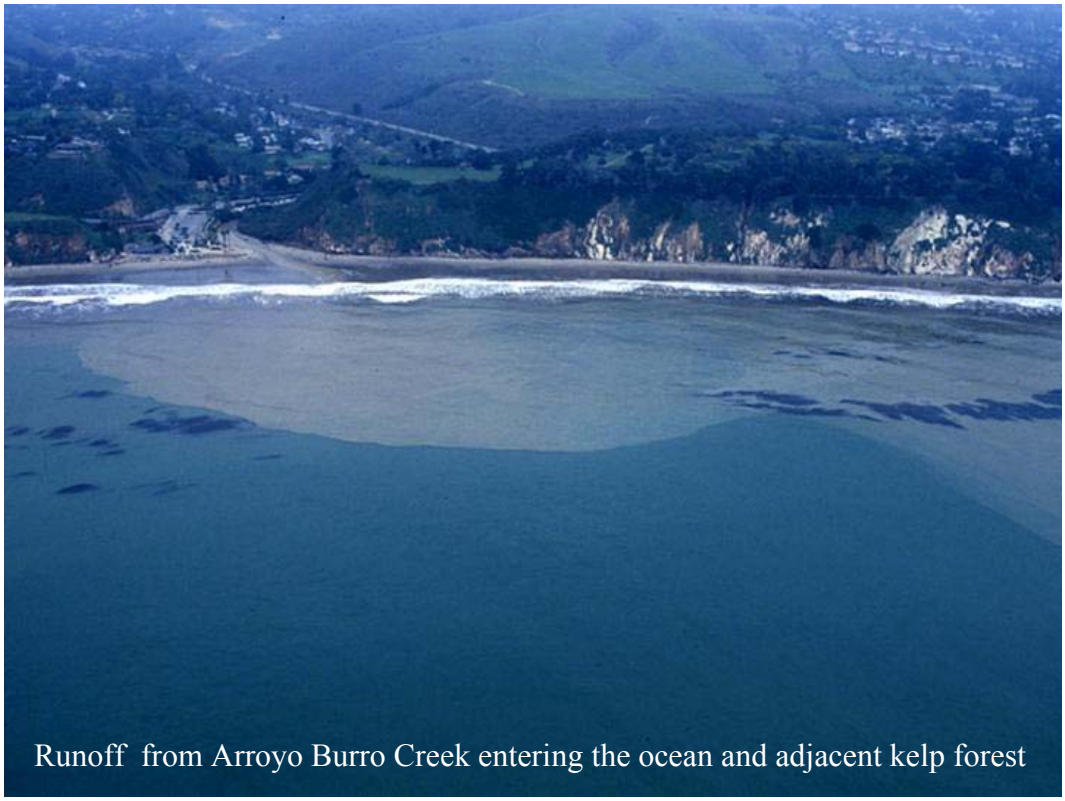
SANTA BARBARA COASTAL LONG TERM ECOLOGICAL RESEARCH

THREE YEAR PROGRESS REPORT- Volume 2

APPENDICES



Runoff from Arroyo Burro Creek entering the ocean and adjacent kelp forest

PREPARED FOR THE NATIONAL SCIENCE FOUNDATION SITE REVIEW TEAM

JUNE 2 & 3, 2003
SANTA BARBARA, CA

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Appendix I. SBC Publications and Presentations

JOURNAL PUBLICATIONS

In Press

Bay, S., B. H. Jones, K. Schiff and L. Washburn. 2003. Water quality impacts of stormwater discharges to Santa Monica Bay. Marine Environmental Research, in press.

Beighley, R.E. and G.E. Moglen. Adjusting measured peak discharges from an urbanizing watershed to reflect a stationary land use signal. Water Resources Research, in press.

Chomko, R.M., H.R. Gordon, S. Maritorena and D.A. Siegel. 2003. Simultaneous determination of oceanic and atmospheric parameters for ocean color imagery by spectral optimization: a validation. Remote Sensing of the Environment, in press.

Dugan, J. E., D. M. Hubbard, M. McCrary and M. Pierson. The response of macrofauna communities and shorebirds to macrophyte wrack subsidies on exposed sandy beaches of southern California. Estuarine, Coastal and Shelf Science, in press.

Fierer, N. and J.P. Schimel. A proposed mechanism for the pulse in CO_2 production commonly observed following the rapid rewetting of a dry soil. Soil Science Society of America, in press.

Hubbard, D. M. and J. E. Dugan. Shorebird use of an exposed sandy beach in southern California. Estuarine, Coastal and Shelf Science, in press.

Kinlan, B. and S. D. Gaines. Propagule dispersal in marine and terrestrial environments: a community perspective. Ecology, in press.

LaMontagne, M.G., J.P. Schimel and P.A. Holden. Comparison of subsurface and surface soil bacterial communities in California grassland as assessed by terminal restriction fragment length polymorphisms of PCR-amplified 16S rRNA genes. Microbial Ecology, in press.

McCuen, R.H. and R.E. Beighley. 2003. Seasonal flow frequency analysis. Journal of Hydrology, in press.

Page, H. M., S. Schroeter, D. C. Reed, R.F. Ambrose, J. Callaway and J. Dixon. Variation in the distribution and abundance of salt marsh vegetation associated with elevation and height of tidal inundation. Bulletin of the Southern California Academy of Sciences, in press.

Phillips, N. E. and S. D. Gaines. 2003. Spatial and temporal variability in size at settlement of intertidal mytilid mussels from around Pt. Conception, California. Invertebrate Reproduction and Development Ecology, in press.

Siegel, D.A., B. Kinlan, B. Gaylord and S.D. Gaines. 2002. Lagrangian descriptions of marine larval dispersion. Marine Ecology Progress Series, in press.

Strayer, D.L., R.E. Beighley, L.C. Thompson, S. Brooks, C. Nilsson, G. Pinay, and R.J. Naiman. Effects of land-cover change on stream ecosystems: roles of empirical models and scaling issues. Ecosystems, in press.

Thornber, C. and S. D. Gaines. 2003. Spatial and temporal variation of haploids and diploids in populations of four congeners of the marine alga *Mazzaella*. Marine Ecology Progress Series, in press.

Washburn, L., K. A. McClure, B. H. Jones and S. M. Bay. 2002. Spatial scales and evolution of stormwater plumes in Santa Monica Bay. Marine Environmental Research, in press.

2003

Airamé, S., J. E. Dugan, K. D. Lafferty, H. M. Leslie, D. A. McArdle and R. R. Warner. 2003. Applying ecological criteria to marine reserve design: a case study from the California Channel Islands. Ecological Applications 13(1 Suppl S):S170-S184.

Allison, G. W., S. D. Gaines, J. Lubchenco, and H. P. Possingham. 2003. Ensuring persistence of marine reserves: catastrophes require adopting an insurance factor. Ecological Applications 13(1 Suppl S):S8-S24.

Fierer, N., J.P. Schimel and P.A. Holden. 2003. Influence of drying-rewetting frequency on soil bacterial community structure., Microbial Ecology 45:63-71.

Fierer, N., J.P Schimel and P.A. Holden. 2003. Variations in microbial community composition through two soil depth profiles. Soil Biology & Biochemistry 35:167-176.

Gaines, S. D., B. Gaylord and J. L. Largier. 2003. Avoiding current oversights in marine reserve design. Ecological Applications 13(1 Suppl S):S32-S46.

Gerber, L. R., S. J. Andelman, L. W. Botsford, S. D. Gaines, A. Hastings, S. R. Palumbi and H. P. Possingham. 2003. Population models for marine reserve design: A retrospective and prospective synthesis. Ecological Applications 13(1 Suppl S):S47-S64.

