



# The California State University



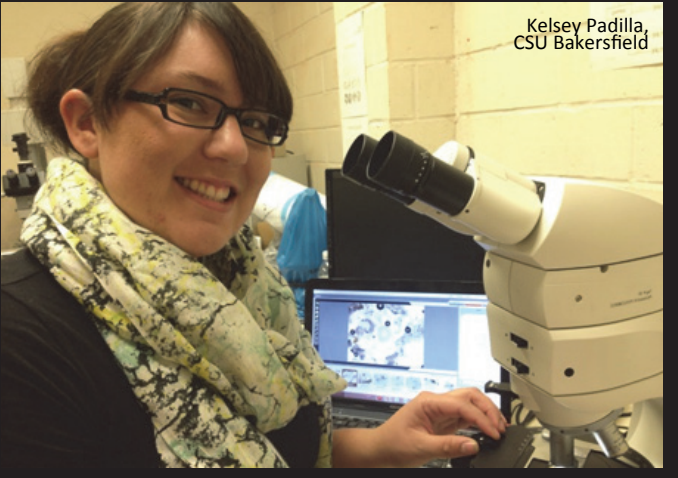
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CSU Fullerton



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## CSU COAST-WRPI Student-Faculty Research Poster Reception

March 25, 2014 • Long Beach, CA

Book of Abstracts



## Welcome!

On behalf of the CSU Council on Ocean Affairs, Science & Technology (COAST) and the Water Resources and Policy Initiatives (WRPI), we are pleased to welcome you to the 2014 Student-Faculty Research Poster Reception at the Chancellor's Office. Student researchers and their faculty mentors from each of the 23 CSU campuses and the marine consortia are on hand to highlight the excellent and timely research conducted throughout the system. COAST and WRPI are proud to present a suite of projects representing efforts to develop solutions to the complex water and coastal zone challenges we currently face. Each project also demonstrates the commitment of CSU faculty members and students to education and learning while advancing our knowledge of California's natural resources, reinforcing the value of the basic scientific process, and achieving excellence.

Thank you for joining us today, and enjoy!



Krista Kamer, Ph.D.  
Director  
COAST



Boykin Witherspoon III  
Executive Director  
WRPI



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Note: \*denotes student authors throughout



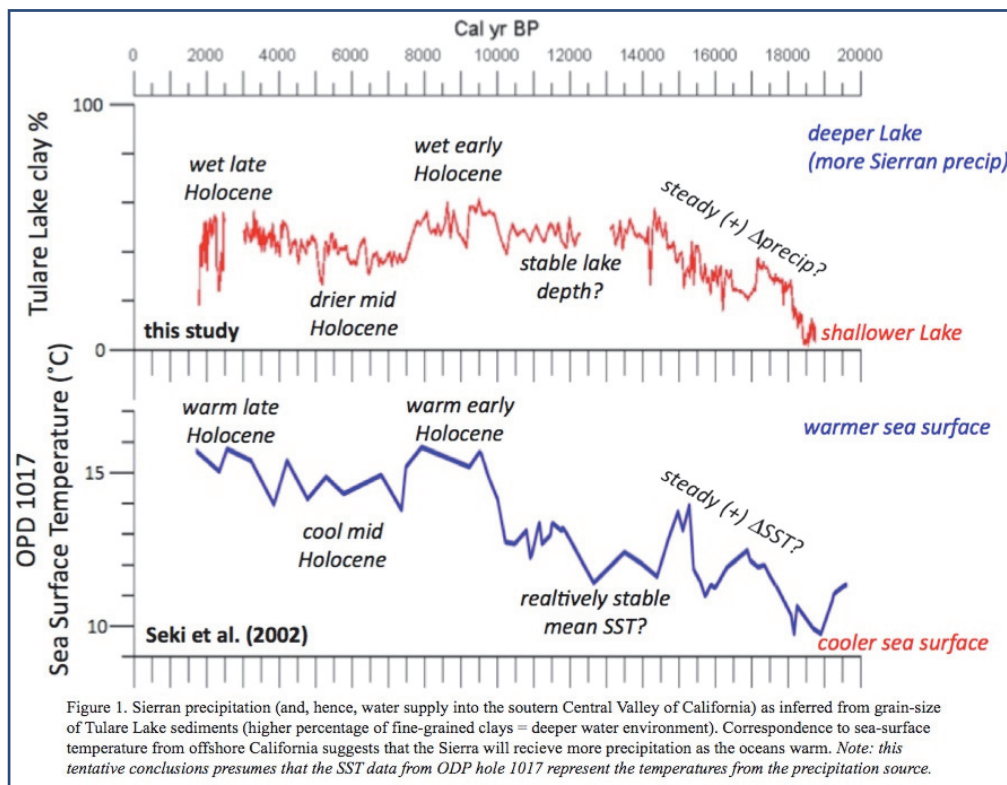
# CSU Bakersfield

**Title:** Toward a 20,000 year record of Sierran stream discharge and its dependence on eastern Pacific sea surface temperatures

**Authors:** Ashleigh Blunt\*, Kelsey Padilla\*, Logan Prosser\*, James Wilson\*, Emmanuel Garcia\*, Cristina Rivas\*, Lindsey Medina\*, and Rob Negrini

**Affiliation:** Department of Geological Sciences and CSUB NSF Center of Research Excellence in Science and Technology, CSU Bakersfield

**Abstract:** The sediments of Tulare Lake provide direct and proxy indicators for the surface elevation of Tulare Lake through time. Because elevation of this lake has been shown to be dependent on the discharge of four Sierran feeder rivers, lake elevation likely indicates the amount of precipitation in the Sierra Nevada over time. CSU Bakersfield students, supported both by a US Department of Agriculture grant to the CSU WRPI and by a National Science Foundation CREST grant to the CSUB Department of Geological Sciences, are working toward a 20,000 year record of Tulare Lake level to constrain the relationship between water resources into the San Joaquin Valley of California and sea surface temperatures (SSTs) over this time period. Initial results based on sediment grain size (clay %) show a strong relationship between stream discharge and eastern Pacific SSTs thus informing decadal-scale forecasts over the next century or so of water supply for one of the world's foremost agricultural centers in anticipation of warming SSTs.



## *CSU Channel Islands*

**Title:** Response of three fluvial systems to wildfire in chaparral environments

**Authors:** Greg Cutler\*<sup>1</sup>, Dylan Ellis\*<sup>1</sup>, Alex Gaskill\*<sup>1</sup>, Ariana Ornelas\*<sup>1</sup>, Fletcher Sams\*<sup>1</sup>, Linda S. O'Hirok<sup>1</sup>, Joan L. Florsheim<sup>2</sup>, and Anne Chin<sup>3</sup>

**Affiliation:** <sup>1</sup>Environmental Science and Resource Management, CSU Channel Islands  
<sup>2</sup>UC Santa Barbara  
<sup>3</sup>UC Denver

**Abstract:** Steep chaparral fluvial systems in southern California are characterized by dense vegetation that stabilizes weathered sediment on hillslopes between wildfires. Here, we report findings from a field investigation to document differences between sediment delivery from hillslopes to channels in two watersheds with varying temporal scales since wildfire. First, we evaluate sediment delivery in the first year following the Springs Fire that burned Big Sycamore Canyon (May 2013). Second, we evaluate sediment delivery 20 years following a fire that burned Malibu Creek watershed (November 1993). Both watersheds are situated in the Santa Monica Mountains, a steep chaparral environment within the Transverse Ranges in southern California. As wildfire burns vegetation, hillslope stability decreases, and weathered sediment is released downslope under the force of gravity—in a process known as dry ravel. During the dry summer following the Springs Fire, active dry-ravel processes produced numerous deposits that merge at the base of hillslopes at the margins of stream channels. Such deposits comprise a significant post-fire sediment source comparable to the dry ravel documented elsewhere in the Transverse Ranges. In contrast, no sediment deposits derived from dry ravel processes were apparent in Malibu Creek 20-years following wildfire. Comparing the movement of dry ravel following storms in these two burned basins with a comparable unburned basin in nearby Wildwood Canyon, provides insights into the short- and long-term sediment dynamics in chaparral environments.



