carlson
UC Water Resources Center, SB050002

Nutrient Deposition and Alteration of Food Web Structure in High Sierran Lakes: Response by Microbial Communities

High-elevation lakes of the Sierra Nevada, once considered isolated from human impacts, are increasingly experiencing the effects of population expansion. Nutrient loading, the result of increasing atmospheric deposition, and the stocking of non-native trout, halted in National Parks but continuing on Forest Service lands, are major anthropogenic impacts to these remote ecosystems. The ecological impacts of both trout stocking and atmospheric pollutants have been studied in high-elevation lakes of the Sierra for nearly two decades, and have been shown to impose significant and lasting impacts at a regional scale, including eradication of endangered species, alterations to algal productivity, and changes in zooplankton population dynamics. Connecting these shifts to ecosystem function and biogeochemical cycling is necessary for understanding and predicting ecological impacts in these lakes, yet this has not yet been a focus, despite the documented sensitivity of alpine lake ecosystems to even minor changes in water chemistry or nutrient availability. This research seeks

to investigate potential ecosystem impacts of eutropication and trout introductions by examining the role of microbes in the structure and function of Sierran lakes.



Daniel Morse **8/18/04-8/23/05** **$3,500**
Oak Ridge National Laboratory, 4000034927

CNMS RS 2003-04S: Scaffolding of Biosynthetic Enzyme Systems to Nanostructured Electrodics for Controlled Synthesis of Inorganic Materials

This project, conducted by graduate student Meredith Murr, is aimed at understanding the catalytic and structure-directing mechanisms of the silicatein filament in order to develop biologically inspired new routes to materials synthesis. Siliceous marine sponges have developed unique biomolecular machinery for the well-controlled supramolecular assembly of silicon-based biomaterials. In particular, the needle-like glass structures, or spicules, of the marine sponge *Tethya aurantia* are composed of a central (axial) protein filament surrounded by well-ordered silica nanoparticles. To begin to elucidate the determinants of specificity, self-assembly and templating, the molecular details of the filament surface are required. Studies will be conducted to help determine how the filament is able to stabilize the formation of ordered inorganic products. The results could lead to the design of biologically-inspired catalytic templates that can mimic the desirable properties of the silicatein filament.

Daniel Morse **7/28/03-9/30/05** **$156,540**
Oak Ridge National Laboratory, ORNL 4000025240

Silicateins and Carbon Nanotubes

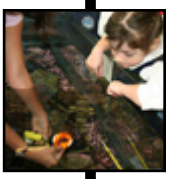
With a precision of nanostructural control that exceeds present human capabilities, biological systems fabricate a remarkable diversity of 3-dimensionally organized silica-based materials. In contrast to the conditions of industrial manufacture, these biological syntheses occur under mild physiological conditions of low temperatures, ambient pressures and near-neutral pH. Analyses of the proteins, genes and molecular mechanisms governing the formation of these composites have revealed a unique mechanism of synthesis with a potential for practical applicability. The PI's research team recently discovered and characterized a new family of proteins occluded in a biologically produced silica, that they named silicateins (for silica proteins). The researchers will extend their expression and display studies with the silicatein molecule by coupling silicatein or its biomimetics to carbon nanotubes (CNTs), for use of the resulting conjugates as catalytic, structure-directing templates for the directed nanofabrication of functional nanostructured composites. A first target will be the synthesis of coherently organized CNT-silsesquioxane composites with improved fluorescence and energy-transfer properties.

Daniel Morse **8/19/02-8/18/05** **$2,006,750**
Paul Hansma
Galen Stucky
J. Herbert Waite
Princeton University, 00000532

Synthetic Self-Healing Structural Materials

This research will develop generic, robust rules and design tools governing synthesis and performance of self-healing structural materials, based on exemplars from biological systems that combine some of the desirable properties of Kevlar and silicones. New routes to synthesis of these multifunctional materials will be developed, together with a robust and generalizable understanding of the fundamental physics and design principles underlying their assembly and behavior. Practical uses include self-healing fibers, solids, armors and protectants, coatings, resins, adhesives and packaging materials. Robust and generalizable rules and design tools governing the physical properties and synthesis of self-healing structural materials should find wide application in extensions to predictive property design in other multifunctional materials as well. This project aims to develop fundamental design principles and new routes to synthesis for manufacture of self-healing fibers, resins, solids and composites based on lessons extracted from the biological protein models.

The UCSB team will develop, test and optimize synthetic analogs of the natural self-healing proteins and protein-based composites on which their approaches are based, and then translate the results of these studies to second generation synthetic materials that are thermally robust, resilient, processible and economically manufacturable.



Daniel Morse **3/1/04-2/28/06** **$241,385**
UC Sea Grant, R/MP-95

Marine Bio-Nanotechnology: High-Performance Materials from Sponge Silicatein

On-going Sea Grant-supported research has focused on characterization of the molecular mechanisms by which the silicatein proteins isolated from a common California marine sponge control the synthesis and nanostructures of titanium dioxide (for the efficient conversion of solar energy to electricity). In collaboration with industrial partners from DuPont, Dow-Corning and Amgen, the PI will apply the results of these studies: 1) to optimize nanostructural control of the resulting titanium dioxide made by the sponge proteins and their synthetic (biomimetic) counterparts; and 2) to optimize the performance of the resulting titanium dioxide nanocrystals for more efficient photovoltaic conversion of solar energy to electricity. Also in collaboration with industrial partners, the PI will extend these results to develop innovative methods for the economically efficient nanofabrication and improved performance of other semiconductors for advanced microeletronic, optoelectronic and medical applications required for the next generation of computers, communications devices, chemical and biological sensors, energy transducers, «smart» medical implants and biochips. The project will also provide training in its unique interdisciplinary approach, combining new developments in marine biotechnology, advanced instrumentation and materials engineering, to product high-performance nano-structured materials.

William Murdoch **1/1/01-12/31/04** **$300,000**
National Science Foundation, NSF DEB 0089515

Analysis of Control and Regulation of an Insect by its Parasitoid

The investigator aims to discover the individual-level mechanisms that lead to stability in a consumer-resource interaction, and to measure their relative contributions. This is the culmination of fifteen years of research on control and regulation of California red scale, a world-wide pest of citrus, by its insect parasitoid, *Aphytis melinus*. The interaction is remarkably stable and is not only a celebrated example of biological control, but also exemplifies a deep theoretical problem in ecology, namely how a prey population can be suppressed to very low densities in a nutrient-rich environment, and yet remain dynamically stable (the paradox of enrichment). In particular, the research seeks to explain the astonishing speed at which Aphytis suppressed scale outbreaks in an earlier part of the experiment.

William Murdoch **9/1/01-8/31/04** **$140,594**
Elizabeth Borer
US Department of Agriculture, 2001-35316-10981

Maximizing Biological Control: One or Multiple Natural Enemies?

The investigators seek to understand the mechanism(s) by which two parasitoids (*Aphytis melinus* and *Encarsia perniciosi*) coexist in the California Red Scale system, and to determine whether the mechanism(s) cause(s) better or worse pest control. Two alternative hypotheses will be tested: 1) Coexistence is achieved by a balance between efficient exploitation and inter-specific interference, and reduces the effectiveness of pest control, and 2) Coexistence is achieved by partial spatial segregation of the parasitoids, and increases the effectiveness of pest control. Biological control has been used effectively for more than a century, but there is still a lack of general understanding of the appropriate conditions for introducing one vs. many control agents. Such understanding would make biological control a more effective component of sustainable US agriculture. It would also reduce the number of alien natural enemy species released, thus reducing potential negative effects on non-target organisms. This research will improve both the scientific basis for biological control and understanding of the fundamental ecological problem of coexistence of species competing for limited resources.

Craig Nicholson **4/1/04-3/31/06** **$248,819**
James Kennett
Christopher Sorlien
National Science Foundation, OCE 0350573

A Test for Extending the High-Resolution Climate History Back to ~450ka: The Interface Between Climate, Tectonics, and Sea-level Change in Santa Barbara Basin

The ODP Site 893 in Santa Barbara Basin provides one of the highest-resolution climatic and paleo-climatic archives of the late Quaternary being studied from the world's oceans. Oxygen isotopic and microfossil results reveal a remarkable correlation of climate change between Santa Barbara Basin and the Greenland Ice Sheet during the last 70 ka, suggesting synchronous climate changes linked through the atmosphere. The investigators will interpret data collected in 2002, use a 3D model to precisely locate favorable sites for piston coring and select sites to sample the extreme climate transition from Oxygen Isotope Stage -12 to 11, and OIS-6 to 5e to ground-truth the seismic correlation from Site 893. Based on the PIs' experience with Site 893, each core will provide crucial high-resolution windows into how global climate changed during these older time periods, and critical insights into the behavior of late-Quaternary climate change at decadal to millennial to orbital scales. The new data will also help evaluate the nature and speed of earlier climate transitions, and thus provide better understanding of the causes of abrupt global climate warming.

Craig Nicholson **2/1/03-1/31/06** **$74,000**
University of Southern California, 083262

Continuing to Build and Evaluate the SCEC 3D Community Fault Model

The purpose of this project is to continue to develop useful digital databases of subsurface information, and to use these data to provide digital 3D structural representations of active fault surfaces for input into the SCEC 3D Community Fault Model (CFM). This includes developing digital 3D fault surfaces and down-dip projections of seismogenic faults based on subsurface well data, seismic reflection data and relocated seismicity, developing alternative fault models that include non-planar fault geometry, as well as testing and evaluating the existing CFM for fault continuity, consistency and compatibility to accommodate finite strain.

Roger Nisbet **9/1/01-8/31/05** **$330,000**
National Science Foundation, NSF DEB 0108450

QEIB: Modeling Population Dynamics and Trophic Interactions in Systems with Unidirectional Flow

Many populations, communities, and ecosystems persist in environments where some or all life stages disperse in media with a strong directional bias. Examples include plants with windborne seeds, aquatic organisms in streams, rivers and estuaries, and marine organisms with larval dispersal influenced by ocean currents. The overall objective of this project is to develop a modeling framework describing consumer-resource interactions in such systems. Although many of the results will have wider application, the primary emphasis is on mechanisms that are important in stream ecology. Typically, stream systems are characterized by high spatial and temporal heterogeneity on many scales, by continuous inputs of nutrients and detritus, and by the presence of distinct populations in the benthos and the drift. Thus the primary aims will be to better understand the factors determining population persistence and distribution in the face of transport processes with a strong unidirectional bias, and to model mechanisms determining the spatial and temporal scales of response to environmental heterogeneity.

Roger Nisbet **3/1/01-2/28/06** **$1,938,130**
Andrew Brooks
Bruce Kendall
Patricia Holden
Kevin Lafferty
Erik Muller
Henry Page
Allan Stewart-Oaten
UC Davis, UCD R-82867601

Western Center for Estuarine Ecosystem Indicator Research

The overriding aim of this project is to develop indicators of wetland ecosystem health that are both simple aggregations of data as well as more complex expressions of overall ecosystem health. A second objective is to develop indicators of biotic integrity for plant, fish, and invertebrate communities using model organisms. The third goal is to develop indicators of toxicant-induced stress and bioavailability for wetland biota. These objectives address significant management goals along the entire California Coast. The components of this integrated program include Ecosystem Indicators, Biological Responses to Contaminants, Biogeochemistry and Bioavailability, and Remote Sensing. UCSB's investigators will make contributions in ecological modeling and statistical analyses, field research, and laboratory studies of microbial communities. The purpose of the modeling and statistical analyses is to integrate information from the many individual studies and derive new indicators of integrity and sustainability of wetlands. Field research will include studies of fish and invertebrates in coastal wetlands, stable isotope studies, and investigations of the utility of indicators based on trematodes. The microbial studies will yield information on sources of coastal pathogens and on the dynamics of microbial communities.

Todd Oakley **1/1/04-12/31/05** **$271,300**
Nikolaos Schizas
National Science Foundation, 0316330

A Multi-Gene Phylogeny of Maxillopod Crustaceans to Facilitate Comparative Study of Eye Evolution

As benefactors of a detailed stratigraphic record, riotous diversity, and cosmopolitan distribution, the Maxillopoda (ostracods, copepods, barnacles, and others) have enormous potential to provide information about evolution, biodiversity, ecology and global change. However, a major obstacle to utilizing this potential is the lack of reliable phylogenetic hypotheses for the group. This project has two major goals: 1) to provide a large-scale molecular phylogeny of maxillopod crustaceans and; 2) to use the phylogeny to test hypotheses about maxillopod eye evolution. A selected team of researchers and collaborators with complementary expertise in the major maxillopod groups will sample a taxonomically diverse array of about 100 maxillopod species that is nearly comprehensive at the level of family to order. They will obtain DNA sequence from four different nuclear genes that will allow not only resolution of maxillopod relationships, but also integration with other studies in arthropod phylogeny. With regard to maxillopod eye evolution, a preliminary phylogeny based on extensive preliminary strongly supports independent origins of compound eyes in both myodocopid ostracods and branchiuran fish lice. The PI's will examine statistically the alternative hypothesis that compound eyes were lost multiple times rather than gained.

Todd Oakley **10/1/04-9/30/05** **$37,200**
National Science Foundation, DGE 0411712

NATO Post Doctoral Research Fellowship

Because of their tremendous diversity, widespread distribution, superb fossil record, and ancient origin, the Ostracoda (Crustacea) have enormous potential for understanding evolution, ecology, and global change. Ostracods may be the commonest of metazoan fossils, with a record dating back 500 million years with thousands of species described, making them especially suited for assessing methods of divergence time estimation, which is vitally important for understanding patterns and rates of evolution and the impacts of geological and environmental changes on biodiversity through

time. This is a collaborative project between Estonian paleontologist Oive Tinn and American molecular evolutionist Todd Oakley. The project draws on the expertise of both to address important questions at the interface of paleontology and molecular evolution, using tools of bioinformatics and Ostracoda as the group of study. Specific goals are: 1) To create an online, integrated database of first fossil appearances and molecular data; 2) To integrate molecular and morphological data for phylogenetic analysis; and 3) To test the ancient origin of Ostracoda hypothesis.

J. Carter Ohlmann **8/28/01-9/30/04** **$184,512**
USDI - Minerals Management Service, Task 18212 MMS-31063

Transport Over the Inner-Shelf of the Santa Barbara Channel

The goal of this project is to provide surface current information over the inner shelf of the Santa Barbara Channel (SBC), data essential to predicting the movement of spilled oil in the region. The knowledge gained through this study will greatly aid the MMS and other government agencies in the management of coastal resources including oil and gas. There is a clear need to understand ocean circulation patterns in the SBC so that consequences of oil and gas activities on the surrounding environment can be addressed. Past and existing research efforts describe and quantify large-scale circulation patterns in the SBC. However, very few data exist to describe circulation patterns over the inner-shelf region. The limited available data are from a few isolated moorings and fail to give information regarding transport and diffusion, the characteristics of inner-shelf flows of most concern for predicting and monitoring the movement of oil. This research will benefit government agencies by improving the ability to track and forecast the movement of oil and other harmful materials within the inner-shelf region of the Santa Barbara Channel. The results will also provide a direct benefit to fisheries management, marine reserve designation, and object recovery missions.

John Orrock **12/15/04-11/30/05** **$43,571**
O. James Reichman
National Science Foundation, DEB-0502069

SGER: Does Manipulation of Top Predators Lead to Rapid Shifts in the Structure of Ecological Communities?

The role of predation in affecting the structure of natural communities is a central question in ecology. However, rarely do systems exist where food webs are amenable to large-scale experimental manipulation, and food webs are often too complex to explicitly track all participants. This project capitalizes upon the planned reintroduction of the Island Fox (*Urocyon littoralis*) to San Miguel Island to determine if top predators lead to rapid shifts in island plant communities by affecting rodent consumers (i.e, a trophic cascade). Evaluating the effect of top predators requires either long-term data from systems with and without top predators or systems where the timing of predator manipulation is known. This study combines both, using long-term data from systems with and without predators as well as experimental data from a system where the duration of predator removal is known. This unique combination of contemporary and historical data makes it possible to rigorously evaluate the role of top predators in insular food webs as well as evaluate how quickly top predators lead to shifts in ecological communities.

Henry Page **9/6/00-3/31/05** **$57,844**
Jenifer Dugan
James Childress
USDI - Minerals Management Service, Task 17601 MMS-31063

Habitat Value of Shell Mounds to Ecologically and Commercially Important Benthic Species

This research will examine whether «shell mounds» remaining after the decommissioning and removal of the platform structure have habitat value for ecologically and commercially important benthic crustaceans and selected other taxa compared to 1) mounds with platform structures, 2) inshore rocky reefs, and 3) soft bottom. The intertidal and subtidal portions of offshore oil platforms provide hard attachment sites for a diverse community of invertebrates. Development of this «fouling» community can be extensive with the accumulation of mussels (*Mytilus* spp.) and other

encrusting species reaching tens of centimeters in thickness. Clumps of this community, dislodged by wave action and through commercial cleaning operations, drop to the bottom as "faunal litterfall." Faunal litterfall and the large mounds of shells that form over time beneath platforms provide habitat and food for invertebrates and fishes, including commercially important crabs. This research will provide information that is needed by decision-makers for discussions on the fate of shell mounds left after decommissioning.

Henry Page **9/16/02-3/31/05** **$156,515**
Jenifer Dugan
Milton Love
Hunter Lenihan
USDI - Minerals Management Service, Task 85339 MMS-31063

Ecological Performance and Trophic Links: Comparisons Among Platforms and Natural Reefs for Selected Fish and their Prey

The overall objective of this research is to provide decision-makers with information on the quality of offshore platforms as reef habitat. Specifically, the investigators will: 1) explore whether indices of ecological performance (e.g., size, individual growth, production) of a model fish and its invertebrate prey differ between a platform and a natural reef over time; 2) test whether the performance (nutritional condition, growth) of a model fish differs among offshore platforms and natural reefs located in different regions of the Santa Barbara Channel at one time; 3) examine depth fidelity, territoriality, foraging activity budgets, and mortality of a model fish as a means of linking prey and predator performance; and 4) acquire data that can be integrated into models, such as ECOPATH, to describe the flow of energy and material among trophic levels on platforms and natural reefs.