Gaylord, B., M.W. Denny and M.A.R. Koehl. 2003. Modulation of wave forces on kelp canopies by alongshore currents. Limnol. Oceanogr. 48:860-871.

Lubchenco, J., S. Palumbi, S. D. Gaines and S. Andelman. 2003. Plugging a hole in the ocean: the emerging science of marine reserves. Ecological Applications 13(1 Suppl S):S3-S7.

Palumbi, S., S. D. Gaines, R. Warner and H. Leslie. 2003. New wave: high-tech tools to help marine reserve research. Frontiers in Ecology and the Environment 1:73-79.

Roberts, C., G. Branch, R. Bustamante, J. Carlos-Castilla, J. Dugan, B. Halpern, H. Leslie, K. Lafferty, J. Lubchenco, D. McArdle, M. Ruckleshaus and R. Warner. 2003. Application of ecological criteria in selecting marine reserves and developing reserve networks. Ecological Applications 13(1 Suppl S):S215-S228.

Roberts, C., S. Andelman, G. Branch, R. Bustamante, J. Carlos-Castilla, J. Dugan, B. Halpern, H. Leslie, K. Lafferty, J. Lubchenco, D. McArdle, H. Possingham, M. Ruckleshaus and R. Warner. 2003. Ecological criteria for evaluating candidate sites for marine reserves. Ecological Applications 13(1 Suppl S):S199-S214.

Zacherl, D. C., P. H. Manríquez, G. Paradis, R. W. Day, J. C. Castilla, R. R. Warner, D. W. Lea and S. D. Gaines. 2003. Trace elemental fingerprinting of gastropod statoliths to study larval dispersal strategies. Marine Ecology Progress Series 248:297-303.

2002

Beighley, R.E., D.L. Johnson and A.C. Miller. 2002. A subsurface response model for storm events within the Susquehanna River Basin. Journal of Hydrologic Engineering, ASCE 8(1):185-191.

Beighley, R.E. and G.E. Moglen. 2002. Assessment of stationarity in rainfall - runoff behavior in urbanizing watersheds. Journal of Hydrologic Engineering, ASCE 7(1):27-34.

Blanchette, C. A., S. D. Gaines and B. Miner. 2002. Geographic variability in form, size, and survival of *Egregia menziesii* (Turner) Areschoug around Point Conception, California. Marine Ecology Progress Series 230: 69-82.

Fierer, N. and J.P. Schimel. 2002. Effects of drying-rewetting frequency on soil carbon and nitrogen transformations. Soil Biol. Biochem. 34: 777-787.

Gaylord B., D. C. Reed, P. T. Raimondi, L. Washburn, and S. R. McLean. 2002. A physically-based model of macroalgal spore dispersal in the wave and current-dominated nearshore. Ecology 83:1239-1251.

Holbrook, S. J., D. C. Reed, and J. S. Bull. 2002. Survival experiments with outplanted seedlings of surfgrass (*Phyllospadix torreyi*) to enhance establishment on artificial structures. ICES Journal of Marine Science 59:350-355.

Moglen, G.E. and R.E. Beighley. 2002. Spatially Explicit Hydrologic Modeling of Land Use Change. Journal of the American Water Resources Association 38(1):241-253.

Nishimoto, M.M. and L. Washburn. 2002. Patterns of coastal eddy circulation and abundance of pelagic juvenile fish in the Santa Barbara Channel, California, USA. Marine Ecology Progress Series 241:183-199.

Shima, J.S. and A.M. Findlay. 2002. Pelagic larval growth rate impacts benthic settlement and survival of a temperate reef fish. Marine Ecology Progress Series 235:303-309.

Shipe, R.F., U. Passow, M.A. Brzezinski, D.A. Siegel and A.L. Alldredge. 2002. Effects of the 1997-98 El Nino on seasonal variations in suspended and sinking particles in the Santa Barbara Basin. Progress in Oceanography 54:105-127.

2001

Boles, J.R., J.F. Clark, I. Leifer and L. Washburn. 2001. Temporal variations in natural hydrocarbon seep rate due to tides, Coal Oil Point area, California. J. Geophys. Res. 106(C11):27,077-27,087.

Botsford, L. W., A. Hastings and S. D. Gaines. 2001. Dependence of sustainability on the configuration of marine reserves and larval dispersal distance. Ecology Letters 4:144-150.

Mertes L. A. K. and J. A. Warrick. 2001. Measuring flood output from 110 coastal watersheds in California with field measurements and SeaWiFS. Geology 29:659-662.

Schroeter S. C., D. C. Reed, D. J. Kushner, J. A. Estes and D. S. Ono. 2001. The use of marine reserves in evaluating the dive fishery for the warty sea cucumber (*Parastichopus parvimensis*) in California, U.S.A. Canadian Journal of Fisheries and Aquatic Science 58:1773-1781.

SBC LTER BOOKS & BOOK CONTIBUTIONS

In Press

Robinson, T. H., A. Leydecker, J. M. Melack and A. A. Keller. 2002. Nutrient Concentrations in Coastal Streams and Variations with Land Use in the Carpinteria Valley, California. California and the World Ocean '02. Santa Barbara California, in press.

2002

Reed, D., B. Evans and M. Anghera. 2002. Guide to the common subtidal plants and animals. Santa Barbara Coastal Ecosystem Long-Term Ecological Research Program. http://sbc.lternet.edu/data/research/reef.

Robinson, T. H., A. Leydecker, J. M. Melack and A. A. Keller. 2002. Nutrient Concentrations in Southern California Streams related to Land Use. Coastal Water Resources, AWRA 2002 Spring Specialty Conference Proceedings, Lesnick, John R. (Editor). American Water Resources Association, Middleburg, Virginia, TPS-02-1, pp 339-343.

SBC LTER DISSERTATIONS AND THESES

2002

Bull, J. S. 2002. An Experimental Evaluation of Different Methods of Restoring *Phyllospadix torreyi* (Surfgrass). Thesis, University of California, Santa Barbara.

Rennebarth, T. 2002. Impact of nutrients on diatom communities in a California Salt Marsh (Einfluesse von Naehrstoffeintraegen auf die Diatomeengesellschaften einer kalifornischen Salzmarsch). Master's Thesis, Technical University of Munich, Limnologial Field Station at the Osterseen, Germany.

Otero, M. P. 2002. Spatial and Temporal Characteristics of Sediment Plumes and Phytoplankton Blooms in the Santa Barbara Channel. Thesis, University of California, Santa Barbara, 113 pp.

Warrick, J A. 2002. Short-term (1997-2000) and long-term (1928-2000) observations of river water and sediment discharge to the Santa Barbara Channel, California. Dissertation, University of California, Santa Barbara, CA, 337pp.

PRESENTATIONS

2003

Anderson, C. R., D.A. Siegel, M.A. Brzezinski, N. Guillocheau and D.A. Toole. A time series assessment of phytoplankton community structure in the Santa Barbara Channel. American Society of Limnology and Oceanography, Salt Lake City, Utah, February 13, 2003.

Beighley, R.E. and J.M. Melack. Impacts of Urbanization on Storm Runoff Frequency Distributions in a Mediterranean Climate. University of California Toxic Substances Research and Teaching Program, 16th Annual Research Symposium, Oakland, California, April 26, 2003.

Beighley, R.E. Streamflow Quantity and Quality in Coastal Watersheds: Impacts of Land Use Change and Climate Variability in Santa Barbara, California. California State University, Long Beach, Department of Civil Engineering, Long Beach, CA, March 18, 2003.

Beighley, R.E., T. Dunne and J.M. Melack. Annual and Interannual Streamflow Variability for Coastal Watersheds with a Mediterranean Climate in Relation to Land Use Change and Climate Variability. American Society of Limnology and Oceanography, The Earth's Eyes: Aquatic Sciences Through Space and Time, Salt Lake City, Utah, February 13, 2003.