## CSU Chico

**Title:** Habitat characterization of Anacapa Island: a look at the bathymetry using rugosity extraction

**Authors:** Cory Pukini\*<sup>1</sup>, Tag Engstrom<sup>1</sup>, Fraka Harmsen<sup>2</sup>, H. Gary Greene<sup>3</sup>, and David Kushner<sup>4</sup>

**Affiliation:** <sup>1</sup>Department of Biological Sciences, CSU Chico

<sup>2</sup>CSU Sacramento

<sup>3</sup>Moss Landing Marine Laboratories, San Jose State University

<sup>4</sup>Channel Islands National Park Service

**Abstract:** Historic overharvesting by commercial and recreational fisheries in the 1950s-1970s left waters near the Channel Islands severely degraded. Removal of predatory species within the kelp forest ecosystem led to trophic cascades and ecosystem collapse by the late 1970s. A series of marine protected areas (MPAs), Marine Reserves (MRs) and the Channel Islands National Park have been established around the Channel Islands to help recovery of kelp forests. These protected areas differ in habitat type as well as management policies making it difficult to assess the effectiveness policies without corresponding habitat data. This project develops meaningful, quantifiable habitat measures that can be linked to biological monitoring data to better understand marine resources within the park and to determine the effectiveness of MPAs. We combine benthic habitat data from high-resolution maps produced by Moss Landing Marine Laboratories with years of National Park Service (NPS) data on species abundance and community structure at sites both inside and outside protected areas around Anacapa Island. We believe that this linked approach will allow the NPS to place biological data in a more informed habitat context to guide analysis of the long-term effects of different management practices in the Channel Islands National Park.



## *CSU Dominguez Hills*

**Title:**        **Marketing opportunities in California fisheries: a deeper look into the Pacific sardine fishery**

**Authors:**    Gabriel Jones\*<sup>1</sup>, Lia Protopapadakis<sup>2</sup>, and Ana Pitchon<sup>1</sup>

**Affiliation:**    <sup>1</sup>Department of Anthropology, CSU Dominguez Hills  
                          <sup>2</sup>Santa Monica Bay Restoration Commission

**Abstract:**     The Pacific sardine fishery is an important asset for California’s coastal communities and the economy, but the species paradoxically remains a “low-value, high volume” product. Using secondary data, we have provided an analysis of current policy, existing alternative models, and stakeholder information in order to indicate the need for newer models of the Pacific sardine fishery and research into strategies employed by local commercial fishermen. This review aimed to discover and analyze innovations in the Pacific sardine fishery that may lead to a more sustainable practice in terms of harvesting and marketing the product that will benefit both the aquatic ecosystem as well as the communities that depend on them. Through investigating existing literature, regulatory obstacles that may be hindering potential marketing opportunities are identified, including conflicts in allocation distributions and other complications under the Coastal Pelagic Species Fisheries Management Plan (CPS FMP). Future research will entail assessing the value of local markets for the Pacific sardine and the social-ecological benefits for California’s fishing communities through a mixed methodological approach. This research is part of a larger, on-going study funded by California Sea Grant that seeks to ascertain marketing innovations for sustainable seafood and communities within selected commercial fisheries.





## CSU East Bay

**Title:** Circadian activity and putative hormones in the sea slug *Tritonia tetraquetra*

**Authors:** Kelsey Wallace\*<sup>1</sup>, Elizabeth Lambert\*<sup>2</sup>, Mark Callaghan\*<sup>2</sup>, and James A. Murray<sup>1</sup>

**Affiliation:** <sup>1</sup>Department of Biological Sciences, CSU East Bay  
<sup>2</sup>Marine Science Major, CSU Monterey Bay

**Abstract:** Recent data have shown that *Tritonia tetraquetra* (a.k.a. *diomedea*), an opisthobranch mollusc that is functionally blind, displays cyclical changes in crawling rate when exposed to a consistent photoperiod, including periods of inactivity akin to 'sleep.' The investigation involved exploring possible hormonal mediation of this activity rhythm. Hemolymph samples were obtained after exposure to a strict 12 hour-light, 12 hour-dark schedule. Exogenous hormones in biological quantities were injected into the hemocoel of the animals at times that corresponded to low secretion levels in order to elicit a change in the rate of crawling, as measured by video analysis. A liquid chromatography/fluorescence detection and high performance liquid chromatography protocol was developed against known biological standards in order to quantify hormone levels in the blood. The data suggest that melatonin is not in the hemolymph. Serotonin, on the other hand, is present in the hemolymph, implying a possible endocrine function. If melatonin and serotonin are involved in this animal's activity, the result could be a simpler biological model for studying the neuronal function of sleep, and may help with understanding how sleep affects memory on a synaptic level. Understanding *Tritonia's* behavioral cycles could also have implications for understanding their ecology.



## CSU Fresno

**Title:** Quantifying shoreline geomorphology and coastal erosion pre- and post-winter storms along Morro Bay sandspit, CA

**Authors:** James Chambers\*<sup>1</sup>, Alexander Snyder\*<sup>2</sup>, Mathieu Richaud<sup>1</sup>, and Rikk Kvitek<sup>2</sup>

**Affiliation:** <sup>1</sup>Department of Earth and Environmental Sciences, CSU Fresno  
<sup>2</sup>Division of Science and Environmental Policy, CSU Monterey Bay

**Abstract:** Coastal erosion due to increased precipitation, wave energy, and sea surface elevations attributed to winter storms has significant implications for the health of protected marine coastal ecosystems. We used a cart-mounted LiDAR system from CSUMB's Seafloor Mapping Lab that provides exceptional high-resolution imagery to more accurately analyze, calculate and model erosion rates along the Morro Bay sandspit. Using Geographic Information System (GIS), alongshore erosion rates were estimated and beach change analyzed using the Topographical Compartment Analysis Tool, a GIS extension developed to incorporate the use of a 3-D environment. The project includes: (a) erosion rates along the sandspit using the LiDAR data, (b) GIS maps of these erosion rates, (c) a comparison of erosion rates between ENSO-neutral years to active El Niño years, (d) a contrast between data recorded from past airborne LiDAR surveys (e.g., 1997-1998 ENSO) with the newly acquired dataset, and a (d) test that ENSO events have a negative impact on erosion rates of the Morro Bay sandspit.