Robert Petty **6/18/04-7/31/05** **$9,995**
UC Lawrence Livermore National Laboratory, B539972

Determining the Contribution of Riverine, In-Delta and Aqueduct Sources of Organic Carbon to Loads in the State Water Project Using AMS Carbon Dating and Stable Isotope Characteristics

The UCSB Principal Investigator will analyze samples from PIs at the Department of Water Resources and Lawrence Livermore National Laboratories for environmentally stable Delta isotopes. Radioactive and stable isotope results will be used in a mixing analysis employing principal components and end member mixing to determine if: 1) Delta island peat is a significant source of C loading to the SWP, 2) C inputs from Delta island peat vary through time depending on seasonal and hydrologic conditions, and 3) Using these techniques, can managers and scientists separate the effects of conversion of Delta agricultural lands to wetlands and reservoirs from other ongoing landuse changes such as increasing urbanization.

Barbara Prézelin **7/1/03-6/30/05** **$274,563**
UC Santa Cruz, 03-T-CEQI-07-0062

Toxic Phytoplankton Along the California Coast: A 500-Mile Perspective

This project is based on results from an earlier, individual award to Dr. Mary Silver at UC Santa Cruz that focused on toxic phytoplankton in central California (the Monterey Bay region). The results showed that toxic algal blooms are relatively common in the study area, with multiple events annually for two major toxin-producing groups of microalgae. During that project, the incidence of algal-related poisonings of marine mammals has increased dramatically along the entire coast. The current study sets up the first large-scale analysis of populations of the two major toxin-producing phytoplankton taxa along the California coastline. The PI's seek to determine the abundance of domoic acid (DA) -producing diatoms of the genus Pseudo-nitzschia and the saxitoxin (STX) -producing dinoflagellate, Alexandrium. This 3-campus project will simultaneously measure the toxins associated with the populations, a large-scale assessment never attempted previously.

Christopher Pyke **12/1/02-11/30/04** **$129,402**
Sandy Andelman
The Nature Conservancy, TNC SB030053

Climate, Ecosystems, and Land-use: Understanding Environmental Variability in Human-dominated Landscapes

Environmental variation creates both risk and opportunities for conservation. The implications of environmental variation in any particular situation vary depending on climatic processes, ecosystem responses, and land-use patterns. Consequently, it is necessary to understand potential interactions between these factors in order to design conservation strategies that use variation to reduce risk and take advantage of opportunities to increase species persistence. Informed action can offset the natural tendency for risk from environmental variation to increase as the total amount of habitat in a landscape decreases. This project addresses this issue by: 1) simulating how climate, ecosystems, and land-use interact over time to change patterns of environmental variation, and 2) applying this framework to evaluate risks faced by vernal pool ecosystems in the Central Valley of California. The results of this work will help conservationists develop better tools for reserve design, understand processes underlying patterns of environmental variability, and manage local vernal pool landscapes to reduce risks associated with landscape and climate change.

Langdon Quetin **10/15/02-9/30/05** **$296,520**
Robin Ross
Virginia Institute of Marine Science, 518606/1247

LTER: Palmer Antarctica LTER: Climate Change, Ecosystem Migration and Teleconnections in an Ice-Dominated Environment

The UCSB investigators are responsible for the Zooplankton and Micronekton component of the PAL LTER study of the pelagic ecosystem west of the Antarctic Peninsula. The work consists of three major areas, core data sets, process experiments, and synthesis and modeling. The core data sets constitute the time series that is the legacy of the LTER, and that allows the investigators to test hypotheses about processes that occur on time scales of decades. UCSB's investigators are responsible for: 1) collection of core data sets during the spring and summer season, primarily during the annual research cruise in January/February; and 2) documentation of data collection methods, quality control/quality assurance of the core data sets, and placement of the core data sets and documentation into the PAL LTER database within two years of collection. Shorter-term process studies on such questions as grazing rates of larval krill on surfaces or factors driving the documented seasonal decrease in biomass of krill in the area will be undertaken in one- or two-year sequences. They will also participate in synthetic and modeling activities, including continuation of the EOF analysis begun during the 1996-2002 period of the project, and analysis of the abundance and distribution of the five major macro-zooplankton species in the PAL LTER study region with the ten-year time series.

Daniel Reed **4/1/00-3/31/06** **$4,484,995**
Scott Cooper
Steven Gaines
Sally Holbrook
John Melack
National Science Foundation, NSF OCE 9982105

LTER: Land/Ocean Interactions and the Dynamics of Kelp Forest Communities

This LTER (Long-Term Ecological Research) site in the Santa Barbara region is focused on ecological systems at the land/ocean-margin. The location is typical of many semi-arid regions in that it includes a large number of watersheds with episodic stream flow that vary in size and land use. The focal coastal ecosystem of this research will be giant kelp (*Macrocystis pyrifera*) forests, which are extremely important to the ecology and economy of coastal areas along the west coast of North and South America. Kelp forests occur on shallow coastal reefs and are affected in both positive and negative ways by land and the open ocean through the movement of water carrying constituents (e.g., sediments, nutrients, larvae, pollutants) from these different sources. Kelp forests have a unique

trophic structure in which producers (macroalgae) and consumers (sessile invertebrates that filter plankton) compete for space. Competition between macroalgae and sessile invertebrates can be mediated by the relative supply of nutrients and particulate organic matter to the reef.

Daniel Reed **1/1/04-12/31/05** **$1,732,070**
Stephen Schroeter
Henry Page
Mark Steele
Simpson and Simpson Business and Personnel Services, Inc., SB040045

San Onofre Nuclear Generating Station Mitigation Project Monitoring Program

In 1974, the California Coastal Commission (CCC) issued a permit to Southern California Edison (SCE) for Units 2 and 3 of the San Onofre Nuclear Generating Station (SONGS). Conditions of the permit require monitoring the impacts of the operation of Units 2 and 3 on the marine environment offshore from San Onofre, mitigation of any adverse impacts, restoration of a southern California wetland, installation of fish barrier devices at the power plant, construction of an artificial reef to replace lost kelp bed resources, and support for a marine fish hatchery. SCE is also required to fund a monitoring program of the mitigation effort to be carried out by appropriate and independent scientific and technical personnel and consultants under the direction of the Executive Director of the CCC. Working closely with the CCC, the UCSB PIs will provide oversight and consultation to SCE on the planning of the wetland restoration project including: pre-restoration monitoring at appropriate reference sites; monitoring of the experimental phase of the artificial reef project; analysis of data on fish impingement at SONGS Units 2 & 3l; assessment of SCE's compliance to the behavioral barriers mitigation requirement; a data management system for all project-related data; supervision of technical staff, contractors and consultants; preparation of quarterly reports for the CCC on the status of the mitigation projects; organization of annual public workshops to discuss the findings and status of the SONGS mitigation program; and preparation of a work program and budget for the coming year.

Daniel Reed **11/1/04-1/31/06** **$40,352**
UC Davis, UCD 013981-02

Mechanical Consequences of Flexibility for Benthic Marine Organisms

The UCSB investigator will oversee field technicians who will conduct monitoring of kelp survivorship in the field. The technicians will also deploy and retrieve a physical instrument used to record wave heights at the core field site of the study, and will carry out morphological measurements and measurements of holdfast strength on kelp plants collected in the Santa Barbara area. The field technicians will also assist the UC Davis investigator during periodic visits to UCSB in deploying devices for determining drag coefficients of kelps and in deploying sensors that directly measure wave forces imposed on these organisms in nature.

Daniel Reed **7/1/04-6/30/05** **$176,016**
Sally MacIntyre
Mark Brzezinski
Sally Holbrook
UC Office of the President, UCOP 012856-01

Ecosystem Functioning in Giant Kelp Forests: Linking Hydrodynamics to an Essential Forage Species and its Benthos

Giant kelp (*Macrocystis pyrifera*) is heavily harvested and is a critical forage species for numerous other marine organisms, many of strong commercial value to fisheries. The subtidal forests formed by this kelp may also have the capacity to function as natural filters to improve coastal water quality. However, despite the clear economic and ecological importance of giant kelp forests, their relationship to surrounding waters and the linked responses of organisms within the community to forest-flow processes have not been explored in any detail. The investigators aim to examine mechanistically 1) the degree of connection of this vital system to its surrounding waters, 2) rates

of consumption or production of waterborne subsidies by kelp forests, 3) the interplay of nutrients, light, and flow in determining kelp growth, and 4) the implications of forest-flow interactions for benthic inhabitants of the forest. The experimental efforts will employ extensive flow measurements, geochemical and biochemical analyses, and traditional ecological methods in exploiting a breadth of expertise in hydrodynamics, marine ecology, biological oceanography, and algal physiology. As such, this work will address pressing problems in coastal water quality, it will increase knowledge of the ecosystem role of a critical forage species, and it will outline the nature of cascading ecological processes that impact fisheries.

O. James Reichman **9/1/01-8/31/05** **$450,000**
Sandy Andelman
Andrew W. Mellon Foundation, MELLON SB020119

Postdoctoral Training in the Management of Environmental Information: A Proposal to the Andrew W. Mellon Foundation

Despite many years and dollars spent in pursuit of useful information about the environment, even the simplest forms of communication between providers and users of the information is extremely difficult, to the extent that scientists may be limited by the inability to access the vast amounts of information that exists. Inaccessibility is particularly true for ecological information. Within the universe of information, ecological data may be as dispersed and heterogeneous as any of interest to scientists and other users. Understanding complex ecological and environmental issues requires information across many scales and disciplines, from the molecular level to whole organisms and from genetics to global change. Contemporary ecological research commonly relies on integrating data as diverse as climatological records, spatial distributions of individuals, changes in biodiversity over space and time, responses of species to experimental manipulations, genetic structure of populations, patterns of human alterations of ecosystems, and much more. The scope of information needed to understand ecological systems is enormous. This project will support three postdoctoral associates in ecology and computer science at the National Center for Ecological Analysis and Synthesis to work on informatics research on the cutting-edge elements of the Center's efforts to imbue the community of information users with a capability for sharing information.

O. James Reichman **1/1/03-12/31/05** **$700,000**
Andrew W. Mellon Foundation, SB030058

Production Implementation of the Knowledge Network for Biocomplexity

Information is the raw material of knowledge and understanding. The research enterprise is designed to generate information - data - and facilitate its incorporation into higher order understanding and true knowledge of the systems under consideration. The geometric increase in information, and its availability in machine form, has made the amount of data accessible overwhelming; unfortunately it has not led to a commensurate increase in knowledge in most fields. This is particularly true for ecological information, which is important for advancing the basic understanding of natural systems. Within the universe of information, ecological data may be as dispersed and heterogeneous as any of interest to scientists and other users. Understanding complex ecological interactions involves both the biotic and abiotic realms, and commonly relies on integrating data as diverse as climatological records, spatial distributions of individuals, changes in biodiversity over space and time, responses of species to experimental manipulations, genetic structure of populations, patterns and processes of ecosystem functioning, and much more. Research at the National Center for Ecological Analysis and Synthesis (NCEAS) has revealed both the need for, and the power of, more generic access to data to address ecological questions.

O. James Reichman **3/23/05-3/31/07** **$300,000**
Sandy Andelman
Andrew W. Mellon Foundation, SB050085

Deploying Information Management Tools and Increasing Analytical Capabilities of Scientists Through the National Center for Ecological Analysis and Synthesis

The National Center for Ecological Analysis and Synthesis (NCEAS) was established to use existing data to address important ecological questions. Accordingly, its research and training activities (including Working Groups, Postdoctoral Associates, and Center Fellows, totaling more than 3,500 individuals in 10 years) focus on the acquisition and access to distributed and heterogeneous ecological information. NCEAS has been engaged in extensive research projects to develop generic data access tools for ecology and allied disciplines. Concurrently, the Andrew W. Mellon Foundation has provided unique support to help deploy the tools, a crucial activity that is not supported by more traditional entities. With this support, the Principal Investigators have discovered that a distinctive opportunity exists at NCEAS to develop informatics tools and train hundreds of scientists in their use. Specifically, while at the Center, scientists are fully engaged in accessing, integrating, and sharing information to conduct their projects and thus are primed to employ new informatics tools. This award from the Andrew W. Mellon Foundation provides support for one person for informatics training and three analytically adept postdoctoral associates to significantly strengthen informatics training for hundreds of scientists who visit the Center each year.

O. James Reichman **4/23/04-9/30/05** **$5,000**
Center for Invasive Plant Management, GC257-04-Z1138

Do Native Consumers and Patch Shape Affect the Dominance of Invasive Plants?

Consumers may play a critical role in the success or failure of invasive plants. For example, a common theme in the biological control of invasive plants is that they can be controlled by introducing consumers from their original range. However, this focus has largely neglected the possibility that invasive plants may dominate native plants by affecting native consumers. The principal investigator tests a novel mechanism by which invasive plants maintain their dominance of 9.2 million hectares of California grassland: by promoting large consumer populations and changing consumer activity patterns, invasive plants suppress native species. The PI will collect baseline data that are necessary to secure funding to conduct a multi-year study on the role of consumers and patch shape in affecting the dominance of California grasslands by invasive plant species. This work brings elements of community and spatial ecology to bear on invasive plant management, components that have traditionally received little attention. Moreover, long-term studies that focus on the role of native consumers in affecting invasive and native plants are virtually nonexistent.

O. James Reichman **4/1/04-3/31/06** **$200,647**
Sandy Andelman
David and Lucile Packard Foundation, 2004-26832

Request for Support of Planning Activities to Develop Scientific Knowledge in Support of Ecosystem-based Management in Coastal Marine Systems

As an initial step in the development of a science strategy focused on Ecosystem-based Management for Sustainable Coastal-marine Systems, the National Center for Ecological Analysis and Synthesis (NCEAS) seeks to develop a program aimed at producing the scientific knowledge necessary for sustainable management of coastal-marine systems. This project provides for the organization and first meeting of the Advisory Committee, and for a distributed graduate seminar that will synthesize information and critically evaluate ecosystem-based management efforts from the last decade.

O. James Reichman **6/20/04-6/20/07** **$534,795**
Sandy Andelman
David and Lucile Packard Foundation, 2004-27169

Knowledge and Capacity-Building to Support Ecosystem-Based Management for Sustainable Coastal-Marine Systems

This is a partnership between the National Center for Ecological Analysis and Synthesis (NCEAS) at UC Santa Barbara and the Packard Foundation that focuses the attention of innovative scientists of the highest caliber on generating the knowledge needed to support an ecosystem-based approach to managing coastal-marine systems. Coastal systems are heterogeneous and dynamic. They also are frequently chaotic, corruptible by invasion of exotic species, and strongly influenced by both nearby

and remote processes, including human activities. The current global population and associated activities of more than 6 billion people are generating unprecedented rates of change in these systems. Thus they cannot be managed successfully by existing approaches. In this context, perhaps the greatest challenge for today's scientific, conservation, and policy communities is to develop ways to ensure new knowledge is relevant and of high quality. A related challenge involves delivering this information in a timely fashion and making the results accessible to managers and decision makers so that scientific information is considered in making environmental policy.

O. James Reichman **3/15/05-2/29/08** **$199,324**
John Orrock
National Science Foundation, DEB-0444217

CRB: The Role of Apparent Competition and Patch Geometry in Mediating the Invasion and Restoration of Grassland Communities

Biological invasions are a leading cause of extinction that imperil the structure and function of ecological communities. Consumers can play an integral role in the outcome of invasions, as evidenced by classical biological control whereby exotic plants are controlled by the introduction of exotic consumers. However, the role of native consumers in affecting biological invasions remains unclear. This project evaluates an untested hypothesis with direct implications for biological invasions: exotic plants can subsidize native consumers, leading to stronger impacts of native consumers on native plants (i.e. apparent competition). Furthermore, this study examines how differences in resources and protective cover between native and exotic patches of vegetation affect the spatial extent of apparent competition by influencing consumer behavior. When consumer incursions limit the spatial extent and pattern of apparent competition, the size and shape of native patches determines what areas, if any, are free of apparent competition. By measuring consumer abundance, activity, and impact in patches of varying geometry, a second untested hypothesis is examined: differences in native and exotic habitats alter consumer behavior, changing the spatial extent of apparent competition and setting geometric thresholds at which patches of native plants are too small or too narrow to persist.

O. James Reichman **9/15/99-2/28/05** **$3,069,000**
Matthew B. Jones
Sandy Andelman
National Science Foundation, NSF DBI 9980154

A Knowledge Network for Biocomplexity

The goal of this project is to integrate the distributed and heterogeneous information sources required for the development and testing of theory in ecology and its sister fields into a standards-based, open architecture, knowledge network. The network will extend recent advances in metadata representation to provide conceptually sophisticated access to integrated data products drawn from distributed, autonomous data repositories. In addition, the knowledge network will include advanced tools for exploring complex data sets from which multiple formulations of hypotheses can be tested. The existence of such a network will lead to broadened understanding of biocomplexity and ecological systems, and allow the application of that understanding to societal issues. This prototype network will be useful across a variety of disciplines and will provide a basis for the growth of multidisciplinary research groups focused on biocomplexity.

O. James Reichman **8/1/00-7/31/05** **$13,190,803**
Sandy Andelman
National Science Foundation, NSF DEB 0072909

National Center for Ecological Analysis and Synthesis

The Center for Ecological Analysis and Synthesis is located in downtown Santa Barbara. The Center provides an outstanding physical and intellectual setting for visiting scientists who conduct collaborative research on major fundamental and applied problems in ecology. The Center's high performance computing facilities and skilled technical staff enable resident and remote researchers to

tackle complex and computationally challenging problems. The results of the Center's research, both data and publications, are disseminated widely to the scientific community, as well as to other user groups, such as resource managers and policy makers.