Bose, R. Delivering Data Lineage for Earth Science Research Computing. Japan-US Workshop on Annotation and Resource Discovery of Geographic Image Data, Nikko, Japan, 21-25 March 2003.

Gaines, S.D. Seeing the big picture: Large versus small scale ecology. Catholic University of Chile, Santiago Chile, April 2003.

Levenbach, S. and C. Kane. The Effect of Silt on Demographic Rates in the Colonial Sea Anemone, *Corynactis californica*. UCTSR&TP 16th Annual Symposium, April 25-26, 2003, Oakland, CA.

Ow, L. N., L. Washburn, D.A. Siegel and E.E. McPhee-Shaw. Moored observations of biological and physical oceanographic variability near kelp reefs in the Santa Barbara Channel. American Society of Limnology and Oceanography, Salt Lake City, Utah, February 13, 2003.

Reed, D., S. Hollbrook. C. Blanchette, and R. Schmitt. Differential reproductive responses to environmental fluctuations in three species of marine plants with contrasting demographies. 6th International Temperate Reef Symposium, Christchurch, New Zealand, January 13-17, 2003.

2002

Anghera, M.L., R.F. Ambrose and S. Bay. The ten-day amphipod sediment toxicity test: Laboratory vs. Field. National Society of Environmental Toxicology and Chemistry, Salt Lake City, UT, 2002.

Anghera, M.L., R.F. Ambrose and S. Bay. . The ten-day amphipod sediment toxicity test: Laboratory vs. Field. 15th Annual UC Toxic Substances Research and Teaching Program Symposium, Long Beach, California.

Anghera, M.L., R.F. Ambrose and S. Bay. The ten-day amphipod sediment toxicity test: Laboratory vs. Field. Southern California Chapter of SETAC, Riverside, CA, Best student poster.

Anghera, M.L. and R.F. Ambrose. Spatial patterns of contaminants and toxicity in wetland sediments: Implications for ecological impact assessment. Southern California Chapter of SETAC, San Diego, CA.

Anghera, M.L., R.F. Ambrose and S. Bay. Spatial patterns of contaminants and toxicity in wetland sediments: Implications for ecological impact assessment. 2001 International SETAC, Madrid, Spain.

Anghera, M.L. and R.F. Ambrose. Influence of contaminants on benthic infauna in a contaminated wetland. 2000 National SETAC, Nashville, TN.

Beckenbach, E.H. and L. Washburn. Observations of Wavelike Phenomena in the Santa Barbara Channel Using HF Radar. Ocean Sciences Meeting, 11-15 February, Honolulu, HI.

Beighley, R.E. Advancements in GIS and Hydrologic Modeling: Adjusting Measured Flow Data from Urbanized Watersheds and a case study of the SBC-LTER. Water Science Group, University of California, Santa Barbara, CA, February 19, 2002.

Beighley, R.E. Hydrologic modeling for the SBC-LTER. Water Science Group Meeting, UCSB, 2002.

Beighley, R.E. and J.M. Melack. Spatial Database Development and Integration into Hydrologic Modeling in Coastal Watersheds for the Santa Barbara Channel – Long Term Ecological Research Project. California and the World Ocean 2002, Santa Barbara, CA, October 28, 2002.

Beighley, R.E., T. Dunne and J.M. Melack. Annual and Interannual Streamflow Variability for Mountainous Coastal Catchments in a Mediterranean Climate in Relation to Land Use Change and Climate Variability. American Geophysical Union, Fall Meeting, San Francisco, CA, December 2002.

Cudaback, C. and L. Washburn. Circulation near Pt. Conception California. PISCO Symposium, Monterey, CA, 2002.

Cudaback, C., L. Washburn and E.P. Dever. Inner-Shelf circulation near Point Conception, California. Ocean Sciences Meeting February, Honolulu, HI, 2002.

Cudaback, C., L. Washburn, J. Caselle, C. Blanchette and B. Gaylord. High frequency sampling of nearshore coastal circulation and invertebrate settlement near Santa Barbara California. Eastern Pacific Ocean Conference, Timberline Lodge, OR, 2002.

DiGiacomo, P.M., B. Holt and L. Washburn. 2002. Pollution Hazards Off the Southern California Coast: Satellite and In Situ Observations of Naturally Occurring Oil Seepage, Storm Water Runoff and Wastewater Plumes. Water Quality: Ocean Modeling, Observations and Remote Sensing, California and the World Ocean, Santa Barbara, CA, 2002.

DiGiacomo, P. M., B. Holt and L. Washburn. Pollution Hazards off the Southern California Coast: Satellite and In-Situ Observations of Naturally Occurring Oil Seepage and Storm Water Runoff Plumes. Ocean Sciences Meeting, February 2002, Honolulu, HI.

DiGiacomo, P.M., B. Holt and L. Washburn. An Examination of Small-Scale Coastal Eddies and Pollution Hazards off California Using an Integrated Multi-Sensor/In-Situ Approach. AIRSAR Workshop, Jet Propulsion Laboratory, Pasadena, CA.

Dugan, J. E. Riddles in the sand: ecological patterns and processes on exposed sandy beaches Invited Seminar, Sonoma State University 2002.

Dugan, J. E. Ecological effects of grooming on exposed sandy beaches in southern California. Invited Seminar, California State University Northridge, 2002.

Dugan, J. E. Ecological impacts of grooming on exposed sandy beaches in southern California. California and the World Ocean '02, Santa Barbara, CA.

Dugan, J. E. Response of sandy beach ecosystems to macrophyte wrack subsidies. Presented at NOAA Hazardous Materials Response Division Annual Meeting, Santa Barbara, CA.

Dugan, J.E. Effects of beach grooming on sandy beaches in California. Presented to San Diego City Council, Natural Resources and Culture Committee, San Diego, CA, 2002.

Gaines, S. D. Large scale dynamics of marine ecosystems. AAAS Meeting, Denver, Colorado, 2002.

Gaines, S. D. Fluid connections. Seminar to UCSB Board of Trustees, Univ. of Calif., Santa Barbara, 2002.

Gaines, S. D. Large scale perspectives on marine ecology. Seminar. Univ. of Calif., Santa Barbara, 2002.

Gaines, S. D. Large scale perspectives on marine ecology. Seminar, Calif. State Univ., Fullerton, 2002.

Gaines, S. D. Seeing the big picture: Large versus small scale ecology. Calif. State Univ., Fullerton, 2002.

Lenihan, H.S. Santa Barbara Channel LTER: an example of multidisciplinary coastal marine research at USCB. UCSB Bren School of Environmental Science and Management Fall Student Orientation, 2002.

Levenbach, S. Human and Natural Causes of Variation in Benthic Community Composition on Nearshore Rocky Reefs. UCTSR&TP 15th Annual Symposium, April 5-6, 2002, Long Beach, CA.

Leydecker, A. and J. Altstatt. Nutrient response of the Ventura River to drought conditions in southern California. American Geophysical Union, Fall Meeting, San Francisco, CA, 2002.

Leydecker, A., T. Robinson and J. M. Melack. Stormflow NutrientConcentrations in Coastal Streams Tributary to the Santa Barbara Channel, California: A Common Urban Response. Winter Meeting of the American Geophysical Union, San Francisco CA, December 2001.

McPhee-Shaw, E. Internal waves over continental slopes: implications for the suspension and transport of sediment. American Geophysical Meeting, San Franciso, CA, December, 2002.

McPhee-Shaw, E., D. Siegel, L. Washburn and M. Brzezinski. The Santa Barbara Channel LTER. Oceanographic data from near-shore stations, 2001, with implications for nutrient delivery to kelp reefs. Departmental seminar at the Applied Physics Laboratory at the University of Washington, 2002.