## CSU Fullerton

**Title:** Impact of an Olympia oyster (*Ostrea lurida*) restoration project on a nearby eelgrass (*Zostera marina*) bed

**Authors:** Sara Briley\*<sup>1</sup>, Rick Ware<sup>2</sup>, Christine Whitcraft<sup>3</sup>, and Danielle Zacherl<sup>1</sup>

**Affiliation:** <sup>1</sup>Department of Biological Science, CSU Fullerton

<sup>2</sup>Coastal Resources Management, Inc., Corona del Mar, CA

<sup>3</sup>Department of Biological Sciences, CSU Long Beach

**Abstract:** Filter feeding bivalves, including oysters, are well-known for their ability to improve water clarity, which has the potential to positively impact seagrasses by increasing light available for growth. However, extremely low population densities of Olympia oyster, *Ostrea lurida*, have limited our understanding of its potential impact on local eelgrass, *Zostera marina*. An Olympia oyster restoration project built shoreward of an existing eelgrass bed in Alamitos Bay, Long Beach, CA offers a unique opportunity to examine this relationship. We monitored eelgrass shoot density and water column light availability before and after installation of a constructed oyster bed in an adjacent eelgrass bed and at two nearby reference eelgrass beds. One year after construction, eelgrass near the restored oyster bed shows no significant change in shoot density; but contradictory trends in reference eelgrass beds diminish a clear signal of oyster impact. Oyster impact on light availability is not discernible, as trends for increased light availability in the eelgrass bed near the oyster bed are mirrored in one of the reference eelgrass beds. Continued monitoring and additional measures are necessary to understand the relationship between *O. lurida* and *Z. marina*, which is relevant for future restoration of both species.



# Humboldt State University

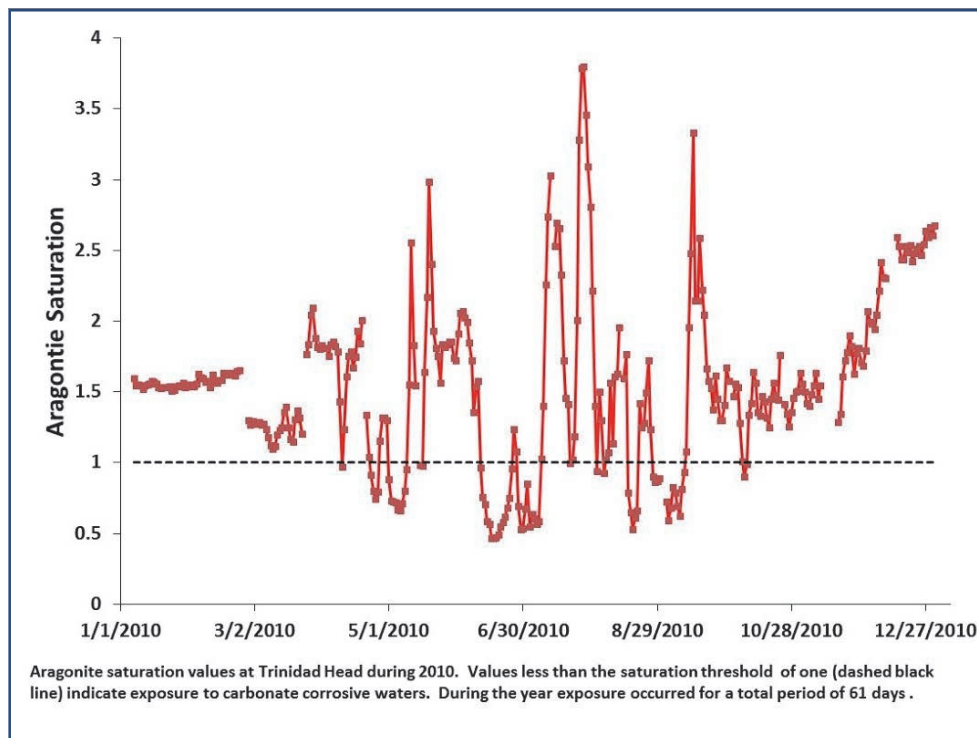
## Title: Frequency and intensity of exposure to carbonate corrosive surface waters within a coastal upwelling system

Authors: Jasen Jacobsen\*<sup>1</sup>, Jeffrey Abell<sup>1</sup>, and Frank Shaughnessy<sup>2</sup>

Affiliation: <sup>1</sup>Department of Oceanography, Humboldt State University

<sup>2</sup>Department of Biology, Humboldt State University

**Abstract:** A primary consequence of increasing atmospheric CO<sub>2</sub> is the lowering of ocean pH and the associated stress on calcium carbonate-bearing organisms. Coastal regions are vulnerable to low pH conditions due to seasonal upwelling, which periodically introduces CO<sub>2</sub>-enriched deep water to the surface. Time-series of pH, chlorophyll, temperature, and salinity from a near-shore mooring at Trinidad Head, California (41°N 124°W) were analyzed to ascertain the frequency and intensity of exposure to carbonate corrosive waters from 2005-2011. Most years during this period experienced sporadic, moderate upwelling events with 11-35 days of exposure. Anomalously strong upwelling in 2010 resulted in more frequent and intense exposure totaling 61-84 days. The exposure intensity, as indicated by cumulative under-saturation, was 3-4 times greater than in the other years analyzed. Exposure intensity would have been greater were it not for enhanced phytoplankton productivity associated with upwelled nutrients. This buffered low-pH conditions as excess CO<sub>2</sub> was utilized during photosynthesis. During late summer exposure was also limited by warming and subsequent stratification of surface waters. This inhibited CO<sub>2</sub>-enriched deep water from reaching surface during upwelling events. This analysis can provide more realistic exposure conditions for ecological laboratory experiments that attempt to determine the effect of increased ocean acidification on calcium carbonate-bearing organisms.



## CSU Long Beach

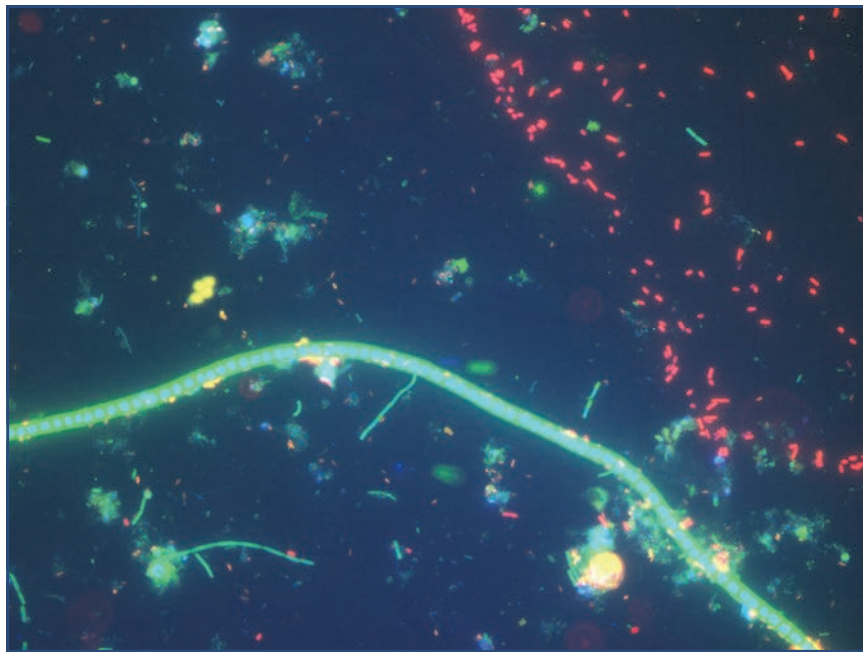
**Title:** Sulfur cycling microbial mats of the Palos Verde hydrothermal vent field: an analog for deep-sea vents