O. James Reichman **2/1/03-1/31/06** **$364,197**
Joshua Schimel
National Science Foundation, NSF DEB 0235624

CRB: The Role of Seed Limitation, Resource Competition, and Community Complementarity in Invasions and Restorations

One of the largest and most persistent conversions of a native plant community worldwide is the invasion of 9.2 million ha of native perennial grassland in California by exotic annual grasses and forbs from the Mediterranean region. In addition to the loss of native plant biodiversity, this invasion has potentially altered basic ecosystem processes through increased nitrate leaching, altered fire regimes, and decreased carbon storage. The conversion of native plant communities may also have affected the value of this land for agriculture by decreasing the quality of summer grazing. Invasions by exotic species are one of the most serious threats to global biodiversity and restoration is a critical tool to mitigate existing biodiversity losses. Clearly the ability to predict the outcome of invasions and restorations would be a great asset to global conservation efforts while providing important information for the basic understanding of basic ecological processes. Currently, there is little general theory on restoration, while invasion theory is quite well developed. Although these processes may seem dissimilar, predicting the outcome of restoration and invasion both involve understanding the conditions under which small populations establish and spread in the face of competition from abundant, resident competitors, and thus can be interpreted within the context of competition and invasion ecology.

O. James Reichman **10/1/02-9/30/05** **$1,960,085**
Mark Schildhauer
Matthew B. Jones
National Science Foundation, NSF EF-0225676

ITR Collaborative Research: Enabling the Science Environment for Ecological Knowledge

Continuing advances in computation and communication are transforming the scientific process. Biodiversity research, like the fields of molecular, structural and proteomic biology, is re-inventing itself with new technology applications, and is evolving into an increasingly predictive and integrative science focused on important research and policy issues. This international ITR collaboration takes on key challenges for biodiversity researchers by modeling, designing and implementing the data discovery, integration and visualization components for a semantic web in environmental science. The initiative stands on the foundation of substantial and productive NSF investment in ecological and biodiversity informatics and it brings together four highly collaborative, forward-looking institutions in a partnership committed to inventing and supporting a global computing infrastructure for environmental biology. The project involves a multidisciplinary team of computer scientists, ecologists and technologists collaborating in complementary IT R&D and working group units.

O. James Reichman **9/1/02-8/31/05** **$323,734**
University of North Carolina, UNC-5-37135

An Information Infrastructure for Vegetation Science

This is a subcontract from an NSF award to Robert Peet at the University of North Carolina (UNC) entitled: «An Information Infrastructure for Vegetation Science ? Phase II.» Scientific and technical computing personnel from UCSB's National Center for Ecological Analysis and Synthesis (NCEAS) will provide guidance for the technical design and development work related to the VegBank system that is part of UNC's project. Specifically, the products comprising the VegBank system will benefit from NCEAS resources including: 1) database design expertise, 2) database development knowledge,

3) interface design skills, 4) robust hardware and networking infrastructure, and 5) technical oversight within the framework of the NCEAS' scientific computing staff.

William Rice **2/1/02-1/31/06** **$480,000**
National Science Foundation, NSF DEB-0128780

Gender-Specific Fitness and Intersexual Developmental Conflict in a Drosophila Model System

Males and females express overlapping sets of genes. This shared hereditary material can be selected toward different gender-specific optima and produce sexually antagonistic selection. Intersexual genetic conflict occurs during development when an allele moves one sex toward its gender-specific optimal phenotype, but has the opposite effect in the other sex. A recent pilot experiment in the PI's lab using a Drosophila melanogaster model system, provides preliminary evidence that the genome of this species contains substantial sexually antagonistic fitness variation and suggests that a large fraction of the genome-wide genetic variation for fitness is divergently selected between sexes. Building on the pilot study, the investigator will quantify the extent to which the genome-wide standing genetic variation for fitness is concordantly vs. discordantly selected between the sexes.

William Rice **8/15/01-7/31/03** **$158,315**
UC Riverside, UCR SB020044

The Origin of Barriers to Fertilization and Their Role in Speciation: From Populations to Proteins

The UCSB investigator will clone a sample of fifty genomic haplotypes and assay these genomes for 1) their fitness (total, adult, juvenile, and sperm competition) when expressed in males, 2) their fitness (total, adult, and juvenile) when expressed in females, and 3) the harm to a male's mate (both through behavior and through seminal fluid) when these genomes are expressed in males. In collaboration with D. Howard and R. Harrison, the UCSB investigator will assay five pairs of populations which have adapted to the same laboratory environment for ~ 1,000 generations but that experienced independent intersexual coevolution (parallel populations). Males will be assayed with females from their population of origin (con-population females) and with females from the parallel population that was derived from the same ancestral population (hetero-population females). The PI will characterize both the defense phenotpye of the males (in the context of sperm competition) and the degree to which they harm their mates via seminal fluid proteins.

William Rice **8/1/03-7/31/05** **$219,690**
University of Washington, UW 806099

IRCEB: The Origin of Barriers to Fertilization and Their Role in Speciation: From Populations to Proteins

The UCSB investigator will clone a sample of fifty genomic haplotypes and assay these genomes for 1) their fitness (total, adult, juvenile, and sperm competition) when expressed in males, 2) their fitness (total, adult, and juvenile) when expressed in females, and 3) the harm to a male's mate (both through behavior and through seminal fluid) when these genomes are expressed in males. In collaboration with D. Howard and R. Harrison, the UCSB investigator will assay five pairs of populations which have adapted to the same laboratory environment for ~ 1,000 generations but that experienced independent intersexual coevolution (parallel populations). Males will be assayed with females from their population of origin (con-population females) and with females from the parallel population that was derived from the same ancestral population (hetero-population females). The PI will characterize both the defense phenotype of the males (in the context of sperm competition) and the degree to which they harm their mates via seminal fluid proteins.

Robin Ross **8/1/00-8/31/05** **$518,000**
Langdon Quetin
National Science Foundation, NSF OPP99-09933

Winter Ecology of Larval Krill: Quantifying Their Interaction with the Pack Ice Habitat

Growth rates of larval and juvenile Antarctic krill (*Euphausia superba*), and community composition and productivity of the sea ice biota vary during winter. Thus temporal and microhabitat variability in productivity and composition of the sea ice communities will impact both food quantity and quality, and likely growth and survival of larval krill. The investigators will quantify the role of sea ice microbial communities in the energetics of larval and juvenile krill, and the contribution of sea ice biota to total primary production in winter. In addition, they will identify the biotic and abiotic characteristics of the pack ice habitat that influence distribution patterns in krill larvae; and they will measure the environmental conditions under which larval and juvenile krill decouple from the under-ice habitat. This is the first study to comprehensively address the temporal and spatial coupling of krill populations with the pack ice, and it will fill a major information gap about one of the important biological communities in the waters west of the Antarctic Peninsula.

Linda Runft **9/1/01-8/31/04** **$118,000**
Kathleen Foltz
Public Health Service, PHS 1 F32-GM63410

The Signalling Pathway Leading to Ascidian Egg Activation

An important problem of cell biology concerns how the cell-cell interaction between sperm and egg stimulates release of intracellular Ca2+ from the egg's endoplasmic reticulum (ER). Research in several systems, including mammals and ascidians (an invertebrate chordate, has demonstrated that injection or sperm extract into eggs stimulates intracellular Ca2+ release. Studies in ascidians have also shown that sperm extract injection stimulates Ca2+ release in eggs using the same signaling pathway (involving PLCμ and a Src family kinase) that is activated at fertilization. The activating factor in the sperm extract is heat sensitive, suggesting that it is a protein. These results support the hypothesis that the sperm introduces a protein into the egg during sperm-egg fusion that activates the Ca2+ release signaling pathway by acting, directly or indirectly, with a Src family kinase (SFK). The experiments that will be conducted by this project are designed to isolate the cDNA for ascidian egg Src type kinases and to use the recombinant ascidian egg SFK as a tool to isolate the protein in the ascidian sperm extract that stimulates Ca2+ release in the egg. Isolating such a protein would represent a significant step forward in understanding how sperm-egg fusion can trigger the initiation of embryonic development in chordates.

Cristina Sandoval **1/1/04-9/30/04** **$9,547**
Susan Swarbrick
Shoreline Preservation Fund - Associated Students UCSB, Fall03-10

Buffer Protection and Restoration at Coal Oil Point Reserve

This project will create a buffer zone between the northern boundary of Coal Oil Point Reserve and the trail, road and possible future development of UCSB's North Campus area. The buffer zone will be stripped of restored habitat along the boundary, will function as a subtle barrier to discourage trespassing into protected areas, and will direct pedestrians to the marked trailhead. The project will finish restoration of a steep slope near the slough bridge from which iceplant has recently been removed. The restored slope will help stabilize the soil and reduce erosion into the slough. Additionally, replacement of exotic weeds with native plants will increase the aesthetic and biological values of the area. Student restoration interns and volunteers will work on both tasks and will participate in the propagation of native plants.

Cristina Sandoval **1/1/05-6/30/05** **$9,625**
Susan Swarbrick
Shoreline Preservation Fund - Associated Students UCSB, Fall04-09

Buffer Protection and Restoration at Coal Oil Point Reserve

This is the final phase of the creation of a buffer zone along the northern boundary of Coal Oil Point Reserve (COPR). The buffer zone of restored habitat will function as a subtle barrier to discourage trespassing into protected areas and to direct pedestrians to the marked trailhead. Additionally, replacement of exotic weeds with native plants will increase the aesthetic and biological values

of the area. Student restoration interns and volunteers will work on both tasks, will participate in the propagation of native plants, and in doing so will learn ecological principles and restoration techniques. Volunteers from UCSB fraternities and sororities will be offered the opportunity to fulfill their community service requirements and promote student stewardship of COPR's natural resources. This project is part of a long-term restoration effort aimed at improving the quality of rare coastal habitats at COPR and, at the same time, providing educational opportunities for UCSB students. The removal of exotic species will enhance habitats that are vital to indigenous plant species and their associated fauna.

Russell Schmitt **11/16/04-9/30/05** **$1,391,737**
Sally Holbrook
Gordon and Betty Moore Foundation, SB050036

Initial Instrumentation of the Moorea Coral Reef Long-Term Ecological Research Site

This award provides funds to purchase instruments and equipment associated with the newly-funded National Science Foundation Long-Term Ecological Research (LTER) Site at the Richard Gump South Pacific Research Station in Moorea, French Polynesia. A central goal of the LTER program is to advance understanding of ecological phenomena within and among ecosystems that occur over long periods of time and ranges of spatial scales. The research objectives of the Moorea LTER are to better understand key processes in coral reef ecosystems that 1) modulate ecosystem function, 2) shape community structure and diversity, and 3) determine abundance and dynamics of constituent populations. Such mechanistic understanding will allow more accurate predictions of how coral reef ecosystems will respond to environmental change. Coral reefs are among the most complex of biological phenomena. Because of their complexity, scientists have an incomplete understanding of the multitude of abiotic forcing functions and biotic processes that collectively determine their structure, function and dynamics. A number of perturbations are predicted to cause sweeping change in coral reef ecosystems, and indeed that coral reef ecosystems may collapse within the coming few decades, a period equivalent to the duration of an LTER site. While there are numerous coral reef monitoring programs, descriptive ecology alone cannot elucidate the mechanistic basis of change in these systems.

Russell Schmitt **7/1/00-6/30/05** **$700,121**
Sally Holbrook
National Science Foundation, NSF OCE 9910677

Abundance, Dynamics and Coexistence of Interacting Damselfishes: Quantifying the Contributions of Causal Processes Across Spatial Scales

This study focuses on the causes of variation in abundance of reef fishes whose local populations are linked via exchange of reproductive output. Research has shown that the size of a local population of these organisms is determined by several simultaneously-operating processes, and the key to understanding the relative importance of these processes is the interplay between larval supply and density-dependent interactions. It is now understood that a local population cannot be considered in isolation of other sub-populations or species, and multiple spatial scales must be examined to fully comprehend the dynamics of the system. Finally, several frameworks now exist that can allow evaluation of the contributions of various processes in setting local features (e.g., larval supply of potential competitors, habitat availability, food supply, predation pressure). These quantitative frameworks need to be applied to real systems to resolve several fundamental - and largely unanswered - questions for reef fishes, including the relative importance of the multiple processes that affect local abundance and dynamics, the degree of variability in their importance, the determinants of relative abundance and coexistence of competitors, where and how population regulation occurs, and whether the dynamical behavior of the system as a whole differs from that predicted from dynamics at smaller spatial scales.

Russell Schmitt **9/1/04-8/31/05** **$820,000**
Sally Holbrook
National Science Foundation, OCE-0417412

LTER: Long-Term Dynamics of a Coral Reef Ecosystem

This award establishes a Long-Term Ecological Research (LTER) site focused on dynamics of coral reef ecosystems at the island of Moorea, French Polynesia, location of the University of California's Gump Research Station. Coral reefs are of great ecological importance, having the highest species diversity of any marine habitat and ranking near the top of all ecosystems with respect to annual total gross productivity. The communities are supported structurally by reef-building corals and trophically by efficient recycling. Unlike highly productive terrestrial ecosystems, the key biotic interaction underlying reef systems is the mutualistic relationship between hermatypic corals and photosynthetic zooxanthellae. Hermatypic corals are both functional autotrophs and herotrophs and derive carbon from multiple sources. In addition to biotic interactions, numerous other biological processes are influenced by a variety of abiotic events that can operate at spatial scales ranging from millimeters to hundreds of kilometers, and which can vary on short to long time scales. Both the scientific community and the public have tremendous interest in and concern about conservation of coral reef ecosystems. This project will greatly increase understanding of these systems, and as such, will inform government officials, resource managers and others charged with conservation and management of coral reefs.

Russell Schmitt **7/1/01-6/30/05** **$1,270,000**
UC Toxic Substances Research and Teaching Program, TOXICS

Coastal Toxicology Component of the UC TSR &TP

The overall objective of the Coastal Toxicology Program is to help resolve pollution-related environmental problems in California's aquatic ecosystems. This is accomplished by facilitating faculty research on appropriate issues, and by providing students with research and training opportunities in environmental toxicology. The resolution of environmental problems requires interdisciplinary efforts and accordingly, the Coastal Toxicology Program is comprised of a network of UC scientists from the Santa Barbara, Santa Cruz, Davis and Los Angeles campuses as well as Scripps Institution of Oceanography, Bodega Marine Lab and Lawrence Berkeley Lab.

Russell Schmitt **10/1/00-9/30/05** **$802,291**
Jenifer Dugan
Steven Gaines
Scott Hodges
Robert Jacobs
Henry Page
Leslie Wilson
USDI - Minerals Management Service, MMS 14350100CA-31063,TO17609

Advancing Marine Biotechnology: Use of OCS Oil Platforms as Sustainable Sources of Marine Natural Products

The objective is to investigate the feasibility of using OCS oil platforms for the development of marine biotechnology, and specifically to explore the use of organisms growing on the platforms for development of pharmacological compounds. The study integrates research across three disciplinary areas: community and population ecology of reef organisms, population genetics and natal sources, and pharmacology with an emphasis on natural products identification and mechanisms of action. The long-term success of using OCS oil platforms for biotechnology development requires basic information derived from each of these areas. The community and population ecology focus involves surveying oil platforms for organisms with potential applications to biotechnology, particularly those with pharmacological application, to determine the factors affecting growth and distribution of these organisms. The population genetics group will work to generate molecular-genetic markers for the accurate identification of species with potential applications to biotechnology, determine the degree of genetic diversity of organisms growing on platforms relative to natural reefs, and identify source populations for organisms growing there. The pharmacologists will examine organisms to identify novel compounds, particularly eicosanoids and coumarins, affecting inflammation, wound healing or cell division.

Russell Schmitt **7/1/00-10/31/06** **$749,029**
USDI - Minerals Management Service, Task 17600 MMS-31063

Coastal Marine Institute Program Management

The Coastal Marine Institute (CMI) Program Management provides administration and management for the program, serving as an interface between the University of California, the Minerals Management Service, and the State to ensure that objectives and interests of the agencies are translated into appropriate actions by the CMI. Program management includes administration of the annual study solicitation and review process, as well as overseeing contract management of all studies to assure that they are conducted in accordance with specifications delineated in the technical proposal.

Russell Schmitt **9/25/01-9/30/06** **$140,877**
USDI - Minerals Management Service, Task 18234 MMS-31063

Spatial and Temporal Variation in Recruitment to Rocky Shores: Relationship to Recovery Rates of Intertidal Communities (Flow-through to P. Raimondi - UCSC)

Intertidal communities are considered among the most vulnerable to impacts resulting from oil spills because most species are sessile and because oil is deposited on intertidal surfaces during ebb tides. In such communities, recovery following a catastrophic event will be largely dependent on recruitment of propagules to the affected area. The propagules of many organisms (e.g., mussels and barnacles) disperse widely (>10 kilometers) while others (e.g., many algal species, tunicates and bryozoans) disperse over relatively short distances (meters to 100's of meters). Therefore, the timing and spatial extent of dispersal will set constraints on when and where recovery will occur. Although there is a general appreciation of the importance of larval stages and recruitment to the population dynamics of marine species, researchers still lack an understanding of the level of variation of recruitment in space and time on the California coast. More importantly, there is almost no information on the variation in recovery rates (spatial variation) that occur along the coast of California and the degree to which variable recruitment affects local recovery.