McPhee-Shaw, E. Inner-Shelf Observations from the Santa Barbara Channel LTER. Departmental seminar, UCSB, 2002.

McPhee-Shaw, E., M. Brzezinksi, D. Siegel, and L. Washburn. The Santa Barbara Channel LTER: Oceanographic data from near-shore stations, 2001-2002, with implications for nutrient delivery to kelp reefs. California and World Ocean '02 Conference, Santa Barbara, CA, October 27-30, 2002.

McPhee-Shaw, E., L. Washburn, D. Siegel and M. Brzezinski. The Santa Barbara Channel LTER (Long-term ecological research) study. Oceanographic time-series data from nearshore stations, 2001, with implications for nutrient delivery to kelp reefs. EPOC (Eastern Pacific Ocean Conference) Meeting, Mt Hood, OR, 2002.

Otero, M.P. Physical Forcing of Plumes and Blooms in the Santa Barbara Channel. Department seminar, UCSB, 2002.

Otero, M.P., D.A. Siegel and E. Fields. Physical Forcing of Plumes and Blooms in the Santa Barbara Channel: An Integrated Satellite Approach. 2002 AGU/ASLO Ocean Sciences Meeting, Honolulu HI.

Robinson, T. Santa Barbara Coastal Long Term Ecological Research (LTER); Nutrient Concentrations in Coastal Streams, Variations with Land Use in the Carpinteria Valley, California. California and the World Ocean '02, Santa Barbara, CA, 2002.

Robinson, T. H., A. Leydecker, J. M. Melack and A. T. Keller. Nutrient Concentrations in Southern California Streams Related to Land Use. AWRA Spring Conference, New Orleans, LA., May 2002.

Senyk, N. and D.A. Siegel. Using remotely sensed data to describe spatial and temporal habitat distributions of the giant kelp, *Macrocystis pyrifera*. California and World Ocean '02 Meeting, Santa Barbara, CA, November 2002.

Siegel, D.A. How to design a marine protected area. Public talk presented at the Entrepreneurs^2 - National Resource Defense Council Joint Meeting on Catalina Island, September 2002.

Siegel, D.A. Satellite Views of Plumes and Blooms in the Santa Barbara Channel. Six minutes of live television presented as part of the Project Oceanography program on the Santa Barbara Channel (see www.marine.usf.edu/pjocean/).

Simpson, J. Stream communities in natural and nutrified coastal watersheds. Habitat restoration seminar, EEMB, University of California, Santa Barbara, CA, 2002.

Warrick, J.A., L.A. Mertes, D.A. Siegel and L. Washburn. River plumes in the Santa Barbara Channel, California - observations of river discharge and plume forcing. 2002 AGU/ASLO Ocean Sciences Meeting, Honolulu HI.

Washburn, L. How does the ocean flow in the Santa Barbara Channel? Geography Awareness Week presentation to three 5th grade classes, Adams School.

Washburn, L. Hydrocarbon seepage in the Santa Barbara Channel, seminar presented to Sanctuary Naturalist Corps, Volunteer-in-training program of the Channel Islands National Marine Sanctuary, Will Rogers School, Ventura, 2002.

Washburn, L., D. Reed, C. Ohlmann, C. Cudaback and E. Dever. A coastal observing system on the South-Central Coast for understanding links between the regional circulation, pollutant transport, and dispersion. California and the World Ocean, Santa Barbara, CA, 27-30 Oct. 2002.

Washburn, L., P.M. DiGiacomo and B. Holt. Interpreting SAR Imagery from Surface Currents Obtained from High Frequency Radar Near Point Conception, California. AIRSAR Workshop, Jet Propulsion Laboratory, Pasadena, CA, 5 March 2002.

Washburn, L., S. Gaines, E. P. Dever and D. Reed. An Observational Network for Multidisciplinary Time Series on the Central California Coast. Ocean Sciences Meeting February, Honolulu, HI, 11-15 Feb. 2002.

Zimmerman, R.C. and D.C. Reed. In situ spectroscopy of submerged plant canopies: application to the quantification of standing crop and potential productivity. Ocean Optics XVI, 18-22 November 2002, Santa Fe, NM.

2001

Anghera, M.L. and R.F. Ambrose. Linking benthic infauna communities to toxicity and contaminants in a tidal wetland. National Society of Environmental Toxicology and Chemistry, Baltimore, MD, 2001

Anghera, M.L. and R.F. Ambrose. Spatial patterns of contaminants and toxicity in wetland sediments. 14th Annual UC Toxic Substances Research and Teaching Program Symposium, Lake Tahoe, California, 2001.

Beighley, R.E., T. Dunne, J. M. Melack and L .A. Mertes. Hydrologic modeling for the Santa Barbara Coastal Long Term Ecological Research Project. American Geophysical Union Chapman Conference, "State-of-the-Art Hillslope Hydrology," Sunriver, Oregon, 2001.

Bull, J. S, S. J. Holbrook and D. C Reed. Evaluation of restoration techniques to mitigate losses of surfgrass (*Phyllospadix torreyi*) from anthropogenic impacts. 14th Annual UC Toxic Substances Research and Teaching Program Symposium, Lake Tahoe, California, 2001.

Busse, L. The effects of nutrients and grazers on algae in Mission Creek. Water Quality Meeting, UCSB, 2001.

Chomko, R., H.R. Gordon, S. Maritorena and D.A. Siegel. Simultaneous Determination of Oceanic and Atmospheric Parameters for Ocean Color Imagery by Spectral Optimization: A Validation. 2001 AGU Fall Meeting, San Francisco CA, December 2001.

Dugan, J. E., D. M. Hubbard and H. M. Page. Ecological effects of grooming on exposed sandy beaches in southern California. 82nd Annual Meeting of the Western Society of Naturalists, Ventura, CA, 2001.

Kellner, J. and R. Nisbet. Population dynamics in heterogeneous environments: the role of spatial and temporal variability. 14th Annual UC Toxic Substances Research and Teaching Program Symposium, Lake Tahoe, California, 2001.

Levenbach, S., S. J. Holbrook and R. J Schmitt. Human and natural causes of variation in forage species on nearshore reefs. 14th Annual UC Toxic Substances Research and Teaching Program Symposium, Lake Tahoe, California, 2001.

Leydecker, A. Water quality in coastal streams. Santa Barbara Channel Keepers, Santa Barbara, CA, 2001.

Leydecker, A., T. Robinson and J.M. Melack. Stormflow nutrient concentrations in coastal streams tributary to the Santa Barbara Channel, California: A common urban response. American Geophysical Union, Fall Meeting, San Francisco, CA, 2001.

Maritorena, S., D.A. Siegel and the NASA SIMBIOS Team. Dominance of colored dissolved organic material in determining light availability in the sea. 2001 AGU Fall Meeting, San Francisco CA, December 2001.

Melack J .M. Overview of LTER activities. Project Clean Water, Santa Barbara County, 2001.

Mertes, L. A., D. Siegel, J. A. Warrick and M. Otero. Seasonality of plumes and blooms for 1997-2001 in the Santa Barbara Channel, California. 82nd Annual Meeting of the Western Society of Naturalists, Ventura, CA, 2001.

Otero, M. P., D. A. Siegel and E .A. Fields. Satellite view of plumes and blooms in the Santa Barbara Channel; Validation and description. ASLO Aquatic Sciences Meeting, Albuquerque, NM.

Reed, D. Effects of human activities on ecosystems at the land/ocean margin: Introduction. 82nd Annual Meeting of the Western Society of Naturalists, Ventura, CA, 2001.

Reed, D. Patterns and consequences of spore dispersal in giant kelp *Macrocystis pyrifera*. Departmental seminar, University of Maine, Orono, Maine, 2001.