**Authors:** Priscilla Miranda\*<sup>1</sup>, Lora Stevens<sup>1</sup>, and Jesse Dillon<sup>2</sup>

**Affiliation:** <sup>1</sup>Department of Geological Sciences, CSU Long Beach

<sup>2</sup>Department of Biological Sciences, CSU Long Beach

**Abstract:** The Palos Verdes shallow-sea hydrothermal vents of the California coast are modern day analogs for early Earth microbial communities and, unlike deep-sea hydrothermal systems, provide an easily accessed setting in which to study chemolithoautotrophic sulfur cycling. Previous studies have cultured sulfur-oxidizing bacteria from these mats; however, almost nothing is known about the diversity of the sulfur-cycling microorganisms involved and their interactions *in situ*. We studied the phylogenetic diversity, spatial composition and metabolic activity of the mat community by characterizing PCR-amplified 16S rRNA genes, application of Fluorescent *in situ* Hybridization (FISH) and measuring sulfate-reduction activity rates. Phylogenetic analysis resulted in identification of a diverse group of sulfur-cycling bacteria including relatives of known sulfur-oxidizing and sulfate- and sulfur-reducing lineages. The FISH investigation revealed close physical association between sulfur-oxidizing and sulfate-reducing bacteria, while the activity study showed high rates of sulfate reduction that are primarily of biological origin. In summary, our investigation has revealed a diverse and productive sulfur-cycling bacterial community operating within the Palos Verdes mat ecosystem.



# CSU Los Angeles

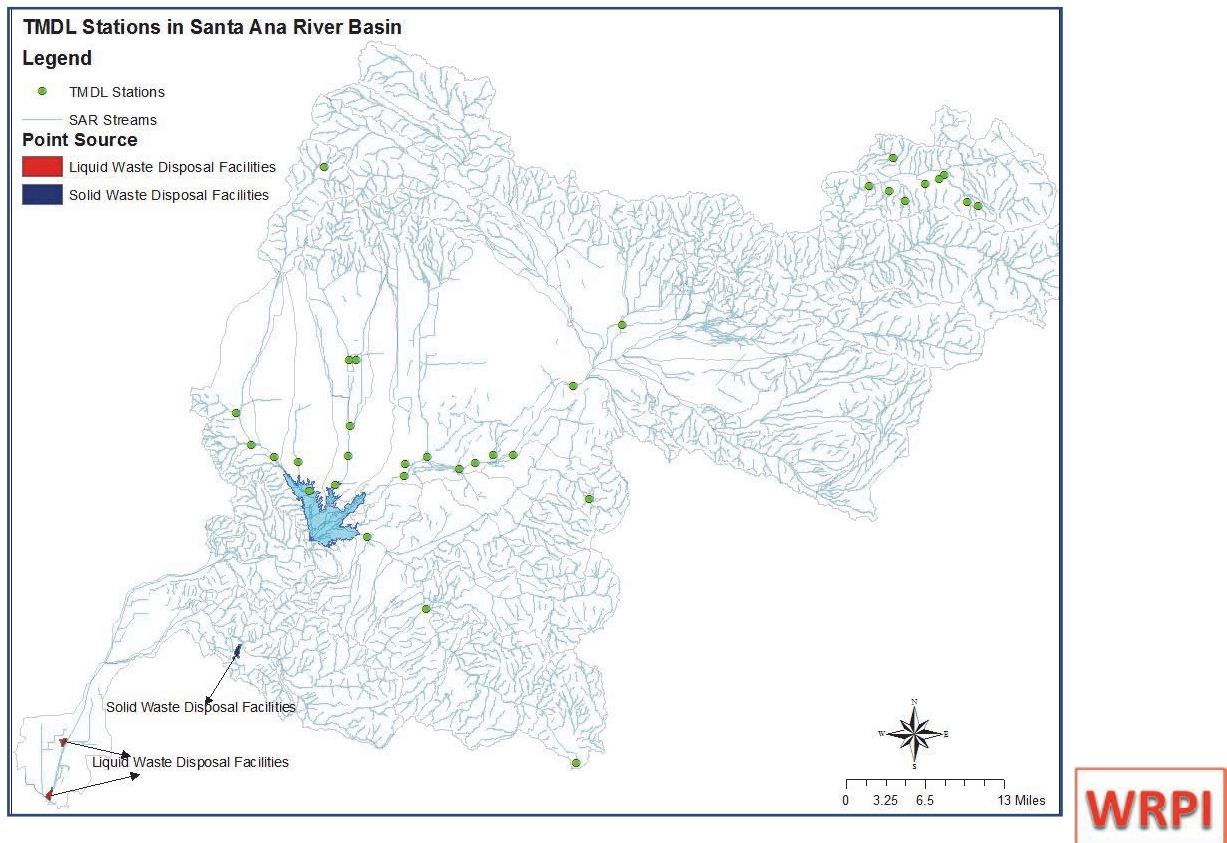
**Title:** Nutrient runoff in lower Santa Ana River watershed

**Authors:** Sk Mamun\* and Claudia Espinosa-Villegas

**Affiliation:** Department of Engineering, CSU Los Angeles

**Abstract:** Concentrations of the nutrients in lower Santa Ana River (SAR) were measured in 2013. Different GIS tools (slope, flow direction, flow accumulation, stream order etc.) were used to characterize the physical environment that influences runoff in these sub basins. The principal sources of water in the basin are upstream flow through Prado Dam, mountain runoff, wastewater and urban runoff. Therefore, water quality of this basin depends on the water quality of the upstream. The principal land use of this basin is undeveloped vacant land, followed by residential and urban usage. Almost 50% of the basin area is impervious surface. The remaining 50% land is pervious surface at the steep mountainous part. Therefore, the total basin area contributes to surface runoff.

Nitrate concentrations in SAR were between 3.2-6.9 mg L<sup>-1</sup>, and a mean of 5.8 mg L<sup>-1</sup>. Orthophosphate ranged from 0.25-0.51 mg L<sup>-1</sup>, with a mean of 0.37 mg L<sup>-1</sup>. Maximum nutrient concentrations were measured near Prado dam. Measured nutrient concentrations did not show any pattern of nutrient accumulation throughout the basin, which suggest that nutrient concentrations in lower SAR are dependent on upper SAR, but were higher than those presented by Kratzer *et al*, 2011.