Russell Schmitt **9/1/02-8/31/05** **$1,200,000**
Evelyn Hu
William M. Keck Foundation, SB030003

The Ecotechnology Initiative: Bioengineering Approaches to Restoration Bottlenecks

This is an Interdisciplinary Research Program in Ecotechnology that blends the investigators' unique strengths in ecology, marine science, and engineering to develop new techniques and technologies for the conservation of natural resources. Ecotechnology is a new, proactive approach to such critical conservation issues as restoration of degraded habitats, maintenance of biodiversity and enhancement of exploited populations. Restoration frequently is a necessary adjunct to other strategies used to protect natural resources, yet there is a lack of effective techniques to assist recovery of degraded marine habitats and species. Researchers are poised for major advances in the development of ecotechnological applications to conservation issues due to recent breakthroughs in the theoretical understanding of the ecological bottlenecks to restoration and dramatic advances in the development and miniaturization of technology that can be used to sense and manipulate systems at the nanometer or micron scale. This Program in Ecotechnology has the potential to catalyze a paradigm shift in the approach taken to environmental restoration.

Stephen Schroeter **3/1/03-2/28/06** **$55,957**
John Dixon
California Wildlife Foundation, SB030101, Task 1

Studies of Sea Urchins Settlement in Southern and Northern California

The patterns of settlement of red (*Strongylocentrotus franciscanus*) and purple (*S. Purpuratus*) sea urchins may have important impacts on the commercial fishery and provide an important fishery-independent measure of stock health. The investigators have monitored weekly to bi-weekly sea

urchin settlement at multiple sites in southern and northern California since February 1990. Their studies to date have identified spatial and temporal patterns in sea urchin settlement (including the effects of periodic El Niño and Las Niñas) and have identified some of the likely mechanisms responsible for these patterns. The investigators' long-term and geographically extensive record of sea urchin settlement continues to provide the only integrated, fishery independent index of the condition of the breeding stock, since larval supply and settlement are a function of the effective breeding population.

Raymond Smith **10/1/96-9/30/04** **$4,472,364**
Langdon Quetin
Robin Ross
National Science Foundation, NSF OPP96-32763

Long-Term Ecological Research on the Antarctic Marine Ecosystem: An Ice-Dominated Environment

This is the continuation of the Palmer Long-Term Ecological Research (PAL) program, which focuses on the marine ecosystem in the western Antarctic Peninsula (WAP) region. The addition of the PAL to the LTER Network in October of 1990 extended the geographical and ecological range significantly and provided the opportunity to link ecological processes between hemispheres as well as across terrestrial and marine biomes. A central tenet of the PAL is that the annual advance and retreat of sea ice is a major physical determinant of spatial and temporal changes in the structure and function of the Antarctic marine ecosystem, from total annual primary production to breeding success in seabirds. We are currently evaluating a number of testable hypotheses linking sea ice to: the timing and magnitude of seasonal primary production; the dynamics of the microbial loop and particle sedimentation; krill abundance, distribution and recruitment; and the breeding success and survival of apex predators.

Mark Steele **2/1/04-1/31/06** **$357,983**
USDC - National Oceanic & Atmospheric Administration, CMRC-03-NRME-01-04A, 05C

Density Dependence in Exploited Marine Fish: An Experimental Test and Theoretical Exploration of the Implications for Fisheries Enhancement via Marine Protected Areas

This research aims to evaluate the utility of marine protected areas (MPAs) as tools for fisheries management. In light of worldwide overfishing, MPAs have been widely advocated as an alternative to traditional, population-based methods of fisheries management. It is unclear, however, whether MPAs can be expected to enhance fisheries yields relative to traditional management techniques. Much of the uncertainty stems from a lack of information on what will happen to demographic rates (e.g., mortality, growth, fecundity, emigration) inside MPAs as populations build. If critical resources become limited as populations grow, then demographic rates will become density dependent. Density dependence in some demographic rates (e.g., emigration) will tend to make MPAs more effective, due to increased spillover; whereas density dependence in other rates (mortality, growth, fecundity) will tend to render them less effective than traditional management techniques, due to reduced larval export. Hence, it is critical to know which, if any, demographic rates of exploited species are density dependent. Currently, very little is known about this because empirical studies have generally focused on small, non-exploited species. Moreover, theoretical explorations of fisheries management via MPAs have inadequately incorporated density dependence, so it is difficult to predict how MPAs will affect fisheries. There is a clear need for more information on density dependence in MPAs in order to predict how they will affect fisheries.

Jennifer Thorsch **7/1/03-6/30/05** **$5,981**
Shoreline Preservation Fund - Associated Students UCSB, Fall02-15

UCSB Natural Areas Interpretative Program

This project will produce designs for interpretive materials in UCSB Natural Areas, under the guidance of Museum of Systematics and Ecology staff. Products will include designs for signs, web pages, tours, and down-loadable self-guided tour pamphlets. Topics will include a wide range

of themes: historic photographs, land use history, natural resources, ecological restoration, rare species, coastal processes, and water quality issues. The ultimate goal is to assemble an integrated interpretation program for UCSB's Natural Areas.

Jennifer Thorsch **1/1/04-9/30/04** **$10,000**
Shoreline Preservation Fund - Associated Students UCSB, Fall03-03

Water Quality Analysis of Urban Runoff at Manzanita Village

The UCSB Museum of Systematics and Ecology (MSE) has been given the task of restoring natural areas around the Manzanita Village Housing complex, areas which include wetlands, native grasslands and coastal sage scrub. For the purpose of monitoring and mitigating possible negative anthropogenic effects on wetlands and the ocean, MSE has also been asked to build, design and maintain bioswales, constructed wetlands that are used to treat runoff water through uptake and transformation. This award provides for nutrient water quality testing of urban runoff water through the bioswales at Manzanita Village. Under the oversight of UCSB staff researcher Mauricio Gomez, undergraduate students will have the opportunity to become involved in water sampling, gain experience with data analysis, and learn about native plants.

Jennifer Thorsch **11/1/03-9/30/04** **$4,632**
Shoreline Preservation Fund - Associated Students UCSB, SPF FALL03-04

UCSB Campus Lagoon Water Quality

The UCSB Campus Lagoon acts as a buffer zone for a great part of the watershed runoff between main campus and the ocean. Since the lagoon's water will ultimately end up in the ocean, it can be concluded that the overall health of the lagoon will directly affect the health of the coastal environment it is linked to. Therefore, it is important to study and monitor possible sources of contamination at various levels of the ecosystem. Results of a nutrient sampling regimen conducted in the Campus Lagoon in December of 2001 indicated points of watershed inflow that had high levels of inorganic contamination. This project provides funds for undergraduate student Kelly Buell to build and expand upon the earlier study by implementing a more comprehensive sampling program and investigating possible sources of contamination within the watershed.

Jennifer Thorsch **6/24/04-12/31/04** **$2,130**
Shoreline Preservation Fund - Associated Students UCSB, SPF SPRING04-11

Lagoon Park Enhancement Plan - Phase II

In conjunction with implementation of the Manzanita Village Student Housing Project at UCSB, the PI is implementing the Enhancement Plan for Lagoon Park - Phase II. The ecological enhancement project for Phase II includes approximately six acres located adjacent to the Manzanita Village Student Housing Project, extending along the western margin of the Campus Lagoon, south to the beach and across the ocean bluff terrace west to Isla Vista. Phase II enhancement includes the creation/enhancement of approximately one acre of vernal pools and other vernal wetlands. Surrounding the vernal wetlands, the upland will be restored to native perennial grassland, consisting primarily of *Nassella pulchra*, mixed with native forbs and shrubs.

David Valentine **9/1/04-8/31/06** **$35,000**
American Chemical Society, ACS PRF 40643-G2

Microbial Alteration of Natural Gas in Marine Sediments and Waters

Natural hydrocarbon seeps continuously release massive quantities of oil and gas into the marine environment worldwide. Seepage influences water, beach, and air quality, as well as marine and terrestrial life. Microbes live in and around seeps and survive by consuming oil, sulfides, and possibly gas. This activity provides a visible indication of subsurface hydrocarbons, generates biogeochemical «hotspots» in the coastal ocean, and alters the distribution of emitted hydrocarbons. The fate of marine petroleum has been the focus of considerable study. However, little is known about the

importance and fate of gases, which make up the majority of emissions; there exist major gaps in knowledge, especially with regard to ethane and propane. The Principal Investigator hypothesizes that propane, and to a lesser extent ethane, are consumed in seep areas, and that this activity serves as a major control on the composition of released hydrocarbons and on seep biology. This study seeks to address the PI's hypotheses by directly quantifying rates of ethane and propane consumption for the first time, in concert with analyses of gas concentrations and stable isotope distributions.

David Valentine **4/15/05-3/31/06** **$133,240**
National Science Foundation, 0447395

CAREER: Microbial Geochemistry of Natural Marine Gas Seeps - A Research and Education Plan

This project integrates research and education focusing on the fate of methane seeping naturally into the marine environment - an issue of environmental and economic relevance. The primary research goal is to determine the impact of microbial methane oxidation on the flux of methane from the sediments to the ocean/atmosphere in areas of active gas seepage. Educational goals are: 1) to train graduate students in the integrated study of microbiology and geochemistry; 2) to educate undergraduate students in the marine sciences through year-long research projects, and through incorporation of results into general education courses; 3) to incorporate undergraduate students into ocean going research by including them as active participants in proposed cruises through a formal field studies course; and 4) to introduce K-12 students and teachers to the topic of marine hydrocarbons through participation in UCSB's Floating Lab outreach program.

David Valentine **8/31/03-7/31/06** **$299,670**
National Science Foundation, EAR-0311894

Collaborative Research: Hydrogen Isotope Biogeochemistry of Anoxic Environments - Field and Laboratory Studies

The goal of this project is to develop compound-specific hydrogen isotope analyses as a tool for process-oriented biogeochemical studies of anoxic environments. Analytical techniques are now well established, and the next major hurdle is to understand the biochemical controls on isotopic distributions in these environments. This study will seek such understanding through a combination of field and laboratory studies, implemented as a collaboration between PI's at Caltech and UC Santa Barbara. Research will focus on sulfate-reducing bacteria (SRB) due to their quantitative importance for carbon cycling in marine settings. The results of this research are potentially important for a wide range of scientific disciplines, including microbial ecology (novel approaches for quantifying the importance of interspecies hydrogen transfer in microbial communities), carbon cycling (isotopic mass-balance estimates of organic matter remineralization by anaerobic processes), organic geochemistry (identification of lipids produced by H2-consuming microbes), paleoclimatology (improved understanding of the preservation of organic D/H ratios during diagenesis), Earth system history (novel tools to study redox conditions of the geologic past) and biochemistry (methods for identifying the cellular location of hydrogenase enzymes).

David Valentine **2/1/03-1/31/05** **$54,865**
National Science Foundation, MCB02-33946

Research Starter Grant

The anaerobic oxidation of methane is a microbially-mediated process by which the reduction of sulfate is coupled to the oxidation of methane. This process is prevalent on a global scale and is estimated to consume between 12 and 50% of the net modern atmospheric methane flux (70 to 300 Tg per year). The microbes responsible for this process are important, as methane is a potent greenhouse gas in the atmosphere, and their metabolism prevents large quantities of methane in the Earth from reaching the atmosphere. Despite the importance of this process, the responsible organisms have never been cultured in the laboratory. Recent studies conducted in the investigator's laboratory indicate that sustained growth of these organisms is possible in the laboratory, given the appropriate conditions, especially elevated pressures of methane (50 to 150 atmospheres). As part of this research, the investigator will continue growth of the enrichment cultures, characterize the microbial

community composition and physiology of the enrichments, and isolate the methane oxidizers. This work will lead to development of new methods for culturing strictly anaerobic bacteria and archaea at low temperatures with high gas pressures. These methods promise to enhance infrastructure for microbiological research.

David Valentine **8/1/03-10/31/04** **$43,775**
UC Irvine, UCI 2003-1321

LExEn: Integrated Biogeochemical and Microbiological Studies of Cold, Anoxic Sediments

The UCSB researcher participated on the Skan Bay cruise in 2003. During the cruise, he analyzed depth distributions of H2, and CH4 in the sediments. He is responsible for completing studies of organic acid depth distributions, and sample storage stability. He will quantify depth distributions of sulfate from samples collected during the 2003 cruise and will analyze depth distribution of sediment dissolved organic carbon, and possibly

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David Valentine **10/1/02-9/30/05** **$83,071**
USDI - Minerals Management Service, Task 85338 MMS-31063

Weathering of Aromatic Compounds in the Coastal Marine Environment: Quantifying Rates of Microbial Metabolism

This research focuses on the environmental effects of offshore petroleum release, specifically on the microbial weathering of aromatic compounds released into the marine environment offshore Santa Barbara, California. In a general sense, the investigator seeks to develop techniques to measure the rates at which microbes consume aromatic compounds in the marine environment, while simultaneously determining the breakdown products. Once developed, these techniques will be applied to study the microbial weathering of aromatics in oil slicks, in contaminated waters adjacent to natural seeps and in produced waters released from OCS platforms in the Santa Barbara area. This study will provide kinetic and structural information on the intermediates and products arising from the microbial weathering of aromatic compounds emitted from natural marine hydrocarbon seeps. Such information derived from a natural setting may provide a useful comparison when considering the quantity and composition of releases from the petroleum industry. The project will also provide kinetic and structural information on the weathering products of aromatic compounds in natural oil slicks. This study will yield information on the fate of aromatics in produced water released from OCS platforms and may improve at-sea oil weathering models, thereby contributing to more informed decision making.

J. Herbert Waite **6/1/02-5/31/06** **$360,000**
National Science Foundation, NSF CHE01-32443

Biochemistry of Algal Adhesives

The UCSB principal investigator is the only American participant in a multi-investigator project encompassing six university research teams and two biotech companies. The composite project, funded by the Research Directorate of the European Commission, seeks to isolate, characterize, mimic, and bulk-produce algal adhesive proteins with the ultimate aim of developing pharmaceutical adhesives and to mitigate fouling. The UCSB component is limited to the biochemical characterization of algal adhesive proteins from one or more of the following species: *Enteromorphia, Gracilaria conferta*, *Ulva lactuca*, and *Fucus spiralis*. There are four aims: 1) To determine the mass and shape of the native algal adhesive glycoproteins and their subunits. 2) To determine the range of chemical functionality in algal adhesive proteins. 3) To determine the primary sequence of the adhesive glycoproteins. 4) To isolate and characterize cross-link containing peptides. These investigations are dependent on EC partners for algal adhesive proteins, haloperoxidase and cDNA-deduced protein sequences.

J. Herbert Waite **7/11/03-5/31/06** **2,483,600**
Galen Stucky
Francis Zok
Public Health Service, R01 DE014672

Biomimetic Blades: Mincing with Less Mineral

Tooth enamel and dentin are the premier materials in vertebrates for hardness and abrasion resistance. The superb properties of these materials are vital adaptations for proper ingestion nutrition and, when compromised through decay or injury, pose many fundamental and technical challenges to effective restoration. In polychaete worms such as Glycera and Nereis, the tooth-like jaws have a resistance to wear that is comparable to enamel; however, this is accomplished with a tenth as much mineralization (Glycera) or no mineralization at all (Nereis). The investigators believe that these mainly proteinaceous jaws offer important insights into the design of biocompatible wear-resistant materials. Based on preliminary studies they seek to demonstrate that specific proteins/polymers can be hardened and toughened by mineralization, metal ion chelation, or both. The aim is a state-of-the-art chemical, structural and mechanical characterization of the jaws using mass spectrometry, molecular biology, X-ray analysis and nanoindentation. Rigorous engineering principles will be applied to the analysis of jaws to distill a set of biomimetic rules regarding the relationship between structure and wear. Significant correlations between the chemical, microstructural and mechanical properties will be used to direct the preparation of His-containing copolymers into hard films containing Cu or Zn ions. The chief health benefits of this research will be insights about lightweight replacement materials with superior hardness and abrasion resistance.

George Wardlaw **7/1/04-6/30/05** **$25,000**
David Valentine
UC Toxic Substances Research and Teaching Program, 2004G-37

Development of a Novel Biodegredation Index for Toxic Hydrocarbons in Contaminated Marine Sediments

Polycyclic aromatic hydrocarbons (PAHs), such as benzene, anthracene and benzo(a)pyrene are suspected to be cancer-causing agents to humans and other organisms. Oil and its derivatives contain a large proportion of PAHs. In some oils, the PAH concentration can reach 20%. Each year over 380 million gallons of petroleum enter the oceans throughout the world. The goal of this project is to understand and predict the chemical evolution of petroleum and specifically PAHs in petroleum-contaminated marine environments. Bioremediation techniques have employed a number of different organisms to clean oil-contaminated soils, beaches and coastal sediments. However, this has generally been carried out without an analytical method capable of tracking the disappearance of the most harmful oil fractions or the appearance of possibly more harmful toxins. Using new chromatographic technologies, the investigators seek to identify and quantify a suite of novel products and intermediates produced during petroleum biodegradation in anoxic sediments. Many such compounds may be more harmful than the original PAHs from which they were produced.

Robert Warner **4/1/04-3/31/07** **$268,137**
Steven Gaines
National Science Foundation, OCE-0351843

Collaborative Research: Tracking Larval Invertebrate Dispersal Trajectories Using Calcified Structures

Many marine species produce pelagic larvae that can be advected away from their natal source by oceanic currents. Predicting their destination has been one of the foremost challenges for marine biologists. The potential interactions among larval swimming behaviors, complex ocean circulation dynamics, and variability in pelagic duration make it difficult to predict the sources of larvae settling into adult habitat. Yet, identification of the natal source of incoming recruits has tremendous consequences for understanding population dynamics as well as for the design of effective marine reserve networks. Fish biologists have successfully exploited otoliths as environmentally induced natural tags to examine exchange among fish populations in some systems. Despite pressing needs to also understand the dispersal trajectories of invertebrate larvae, ecologists have paid less attention

to analogous environmentally induced tags in larval invertebrate hard parts. Invertebrate ecologists only recently demonstrated the potential to use the elemental composition of molluscan statoliths and protoconchs as tags of natal origin. However, to date, no study has effectively used this tool to identify the natal source of any marine invertebrate recruit. This research will use environmentally induced tags in the statoliths of recently recruited *Kelletia kelletii* whelks to examine exchange of larvae among distinct regions of this species' range.