Schmitt, R. The SB Coastal Ecosystem LTER – A Multidisciplinary Research Program. University of California Coastal Toxicology Retreat, Bodega, CA, 2001.

Siegel, D.A. Education and Research at the University of California or Satellite Views of Plumes and Blooms of the Santa Barbara Channel. Space Coast Summit 2001, Santa Maria, CA.

Siegel, D.A., L. Washburn, J.A. Warrick, D.A. Toole, R.C. Smith, O. Polyakov, M. Otero, L.A. Mertes, N. Guillocheau and M.A. Brzezinski. An Ocean Color Assessment of Sediment Plumes and Phytoplankton Blooms in the Santa Barbara Channel, California. 2001 AGU Fall Meeting, San Francisco CA, December 2001.

Siegel, D.A., N.B. Nelson, T.K. Westberry, M.C. O'Brien and A.F. Michaels. Bio-Optical Modeling of Primary Production on Regional Scales: The Bermuda BioOptics Project (BBOP). 2001 AGU Fall Meeting, San Francisco CA, December 2001.

Warrick, J. The Source and Fate of River Water and Sediment in the Santa Barbara Channel, California. Departmental seminar, UCSB.

Washburn, L. The physical environment of the Santa Barbara Channel. Seminar presented to Sanctuary Naturalist Corps, Volunteer-in-training program of the Channel Islands National Marine Sanctuary, Chase Palm Park.

2000

Anghera, M.L. and R.F. Ambrose. Spatial patterns of contaminants and toxicity in wetland sediments: Implications for ecological impact assessment. Southern California Chapter of SETAC, San Diego, CA, 2000.

Anghera, M.L., R.F. Ambrose and S. Bay. Spatial patterns of contaminants and toxicity in wetland sediments: Implications for ecological impact assessment. 2001 International SETAC, Madrid, Spain.

Anghera, M.L. and R.F. Ambrose. Influence of contaminants on benthic infauna in a contaminated wetland. 2000 National SETAC, Nashville, TN.

Busse, L. The use of diatoms as indicators for water quality in streams and wetlands. Water Quality Meeting, UCSB.

Reed, D., S. Cooper, S. Gaines, S. Holbrook, J. Melack and H. M. Page. Introducing the Santa Barbara Coastal Ecosystem Long-Term Research Project. LTER All Scientist Meeting, Snowbird, Utah.

Washburn, L., D. Reed, S. Cooper, S. Gaines, S. Holbrook, J. Melack and M. Page. An overview of the Santa Barbara Long-Term Ecological Research (LTER) Program, Eastern Pacific Ocean Conference, Victoria, BC, Canada.

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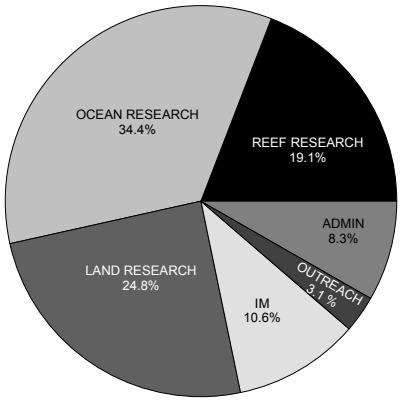
Appendix II. Budget and Expenditures

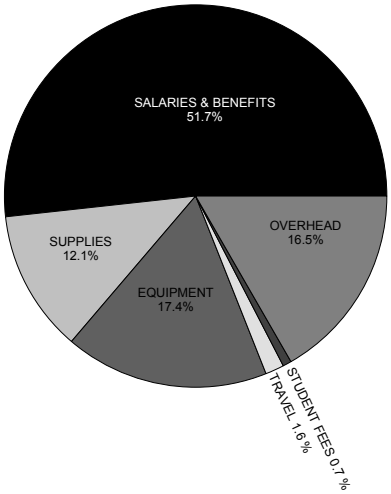
During its first three years, SBC received $2,213,000 from NSF and had $1,973,864.83 in expenditures. Level funding is anticipated for the remaining three years of the award and approximately ten percent of the funds awarded to date have been purposely set aside to cover the costs of inflation and salary increases in years 4, 5 and 6. Nearly 80% of expenditures have been used to fund research directly, with about 8% going to support the project's administration (primarily salaries for the lead PI and research coordinator). Ten percent of project funds have been used to support the project's information management (largely salary for the IM manager); substantial match in this area has been provided by PISCO.



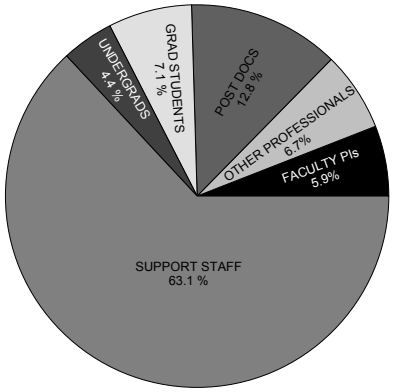
Expenditures by programmatic area

More than half the expenditures have been used to pay the salaries and benefits of project personnel. Nearly two thirds of the salary costs have been spent on support staff who play a pivotal role in all aspects of research and information management. Most postdocs and graduate students working on the project are funded from other sources (including match from the UC Coastal Toxicology Program). Nonetheless, more than ten percent of project funds were spent on postdoc and graduate student salaries with an additional four percent being used to support undergraduate student involvement.

Expenditures by expense category



Salaries



Institutional matching funds from the University of California play a pivotal role in supporting the research activities of the Santa Barbara Coastal LTER. Lead Investigator Reed receives two months salary and benefits each year from the Marine Science Institute to manage the project, while the UC Coastal Toxicology Program provides 12 months of salary and benefits each year to support a post doc working on the project.

The Office of Research and the College of Letters and Sciences at UCSB collectively contribute $25,000 annually in discretionary research funds. Research at SBC LTER benefits greatly from an off campus overhead rate of 26% negotiated with the Office of Research. The savings from the reduced overhead rate in combination with the matching funds listed above amount to approximately $175,000 in additional research funds made available to the project each year.

Appendix III. Collaborative Projects

Below is a list of the funded and pending projects that have established collaborations with the Santa Barbara Coastal LTER.

Investigators	Title	Funding Agency	Amount	Award Period	Status
S. Anderson, R Nisbet, S. Morgan, G. Cherr,, R. Higashi, S. Ustin	Pacific Estuarine Ecosystem Indicator Research Consortium (PEEIR	Environmental Protection Agency	$6 000,000	04/01/2001 - 06/30/2005	Funded
J. Case, M, Brzezinski, B. Fletcher, S. Gaines, S. Haddock, W. Hamner, M. Latz, S. MacIntyre, M. Moline, D. Neilson, D. Reed, D. Seigel, K. Stolzenbach, L. Washburn	Coastal Bioluminescence Prediction Network (BPN): An Economical Development by Supplementation of Existing Environmental Monitoring Resources	Office of Naval Research	$228,476	04/30/2002 - 04/30/2004	Funded
J. Dugan, M. Page, S. Schroeter	An experimental investigation of the recovery of sandy beaches from beach grooming	California Sea Grant	$9,999	07/01/2002- 06/30/2003	Funded
J. Dugan, M. Page, A. Wenner	Ecological effects of beach grooming on exposed sandy beaches	California Sea Grant	$112,414	09/6/2000- 09/30/2003	Funded
S.. Gaines	Marine Research to Classrooms	Homeland Foundation	$15,000	12/01/2001 – 11/30/2002	Funded
S.. Gaines	Channel Islands Field Station Marine Ecology Cooperative Agreement	US Department of the Interior	$5,108	07/30/2001- 12/31/2002	Funded
S.. Gaines	Effect of ENSO on Key Species at their Southern Limits Along the Northeastern Pacific Coastline: A Collaborative Training Initiative Between Scientific Teams form the University of California and Mexico	UC Mexus	$9,090	07/01/2002 - 12/30/2003	Funded
S. Gaines, C. Blanchette, C. Jones, M. Jones, M. Schildhauer	Capturing Data in the Field: An Application Framework for Easily Creating Custom Data and Metadata Entry Forms on Handheld and Desktop Computers	National Science Foundation	$293,125	02/15/02- 01/31/03	Funded
S. Gaines, B. Broitman	A Dynamic Approach to the Characterization of Marine Habitats	UC Office of the President	$25,000	01/01/02- 12/31/02	Funded
B. Gaylord, M. Denny, M. Koehl	Mechanical consequences of flexibility for benthic marine organisms	National Science Foundation	$348,026	02/01/2003 - 01/01/2006	Funded