# California Maritime Academy

**Title:** Ballast water management system testing facility at the California Maritime Academy: undergraduate engagement to solve applied problems and protect California's coastal resources

**Authors:** Hannah Foster<sup>\*1,3</sup>, Richard Muller<sup>2</sup>, Meredith McPherson<sup>2</sup>, William Davidson<sup>2</sup>, and Alexander Parker<sup>3</sup>

**Affiliation:** <sup>1</sup>Department of Marine Transportation, California Maritime Academy

<sup>2</sup>Golden Bear Facility, California Maritime Academy

<sup>3</sup>Department of Science and Mathematics, California Maritime Academy

**Abstract:** Ships add seawater (and associated marine organisms) as ballast to provide stability during transit. Maritime trade is global, and there are complications when non-native species collected in ballast water at foreign ports are introduced into California's nearshore marine communities. Once non-native species have invaded, they can disrupt and displace native species, interrupting ecosystem function. US Coast Guard and International Maritime Organization regulations that mandate the treatment of ballast water are meant to decrease marine invasions, but also require that treatment approaches be tested for their efficacy prior to approval for commercial maritime use. CSU's California Maritime Academy (CMA) operates the 500 foot Training Ship *Golden Bear* to train cadets for fields in maritime industries. CMA has outfitted the ship to serve as a ballast water management system testing facility (the Golden Bear Facility, GBF). CMA is engaging cadets as student assistants during operations of the GBF where they help to perform experiments to optimize facility performance. The GBF fulfills the CSU mission of applied research to serve California, and provides a unique opportunity for CMA cadets to gain hands-on experience working on environmental issues that impact the maritime industry.



## CSU Monterey Bay

**Title:**        **Big Sur Watershed Management Plan: balancing resources for people and salmonids**

**Authors:**     Sam Phillips\* and Douglas Smith

**Affiliation:**  Division of Science & Environmental Policy, CSU Monterey Bay

**Abstract:**    Habitat loss from urban and agricultural development is the leading cause of declining salmonid populations along California’s central coast. Salmonid conservation and restoration efforts are sometimes funded by the State once a Watershed Management Plan has identified the local limiting factors, and has prioritized restoration projects that improve impaired ecological function. We are collaborating with Federal, State and County resource agencies on a *Watershed Management Plan* that will detail what residents and resource managers can do to sustain the federally-threatened steelhead population in the Big Sur River. Our contribution to the plan describes the current impairments and land-use constraints in the context of flooding, landslides, fire, erosion, migration barriers, climate-change, and other geologic factors that influence both residents and the steelhead spawning grounds. Our methods included reconnaissance hikes, stream cross section surveys, channel particle size analysis, GPS surveys of lagoon erosion, GIS mapping, remote sensing analysis, and a watershed fly-over. These data were used to create text, maps and schematics that stakeholders can use to make decisions about conservation and restoration activities in their watershed. The results have been presented at public stakeholder meetings and will add to a growing watershed management plan to be completed this year.





## *Moss Landing Marine Laboratories*

**Title:** Interspecific competition between *Undaria pinnatifida* and native kelps: is competitive success linked to phylogenetic relatedness?

**Authors:** Suzanne Christensen\*

**Affiliation:** Moss Landing Marine Laboratories, San Jose State University

**Abstract:** Competition, whether it is between species or between individuals within a species, plays an important role in the structuring of seaweed populations and communities. Interspecific competition is the competitive interaction between species, which results from one species using an available limited resource, such as space, at the expense of the other. Many community ecologists hypothesize that more closely related species will experience greater competition with each other since they are more ecologically similar than distantly related species. Research investigating this hypothesis in the marine environment, however, is lacking. This study focuses on interspecific microscopic competition between the invasive species *Undaria pinnatifida* and 12 California native kelp species. The goal of this study is to investigate if the strength of competition in *Undaria* varies as a function of its competitor's phylogenetic relatedness. For each interspecific experiment, competition between *Undaria* and its native competitors will be quantified by using three different settlement ratios (1/10, 10/1, 10/10 spores/mm<sup>2</sup>) and monocultures of each species. A correlation between *Undaria*'s competitive success and the phylogenetic distance separating this invasive from its native competitors will be used. This study will provide insight into what native species *Undaria* could potentially interfere with if it spreads along the coastline of Central California.



# CSU Northridge

**Title:** Mapping wetlands of southern California

**Authors:** Danielle DeMello\* and Shawna Dark

**Affiliation:** Department of Geography, CSU Northridge

**Abstract:** The fragmentation and loss of Southern California's wetlands and associated riparian habitat has resulted in the threatened extinction of numerous wetland-dependent species, a loss of biodiversity, and has contributed to a decline in water quality. Unfortunately, recent wetland habitat maps do not exist for over two-thirds of the region. As a result, a region-wide wetland mapping effort was initiated for the coastal watersheds of Southern California by the Southern California Coastal Water Research Project (SCCWRP) and CSU Northridge. This poster will review the mapping effort, associated methodology, and final products produced from the project. The resulting geospatial data and associated classifications are intended to be used by local, state and federal agencies to support objectives such as land use planning, comprehensive watershed management planning, long-term water quality and environmental restoration, and conservation planning.



## *Ocean Studies Institute*

**Title:** Habitat selection of white croaker (*Genyonemus lineatus*) in the Los Angeles and Long Beach harbors

**Authors:** Bonnie Ahr\*, Michael R. Farris\*, and Christopher G. Lowe

**Affiliation:** Department of Biological Sciences, CSU Long Beach

**Abstract:** Sediment contamination of DDT and PCBs within the Los Angeles and Long Beach Harbors has been a continuing environmental concern due to the negative effects these contaminants have on marine organisms and human health. White croakers (*Genyonemus lineatus*) are a sentinel fish species for contamination due to their susceptibility to pollutants and direct interaction with contaminated sediments through their benthic foraging behavior. Acoustic telemetry, fractal analysis, and mixed effect models were used to determine white croaker movements and habitat selection in the LA-LB Harbor. White croakers exhibited a diel shift in depth and occupied shallower depths at night than during the day. Time of day and region of the harbor were important predictors of depth use. No diel difference indicative of foraging behavior was observed; however, a seasonal difference in potential foraging behavior was observed in the movement analysis. White croakers spent significantly more time per unit area in sections of the harbors with the highest polychaete density (300-960 polychaetes/0.1m<sup>2</sup>) in comparison to medium (150-290 polychaetes/0.1m<sup>2</sup>) and lower densities (30-140 polychaetes/0.1m<sup>2</sup>). Potential prey availability and depth combined with a temporal component are key predictors in white croaker habitat selection and indicate areas where fish may be acquiring contaminants from sediment.