Robert Warner **1/1/02-12/31/04** **$500,000**
Stephen Swearer
UC Office of the President, UCOP02T CEQI 08 0105

Larval Pathways and Population Connectivity in Nearshore Marine Organisms

One of the least understood and most fundamental processes in marine ecology is dispersal, or transport of larvae. To what extent are local adult population dynamics influenced by the dispersal of larvae from neighboring source populations? Do self-recruiting populations exist? How far do larvae disperse? The sources and destinations of larvae have been unknown for nearly all commercially important species, yet any model of resource management or biodiversity preservation depends on this information. We wish to understand the interdependency of commercially important California coastal populations by identifying the sources of larval recruits. The project will use environmental signatures, consisting of trace metal inclusions in the hard structures of larvae (e.g., fish otoliths) that are laid down over time. Elements from the surrounding seawater become permanently incorporated into the structures, which then act as daily recorders of the environment experienced during the larval phase. Along coastal margins, concentrations of many trace elements are significantly higher than in the open ocean, and differences in trace element concentrations among coastal water masses occur as well. Recently developed high-precision mass spectrometers and laser microprobes allow a sequential analysis of past environments, down to a resolution of a few days.

Robert Warner **8/1/03-6/30/05** **$9,999**
Jennifer Caselle
UC Sea Grant, R/F-95PD-F-1/1

Use of Natural Tags in Loligo opalescens Paralarvae to Trace Dispersal History

The investigators will develop methods to detect the trace element (Sr, Ba, Mg, Mn, Zn, Fe) composition in the statoliths of paralarval market squid, *Loligo opalesacens*, using Laser Ablation - Inductively coupled Plasma Mass Spectrometry (LA-ICPMS). They will then establish that there are detectable and consistent differences in trace element composition for paralarval statoliths from different geographical areas. By establishing an "atlas" of paralarval local environmental signatures (that is, identifiers of potential source populations), it will be possible to subsequently assign returning adults to their birthplaces by reading the larval section of their statolith. The central objective of this project is to identify the sources of recruits to the market squid fishery, providing critical information for science-based fishery management. Knowledge of the degree to which regional production results from local recruitment will substantially increase the ability to manage on a spatial basis. The longer-term demonstration of connectivity and degree of self-recruitment among local populations of market squid in southern California will be of immediate use to regulatory agencies (for fisheries management) and to regional groups planning marine reserves under the Marine Life Protection Act.

Libe Washburn **2/1/05-12/31/05** **$342,928**
UC San Diego, 0478.01SB

Short-Medium Range Resolution/Long Range HF Radars-Task A.1

As part of the Southern California Coastal Observing System (SCCOOS)m UCSB will collaborate with other institutions in the Southern California Bight, including Scripps Institution of Oceanography, USC and CalPoly San Luis Obispo to operate an array of HF radars for mapping surface currents. This portion of the project involves purchase, installation, calibration and operation of approximately

twenty-one HF Radar installations. The installation consists of the placement of HF radar mast, antenna and associated computer hardware and shelter.

Libe Washburn **2/1/05-12/31/07** **$41,509**
UC San Diego, 0478.03SB

Two Bight-Scale Sections Using an Underway CTD-Task C.1

As part of the Southern California Coastal Observing System (SCCOOS)m UCSB will collaborate with other institutions in the Southern California Bight, including Scripps Institution of Oceanography, USC and CalPoly San Luis Obispo to operate an array of HF radars for mapping surface currents. Researchers will use the current data obtained from the radar array to develop products for agencies charged with managing coastal ocean waters. UCSB will lead the research effort to acquire one line of CTD stations from ships that regularly travel between the mainland and one of the offshore islands in the Southern California Bight.

Libe Washburn **9/25/02-9/30/04** **$135,210**
USDI - Minerals Management Service, Task 85386 MMS-31063

Observations of the Surface Circulation in the Eastern Santa Barbara Channel Using High Frequency Radar and Langrangian Drifters

The MMS has long recognized the need to understand the circulation in the Santa Barbara Channel (SBC) because of extensive oil and gas production in the area. Accurate descriptions of the near surface circulation throughout the Channel are required to assess the consequences of a large oil spill, such as occurred in 1969 and to respond accordingly. Much has been learned about circulation in the SBC since 1969, due in large part to MMS-funded studies. This project will assist state and local agencies and the MMS by advancing understanding of circulation processes in the eastern SBC. This area has many active oil production platforms, so organizations that may have to respond to ill spills, such as the not-for-profit cooperative Clean Seas, need good data on likely spill trajectories. Several creeks and two rivers, the Ventura and the Santa Clara, discharge freshwater runoff into the eastern SBC during winter storms. Results from this research will benefit other agencies responsible for monitoring pollution due to runoff, such as the Central Coast Ambient Monitoring Program, and Santa Barbara County's Ocean Monitoring Program. There is strong agency interest in measuring coastal currents for local pollution studies. This project will complement monitoring efforts of these agencies by obtaining information about the transport and dispersion of runoff plumes into the coastal ocean.

Alison Whitmer **1/1/04-9/30/04** **$12,672**
Shoreline Preservation Fund - Associated Students UCSB, FALL03-13

Marine Science Institute Educational Outreach Internships for UCSB Undergraduates

The Marine Science Institute Education and Outreach Internships Program offers UCSB undergraduates the opportunity to extend their learning outside of the lecture hall through experiential education in marine science. Interns learn about ongoing marine science research at MSI, with particular focus on locally relevant research projects, thereby increasing their coastal ecosystem awareness. They also receive hands-on training in communicating about marine science research by conducting public tours and instructing K-12 student participating in field trips to UCSB. In short, this program allows students to deepen their knowledge about marine science and become MSI educational outreach experts. The undergraduate interns are not only extremely knowledgeable about the UCSB coastline, but also about coastal ecosystems in general, increasing their science literacy and empowering them to make informed decisions that will lead to coastal habitat conservation and preservation.

Alison Whitmer **10/15/04-9/30/05** **$13,837**
Shoreline Preservation Fund - Associated Students UCSB, FALL4-01

Education and Outreach Internship

This is an ongoing Education and Outreach Internship program which offers UCSB undergraduate students the opportunity to extend their learning outside of the lecture hall through experiential education in marine science. Interns learn about local coastal ecosystems and the natural history of marine organisms, as well as ongoing, locally-relevant, marine science research at UCSB. This program has a strong public education component, as the interns conduct tours for the public and K-12 classes. This program creates UCSB undergraduates who are not only extremely knowledgeable about the campus coastline, but also about coastal ecosystems in general, increasing their science literacy and empowering them to make informed decisions that will lead to coastal habitat conservation and preservation.

Allison Whitmer **6/1/05-1/31/06** **$7,712**
Shoreline Preservation Fund - Associated Students UCSB, Spring05-08

Education and Outreach Internship

This is an ongoing Education and Outreach Internship program which offers UCSB undergraduate students the opportunity to extend their learning outside of the lecture hall through experiential education in marine science. Interns learn about local coastal ecosystems and the natural history of marine organisms, as well as ongoing, locally-relevant, marine science research at UCSB. This program has a strong public education component, as the interns conduct tours for the public and K-12 classes. This program creates UCSB undergraduates who are not only extremely knowledgeable about the campus coastline, but also about coastal ecosystems in general, increasing their science literacy and empowering them to make informed decisions that will lead to coastal habitat conservation and preservation.

Michael Williams **12/15/03-11/30/06** **$225,757**
Joshua Schimel
William Murdoch
Susan Swarbrick
National Science Foundation, NSF DBI 0330442

Sedgwick Reserve Infrastructure Development

Sedgwick Reserve is one of the largest reserves in the University of California's Natural Reserve System. It is exceptional for its biological diversity and landscape heterogeneity. The Reserve is available for use as a research site and outdoor classroom by researchers, teachers and students from any institution of higher learning, government agency or scientific organization. Located about 50 km northwest of the UC Santa Barbara campus, on the slopes of the San Rafael Mountains, Sedgwick Reserve has become a site for both important ecological research and for major outreach activities in environmental education. This grant provides support to upgrade the Reserve's existing infrastructure in preparation for a new multipurpose building funded by UC. The University's long-term goal is to provide facilities that would support world-class environmental research and university-level instruction, as well as K-12 environmental education, while restoring and preserving Sedgwick's natural resources.

Douglas Wilson **11/6/02-6/30/05** **$52,886**
Texas A&M Research Foundation, F001642

Ocean Drilling Program Scientific Cruise 206

This award supports Dr. Wilson's participation in Leg 206 of the Ocean Drilling Program as co-chief scientist and paleomagnetist. The objective of the leg is to increase understanding of the formation and alteration of oceanic crust by deep sampling at a site about 400 miles southwest of Nicaragua. He was involved in planning the operations of the leg and selecting the scientific party. During the expedition, Dr. Wilson will have responsibility to participate in decisions on division of sample material, revisions to the operational plan, writing weekly summaries of operations and preliminary science results, and taking and measuring samples for paleomagnetic analysis. Post-cruise duties

will include contributing to writing a summary manuscript, editing all of the manuscripts for the Scientific Results volume, and completing and publishing analysis of the paleomagnetic samples.

Douglas Wilson **1/5/03-11/7/05** **$21,988**
Texas A&M Research Foundation, F001735

Magnetic Studies of ODP Leg 206 Samples and Logging Data

Shipboard paleomagnetic measurements during Leg 206 showed highly variable magnetic stability, with all units at least slightly affected by drilling overprint and some units completely remagnetized. New measurements in a shore-based lab will offer significantly better characterization of the magnetization prior to drilling overprint. Integration of sample data with downhole magnetic field data provides the best chance of determining in situ magnetization direction and intensity. Characterization of in situ magnetization will address fundamental questions on the source layer of marine magnetic anomalies. This research addresses the goal of improving the understanding of the source layer of marine magnetic anomalies by improving on the shipboard paleomagnetic data using measurements of smaller paleomagnetic samples in a magnetically cleaner lab, and by integrating the paleomagnetic results with downhole measurements of magnetic field and with core orientation determinations. Paleomagnetic data will also supplement the interpretation of eruption history by providing time constraints from changes in inclination, and rock magnetic data will supplement the interpretation of alteration with information on the oxidation state of magnetite and titanomagnetite.

Oran Young **9/1/04-8/31/06** **$37,016**
The New Media Studio, BERKMAN_NSF_DUE_0329044

Marine Mammal Commission Digital Library of International Envrionmental and Ecosystem Policy Documents

This flow-through award from the National Science Foundation provides funds to support graduate student Julie Ekstrom, whose task is to create, with input from the advisory board, a simple multiple-choice questionnaire about the functionality, operation, design and application of the Digital Library of International Environmental and Ecosystem Policy Documents. The student will also oversee the interpretation of the user activity logs and questionnaire, to iteratively refine the digital library so that it can be effectively utilized and maintained in future years. REU (Research Experiences for Undergraduates) students will be involved with the project and will be supervised by the graduate student.

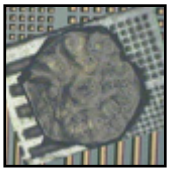
Space

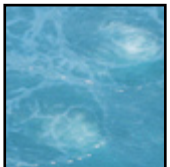




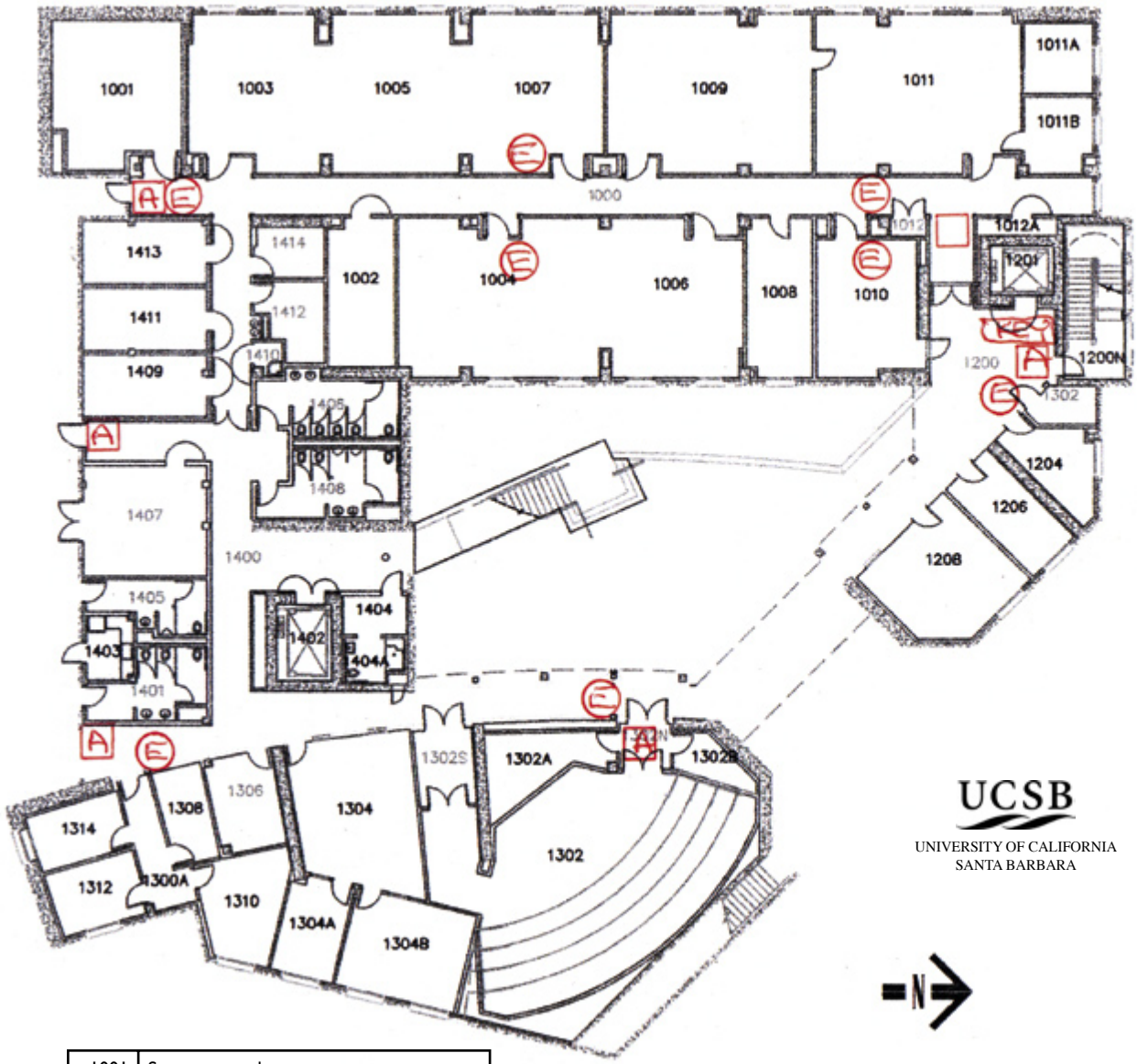






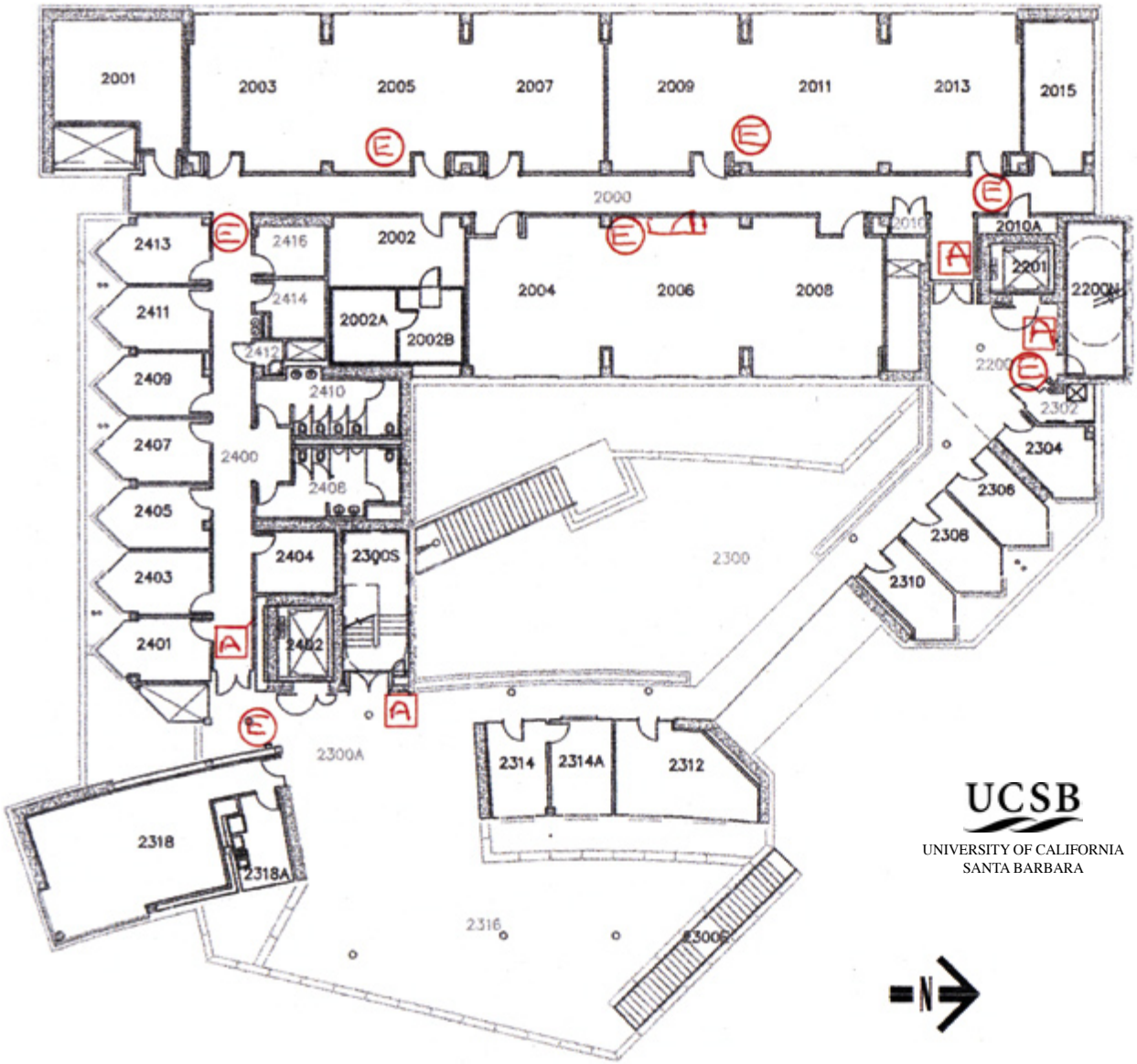
Marine Science Research Building
Bldg. No. 520 - 1st floor
01/2005



