The California State University
COUNCIL ON OCEAN AFFAIRS, SCIENCE & TECHNOLOGY (COAST)

COAST Faculty - Student Research Poster Reception

January 25, 2011 • Long Beach, CA

Book of Abstracts

Welcome!

Welcome to the Inaugural COAST Faculty-Student Research Poster Reception. We are pleased to present student researchers and their faculty mentors from 20 CSU campuses to showcase the excellence and relevance of marine and coastal research throughout the CSU. The posters presented here demonstrate the use of cutting-edge technology and novel approaches to address our most pressing environmental challenges and basic scientific questions while providing valuable training and educational experiences for the students. The authors represent many different disciplines and epitomize the wealth of expertise and technical capability housed within the CSU. Faculty-student research projects such as these are critical to the development of solutions that guarantee the use and enjoyment of our coast and ocean for generations to come.

On behalf of COAST, thank you for joining us today!

Krista Kamer
Program Coordinator

CSU Bakersfield

Diversity and antifungal ability of epibiotic microorganisms associated with invasive marine bryozoan species from California

Authors: Lauren Dowell*, Kushwinder Gill*, Michelle Mera*, Barbara Chambers* and Antje Lauer

Affiliation: Department of Biology, College of Natural Sciences and Mathematics

Abstract: *Bugula neritina* and *Watersipora subtorquata*, two invasive marine bryozoans, have invaded coastal areas in California and are outcompeting native marine invertebrates worldwide. We have investigated the bacterial and fungal diversity of biofilms on these bryozoa with particular emphasis on *W. subtorquata* from Morro Bay, Monterey, Marina Del Rey, Elkhorn Slough, and Moss Landing, California. Scanning electron microscopy (SEM), DNA extraction, polymerase chain reaction (PCR), denaturing gradient gel electrophoresis (DGGE), and antifungal challenge assays have been utilized to characterize the associated microbial diversity. Results have revealed strong antifungal activity of some bacterial species from the bryozoan biofilm. DGGE results showed that the microbial diversity of *W. subtorquata* and *B. neritina* is different from the surrounding seawater and from neighbouring invertebrates. Furthermore, the microbial diversity in the bryozoan biofilms of the same species was more closely related compared to other bryozoan species at the same sampling site, indicating that bryozoa are able to influence the microbial diversity in their biofilms. We have found support for our hypothesis that bryozoa possess a distinct bryozoan species-specific biofilm containing antifungal bacteria that might protect them against fungal overgrowth, which may contribute to their invasive character.

Note: * denotes student authors throughout

CSU Channel Islands

An interdisciplinary approach to evaluating the sustainability of seafood options across southern California

Authors: Sean Anderson†, Simone Aloisio‡, Blake Gillespie‡, Andrew Domingos*†, Gerardo Hidalgo Jr.*†, Aaron Satterlee*‡ and Deborah Gaines*‡

Affiliations: †Environmental Science and Resource Management Program, College of Natural Science; ‡Chemistry Program, College of Natural Science

Abstract: To gauge the sustainability and toxicity of seafood available to Californians, we surveyed point of sale seafood at 134 restaurants and 64 markets across Santa Barbara, Ventura, and Los Angeles Counties from 2007 through 2010. We collected socio-economic data about each item sold, purchasing a subset of these fish for subsequent analysis in our laboratories by undergraduate researchers. Tissue samples were tested for heavy metal load using atomic absorption spectroscopy and for synthetic carotenoid pigments as markers of harvest method using chiral-HPLC. We found 1) seafood travels an average 5,482 (± 97se) km to reach our tables, 2) transport of restaurant items utilized twice as much energy and produced at least double the emissions of carbon dioxide (2.1 ± 0.9se vs. 1.1 ± 0.5 kg lb^{-1}) relative to market items, 3) mercury concentrations ranged between 0.05-0.98 ppm, 4) no statistical difference in the mercury content of farmed and wild-caught salmon, and 5) >90% of salmon samples were correctly reported as wild or farmed by pigment analysis. Restaurants provided less seafood information, knowledgeable staff, and sustainable seafood, but offered more local seafood relative to markets. Lack of detailed seafood information appears to be the biggest barrier to expanded sustainable seafood purchasing.