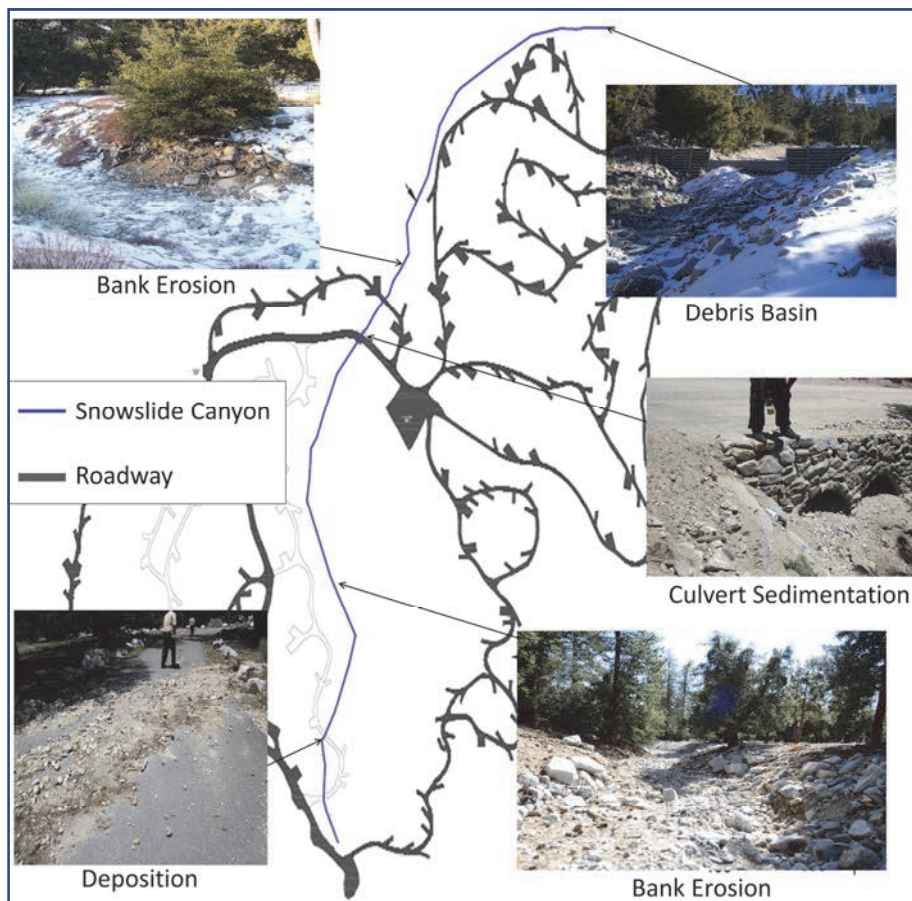
# Cal Poly Pomona

## Title: Case study of RVR Meander on Snowslide Canyon Creek

Authors: Richard Wayne Alcala\* and Seema C. Shah-Fairbank

Affiliation: Department of Civil Engineering, Cal Poly Pomona

**Abstract:** Various computer modeling programs have been developed in order to analyze the lateral migration of rivers for stability. Fluvial processes cause river courses to evolve naturally, though erosion and deposition of sediment within the bed and banks of a river system. Snowslide Canyon Creek flows through Crystal Lake Campground, located in the San Gabriel Mountains. In 2002, the “Curve Fire” burned a significant portion of the watershed surrounding the campground. The reduced vegetation and exposed soil has caused an influx of sediment entering the creek resulting in bed and bank alterations (erosion and deposition). The change in the sediment transport capacity has caused zones of bank and bed erosion and deposition. RVR Meander was employed to examine the lateral channel migration due to bank erosion. The 100-year flow rate for Snowslide Canyon within the campground ranged from 300 cfs to 800 cfs. The channel bed is composed of gravel and cobbles, however the banks are composed of sand and fine gravel which is highly erodible. The result of simulating a 100-yr storm event through RVR Meander shows channel migration of 10 to 20 feet.



## CSU Sacramento

**Title:** Morphometric variation in adult California steelhead (*Oncorhynchus mykiss*) between four distinct population segments

**Authors:** Farhat Bajjaliya\* and Ronald M. Coleman

**Affiliation:** Department of Biological Sciences, CSU Sacramento

**Abstract:** The way in which an organism allocates limited resources to physiological function is often determined by evolutionary constraints within its immediate environment. Evolutionary constraints, such as arduousness and distance of spawning migration, habitat availability, and stream discharge take part in shaping heritable life history components within the family Salmonidae. Although reproductive homing is displayed to varying degrees within sub species, the affinity for Salmonidae to return to natal streams to spawn has minimized genetic interchange between geographically isolated, locally adapted, populations. Because of minimized genetic interchange, morphometric characteristics such as body size and depth should be expected to vary between distinct populations. The question then becomes: how do conditions affecting upstream migration influence the evolution of adult steelhead morphometrics between rivers or river types? This is of particular importance when considering the management and recovery of California steelhead, *Oncorhynchus mykiss*. The purpose of this study is to examine the variation of adult California steelhead morphometrics among four distinct populations.



## *CSU San Bernardino*

**Title:** The use of alum for the in situ treatment of turbidity and nutrient removal in Canyon Lake, CA

**Authors:** Emmett Campbell\*, Ingrid Williams\*, Crystal Carver-Steil\*, Steven Merrill\*, and James Noblet

**Affiliation:** Department of Chemistry and Biochemistry, CSU San Bernardino

**Abstract:** The City of Canyon Lake is a private community of about 10,650 residents in Riverside County, CA. The water quality of the lake is impaired by high turbidity related to over-productivity from excess nutrient inputs from the surrounding watershed. A study was performed to investigate the use of alum, hydrated aluminum sulfate ( $\text{Al}_2(\text{SO}_4)_3 \cdot n\text{H}_2\text{O}$ ), for removal of both turbidity and nutrients. One concern about the use of alum for in-lake treatment is the potential for residual aluminum concentrations that exceed ambient water quality criteria for the protection of aquatic life. So dissolved aluminum concentrations were measured along with turbidity, temperature, pH, conductivity, total organic carbon (TOC), total nitrogen and total phosphorus before and after treatment. The results show that alum doses of 50-100  $\mu\text{g}/\text{L}$  were effective in reducing the turbidity to below the desired criterion of  $< 1.0$  NTU. An alum dose of 100  $\mu\text{g}/\text{L}$  also removed 23-64% of the total nitrogen and 92-97% of the total phosphorus. Based in part upon this study, the City of Canyon Lake has embarked on pilot project using alum applications for nutrient control in Canyon Lake. The CSUSB Water Quality Laboratory has been contracted to perform effectiveness monitoring for this effort.