Investigators	Title	Funding Agency	Amount	Award Period	Status
M. Page, D. Reed, S. Schroeter	San Onofre Nuclear Generating Station Mitigation Project Monitoring Program	California Coastal Commission	$1,921,431	01/01/2002 - 12/31/2003	Funded
D. Siegel, C. Costello, B. Kendall, S. Gaines, R. Warner	Flow, Fish and Fishing: Disparate Scales of Process Make Nearshore Fishery Management a Difficult Task	National Science Foundation	$1,995,951	07/01/2003 – 06/30/2008	Funded
D. Siegel, B. Kendall	Marine Protected Area Design and Monitoring using Satellite Data: A Prototype Study in the Channel Islands National Marine Sanctuary	National Oceanic and Atmospheric Administration	$320,025	08/01/2001 – 07/31/2004	Funded
D. Siegel, S. Maritorena, N. Nelson	Plumes and Blooms: Observations, Analysis & Modeling for SIMBIOS	National Aeronautics & Space Administration	$619, 198	01/26/2001 – 11/30/2003	Funded
L. Washburn	Observations of the surface circulation in the Eastern Santa Barbara Channel using high frequency radar and Lagrangian drifters	Minerals Management Service	$135,210	09/25/2002 - 09/30/2004	Funded
L. Washburn	Links between coastal circulation and pollutant dispersal in the Santa Barbara Channel	University of California Marine Council	$142,446	10/01/2001 - 09/30/2003	Funded
L. Washburn, S. Gaines	Observing the surface circulation along the south-central California coast using high frequency radar: consequences for larval and pollutant dispersal	Minerals Management Service	$224,000	09/6/2000- 09/30/2003	Funded
M. Williams, D. McKnight, W. McDowell, J. Melack, J. Schimel	Dissolved Organic Nitrogen Intersite Comparison (DONIC)	National Science Foundation	$50,000	10/1/2000 - 03/31/2004	Funded
J. Frew, D. Siegel, L. Washburn, C. Jones, E. Beighley	Peer Modeling Framework - Integrating Independent Environmental Models	National Science Foundation	$3,529,531	10/1/2003 - 09/30/2008	Pending
A. Guerrini, J. Dugan	Reconciling Ecological Restoration with Human History	National Science Foundation	$295,468	10/01/2003 – 09/30/2006	Pending
A. Guerrini, J. Dugan, B. Swartzburg, P. Neushul	Historicizing Ecological Restoration	National Endowment for the Humanities	$158,401	07/01/2003 – 06/30/2006	Pending

Investigators	Title	Funding Agency	Amount	Award Period	Status
J. Largier, B. Gaylord, S. Gaines, C. Ohlmann, L. Washburn, D. Siegel, S. Grant, T. Holden, C. Scholin	A Southern California Bight Pathogen Research Center (CSPEC): Pathogen transport and fate component	National Science Foundation / National Institutes of Health	$7,044,088	10/01/2003 - 9/01/2008	Pending
M. Latz, L. Busse, R. Goericke, B. Palenik	Microalgal Diversity in Coastal Wetlands of Southern California: Species, Functional, and Genetic Approach	National Science Foundation	$ 820,437	10/01/2003 – 09/20/2006	Pending
J. Lubchenco, B. Menge, M. Denny, G. Somero, P. Raimondi, M. Carr, S. Gaines, R. Warner	The Partnership for Interdisciplinary Studies of Coastal Oceans A Large-Scale, Long-Term Ecological Consortium	David and Lucile Packard Foundation	$20 million	01/01/2004 – 12/31/2008	Pending
J. Pringle, E. McPhee-Shaw	Remotely-forced and internal wave transport into the Southern California Bight nearshore	National Science Foundation	$318,791	09/01/2003 - 09/01/2006	Pending
D. Siegel, P. Ricchiazzi	Rigorous Application of MODIS Ocean Color Imagery to a Case II Ocean: Case Study of Plumes and Blooms in the Santa Barbara Channel	National Aeronautics & Space Administration	$891,023	11/01/2003 – 10/31/2006	Pending

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Appendix IV. SBC Biographical Sketches of Senior and Postdoctoral Investigators

Senior Investigators

Postdoctoral Investigators

MARK A. BRZEZINSKI
Department of Ecology Evolution and Marine Biology
University of California
Santa Barbara, CA 93106-9610
Telephone: 805 893-8605
Fax: 805-893-4724
Email: brzezins@lifesci.ucsb.edu

Area of Expertise: Phytoplankton Ecology/Physiology, Oceanic Nutrient Cycling; Oceanic Silicon Cycle, Diatom Silicon Metabolism

Education:

B.S.	Biology/Marine Science, Southampton College of Long Island University	1979
Ph.D.	Biological Oceanography, Oregon State University	1987

Academic Employment:

1999 - present	Professor, Ecology Evolution and Marine Biology
1995- 1999	Associate Professor, Ecology Evolution and Marine Biology
1989- 1995	Assistant Professor, Biological Sciences, UCSB
1989	Guest Investigator, Woods Hole Oceanographic Institution
1988	Postdoctoral Associate, Massachusetts Institute of Technology
1987	Postdoctoral Scholar, Biology Department, Woods Hole Oceanographic Institution

SBC LTER Synergistic Activities:
Participant in 5 of 7 LTER UNOLS cruises in Santa Barbara Channel - Chief Scientist in 4. Responsible for deployment of WS Oceans automated nitrate analyzer for studies of nutrient delivery to Kelp forests. Supervision of monthly water sample collection and processing on core reef sites. Member LTER Executive Committee. Co-chair of graduate student, Clarissa Anderson, who is conducting dissertation research in the context of the SBC LTER. Co-supervisor of a post doc, Erika McPhee on SBC LTER. P.I. on ONR DURIP award providing LTER related equipment. Participant LTER retreat 2002.

Five publications most closely related to project:

Shipe, R.F. and M.A. Brzezinski. 2001. A time-series study of silica production and flux in an eastern boundary region: Santa Barbara Basin, California. Global Biogeochem. Cycles 15: 517-531.

Queguiner, B., and M.A. Brzezinski. 2002. Biogenic silica production rates and particulate organic matter distribution in the Atlantic sector of the Southern Ocean during austral spring 1992. Deep Sea Research II 49: 1765-1786

Brzezinski, M.A., M.-L. Dickson, D.M. Nelson, and R. Sambrotto. 2002. Ratios of Si, C and N Uptake by Microplankton in the Southern Ocean. Deep Sea Research II 50: 619-633.

Brzezinski, M.A., J.L. Jones, K. Bidle, and F. Azam. 2002. The Balance Between Silica Production and Silica Dissolution in the Sea. Insights from Monterey Bay, California Applied to the Global Data Set. Limnol. Oceanogr. in press.

Bidle, K.D., M.A. Brzezinski, R.A. Long, J.L. Jones, and F. Azam. in press. Diminished efficiency of the oceanic silica pump caused by bacterially-mediated silica dissolution. Limnol. Oceanogr.