CSU Dominguez Hills

Competing ideologies, policy, and marine protected areas

Authors: John Bunce*† and Dr. Ana Pitchon‡

Affiliations: †Department of Psychology, College of Natural and Behavioral Sciences; ‡Department of Anthropology, College of Natural and Behavioral Sciences

Abstract: The process of establishing Marine Protected Areas (MPAs) is complicated due to the multiple valuations ascribed to a single ecosystem. MPAs are being constructed and implemented by a variety of interests, including State and Federal regulatory agencies, conservation organizations, fisheries representatives, and academics. Academics and conservation groups point to the necessity and effectiveness of no-take zones, citing their success in regenerating fish stocks and boosting future harvest levels on the border of MPAs. Fishermen express the concern that MPA formation in conjunction with other emerging exclusion zones such as wave or wind energy farms is substantially reducing the scope of productive fishing grounds that remain available for commercial harvest. However, in resource systems featuring non-excludability and subtractability, appropriators are mutually interdependent and therefore must develop coordinated strategies that, by constraining the options available to the individual resource user maximizes the collective returns from the common pool resource and ensures its continued survival. This research examines the multiple yet competing justifications for MPAs through an analysis of the subjective inherent value various ideologies apply to natural places using the case of the California South Coast design process.

CSU East Bay

Investigating microbial water quality of San Leandro Creek and San Francisco Bay

Authors: Stephanie L. Molloy, Kathy Seiber* and Sirma Mihaltcheva*

Affiliation: Department of Biological Sciences, College of Sciences

Abstract: Intense urbanization and other anthropogenic activities, such as legacy mercury mining, in the San Francisco Bay area can have serious impacts on water quality and natural microbial populations of the Bay and its inputs. This study investigates the presence and sources of fecal pollution in San Leandro Creek, which ultimately discharges into San Francisco Bay. Fecal indicator bacteria were detected at all sampling sites in the creek under both dry and rain conditions. *Aeromonas* spp. were detected at all sites and in biofilm samples from the creek. Molecular evidence of human fecal pollution was found in the creek. Pollution indicator levels were higher under rain conditions; human fecal pollution was detected during every rain event. This suggests that under rain conditions there was an input of fecal pollution, likely from runoff. The presence of fecal indicators, human fecal pollution, and a potential waterborne pathogen in San Leandro Creek, a protected watershed, raises public health concerns related to recreational use of the creek and protection of the drinking water reservoir and Bay water quality. Ongoing research is investigating the effect of heavy metals pollution on natural microbial populations, and the harboring of pathogens by biofilms in the Bay and its inputs.

CSU Fresno

Determining the habitat preference of Sand Lance (*Ammodytes hexapterus*) using multibeam bathymetry in the San Juan Islands, Washington

Authors: Elizabeth Davidson*, H. Gary Greene and Fraka Harmsen

Affiliation: Department of Earth & Environmental Sciences, College of Natural Science and Mathematics

Abstract: *Ammodytes hexapterus* (Pacific Sand Lance or PSL) is an ecologically important fish species along the west coast of North America from Alaska to southern California. PSL supports many other marine species, including 29 species of birds, 10 species of marine mammals, and 30 species of commercial and sport fishes. Previous studies have shown PSL to be highly substrate specific. We investigated PSL distribution in three sand wave fields in the San Juan Islands, Washington: the central San Juan Channel (a known PSL subtidal habitat), and two previously un-sampled fields west of Sucia Island and southwest of Lopez Island. Multibeam bathymetric data, subsea video, and sediment analysis show that PSL occupy the San Juan Channel, which is composed of well-sorted medium grained (.5 mm size) siliciclastic sand. Sediment samples from the two un-sampled fields have an average grain size higher and lower respectively than the San Juan Channel field. PSL have been recovered in the Sucia field but not in the quantity found in the San Juan Channel field. As of now, no PSL have been recovered from the Lopez field. Future work will focus on determining a predictive habitat model for PSL to help determine their distribution and abundance.

CSU Fullerton

Does extended incubation affect morphology, swimming, or feeding of larval California grunion, *Leuresthes tenuis*?