1001	Seawater workroom
1002	Common support laboratory
1003	Gaines laboratory
1004	Page/Dugan laboratory
1005	Gaines laboratory
1006	EPA laboratory
1007	Siegel laboratory
1008	Postdoc/Visiting Scholar office
1009	Analytical Laboratory
1010	Hazardous Materials Storage
1011	Analytical Laboratory
1204	Michael Sheehy/Mark Readdie
1206	Graduate Student office space

1208	Graduate Student office space
1302	Auditorium
1304	Mail room, student lounge
1304a	Graduate Student office space
1304b	Graduate Student office space
1308	Copier room
1310	Graduate Student office space
1312	Postdoc office space
1314	Postdoc office space
1409	Seawater workroom
1411	Seawater workroom
1413	Seawater workroom

Marine Science Research Building
Bldg. No. 520 - 2nd floor
01/2005

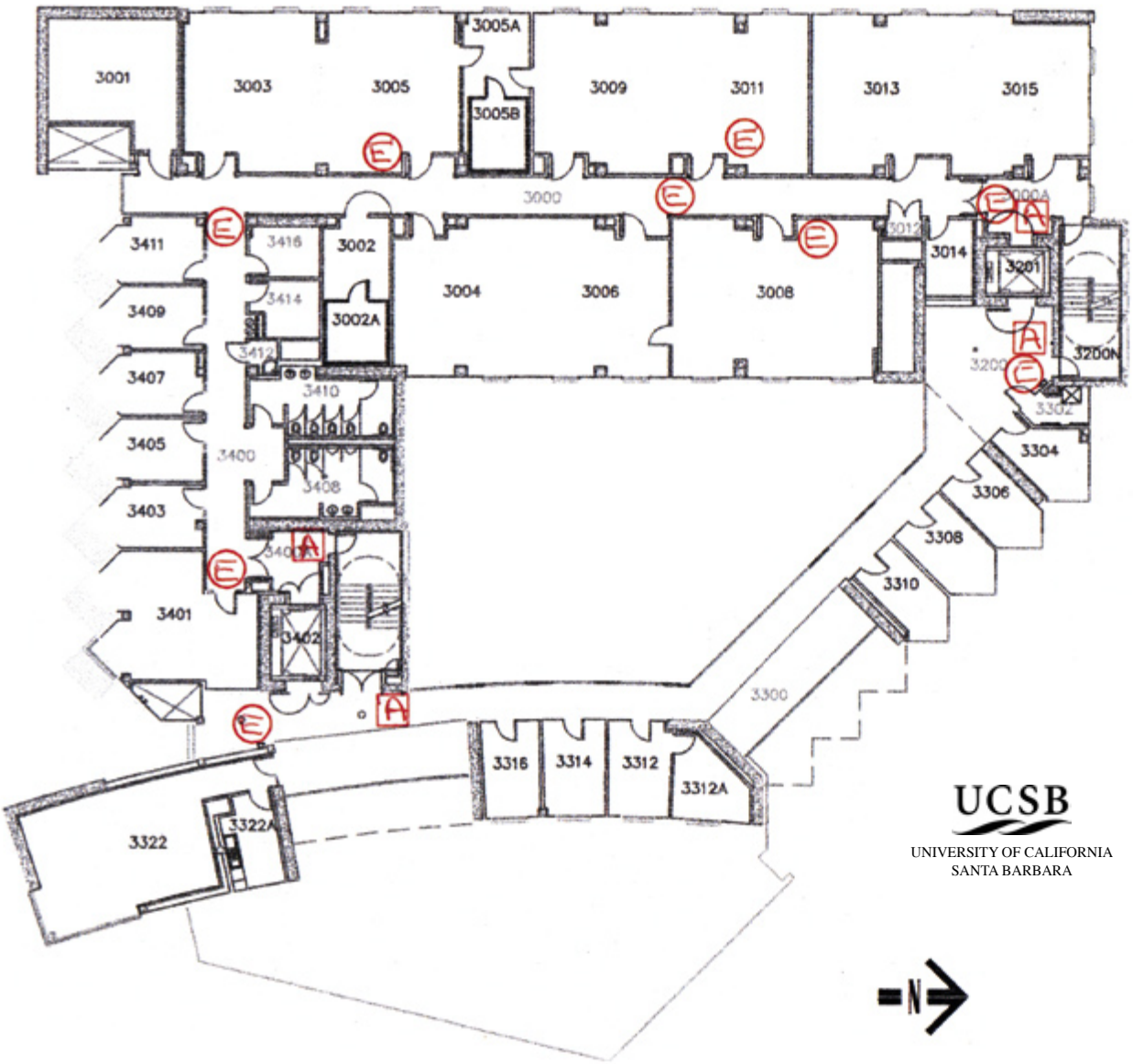


2001	Seawater workroom
2002	Common support laboratory
2002a	Environmental room
2002b	Environmental room
2003	Hofmann laboratory
2004	Quetin/Ross laboratory
2005	Hofmann laboratory
2006	Quetin/Ross laboratory
2007	Hofmann laboratory
2008	Dudley laboratory
2009	Levine laboratory
2011	Levine laboratory

2013	Valentine laboratory
2015	Will McClintock
2304	Postdoc office
2306	Dov Sax/Bernardo Broitman
2308	Satie Airame
2310	Postdoc office
2312	Natural Reserve System/ Donna Moore
2314	Natural Reserve System/ William Murdoch
2314a	Natural Reserve System/ Sue Swarbrick
2318	Conference room

2401	Mark Page
2403	Jenifer Dugan
2404	Storage
2405	Langdon Quetin
2407	Robin Ross
2409	Allison Whitmer
2411	Gretchen Hofmann
2413	Postdoc office

Marine Science Research Building
Bldg. No. 520 - 3rd floor
01/2005

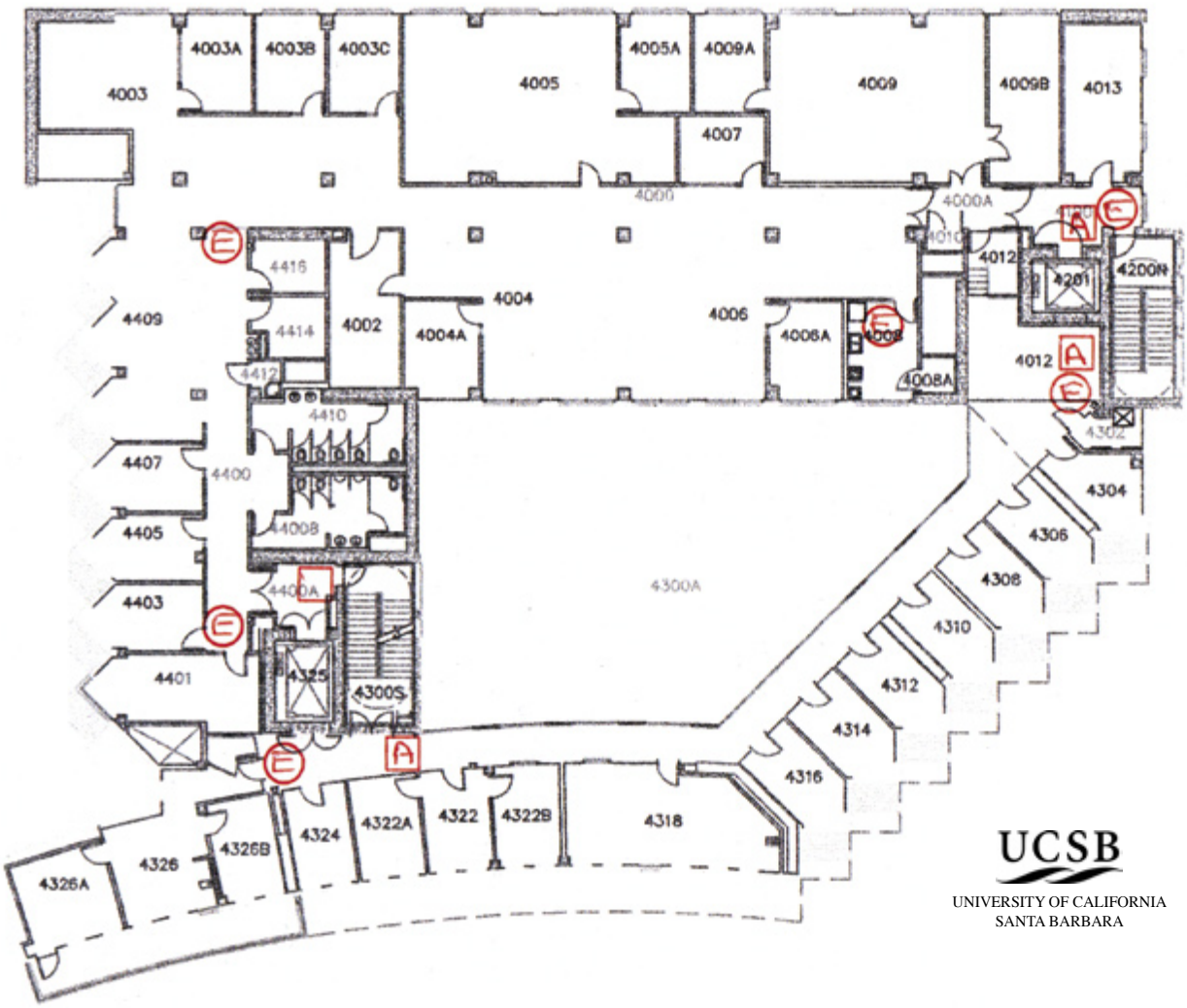


3001	Seawater workroom
3002	Common support laboratory
3003	Reed laboratory
3004	Holbrook laboratory
3005	Reed laboratory
3005a	Common support laboratory
3006	Schmitt laboratory
3008	Gaines laboratory
3009	Warner laboratory
3011	Warner laboratory
3013	Washburn laboratory

3014	Storage
3015	MacIntyre laboratory
3304	Thomas Dudley
3306	Postdoc office
3308	Dan Reed
3310	Andrew Brooks
3312	Postdoc office
3312a	Postdoc office
3314	Russell Schmitt
3316	Sally Holbrook
3322	Conference room

3401	Margaret O'Brien/Jordan Morris
3403	Econinformatics - Jing Tao/Chad Berkley
3405	Econinformatics - Dan Higgins/Sid Garg
3407	Econinformatics - Matthew Brook/Matt Jones
3409	Econinformatics - John Harris/Mark Schildhauer
3411	Econinformatics - Peter Anderson/Nico Franz

Marine Science Research Building
Bldg. No. 520 - 4th floor
01/2005



4002	Copier/mail room
4003a	Ocean O'Graphics - Monica Pessino
4003b	Storage
4003c	Joyce Wolever
4004A	Rachel Whitacre
4004d	Steve Gilbert
4005A	Barbara Sanchez
4005a	Doris O'Leske
4005b	Ann Springer
4005c	Nicole Zavala
4005e	Lis Fior
4006A	Deb Owens
4006a	Marie Ciluaga
4006b	Bonnie Roper
4006e	Mike O'Neil

4007	Conference room
4008	Break room
4009B	Server room
4009b	Jim Woods
4009d	Mike Franklin
4012	IT storage
4013	Shipping/receiving
4304	Sally MacIntyre
4306	Libe Washburn
4308	Gail Osherenko
4310	William Freudenberg
4312	Jonathan Levine
4314	Jen Caselle
4316	Carol Blanchette
4318	Conference Room

N

4322	O.J. Reichman
4322a	Steven Gaines
4322b	Robert Warner
4324	Development - Amelia Picciotto
4326	Development - Geness Branton
4326a	MSI Director
4401	Tim Schmidt
4403	Storage
4405	Laurie Eusey
4407	Bonnie Williamson
4409A	Judy McCaslin
4409B	Joanna Yates
4409C	Marisol Hernandez

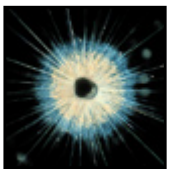
Marine Science Institute Trailers

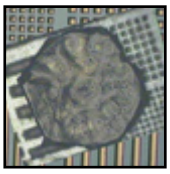
319-a	Jack Engle
319-b	Jack Engle
319-c	Jack Engle
319-d	NRS storage
319-e	Dale Krause
325-a	John Richards
325-b	Craig Nicholson
325-c	Craig Nicholson
325-d	Miriam Polne-Fuller
325-e	Jack Engle
334-a	Scott Simon
334-b	REEF
334-c	REEF
338-d	Herb Waite/Ira Leifer
338-e	Herb Waite/Ira Leifer
342-105	Kevin Lafferty
342-107	Kevin Lafferty
342-109	Mike McGinnis
342-113	Patti Halpin
342-115	Conference room
342-117	Carrie Culver

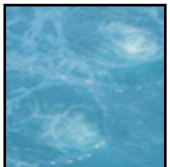
Statistical Summary



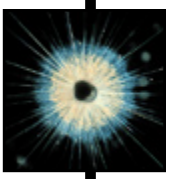


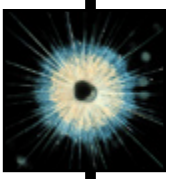



Research Support Summary



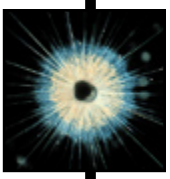
	Awards	Percentage of Total
Federal Agencies		
National Aeronautics and Space Administration	$ 48,000	0.25%
National Science Foundation	8,656,321	44.71%
Oak Ridge National Laboratory	33,500	0.17%
Public Health Service	795,207	4.11%
UC Sea Grant	212,170	1.10%
US Department of Energy	128,670	0.66%
US Environmental Protection Agency	332,099	1.72%
US Fish & Wildlife Service	18,581	0.10%
US Forest Service	17,118	0.09%
US Geological Survey	65,139	0.34%
USDC - National Oceanic & Atmospheric Administration	138,673	0.72%
USDI - Minerals Management Service	150,000	0.77%
USDI - National Park Service	110,000	0.57%
Federal Agencies Totals	**$ 10,921,137**	**56.41%**
Private Agencies		
Advanced Technology Institute	$ 0	0.00%
American Chemical Society	40,000	0.21%
Andrew W. Mellon Foundation	300,000	1.55%
California Artificial Reef Enhancement	132,714	0.69%
California Trout	10,000	0.05%
David and Lucile Packard Foundation	1,159,795	5.99%
Gordon and Betty Moore Foundation	1,391,737	7.19%
Harvard University	301,214	1.56%
Martin V. & Martha K. Smith Foundation	5,000	0.03%
Oregon State University	2,060,104	10.64%
Princeton University	646,250	3.34%
SRS Technologies	49,767	0.26%
The Nature Conservancy	53,405	0.28%
The New Media Studio	93,726	0.48%
Virginia Institute of Marine Science	104,520	0.54%
Private Agencies Totals	**$ 6,348,232**	**32.79%**



State/Public Agencies

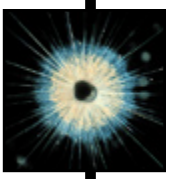
California Department of Fish and Game	$ 370,746	1.92%
California Regional Water Quality Control Board	160,000	0.83%
Center for Invasive Plant Management	5,000	0.03%
City of Santa Barbara	130,007	0.67%
Shoreline Preservation Fund - Associated Students UCSB	60,696	0.31%
UC Davis	163,470	0.84%
UC Irvine	50,000	0.26%
UC Office of the President	176,016	0.91%
UC San Diego	384,437	1.99%
UC Santa Cruz	106,202	0.55%
UC Toxic Substances Research and Teaching Program	270,000	1.39%
UC Water Resources Center	58,000	0.30%
University of Miami	72,756	0.38%
University of Washington	82,763	0.43%
State/Public Agencies Totals	$ 2,090,093	10.80%
Total	**$19,359,462**	**100.00%**

Budget Summary
2004-2005



Permanent Funds	FTE	Appropriation	Expense	Balance
Academic Salaries				
Director				
Stipend		4,200	-8,400	-4,200
Other	0.75	31,014	-31,014	0
Staff Salaries	13.75	759,988	-685,257	74,731
General Assistance		14,901	-204,988	-190,087
Employee Benefits		296,445	-298,054	-1,608
S&E		31,589	-56,974	-25,385
Other		0	0	0
Total 2004-05		**1,138,137**	**-1,284,686**	**-146,549**
less 04/05 BST			-24,979	-24,979
less 04/05 Budget cut			-11,562	-11,562
Adjusted total 2004-05		**1,138,137**	**-1,321,227**	**-183,090**