CRAIG A. CARLSON
Department of Ecology, Evolution and Marine Biology
University of California
Santa Barbara, CA 93106-9610
Telephone: 805-893-2541
Fax: 805-893-8062
Email: carlson@lifesci.ucsb.edu

Area of Expertise: Biological oceanography, microbial ecology and dynamics of dissolved organic matter

Education:

B.A.	Colby College, Waterville, ME	1986
Ph.D.	University of Maryland, College Park, MD; December	1994

Academic Employment:

2001 - present	Assistant Professor, University of California Santa Barbara, Santa Barbara, CA
1999- 2000	Associate Research Scientist, Bermuda Biological Station for Research Inc., Bermuda.
1997- 1999	Assistant Research Scientist, Bermuda Biological Station for Research Inc., Bermuda.
1994- 1996	Postgraduate researcher, Bermuda Biological Station for Research Inc., Bermuda

SBC LTER Synergistic Activities:
I joined the UCSB faculty in 2001 and began working with the LTER program in the winter of 2002. In addition to myself, I have two Ph.D students working on LTER related research. My research group has participated on several LTER research cruises collecting a variety of samples including bacterial abundance, activity, dissolved organic matter and prokaryotic community structure. This is not funded work but will be useful preliminary data for a focused project affiliated with the LTER program. The data are currently being processed and will be available to the LTER database. In spring of 2002 I participated in a preliminary study to investigate the changes in biogeochemistry of water mass as it passes through a kelp forest. My involvement was to look at changes in dissolved organic matter stocks. The results of this experiment were very encouraging and were used in a proposal to investigate community metabolism in a kelp forest. The initial proposal was denied but we were encouraged to resubmit (see below).

Five publications most closely related to project:

Carlson, C.A., H.W. Ducklow, and Anthony F. Michaels. 1994. Annual flux of dissolved organic carbon from the euphotic zone in the northwestern Sargasso Sea. Nature 371: 405-408.

Carlson, C.A. and H.W. Ducklow. 1996. Growth of bacterioplankton and consumption of dissolved organic carbon in the Sargasso Sea. Aquatic Microbial Ecology 10: 69-85.

Carlson, C.A., H.W. Ducklow, D.A. Hansell, and W.O. Smith Jr. 1997. Organic carbon partitioning during spring phytoplankton blooms in the Ross Sea polynya and the Sargasso Sea. Limnology and Oceanography 43: 375-386.

Carlson, C.A., N.R. Bates, H.W. Ducklow, and D.A. Hansell. 1998. The use of gas tight bags and biogeochemical properties to estimate bacterial respiration and growth efficiency in the Ross Sea, Antarctica. Aquatic Microbial Ecology 19: 229-244.

Carlson, C.A., S.J. Giovannoni, D.A. Hansell, S.J. Goldberg, R. Parsons, M.P. Otero, K. Vergin, and B.R. Wheeler. 2002. The effect of nutrient amendments on bacterioplankton growth, DOC utilization, and community structure in the northwestern Sargasso Sea**.** Aquatic Microbial Ecology 30: 19-36.

KEITH C. CLARKE
Department of Geography
University of California
Santa Barbara CA 93106-4060
Telephone: 805-893-7961
Fax: 805-893-3146
Email: kclarke@geog.ucsb.edu

Area of Expertise: Geography; surveying and mapping

Education:

B.A.	Geography and Economics (Honours), Middlesex Polytechnic	1977
M.A.	Geography, University of Michigan	1979
Ph.D.	Geography, University of Michigan	1982

Academic Employment:

2001 – present	Chair, Department of Geography, UCSB
1998	Director (SB) National Center for Geographic Information and Analysis
1996	Professor, Department of Geography, UCSB
1994- 1996	Chair, Department of Geology & Geography, Hunter College.
1992	Research Physical Scientist, Office of Research, National Mapping Division, USGS.
1991	Professor, Hunter College and the CUNY Graduate School and University Center.
1987- 1991	Associate Professor, City University of New York Graduate School and Univ. Center.
1986- 1991	Associate Professor, Hunter College
1982- 1986	Assistant Professor, Hunter College.
1980- 1982	Instructor, University of Michigan.
1980- 1982	Director of Computing, Center for Research on Social Organization, U. Mich.

SBC LTER Synergistic Activities:
Chair, Committee to review the Concept of the National Map, Mapping Sciences Committee,National Academy of Sciences (2002-2003). Chair, Executive Committee, College of Letters and Science, UCSB. Chair, Communications Committee, American Congress on Surveying and Mapping (2002). President, Cartography and Geographic Information Society (part of the American Congress on Surveying and Mapping) (2000-2001). North American Editor, International Journal of Geographical Information Systems (1992-1997).

Five publications most closely related to project:

Clarke, K.C. 1999. "Visualizing Different Geofutures" Chapter 7 in Longley, p. Brooks, S., Macmillan, B. and McDonnell, (1999) Geocomputation: A Primer, London: J. Wiley. pp. 119-137.

Clarke, K.C. 2001. Cartography in a mobile internet age. Proceedings, The 20th International Cartographic Conference, ICC2001, Beijing, China, August 6-10th.3: 1481-1488.

Goodchild, M.F. and K.C. Clarke. 2002. "Data Quality in Massive Data Sets", Chapter 18 in J. Abello et al. (eds) Handbook of Massive Data Sets, Amsterdam, Kluwer Academic. pp. 643-659.

Nusser, S., L. Miller, K. Clarke, and M. Goodchild. 2002. Future views of field data collection in statistical surveys. Proceedings of dg.o 2001 National Conference on Digital Government Research, Los Angeles, CA. http://www.isi.edu/dgrc/dgo2001/papers/session-3/nusser1.pdf.

Nusser, S.M., L.L. Miller, K. Clarke, and M.F. Goodchild. 2003. Geospatial information technologies for mobile field data collection. Comm. of the ACM. 46(1): 63-64.

SCOTT D. COOPER
Dept. of Ecology, Evolution and Marine Biology
Marine Science Institute,
University of California
Santa Barbara, CA 93106
Phone: 805-893-4508
Fax: 805-893-4724
E-mail: scooper@lscf.ucsb.edu

Education:

B.S.	University of Nebraska, Lincoln	1974
Ph.D.	University of Wisconsin, Madison	1979

Honors: Danforth Fellow, Phi Beta Kappa, Regent's Scholar, U.C. Junior Faculty Fellow

Academic Employment (last 10 years):

7/91-present	Professor, UC Santa Barbara; Aquatic biology, tropical ecology, limnology, stream ecology
7/98-2001	Chair, Department of Ecology, Evolution, and Marine Biology, UCSB.
4/95-4/97	Director, Natural Reserve System, UCSB. Manage 6 reserves and field stations
1/98-2001	used for teaching, research, and public outreach. (Acting Director: 4/94 - 4/95)
7/89-6/91	Director, UC Education Abroad Program in Nairobi, Kenya, and Acting. Assoc.Prof, Dept. of Zoology, Univ. of Nairobi.

SBC LTER Synergistic Activities:
PI and Member of SB LTER Executive Committee. Participant in SB LTER investigations of trophic structure and interactions in coastal streams inclucing research on stream ecology and instream processing of nutrients. Assisted in design of field experiments and sampling protocols. Chair, co-chair and member of dissertation committees of graduate students conducting research in context of LTER.