Authors: Andres Carrillo*, Helena Aryafar*, Fatemeh Almasarweh*, Hadrian Bansuan*, Annie Miranda*, Tracie Treybig* and Kathryn Dickson

Affiliation: Department of Biological Science, College of Natural Sciences and Mathematics

Abstract: The California grunion, *Leuresthes tenuis*, spawns on sandy beaches on nights following spring high tides. Fertilized eggs develop within the sand for 8-14 days until they are stimulated to hatch by wave action during the next spring high tide. If that does not happen, embryos may extend incubation to up to 30 days post-fertilization (dpf) and hatch during a subsequent spring high tide. We investigated effects of extended incubation on morphology, swimming and feeding in grunion larvae. Eggs were fertilized, incubated at 20°C, and stimulated to hatch at 10 dpf (normal incubation) and 28 dpf (extended incubation). Cleared-and-stained 28-dpf larvae had significantly more pharyngeal and dentary teeth, and more skeletal elements in the caudal fin, than 10-dpf larvae. Volitional swimming activity of individual larvae, measured as the distance traveled over 60 seconds from digital videos, did not differ significantly between 10- and 28-dpf larvae. Feeding rates of larvae, measured as the change in rotifer density over 4 h, were significantly greater in 28-dpf larvae than 10-dpf larvae, which may be related to increased number of teeth observed in 28-dpf larvae. Extended incubation results in grunion larvae with more skeletal structures and greater feeding rates, which may improve post-hatching survival.

Humboldt State University

High predation may hinder restoration of native oysters in Humboldt Bay, California

Authors: Julie Koeppel*†, Ariel Carter*‡ and Sean F. Craig†

Affiliations: †Department of Biological Sciences, College of Natural Resources & Sciences; ‡Charleston Southern University

Abstract: Oyster reefs serve an important role in estuarine ecosystems, creating complex habitat that serves as home for future generations of oysters, sessile invertebrates, and fishes. Native oysters, *Ostrea lurida*, were historically abundant in Humboldt Bay, but failed to rebound from over harvesting and destructive harvest practices that disrupted existing reef structures. To determine why these populations have not recovered, we examined predation as a potential limiting factor on native oysters in Humboldt Bay, California. In 2008 and 2009, juvenile oysters were cultured at the Telonicher Marine Laboratory. Plastic tiles seeded with juvenile *O. lurida* were assigned to one of three treatments: (1) open to predation, (2) caged with stainless steel mesh to exclude predators, or (3) fenced, which allowed predators access while controlling for cage effects. Results showed that *O. lurida* survivorship was significantly greater in caged treatments relative to those open to predation (open and fenced controls). The predominant predator at one site was the introduced oyster drill, *Urosalpinx cinerea*. In 2010 we repeated the study using one-year old oysters. As with juveniles, survival was significantly higher in treatments protected from predation. Mortality from predators is thus likely to hinder oyster restoration efforts in Humboldt Bay, California.

CSU Long Beach

Pollutant effects in California fish – Endocrine disruption, tissue protein expression, and physiological impairment

Authors: Claire M. Waggoner*, Dwight Causey*, Jesus A. Reyes* and Kevin M. Kelley

Affiliation: Department of Biological Sciences, College of Natural Science and Mathematics

Abstract: In urban-impacted coastal waters of California, a wide variety of environmental contaminant chemicals are known to accumulate in the tissues of resident wildlife. In several wild fish species, our studies have demonstrated that contaminated environments can be associated with important, deleterious physiological impacts. These may include altered endocrine regulatory pathways ("endocrine disruption"), detoxification responses, and larger systemic effects (e.g., on growth, metabolism, reproduction). Findings also indicate that different types or classes of environmental contaminants are significantly related to distinct effects. Polychlorinated biphenyls (PCBs), for example, are strongly related to thyroid disruption, while the pesticide DDT is related to disruption of stress-response (cortisol) and reproductive systems. Using state-of-the-art proteomics technologies, our studies are also discovering previously undocumented effects by measuring tissue protein expression in impacted fish. For example, liver exhibits important changes in detoxification processes (variety of enzymatic pathways), metabolic adaptations (e.g., catabolism), and cellular-level acclimations, while endocrine tissues are revealing clues as to why their function is impaired. An integrative analytical approach, based upon multiple measures, is beginning to elucidate underlying mechanisms of environmental effects in fish and their potential causative agents. (Supported by NOAA-Sea Grant Programs)