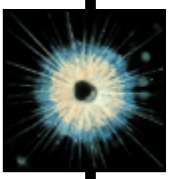
Temporary Funds	Appropriation	Expense	Balance
A-21 return	399,045	-39,095	359,950
IRC fundraising	24,000	-23,870	130
Research support - Lea	67,053	-7,036	60,017
Research support - Prezelin	99,949	-53,178	46,771
Research support - Wilson	1,514	-46	1,468
Outreach programs	82,388	-93,702	-11,314
Herbst A-21	16	0	16
Butler A-21	150	-387	-237
Prezelin A-21	821	-83	738
Research support - MacIntyre	240	0	240
SCWP Polne-Fuller	50	0	50
Research support - Gaines	45,953	-44,068	1,885
Osherenko Salary	44,000	-44,000	0
FOG 3	5,089	-5,000	89
Research support - Brzezinski	7,733	-1,444	6,288
Research support - Brzezinski	8,718	-7,118	1,600
REEF operations	3,360	-3,148	212
PISCO A-21	0	-6,492	-6,492
Gaines support	22,934	-22,934	0
GUS support	144,000	-12,488	131,512
Dudley salary	75,000	-9,375	65,625
NCEAS match	103,757	-110,229	-6,472
Grant match - Reichman	126,134	-5,628	120,506
Grant match - Reichman	105	-105	0
Grant match - Quetin/Ross	22,719	-17,988	4,731
Grant match MMS	22,647	-22,483	163



Grant match MMS	103,641	-63,782	39,859
Grant match MMS	12,161	-3,306	8,855
Grant match MMS	3,500	-248	3,252
Grant match MMS	318	-248	70
Grant match - Reed	11,615	-2,652	8,963
Grant match - Reed	10,126	-1,590	8,536
Grant match - Reed	14,717	-6,433	8,285
Grant match - Matthys	46,404	-6,743	39,661
Grant match - Reed	4,938	-2,334	2,604
Grant match - Morse	33,361	-18,934	14,427
Grant match - Schmitt	50,000	-1,161	48,839
Grant Match - Schmitt	25,000	-20,414	4,586
Grant support - Brzezinski	8,718	-7,765	953
Total 2004-05	**1,631,875**	**-665,507**	**966,368**

Recharges	**Income**	**Expense**	**Balance**
MSI Revenue	294,418	-293,366	1,052
Analytical Laboratory	196,027	-209,420	-13,393
MSI GUS revenue	34,457	0	34,457
Mass Spectrometer - Brzezinski	6,778	-6,344	434
CRC copier	3,371	-386	2,985
Love lab - income	244	0	244
Mass Spectrometer - Lea	33,253	-15,478	17,774
MSI Graphics recharge	25,512	-20,423	5,089
Wide format printer	892	-1,375	-483
Total 2004-05	**594,952**	**-546,791**	**48,161**

Statistical Summary for the Marine Science Institute



1. Academic personnel engaged in research:

a.	Faculty	63
b.	Professional Researchers/Project Scientists	39
c.	Specialists/Acdemic Coordinators	13
d.	Visiting Researchers	8
e.	Postdoctoral/Postgraduate Researchers	54
	TOTAL	177

2. Graduate Students:

a	Employed on contracts and grants	97
b.	Employed on other sources of funds	
c.	Participating through assistantships	
d.	Participating through traineeships	
e	Other (specify)	
	TOTAL	97

3. Undergraduate Students:

a.	Employed on contracts and grants	257
b.	Employed on other funds	
c.	Number of volunteers, & unpaid interns	97
	TOTAL	354

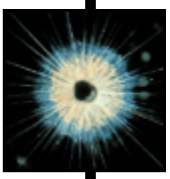
4. Participation from outside UCSB: <u>(optional)</u>

a.	Academics
b.	Postdoctorals
c.	Postgraduate Researchers
d.	Other (specify)

5. Staff (Univ. & Non-Univ. Funds):

a.	Technical	168
b.	Administrative/Clerical	64

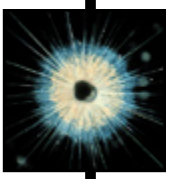
6. Seminars, symposia, workshops sponsored	115
7. Proposals submitted	164
8. Number of different awarding agencies dealt with*	66
9. Number of extramural awards administered	239
10. Dollar value of extramural awards administered during year**	$84,367,049
11. Number of Principal Investigators***	137
12. Dollar value of other project awards ****	$1,420,623



13. Number of other projects administered	68
14. Total base budget for the year (as of June 30, 2005)	$846,304
15. Dollar value of intramural support	$1,705,453
16. Total assigned square footage in ORU	~65,000
17. Dollar value of awards for year (08 Total)	$19,359,462

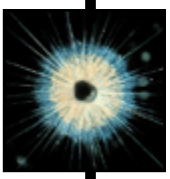
* Count each agency only once (include agencies to which proposals have been submitted).
** If the award was open during the year, even if for only one month, please include in total.
*** Number of PIs, Co-PIs and Proposed PIs (count each person only once.)
**** Other projects - such as donation, presidential awards, fellowships, anything that isn't core budget, extramural, or intramural.

Five-Year Research Support Summary

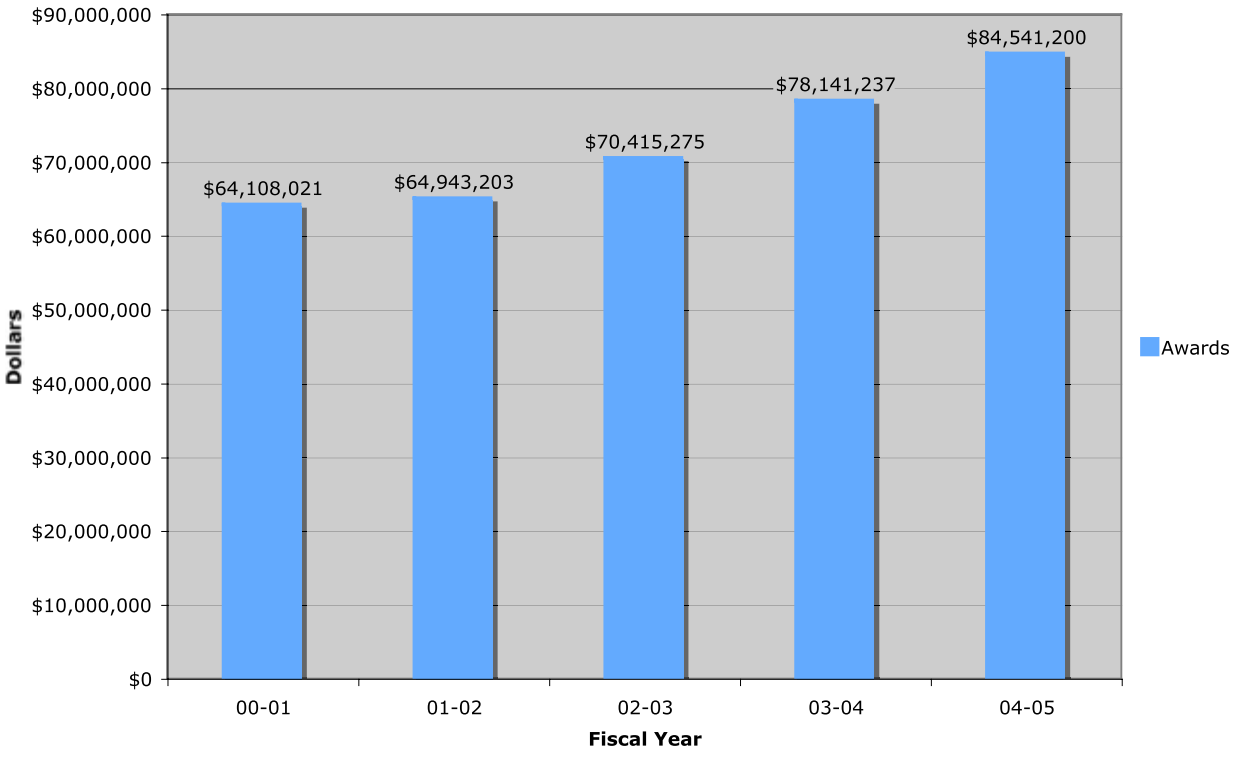


	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
1. Academic personnel engaged in research					
a. Faculty	59	60	62	58	63
b. Professional Researchers	43	52	52	50	39
c. Visiting Researchers	9	15	12	7	8
d. Specialists/Academic Coord/Academic Admin.	7	10	15	18	13
e. Postdoctorals/Postgraduates	65	56	56	60	54
Total	**183**	**193**	**197**	**193**	**177**
2. Staff (Univ. & Non-Univ. Funds)					
a. Technical	178	179	186	200	168
b. Administrative/Clerical	34	33	35	28	64
Total	**212**	**212**	**221**	**228**	**232**
3. Graduate students employed by MSI	94	84	88	110	97
4. Undergraduate students employed by MSI	221	200	177	216	257
5. Publications	301	350	2**	2**	1**
6. Seminars, symposia, workshops, etc., sponsored by MSI	113	98	105	109	115
7. Proposals submitted	132	157	191	182	164
8. Annual extramural awards	$14,832,799	$18,067,970	$17,508,425	$19,341,065	$19,359,462
9. Extramural awards administered	192	223	238	246	239
10. Other project awards	$419,055	$366,055	$292,948	$1,145,713	$1,420,623
11. Other projects administered	42	46	53	55	68
12. MSI base budget	$800,568	$820,165	$834,306	$857,373	$846,304
13. Intramural support	$1,308,351*	$1,422,616*	$1,513,343*	$1,552,076	$1,631,875
14. Total Funds Administered	$64,108,021	$64,943,203	$70,415,275	$78,141,237	$84,541,200

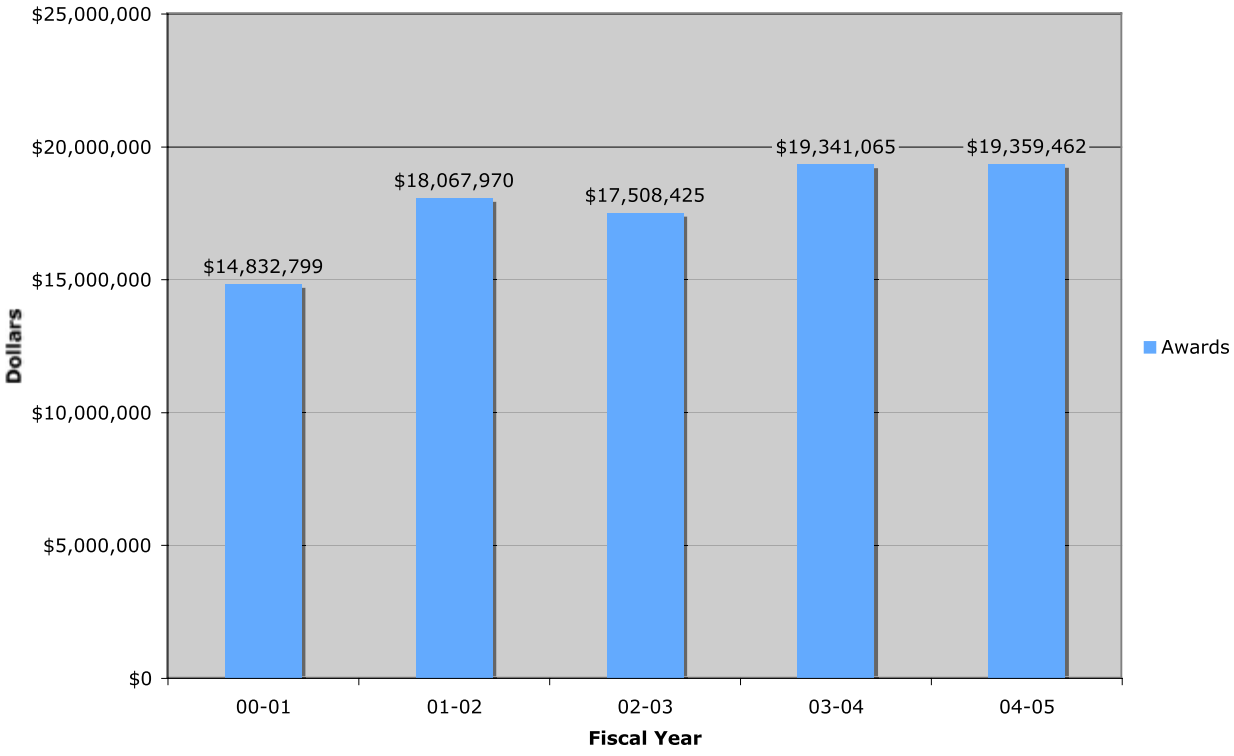
*Includes $500,000 in matching funds from the State of California for NCEAS. **Only Departmental Publications

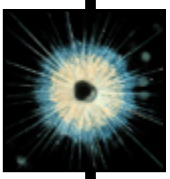


Marine Science Institute - Total Value of Awards Administered

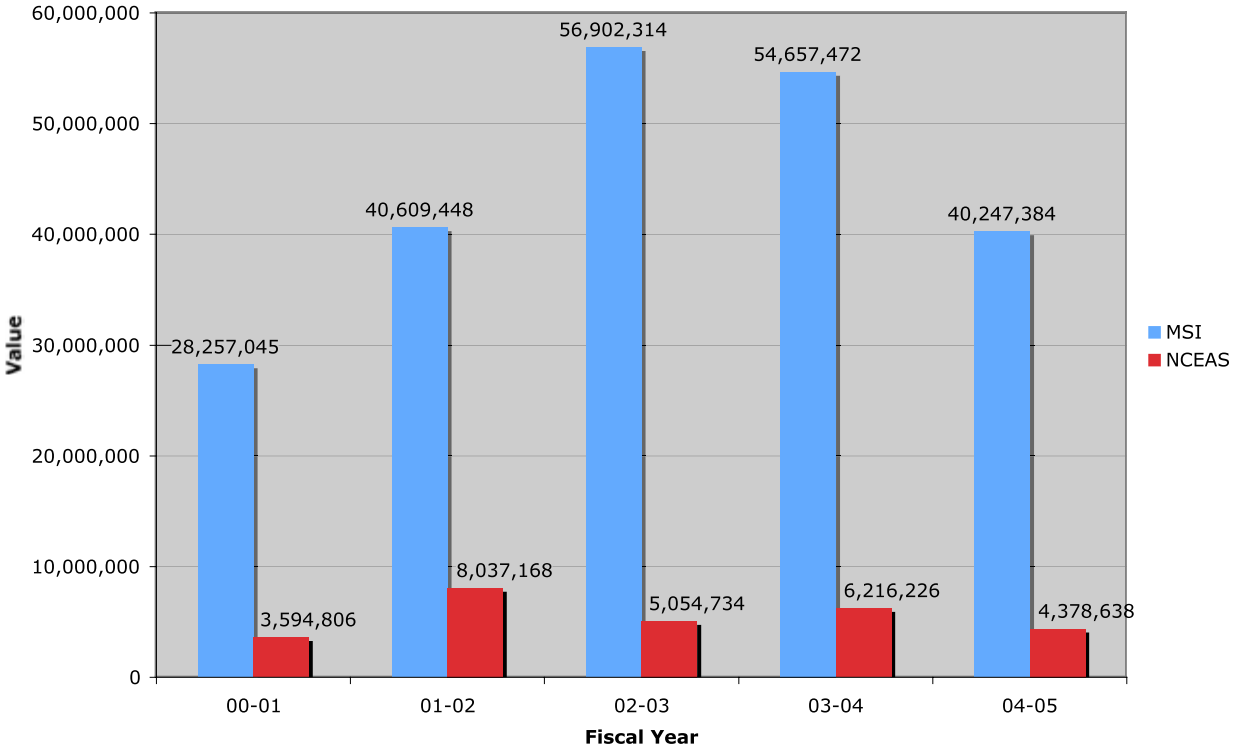


Marine Science Institute - Value of Extramural Awards Received Annually

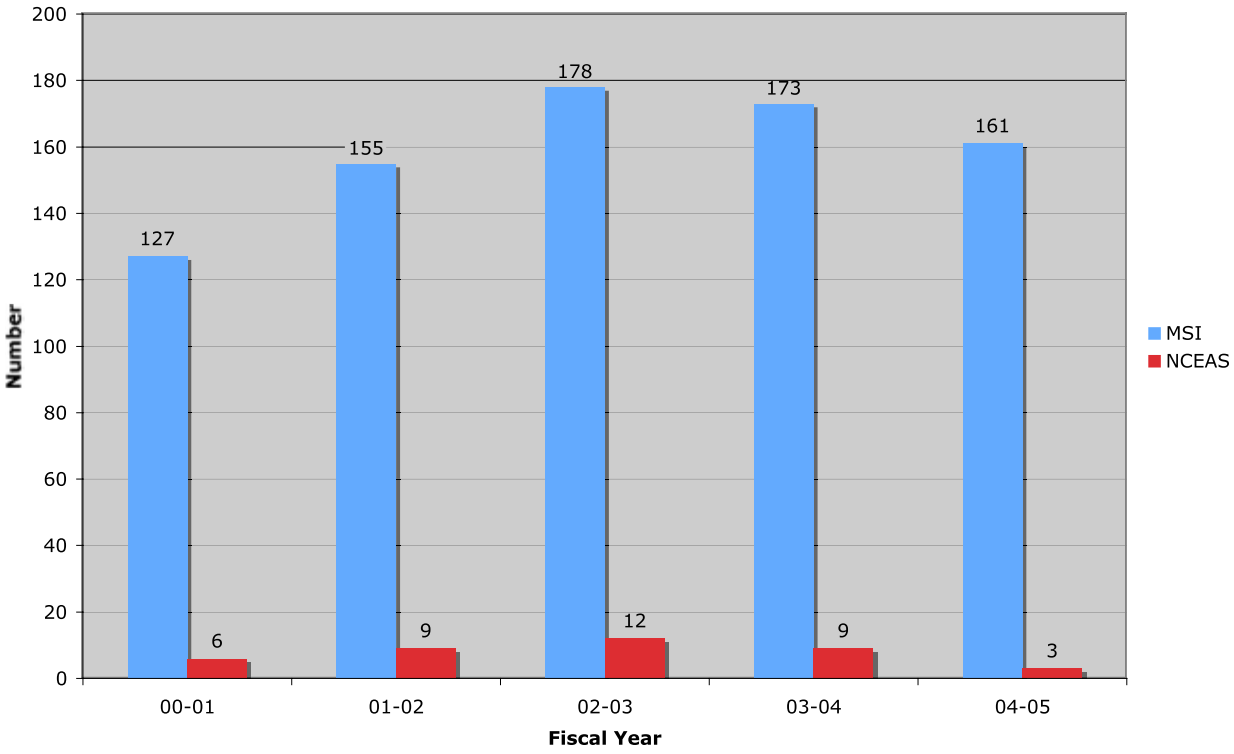




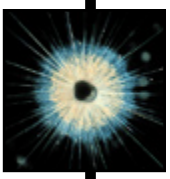
Value of Proposals Submitted Annually by MSI & NCEAS



Number of Proposals Submitted Annually by MSI & NCEAS



Funding Agencies



Advanced Technology Institute

AMEC Environmental and Energy Services Co., Inc.