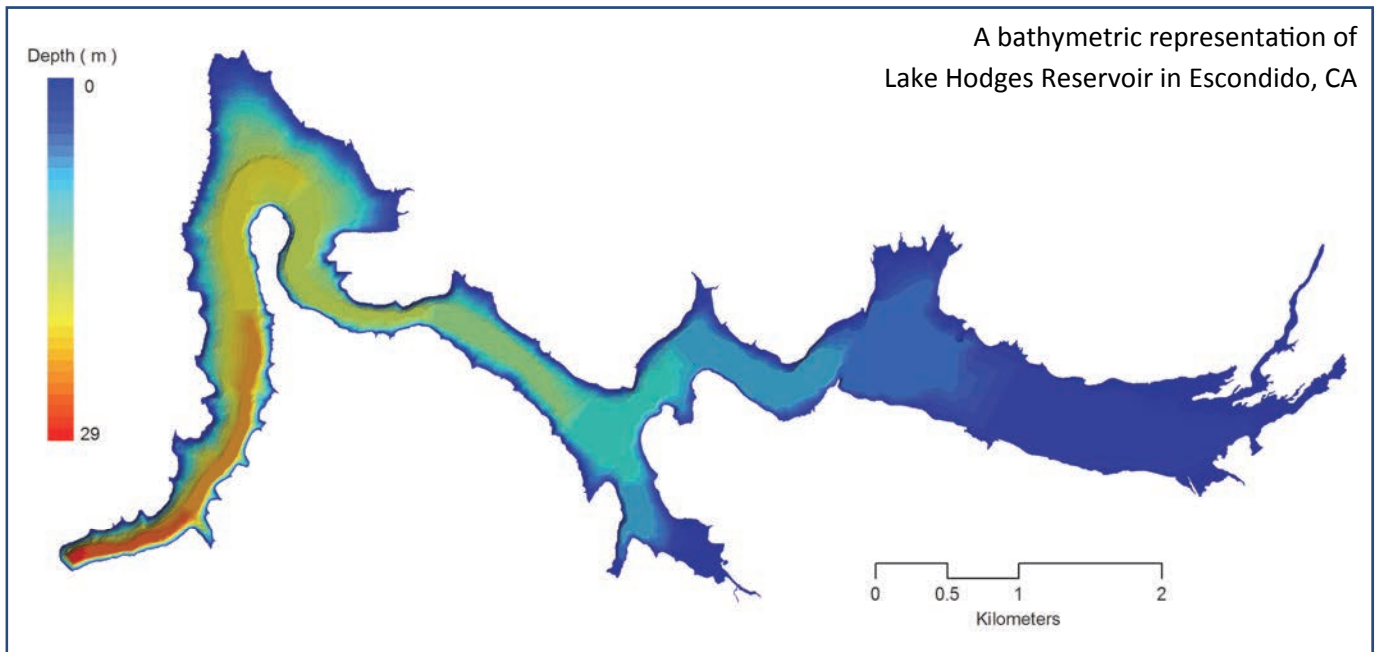
# *San Diego State University*

**Title:** Hydrologic and biogeochemical controls on anoxia and thermal structure in four hypereutrophic drinking water reservoirs

**Authors:** Raymond Lee\* and Trent Biggs

**Affiliation:** Department of Geography, San Diego State University

**Abstract:** Water quality in San Diego drinking water reservoirs is compromised by high algal production, which increases the cost of treatment and can degrade the quality of treated water. It is currently unknown how water level fluctuations, climate variability, fire regimes, and land use interact as controls on water quality. This study uses statistical analysis to determine decadal trends in thermal stability and anoxia, and the factors that control them, in four reservoirs of varying basin morphometry and with varying degrees of agricultural and urban development in their watersheds. Water level fluctuation due to management and interannual variability in inflow, not interannual variability in air temperatures, is the most significant control on reservoir thermal dynamics. Progressive eutrophication, indicated by a significant increase in anoxia and low or decreasing transparency, occurred in two lakes between 1990 - 2011. At one progressively eutrophic lake, urbanization correlated with anoxia, after controlling for the effect of water management, suggesting increasing external loading of nutrients. At the other progressively eutrophic lake, the introduction of fish during the study period can be a significant source of internal loading of nutrients.



# San Francisco State University

**Title:** Effects of lowered pH on the exoskeleton mineralogy of porcelain crabs

**Authors:** Tessa M. Page\*<sup>1</sup>, Samantha Worthington\*<sup>2</sup>, Piero Calosi<sup>2</sup>, and Jonathon Stillman<sup>1,3</sup>

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**Abstract:** Ocean acidification (OA) alters biomineralization of calcium carbonate structures across many marine taxa. For example, in mussels and oysters, OA decreases the relative concentration of ions important in calcification, such as calcium and magnesium. OA has also been shown to alter the composition of exoskeletons in crustaceans, such as in prawns, in which calcium and strontium ratios decrease with decreasing pH. However, the effects of reduced pH on the biomineralization in crab exoskeletons remains poorly understood. Here, we tested the hypotheses that lowered pH causes a decrease in minerals found in crab exoskeletons, and that lower intertidal species will be more highly affected by changes in pH than higher intertidal species. To accomplish this, we examined exoskeletal composition following 24 days of acclimation to pH 8.0, 7.4 and 7.0 in four species of porcelain crab from different intertidal zones and geographic locations. We examined ionic composition ( $[Ca^{2+}]$ ,  $[Mg^{2+}]$ ,  $[Mn^{2+}]$ , and  $[Sr^{2+}]$ ) of the exoskeleton using Inductively Coupled Plasma Mass Spectrometry. We observed a significant effect of pH on most ion concentrations.  $[Ca^{2+}]$  had a 19% decrease from pH 8.0 to 7.4 in the two higher intertidal species, and a 22% decrease in one of the lower intertidal species.  $[Mg^{2+}]$  decreased by 16% in two species from pH 8.0 to 7.4, and decreased by 32% from pH 8.0 to 7.0 in another species.  $[Mn^{2+}]$  increased by 43% with decreasing pH in one of the higher intertidal species, however, there was no change in any of the other species.  $[Sr^{2+}]$  decreased by 43% from pH 8.0 to 7.4 in one species. The effect of pH on species was found to largely coincide to intertidal zone location. Decreases in ion concentration might negatively affect calcification and/or biomineralization in porcelain crabs.





## San Jose State University

**Title:** Monitoring egg attendance behavior using novel biologging technology: a tool to investigate the effects of environmental temperatures on nesting Cassin's Auklets

**Authors:** Emma Kelsey\*<sup>1</sup>, Russell Bradley<sup>2</sup>, Pete Warzybok<sup>2</sup>, Jaime Jahncke<sup>2</sup>, and Scott A. Shaffer<sup>1</sup>

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**Abstract:** Current developments in biotechnology give us the ability to closely monitor how animals use their habitat and respond to environmental variability. Here, we use artificial eggs implemented with innovative data logging devices to examine the incubation behavior of a burrow nesting seabird, Cassin's Auklet (*Ptychoramphus aleuticus*, hereafter auklet) in natural and artificial nests on Southeast Farallon Island, California. These devices recorded egg turning behaviors and incubation temperatures of 35 auklets in different nest types. We found that egg-turning rates for all nest types averaged  $1.8 \pm 0.3$  turns per hour, which is higher than turning rates previously recorded for most bird species. Eggs incubated in different nest habitat types showed significant differences ( $\pm 2^\circ\text{C}$ ) in incubation temperatures between natural and artificial nest habitats (ANOVA,  $F^{3,24} = 4.49$ ,  $p = 0.023$ ). The results of this research demonstrate the utility of this technology to enhance our understanding of incubation behavior in seabirds and the environmental processes that affect it. This project is a collaboration with Point Blue Conservation Science and the U.S. Fish and Wildlife Service and was funded in part by a 2012 COAST Graduate Student Award.