CSU Los Angeles

Dispersal by planktonic larvae: Range limits and connectivity of marine animal populations

Authors: Patrick J. Krug and Hanna Koch*

Affiliation: Department of Biological Sciences, College of Natural Science and Mathematics

Abstract: For most marine animals, movement among populations occurs when tiny planktonic larvae are transported by ocean currents. Theory predicts the length of time larvae spend in the plankton dictates how much migration occurs, and how genetically connected distant populations are, which is a key issue in spacing out marine protected areas. Theory also predicts that steady migration from population centers should swamp out adaptation to stressful conditions at range edges, which is important for understanding whether ranges will shift in response to climate change. We are testing these predictions by quantifying gene flow and population dynamics of marine molluscs along California and across the Caribbean. Locally, two species share a range boundary in the Bay Area where populations are sustained by annual pulses of recruitment, as seasonal currents deliver larvae from the range center; instead of inhibiting adaptation, dispersal permits edge populations to persist in sub-optimal habitat. Oceanographic models make detailed predictions of gene flow among Caribbean islands, but our data for eight species show that barriers to migration are not where models predict, and duration of the larval period does not accurately predict levels of gene flow; thus, current models are not reliable for management and conservation.

CSU Monterey Bay

Quantifying the distribution and abundance of rippled scour depressions (RSDs) on the seafloor of California's continental margin using autoclassfication models

Authors: Alexandra Davis*, Craig Mueller*, Todd Hallenbeck*, Julia Carrillo*, Jocelyne Gomez* and Rikk Kvitek

Affiliation: Division of Science & Environmental Policy, College of Science, Media Arts & Technology

Abstract: The California Seafloor Mapping Project (CSMP) is a cooperative initiative creating a comprehensive, high-resolution (2-5m) coastal/marine geologic and habitat base map for all of California's State waters (mean high water to three nautical miles). This 8500 km^2 dataset is enabling researchers to study patterns and distribution of near shore habitats at scales never before possible, including the presence of rippled scour depressions (RSD) as the most prominent feature on the continental shelf. RSDs are found worldwide and characterized as depressions (0.4m-1m) of coarse grain sediment and sand waves surrounded by a fine sediment plateau. While previous studies have described the geomorphologies of RSDs and speculated on their origin, this is the first regional study describing their patterns of abundance and distribution on a scale of 1000s km. The goal is to use autoclassification methods to quantify the extent and distribution of three benthic habitats (rock, sediment, RSD) within state waters. Using CSMP acoustic backscatter imagery and derived bathymetric products (rugosity, bathymetric position index, and slope), we developed a classification model in ArcGIS to assign habitat into one of these three classes. The results are used to quantify and characterize patterns in the distribution and abundance of these habitats along the California continental margin.

Moss Landing Marine Laboratories

A Regional Class Research Vessel for the CSU

Author: Kenneth Coale

Abstract: The CSU's Moss Landing Marine Laboratories seek to acquire a $70 million Regional Class Research Vessel as part of the Nation's Academic fleet known as UNOLS (University-National Oceanographic Laboratory System). This vessel will replace the current R/V Point Sur that has been operated by MLML since the mid '80s. Since then, MLML has provided excellent oceanographic service to researchers from all over the country, and research opportunities for students within the CSU in all the oceanographic disciplines. To date this represents over 10,000 student days at sea. These students gained experience with the latest oceanographic instrumentation and equipment. Together with the new facilities at the LA Harbor, this vessel will position the CSU to provide the most current training of CSU marine scientists and students and unprecedented access to the offshore realm, a region that is facing difficult challenges due to anthropogenic forcing, climate change and ocean acidification. These facilities and research vessels will continue to position the CSU nationally as a leader in marine science research, education and workforce development. NSF is now seeking proposals from institutions that will assemble a construction management team to deliver three replacement regional class vessels (total ~$200 million). One vessel is slated for the West Coast, Gulf Coast and East Coast, respectively. With the support of the CSU, MLML intends to respond to this call. Our ability to be successful is dependent upon broad support from a diversity of interests and users, throughout the West Coast and beyond.