American Chemical Society

Andrew W. Mellon Foundation

Arnold and Mabel Beckman Foundation

California Artificial Reef Enhancement

California Department of Fish and Game

California Energy Commission, PIER-Public Interest Energy Research

California Regional Water Quality Control Board

California State University – Los Angeles

California State University - Sacramento

California Trout

California Wildlife Foundation

Center for Invasive Plant Management, Montana State University

Channel Islands National Park

City of Santa Barbara

Coastal Conservancy

Coastal Resources Alliance

College of William and Mary

Conservation International Foundation

David and Lucile Packard Foundation

Gordon and Betty Moore Foundation

Harvard University

Joint Oceanographic Institutions, Inc.

L'Oreal USA

Los Angeles Department of Water and Power

Marine Biological Laboratory

Martin V. & Martha K. Smith Foundation

Michigan State University

National Aeronautics and Space Administration

National Science Foundation

Northwestern University

Oak Ridge National Laboratory

Oregon State University

Packard Foundation - Resources Legacy Fund Foundation

Princeton University

Public Health Service, National Institutes of Health

Rutgers University

Santa Barbara Cottage Hospital

Shoreline Preservation Fund - Associated Students UCSB

Simpson and Simpson Business and Personnel Services, Inc.

SRS Technologies

Texas A&M Research Foundation

The Nature Conservancy

The New Media Studio

The Pew Charitable Trusts

UC Berkeley

UC Davis

UC Institute for Energy Efficiency

UC Irvine

UC Lawrence Livermore National Laboratory

UC MEXUS

UC Office of the President

UC Riverside

UC San Diego

UC Santa Cruz

UC Sea Grant

UC Toxic Substances Research and Teaching Program

UC Water Resources Center

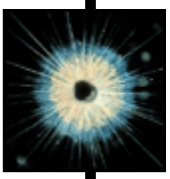
University of Colorado

University of Florida

University of Hawaii

University of Miami

University of North Carolina



University of Southern California

University of Southern California, Sea Grant

University of Utah

University of Washington

US Department of Agriculture

US Department of Agriculture, Forest Service

US Department of Energy

US Department of Commerce - National Oceanic & Atmospheric Administration

US Department of the Interior - US Geological Survey

US Department of the Interior - Minerals Management Service

US Department of the Interior - National Park Service

US Department of the Navy

US Environmental Protection Agency

US Fish & Wildlife Service

Virginia Institute of Marine Science

Wetlabs, Inc.

William M. Keck Foundation

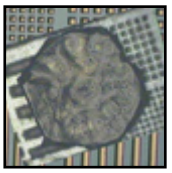
MSI Advisory Committee, Administrative, Professional and Technical Staff












Marine Science Institute
2004-2005

Chancellor	Henry T. Yang
Executive Vice Chancellor	Gene Lucas
Vice Chancellor for Research	Steven D. Gaines (Acting)
Director	Steven D. Gaines
Deputy Director	Mark A. Brzezinski
Assistant Deputy Director	Daniel Reed

Advisory Committee

Mark Brzezinski, ex-officio, Deputy Director of Marine Science Institute, Professor, Ecology, Evolution & Marine Biology
David Clarke, Professor, Materials
Jenifer Dugan, Associate Researcher, Marine Science Institute
William Freudenburg, Dehlsen Professor, Environmental Studies
Steven Gaines, ex-officio, Director of Marine Science Institute, Professor, Ecology, Evolution & Marine Biology
Gretchen Hofmann, Associate Professor, Ecology, Evolution & Marine Biology, Committee Chair
Kevin Lafferty, Assistant Researcher, Marine Science Institute
David Lea, Professor, Geological Sciences
Hunter Lenihan, Assistant Professor, Bren School of Environmental Science & Management
Daniel Morse, ex-officio, Director of Marine Biotech Center, Professor, Molecular, Cellular & Developmental Biology
William Murdoch, ex-officio, Director of Natural Reserve System, Professor, Ecology, Evolution & Marine Biology
Gail Osherenko, Researcher, Marine Science Institute
Omer Reichman, ex-officio, Director of National Center for Ecological Analysis & Synthesis, Professor, Ecology, Evolution & Marine Biology
Robin Ross, Researcher, Marine Science Institute
Tim Schmidt, ex-officio, Manager, Marine Science Institute
Russell Schmitt, ex-officio, Director of Coastal Research Center, Professor, Ecology, Evolution & Marine Biology
Allison Whitmer, Academic Coordinator, Marine Science Institute

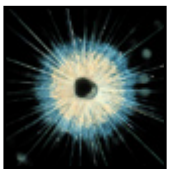
Marine Science Institute
Administrative, Professional and Technical Staff

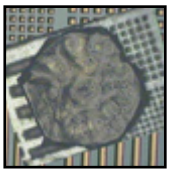
Geness Branton, Development Assistant
William Clinton, Staff Research Associate, Analytical Laboratory
Anya Engen, Laboratory Assistant, Analytical Laboratory
Laurie Eusey, Financial Services Manager
Lis Fior, Budget Specialist
Mike Franklin, Desktop Support
Steve Gilbert, Purchasing Assistant
Marisol Hernandez, Travel Assistant
Alanna Matlick, Travel Assistant
Allen Matlick, GUS Programming
Judy McCaslin, Contract & Grants Officer
Doris O'Leske, Personnel Analyst
Mike O'Neil, Budget Analyst
Deb Owens, Budget Unit Manager
Monica Pessino, Senior Artist
Robert Petty, Manager, Analytical Laboratory
Amelia Picciotto, Director of Development
Bonnie Roper, Budget Assistant
Barbara Sanchez, Personnel Unit Manager
Tim Schmidt, Manager
Ann Springer, Personnel Analyst
Rachel Whitacre, Purchasing Unit Manager
Bonnie Williamson, Contracts & Grants Administration Manager
Joyce Wolever, Operations Coordinator
James Woods, Information Technology
Joanna Yates, Contracts & Grants Assistant
Nicole Zavala, Personnel Analyst

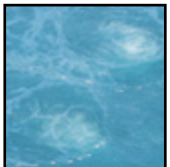
Marine Science Institute
Principal Investigators
2004-2005





Marine Science Institute Principal Investigators 2004-2005

Adler, Peter	Postdoctoral Researcher	Ecology, Evolution and Marine Biology
Alldredge, Alice	Professor of Marine Biology	Ecology, Evolution and Marine Biology
Alroy, John	Assistant Researcher Biologist	Marine Science Institute
Andelman, Sandy J.	Specialist; Deputy Director, National Center for Ecological Analysis & Synthesis	Marine Science Institute
Anderson, Clarissa	Graduate Student Researcher	Marine Science Institute
Arkema, Katherine	Graduate Student Researcher	Marine Science Institute
Berkman, Paul	Project Scientist	Environmental Science & Management
Bianchini, Julie	Assistant Professor of Education	Gervirtz Graduate School of Education
Blanchette, Carol	Assistant Research Biologist	Marine Science Institute
Boles, James	Professor of Geology	Geological Sciences
Boucquey, Noëlle	Undergraduate Researcher	Environmental Science & Management
Brooks, Andrew	Assistant Researcher Biologist	Marine Science Institute
Brzezinski, Mark A.	Professor of Biology, Deputy Director, Marine Science Institute	Ecology, Evolution and Marine Biology
Burnaford, Jennifer	Postdoctoral Researcher	Marine Science Institute
Butler, Alison	Professor of Chemistry	Chemistry
Campbell, Brian J.	Graduate Student Researcher	Geological Sciences
Carlson, Craig A.	Associate Professor of Biology	Ecology, Evolution and Marine Biology
Case, James F.	Research Professor of Neurobiology	Marine Science Institute
Caselle, Jennifer E.	Assistant Research Biologist	Marine Science Institute
Chadwick, Oliver	Professor of Geography	Geography, Environmental Studies
Chapman, David	Professor of Biology	Ecology, Evolution and Marine Biology
Childress, James	Professor of Zoology	Ecology, Evolution and Marine Biology
Chmelka, Bradley F.	Professor of Chemical Engineering	Chemical Engineering
Clark, Jordan F.	Associate Professor of Geology	Geological Sciences
Clarke, Keith	Professor of Geography	Geography
Connell, Joseph	Research Professor of Zoology	Ecology, Evolution and Marine Biology

Cooper, Scott	Professor of Biology	Ecology, Evolution and Marine Biology
Costello, Christopher	Assistant Professor of Environmental Science	Environmental Science & Management
Culver, Carolynn S.	Assistant Research Biologist	Marine Science Institute
Davis, Frank	Professor of Geography	Geography
Dawson, Daniel R.	Reserve Director, Valentine Eastern Sierra Reserve	Marine Science Institute
Deming, Timothy	Professor of Materials	Materials
Dixon, John D.	Associate Research Biologist	Marine Science Institute
Dudley, Tom	Associate Researcher Biologist	Marine Science Institute
Dugan, Jenifer E.	Associate Researcher Biologist	Marine Science Institute
Dutton, Jessica	Graduate Student Researcher	Ecology, Evolution and Marine Biology
Engle, John M.	Associate Research Biologist	Marine Science Institute
Foltz, Kathleen R.	Professor of Biology	Molecular, Cellular & Developmental Biology
Fujiwara, Masami	Postdoctoral Researcher	Marine Science Institute
Gaines, Steven D.	Professor of Biology, Director, Marine Science Institute	Ecology, Evolution and Marine Biology
Gasljevic, Kazimir	Assistant Research Engineer	Marine Science Institute
Gaylord, Brian	Assistant. Research Biologist	Marine Science Institute
Goddard, Jeffrey	Assistant Research Biologist	Marine Science Institute
Halpern, Benjamin	Academic Coordinator	Marine Science Institute
Hansma, Paul	Professor of Physics	Physics
Haymon, Rachel M.	Professor of Geology	Geological Sciences
Herbst, David B.	Assistant Research Biologist	Marine Science Institute
Herrity, Vishna	Academic Coordinator	Gevirtz Graduate School of Education
Hodges, Scott	Associate Professor of Biology	Ecology, Evolution and Marine Biology
Hofmann, Gretchen	Associate Professor of Biology	Ecology, Evolution and Marine Biology
Holbrook, Sally	Professor of Biology	Ecology, Evolution and Marine Biology
Holden, Patricia A.	Associate Professor of Environmental Science	Environmental Science & Management
Hu, Evelyn L.	Professor of Electrical & Computer Engineering	Electrical and Computer Engineering
Hufford, Kristina	Postdoctoral Researcher	Ecology, Evolution and Marine Biology
Jacobs, Robert	Professor of Pharmacology	Ecology, Evolution and Marine Biology
Jellison, Robert	Assistant Research Biologist	Marine Science Institute
Jones, Christopher	Systems and Database Specialist	Marine Science Institute

Jones, Matthew B.	Database and Information Specialist	Marine Science Institute
Keller, Edward A.	Professor of Geology	Geological Sciences
Kendall, Bruce	Assistant Professor of Environmental Science	Environmental Science & Management
Kennett, James P.	Professor of Geology	Geological Sciences
Kinlan, Brian P.	Graduate Student Researcher	Marine Science Institute
Kisailus, David J.	Postdoctoral Researcher	Marine Science Institute
Knapp, Roland A.	Associate Research Biologist	Marine Science Institute
Krause, Dale	Research Geologist	Marine Science Institute
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Lea, David	Professor of Geology	Geological Sciences
Leifer, Ira	Assistant Research Chemical Engineer	Marine Science Institute
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Levine, Jonathan	Assistant Professor of Biology	Ecology, Evolution and Marine Biology
Love, Milton	Associate Research Zoologist	Marine Science Institute
Luyendyk, Bruce	Professor of Geology	Geological Sciences
Macdonald, Ken C.	Professor of Marine Geophysics	Geological Sciences
MacIntyre, Sally	Professor of Biology	Marine Science Institute
Matthys, Eric	Professor of Engineering	Mechanical Engineering
Mazer, Susan	Professor of Biology	Ecology, Evolution and Marine Biology
McClintock, William	Postdoctoral Researcher	Marine Science Institute
McConnell, Christine	Graduate Student Researcher	Marine Science Institute
McGinnis, Michael	Assistant Research Political Science	Marine Science Institute
Melack, John	Professor of Biology	Ecology, Evolution and Marine Biology
Morse, Daniel E.	Professor, Genetics and Biochemistry; Director, Marine Biotechnology Center	Molecular, Cellular & Developmental Biology
Muller, Erik	Assistant Research Biologist	Marine Science Institute
Murdoch, William	Professor of Biology	Ecology, Evolution and Marine Biology
Nicholson, Craig	Associate Researcher	Marine Science Institute
Nisbet, Roger	Professor of Biology	Ecology, Evolution and Marine Biology
Oakley, Todd	Assistant Professor	Ecology, Evolution and Marine Biology

Ohlmann, J. Carter	Assistant Researcher	Marine Science Institute
Onsted, Jeffrey	Graduate Student Researcher	Environmental Science & Management
Orrock, John	Postdoctoral Researcher	Marine Science Institute
Osherenko, Gail	Research Scientist	Marine Science Institute
Osovitz, Christopher	Graduate Student Researcher	Marine Science Institute
Page, Henry M.	Assistant Research B	Marine Science Institute
Pak, Dorothy K.	Assistant Research Geologist	Marine Science Institute
Penley, Constance	Professor of Film Studies	Film Studies
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Pine, Cathy	Academic Coordinator	Materials
Polne-Fuller, Miriam	Academic Coordinator	Marine Science Institute
Price, Nichole, N.	Graduate Student Researcher	Marine Science Institute
Prézelin, Barbara	Professor of Biology	Ecology, Evolution and Marine Biology
Pyke, Christopher	Postdoctoral Researcher	Marine Science Institute
Quetin, Langdon B.	Researcher	Marine Science Institute
Reed, Daniel C.	Researcher	Marine Science Institute
Reichman, O.James	Professor of Biology; Director, National Center for Ecological Analysis & Synthesis	Ecology, Evolution and Marine Biology
Rice, Ronald	Professor of Communications	Communications
Rice, William R.	Professor of Biology	Ecology, Evolution and Marine Biology
Richards, John B.	Marine Resources Specialist	Marine Science Institute
Robinson, Timothy H.	Graduate Student Researcher	Marine Science Institute
Ross, Robin	Research Biologist	Marine Science Institute
Runft, Linda	Postdoctoral Researcher	Marine Science Institute
Sagarin, Rafael D.	Postdoctoral Researcher	Marine Science Institute
Sandin, Stuart	Postdoctoral Researher	Marine Science Institute
Sandoval, Cristina P.	Reserve Director, Coal Oil Point Reserve	Marine Science Institute
Schildhauer, Mark P.	Director of Computing	Marine Science Institute
Schimel, Joshua P.	Professor of Biology	Ecology, Evolution and Marine Biology
Schizas, Nikolaos	Assistant Research Biologist	Marine Science Institute
Schmitt, Russell J.	Professor of Biology; Director, Coastal Research Center	Ecology, Evolution and Marine Biology
Schroeter, Stephen C.	Research Biologist	Marine Science Institute
Seabloom, Eric W.	Postdoctoral Research Ecologist	Marine Science Institute
Siegel, David	Professor of Geography	Geography
Simpson, Julie	Graduate Student Researcher	Ecology, Evolution and Marine Biology
Smith, Katherine	Graduate Student Researcher	Ecology, Evolution and Marine Biology

Smith, Raymond	Research Professor of Geography	Geography
Sorlien, Christopher	Assistant Research Geologist	Marine Science Institute
Steele, Mark	Assistant Research Biologist	Marine Science Institute
Stewart-Oaten, Allan	Professor of Biology	Ecology, Evolution and Marine Biology
Stucky, Galen	Professor of Chemistry	Chemistry
Swarbrick, Susan L.	Associate Director, Natural Reserve System	Marine Science Institute
Swearer, Stephen E.	Assistant Research Biologist	Marine Science Institute
Thorsch, Jennifer	Associate Researcher	Marine Science Institute
Valentine, David L.	Assistant Professor of Microbial Biology	Geology
Vlietstra, Lucy	Postdoctoral Research	Marine Science Institute
Waite, J. Herbert	Professor	Molecular, Cellular & Developmental Biology
Wardlaw, George	Graduate Student Researcher	Geological Sciences
Warner, Robert R.	Professor of Biology	Ecology, Evolution and Marine Biology
Washburn, Libe	Professor	Geography
White, James W.	Graduate Student Researcher	Ecology, Evolution and Marine Biology
Whitmer, Allison	Academic Coordinator	Marine Science Institute
Wilkinson, Robert	Assistant Researcher	Environmental Science & Management
Williams, Michael P.	Reserve Director, Sedgwick Reserve	Marine Science Institute
Wilson, Douglas S.	Associate Research Geophysicist	Marine Science Institute
Wilson, Leslie	Professor of Biochemistry	Molecular, Cellular & Developmental Biology
Young, Oran	Professor of Environmental Science	Environmental Science & Management
Ziegler, Karen	Postdoctoral Researcher	Marine Science Institute
Zok, Francis W.	Professor of Materials	Materials

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