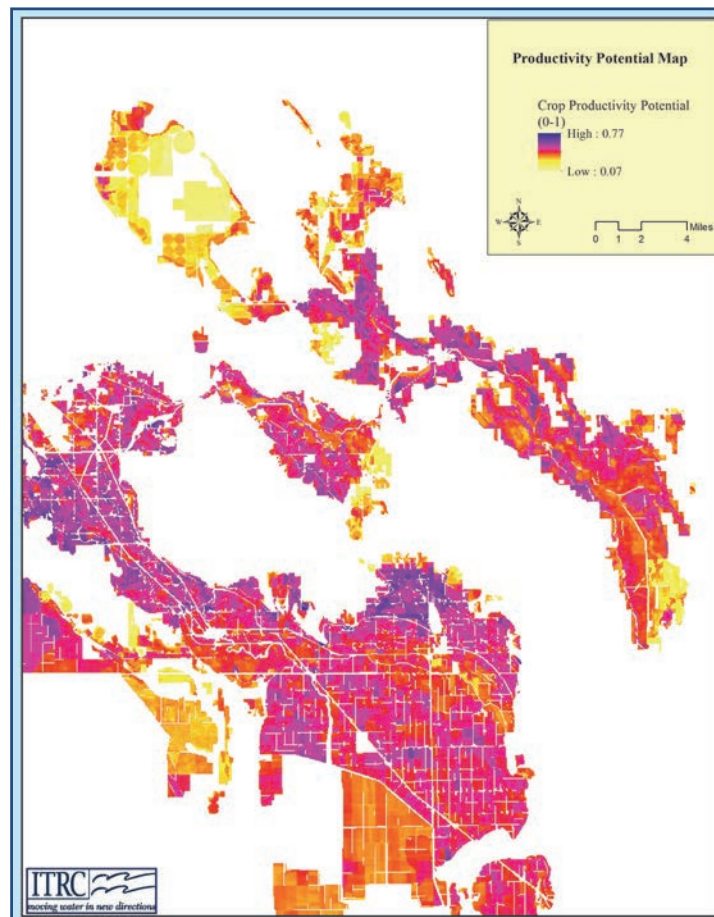
# Cal Poly San Luis Obispo

**Title:** Regional crop productivity indexing tool with user defined weighting of data for decision support

**Authors:** Eunice Wanjiku (Shiko) Njuno\* and Daniel J. Howes

**Affiliation:** Department of BioResource and Agricultural Engineering, Cal Poly San Luis Obispo

**Abstract:** The purpose of this project was to develop a robust Potential Productivity Index (PPI) mapping tool for agricultural lands within the region of interest to support decision making by water managers. The index is computed using raster data that is often readily available for a region (with the exception of evapotranspiration) but requires some pre-processing to create component indices. The PPI value for each 60 meter pixel is based on key components such as soil characteristics, crop evapotranspiration, crop value of current crops grown, water rights associated with the land, and land values. Each component index is given a user defined weight between 0 and 1, where the sum of all weights is less than 1. An ArcGIS ArcToolbox tool was built in the ModelBuilder application to compute the PPI based on these component indices and user-defined weights. An additional tool was created to summarize the results for a user-defined selection of polygons (typically shapefiles for field boundaries or parcels) overlaying the area. The summary results provide both index values as well as actual values from the data within each selected polygon.



## *CSU San Marcos*

**Title:** From shrublands to fruit groves: effects of land use and land cover change on soil carbon storage and fertility in southern California

**Authors:** Zarela R. Guerrero\*, LaTeasha N. Edelman\*, and George L. Vourlitis

**Affiliation:** Department of Biological Sciences, CSU San Marcos

**Abstract:** Agriculture is one of the biggest industries in California, and San Diego County is the largest supplier of avocados to the nation. Orange production is also important in this county which produces nearly 96,000 oranges each year. To accommodate for this industry, in southern California, chaparral is often converted into orange and avocado groves, yet the effects of this land cover change and land use are not well known. Our study compared and contrasted avocado and orange groves to the native shrublands that they replaced to determine how their production affects soil carbon storage and fertility. Field research was conducted at the Santa Margarita Ecological Reserve (SMER) in SW Riverside County, CA on avocado groves, orange groves, adjacent coastal sage scrub and chaparral over a six month period encompassing the rainy season (October-April), when nutrient availability is highest. Four 10m x 10m plots were set at each of the three sites, intact chaparral, avocado and oranges groves, where soil samples, soil pH, surface litter, and available N were sampled monthly. Soil, litter, and foliage samples were collected at the beginning and end of the experiment. The samples collected were brought to the lab and analyzed for C and nutrient content. The data was analyzed using repeated-measured analysis of variance (RM-ANOVA) and 1-way ANOVA. Our results indicate that land use practices associated with avocado and orange production significantly increase litter, soil, and foliage pools N, but not C which provides a better understanding of how human management strategies and land use affect the biogeochemical cycling of managed and unmanaged ecosystems, and provide valuable information for the future of agricultural production.



# Sonoma State University

**Title:** Oxidative stress: a potential cost of breeding in male and female northern elephant seals (*Mirounga angustirostris*)

**Authors:** J.T. Sharick\* and D.E. Crocker

**Affiliation:** Department of Biology, Sonoma State University

**Abstract:** The trade-off between reproductive effort and survival is a key concept of life history theory. A variety of studies support the existence of this trade-off but the underlying physiological mechanisms are not well understood. Oxidative stress has been proposed as a potential mechanism underlying the observed inverse relationship between reproductive investment and lifespan. Northern elephant seals (NES) undergo prolonged fasts while maintaining high metabolic rates during breeding and have robust antioxidant defenses. We investigated NES of both sexes to assess oxidative stress associated with extended breeding fasts. We measured plasma changes in the activity of the oxidant producing enzyme, xanthine oxidase (XO), oxidative damage markers, inflammatory markers and antioxidant enzymes in 30 adult male and 33 adult female northern elephant seals across their 1-3 month breeding fast. Concentrations of XO and antioxidant enzymes increased significantly over breeding in both sexes. Plasma markers of lipid peroxidation (8-isoprostanes), DNA oxidation (8-hydroxy-2-deoxy guanosine) and inflammation (tumor necrosis factor  $\alpha$ ) increased across breeding in adult males. Plasma nitrotyrosine, a marker for oxidative protein damage, increased across breeding in females. Oxidative stress associated with breeding in male and female NES exceeded antioxidant responses, creating oxidative damage as a physiological cost of breeding.



## *CSU Stanislaus*

**Title:** Water quality in the lower Tuolumne River watershed

**Authors:** Dominic M. Walker\*<sup>1</sup>, Matthew R. Cover<sup>1</sup>, Meg Gonzalez<sup>2</sup>, and Joe Zermeño<sup>3</sup>

**Affiliation:** <sup>1</sup>Department of Biological Sciences, CSU Stanislaus

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**Abstract:** Water quality is a critically important factor affecting whether rivers can support uses including domestic and agricultural water supply, recreational activities such as swimming, fish consumption, and healthy aquatic ecosystems. Our objectives were to investigate water quality conditions and raise awareness of the lower Tuolumne River watershed within the northern San Joaquin Valley. This project was a collaboration of the Tuolumne River Trust, Modesto Junior College, and California State University Stanislaus, and also included members of the local community. Since 2011 we have surveyed water quality (including temperature, turbidity, nitrate, and phosphate) once per month at five locations in the watershed. High river flows occurred throughout 2011, while recent years have seen much lower flows. Turbidity, nitrate, and phosphate levels were generally below water quality standards in the Tuolumne River, which mainly receives water from snowmelt in the Sierra Nevada. However, Dry Creek, which receives water from urban and agricultural land uses, had higher pollutant levels, including nitrate and phosphate levels above water quality guidelines. Water temperature in the mainstem Tuolumne River was warmer at downstream locations. This collaborative project has helped to identify water quality concerns for the local community that deserve further investigation.



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