CSU Northridge

A comparison of fish production on artificial and natural reefs in Southern California

Authors: Jennifer Granneman* and Mark Steele

Affiliation: Department of Biology, College of Science

Abstract: Despite the extensive use of artificial reefs worldwide, it is still not clear how well these manmade structures succeed in increasing the net production of fishes in an area. To address this issue, we studied five pairs of artificial and natural reefs in the Southern California Bight. Underwater visual transects were used to quantify fish assemblages and physical characteristics of the reefs. Additionally, four target fish species were collected at each of the reefs to quantitatively compare fish production between artificial and natural reefs. Production was measured as somatic growth and production of reproductive products of the fish species collected. Artificial reefs were found to be more rugose and had greater vertical relief than natural reefs; whereas macroalgae was more abundant on natural reefs. Artificial reefs had significantly greater fish densities and fish biomass densities, although standing stock was significantly greater on natural reefs. Overall somatic, gonadal, and total tissue production measured per square meter of all four species combined was consistently greater on artificial reefs. The greater production of fish tissue observed per square meter on artificial reefs in comparison to natural reefs suggests that artificial reefs are valuable in producing additional fish biomass.

CSU Pomona

Genetic diversity of sea slugs in the eastern Pacific in relation to color, oceanographic conditions, and El Niño/La Niña events

Authors: Elysse Ornelas-Gatdula*, Monica Santander* and Ángel Valdés

Affiliation: Department of Biological Sciences, College of Sciences

Abstract: DNA studies on two groups of sea slugs have shown a well-organized genetic structure along the eastern Pacific. *Polycera alabe* is actually a complex of at least two species that overlap their rages in the Sea of Cortez. Analysis of historic material collected during El Niño and La Niña events, shows that these two species extend their ranges north and south respectively. The two species differ in their external coloration to mimic other sea slugs present in their respective ranges. *Navanax aenigmaticus* also shows two genetically distinct populations. The northern population is present in Southern California and the northern Sea of Cortez and the southern population is present in Southern Mexico. The northern population does not maintain a continuous range. A similar pattern observed on other groups of marine organisms has been used to suggest an ancient seaway between the Sea of Cortez and the northern Pacific coast of the Baja California peninsula. However, dispersal and gene flow during El Niño events around the southern tip of Baja California seems a more likely explanation. Understanding the population structure of these invertebrates in relation to ocean temperatures is important to predict the effects of Global Warming on the oceans.

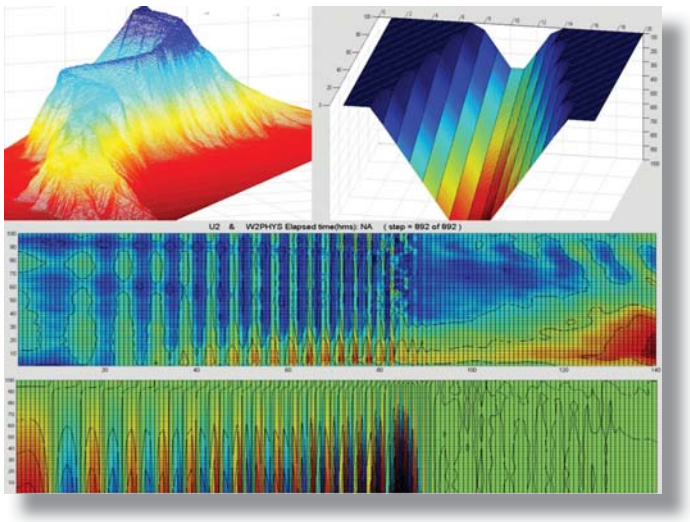
CSU Sacramento

The visualization of internal waves in Monterey Bay submarine canyon using a hydrodynamic model

Authors: AJ Southwell* and RM Coleman

Affiliation: Department of Biological Sciences, College of Natural Science and Mathematics

Abstract: In the ocean, fluids are stratified by density such that dense fluids typically underlie lighter fluids. This stratification supports a new class of waves called internal waves. Internal waves account for most of all the wave energy present in the ocean; however, because displacement occurs within the fluid, as opposed to in the upper air boundary as with the more visible gravity waves, internal waves are as yet understudied and poorly understood. The rather unusual dispersion relation and the counter-intuitive relation between group velocity and the wave vector leads to some unusual physical consequences: wave energy or particle motion travels along the wave crests perpendicular to wave motion. The Upper Monterey Bay Submarine Canyon is an excellent modeling domain for numerical study of internal wave energy generation and amplification because it contains slopes which exist at the critical angle for this strange physics to occur. Internal wave energy coupled with nutrient/biological transport is vital for the physical transport regime that allows the Upper Monterey Bay Submarine Canyon to be the biological diversity hot spot that it is.



CSU San Bernardino

Petrography and sedimentary analysis of the anomalous offshore coarse, yellow-brown sands blanketing the mid to outer San Pedro/Long Beach shelf, Southern California, USA

Authors: W. Britt Leatham and Nicole Renella*

Affiliation: Department of Geological Sciences, College of Natural Sciences

Abstract: The mid to outer San Pedro Shelf (SPS) southeast of the Palos Verdes Peninsula is the benthic gateway to the bustling Port of Los Angeles (the largest by container volume in the US and eighth largest in the world). Benthic grab and sediment core samples collected from the SPS have largely focused on sediment texture and associated benthic fauna. A substantial portion of the mid to outer SPS is thinly mantled with an anomalously coarse, well sorted, yellow-brown sand that has eluded detailed petrographic examination. The SPS sands are located around a possible bedrock exposure, based on dredging and geophysical surveys conducted over the past 50 years. The SPS sand may have been derived from older Pleistocene deposits mantling the shelf, and may be correlative with the Palos Verdes Sand (PVS) of Woodring, Bramlette, and Kew (1946). Reports of ecologic and stratigraphic admixtures of Recent and Pleistocene forams in the SPS sand (Crouch, 1954) suggest that a possible source may be the PVS or equivalent. A single partially exposed stratigraphic section in northeastern San Pedro reveals that the basal, fossiliferous yellow-brown (PVS) fills interstices in bioeroded cobbles/boulders of Miocene Monterey and is somewhat comparable to the SPS.

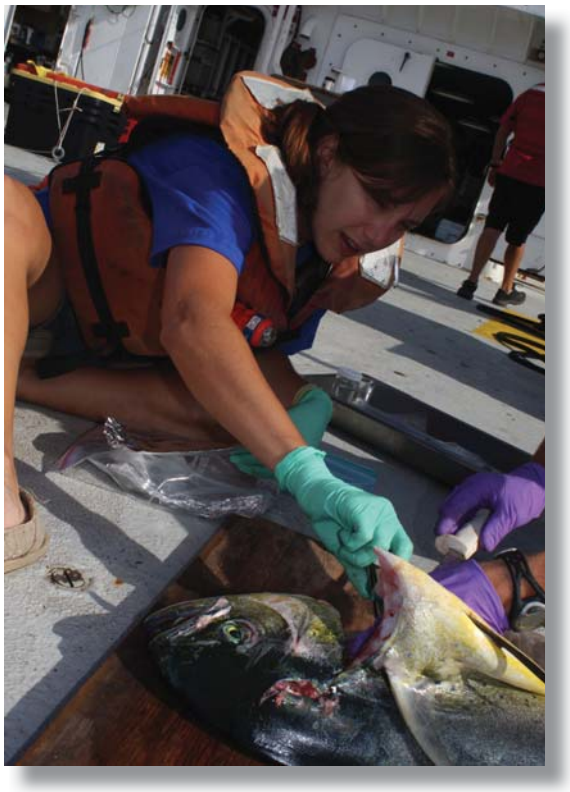
San Diego State University

Chemical and toxicological aspects of plastic debris in the sea

Authors: Chelsea M. Rochman*†, Brian T. Hentschel† and Eunha Hoh‡

Affiliations: †Department of Biology, College of Sciences; ‡Graduate School of Public Health

Abstract: Marine plastic debris is a serious environmental issue and a common topic in the news. Entanglement of animals in plastic debris has received considerable attention, but the chemical aspects of plastic pollution in the ocean have been overlooked by the public and understudied by scientists. In addition to toxins that result directly from the manufacturing of plastics (e.g., BPAs, phthalates), plastic debris also accumulates Persistent Organic Pollutants from seawater. Because many animals ingest plastic debris, we aim to measure how marine plastic debris accumulates toxic chemicals from seawater and the consequences when animals ingest contaminated plastic. We deployed six types of plastic particles (PET, HDPE, PVC, LDPE, PP, and PS) at six different locations in San Diego Bay. These plastics were recovered after 1, 3, 6, 9, and 12 months, and the rates of adsorbtion and equilibrium concentrations of several PAHs, PCBs, and organochlorine pesticides are being analyzed. We will present results for at least two types of plastic from all six locations in the Bay. We also fed particles of LDPE plastic that had been in San Diego Bay for three months to fish (*Oryzias latipes*) and documented several toxic effects: mortality, weight loss, histopathology, immunohistochemistry, and body burden.



San Francisco State University

Ocean acidification effects on porcelain crabs

Authors: Hayley Carter*, Lina Ceballos*, Jean-Claude Breach*, Nathan Miller and Jonathon Stillman

Affiliation: Department of Biology, College of Sciences & Engineering

Abstract: Ocean acidification (OA), dubbed global warming's "evil twin," is the consequence of increased absorption of atmospheric carbon dioxide (CO^2) by the ocean, a process driven by elevated levels of atmospheric CO^2. Marine organisms have seen acidity rise 30% since the dawn of the industrial revolution and in the coming century will be exposed to water more acidic than during the past 20+ million years. OA has been observed to negatively impact the development and survival of marine organisms such as corals, brittle stars and mussels. Effects of OA on crustaceans, including ecologically and commercially important taxa like krill, shrimp and crabs, are less well understood. The porcelain crab is an attractive model to study responses to OA in crustaceans, as adults living in the intertidal zone experience seasonal and daily pH fluctuations, whereas early life history larval stages live in a more stable open ocean environment. We are examining the effects of OA on metabolism, growth and survival in early life stages of porcelain crabs. Our results suggest that OA impacts porcelain crabs by increasing the metabolic costs of homeostasis and decreasing survivorship. Future studies include genomics-enabled approaches to understanding synergistic impacts of OA and temperature changes on porcelain crabs.

San Jose State University

Continental margin friction and deep ocean circulation: Insights gained from the Monterey submarine canyon and other regions

Authors: Katie Morrice*†, Erika McPhee-Shaw†, James Girton‡ and Eric Kunze§

Affiliations: †Moss Landing Marine Laboratories; ‡University of Washington; §University of Victoria

Abstract: Our understanding of climate change and feedbacks between the ocean and atmosphere is hobbled by a weak understanding of ocean dynamics at depths between 500m and several kilometers. To understand warming and acidification associated with anthropogenic carbon loading, we cannot rely on surface observations from satellites and coastal moorings alone: we must go out to sea and measure the abyss. MLML graduate student Katie Morrice has spent over 63 days at sea involved in international efforts to study these questions. She was on expedition from South Africa to Ghana as part of the US Climate Variability and Predictability (CLIVAR) Program. This program measures decadal-scale change in deep-ocean temperature, carbon, oxygen, and pH over the entire planet. Closer to home, she worked offshore of Central California aboard the MLML-operated R/V Point Sur with on an NSF-funded project examining boundary-interior exchange, mixing, and friction over deep continental slopes. Ms. Morrice's thesis on the variability of deep boundary layers provides critical information about these poorly understood processes. In particular, we find rapid exchange between continental margins and the interior abyssal ocean, and we suggest that canyons and other deep mixing "hotspots" may set the rate of exchange between deep ocean waters and the atmosphere.

California Polytechnic State University, San Luis Obispo

Collaborative fisheries research: An approach for gathering critical data needed for monitoring marine protected areas and for fisheries management in California

Authors: Nate Hall*†, Katie Schmidt*‡, Richard Starr‡ and Dean Wendt†

Affiliations: †Department of Biological Sciences, College of Science and Mathematics; ‡Moss Landing Marine Laboratories

Abstract: Collaborative research, whereby scientists and fishermen work in a joint intellectual effort, is a powerful example of involving communities in science. Many benefits result from working together, including 1) the incorporation of fishermen knowledge and expertise into the management process and 2) the development of shared perspectives derived through science-based investigations on the status of marine resources. The California Collaborative Fisheries Research Program was formed in 2006 to participate in the monitoring of marine reserves established through California's Marine Life Protection Act and to collect critical data needed by the state of California to manage nearshore species. During the past four years the program has included hundreds of recreational and commercial fishermen in research and the program has produced a robust data set being actively used for fisheries management and evaluations of California's MPAs. We will present data on how California's MPAs are affecting species composition, fish length, and rates of catch on the central coast of California. The program can serve as a model for how California coastal communities can productively engage in management of marine resources.

Sonoma State University

Phytoplankton to predators: Marine ecology, physiology and oceanography at SSU

Authors: Adele Paquin*†, Mike Tift*†, Dan Crocker†, Karina Nielsen† and Erika McPhee-Shaw‡

Affiliations: †Department of Biology, College of Science and Technology; ‡Moss Landing Marine Laboratories

Abstract: At Sonoma State University we work in research teams comprised of faculty, masters students and undergraduates. Faculty mentor students in the rigor, methods and culture of being a creative, practicing scientist and generating new knowledge, senior students mentor newer students, and faculty learn from all their students. Our objective is to complete funded, cutting edge research while integrating extensive student involvement at every level. Microscopic phytoplankton form the base of marine food chains, are most abundant near the shore, and can sometimes be harmful, depending on the species, yet we know surprisingly little about how they accumulate in the surfzone and change in abundance over time. We are learning that wave-driven transport and changes in the buoyancy of some phytoplankton species, as ocean conditions change, may be responsible. Air-breathing marine vertebrates must rapidly develop physiological capacity for breath-hold diving in order to forage effectively and survive. In many pinniped species this developmental period coincides with long-duration fasting. Investigations on developing northern elephant seals have revealed dramatic changes in hormonal regulation of diving and the ability to down-regulate metabolism across the developmental fast. These studies link maternal foraging success, parental investment and physiological capacity in offspring.

CSU Stanislaus

Seasonal variation in polychaete worm (Class Polychaeta) assemblages in Elkhorn Slough, California and differences from historical data: Preliminary results

Authors: Sarah Bradley Huff* and Dr. Pamela Roe (Advisor)

Affiliation: Department of Biological Sciences, College of Natural Sciences

Abstract: Polychaetes, or bristle worms as they are commonly called, are among the most common animals in estuarine sediments. They are very sensitive to changes in temperature, salinity and particulate matter. Two studies of Elkhorn Slough, Moss Landing, California, have investigated population dynamics of the Class Polychaeta; George MacGinitie's baseline study completed in 1935 and James Nybakken, Gregor Cailliet and William Broenkow's quantitative study completed in 1977. This study revisits the sample sites used in the previous two studies to determine if any seasonal variations in polychaete worm assemblages have occurred and to compare these findings with the historical data of MacGinitie (1935) and Nybakken et al. (1977). Preliminary results show that there is a different community structure among the Class Polychaeta and widespread changes have occurred in both species diversity and species richness when compared to both previous studies. In the 1935 study, the polychaete family Spionidae were completely absent, however in 1977, they represented one of the most commonly found. In this study, it has been found that they make up a very small percentage of the population. Many other species that were found in the 1977 study are now no longer present in any locations studied.

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COUNCIL ON OCEAN AFFAIRS, SCIENCE & TECHNOLOGY (COAST)

COAST Faculty - Student Poster Reception - January 25, 2011
Cover photograph: SDSU graduate student Chelsea Rocham examines a marine fouling worm. Image courtesy of Brian T. Hentschel.

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