Professional Service:
Chaparral Symposium Co-Convenor (‘85); Session Chairperson at Scientific Meetings (ESA, NABS, SIL); Executive Committee of NABS (‘87-’88); Associate Editor of JNABS (‘88-’90, ‘92-’94); Reviewer of many MS, Proposals; External Reviewer, U.S., Canada, South Africa, Australia; Invited Lectures (U.S., U.K., Sweden, Ireland, Australia); Member of Ecology Panel, NSF (‘93-’96)

Five publications most closely related to project:

Nisbet, R.M., S. Diehl, W.G. Wilson, S.D. Cooper, D.D. Donalson, and K. Kratz. 1997. Primary productivity gradients and short-term population dynamics in open systems. Ecological Monographs 67: 555-553.

Cooper, S.D., S. Diehl, K. Kratz, and O. Sarnelle. 1998. Implications of scale for patterns and processes in stream ecology. Australian Journal of Ecology 23: 27-40.

Jenkins, T. M. Jr., S. Diehl, K. W. Kratz, and S. D. Cooper. 1999. Effects of population density on individual growth of brown trout in streams. Ecology 80: 941-956.

Diehl, S., S.D. Cooper, K.W. Kratz, R.M. Nisbet, S.K. Roll, S.W. Wiseman, and T.M. Jenkins, Jr. 2000. Effects of multiple, predator-induced behaviors on short-term producer-grazer dynamics in open systems. American Naturalist 156: 293-313.

Englund, G. and S.D. Cooper. 2003. Scale effects and extrapolation in ecological experiments. Advances in Ecological Research 33: 161-213.

JENIFER E. DUGAN
Marine Science Institute
University of California
Santa Barbara, CA 93106-6150
Telephone: 805-893-2675
Fax: 805-893-8062
Email: j_dugan@lifesci.ucsb.edu

Area of Expertise: Soft sediment ecology

Education:

B.A.	Aquatic Biology, University of California, Santa Barbara	1980
Ph.D.	Biology, University of California, Santa Barbara	1990

Academic Employment:

1995-present	Assistant Research Biologist, Marine Science Institute, UCSB
1991-2002	Lecturer, Ecology, Evolution & Marine Biology and Environmental Studies, UCSB
1994	Postdoctoral Fellow, Marine Science, Univ. of Otago, New Zealand
1993	Postdoctoral Fellow, Zoology, Univ. of Port Elizabeth, South Africa
1990-1994	Postgraduate Researcher, Marine Science Institute, UCSB

SBC LTER Synergistic Activities:
Science and outreach coordinator for SBC-LTER. Assists lead PI and executive committee with project coordination and management and oversees outreach activities. Directs research on the exchange of materials, primarily drift algae, between kelp forests and exposed sandy beaches and the response of macroinvertebrate communities, food webs and higher trophic levels, such as shorebirds to subsidies of drift kelp.

Five publications most closely related to project:

Dugan, J.E. and G.E. Davis. 1993. Applications of fishery refugia to coastal fishery management. Can. J. Fish. Aquat. Sci. 50: 2029-2042.

Dugan, J.E., D.M. Hubbard, and M. Lastra. 2000. Burrowing abilities and swash behavior of three crabs, *Emerita analoga* Stimpson, *Blepharipoda occidentalis* Randall and *Lepidopa californica* Efford (Anomura, Hippoidea), of exposed sandy beaches. J. Exp. Mar. Biol. Ecol. 255(2): 229-245.

Dugan, J.E., D.M. Hubbard, J.M. Engle, D.L. Martin, D.M. Richards, G.E. Davis, K.D. Lafferty, and R.F. Ambrose. 2000. Macrofauna communities of exposed sandy beaches on the Southern California mainland and Channel Islands. Fifth California Islands Symposium, OCS Study, MMS 99-0038: 339-346.

Airame, S., J.E. Dugan, K.D. Lafferty, H.M. Leslie, D. McArdle, and R.R. Warner. 2003. Applying ecological criteria to the design of marine reserves: a case study from the California Channel Islands. Ecol. Appl. 13 (1 Suppl S): S170-S184.

Dugan, J.E., D.M. Hubbard, M. McCrary, and M. Pierson. 2003 The response of macrofauna communities and shorebirds to macrophyte wrack subsidies on exposed sandy beaches of southern California. Estuar. Coastl. Shelf Sci., in press.

THOMAS DUNNE
Donald Bren School of Environmental Science & Management
Department of Geological Sciences
University of California
Santa Barbara, CA 93106-5131
Telephone: 805-893-7557
Fax: 805-893-7612
Email: tdunne@bren.ucsb.edu

Area of Expertise: Field and theoretical studies of watershed hydrology and erosion. Hydrology, sediment transport, and floodplain sedimentation in large lowland rivers

Education:

B.A.	Geography, Cambridge University, UK	1964
Ph.D.	Geography, Johns Hopkins University	1969

Academic Employment:

1995 – present	Professor, Donald Bren School of Environmental Science & Management and Department of Geological Sciences, UCSB
1973-1995	Professor, Department of Geological Sciences, University of Washington, Seattle
1971-1973	Professor of Hydrology and Geomorphology, McGill University, Montreal, Canada

SBC LTER Synergistic Activities:
Dunne has conducted field and modeling studies of runoff processes and their significance for erosion, sedimentation, and water quality during the past 30 years, including current studies of runoff processes, hillslope erosion, and floodplain sedimentation in the Amazon basin, Bolivia and Brazil, and the Sacramento R. basin, California He is involved in data analysis and modeling of runoff and nutrient flux from coastal watersheds in the Santa Barbara Coastal LTER project. He also continues model-based studies of runoff processes in East Africa and at Sedgwick Ranch near Santa Barbara, using data collected under simulated rainfall. His two co-authored textbooks (*Water in Environmental Planning* and *Rapid Evaluation of Sediment Budgets*) stress field-based, process-oriented approaches to calculation of the effects of land use and other factors on runoff and the transport of sediment and solutes.

Five publications most closely related to project:

Dunne, T. et al. 2001. A scientific basis for the prediction of cumulative watershed effects. University of California Wildland Resource Center Report No. 46. 103 pp.

Gabet, E.J. and T. Dunne. 2002. Landslides on coastal sage-scrub and grassland hillslopes in a severe El Nino winter: The effects of vegetation conversion on sediment delivery. Geological Society of America Bulletin 114: 983-990.

Biggs, T.W., T. Dunne, T.F. Domingues, and L.A. Martinelli. 2002. Relative influence of natural watershed properties and human disturbance on stream solute concentrations in the southwestern Brazilian Amazon basin. Water Resources Research 38 (8): 25/1-25/16. (doi: 10. 1029/2001 WR 000271).

Gabet, E.J. and T. Dunne. 2003. Sediment detachment by rainpower. Water Resources Research 9(1): 1/1 – 1/12. 1002, doi:10.1029/2001 WR000656.

Malmon, D.V., T. Dunne, and S.L. Reneau. 2003. Stochastic theory of particle trajectories in alluvial valley floors, Journal of Geology, in press.

WILLIAM R. FREUDENBURG
Environmental Studies Program
University of California
Santa Barbara, CA 93106-4160
Telephone: 805-893-8282
Fax: 805-893-8686
Email: freudenb@envst.ucsb.edu

Area of Expertise: Environment-Society relationships; social and economic impacts of resource extraction; resource-dependent communities; risk, risk management, risk communication, and technological controversies

Education:

B.A.	Communication, University of Nebraska-Lincoln	1974
M.A.	Sociology, Yale University	1976
M. Phil.	Sociology, Yale University	1977
Ph.D.	Sociology, Yale University	1979

Academic Employment:

2002 – present Dehlsen Professor of Environmental Studies and Sociology, UCSB
1985- 2002 Associate Professor, then Professor of Rural Sociology and Environmental Studies, University of Wisconsin, Madison
1983- 1984 American Sociological Association Congressional Fellow, U.S. House of Representatives
1978- 1985 Assistant/Associate Professor of Rural Sociology and Sociology, Washington State University

SBC LTER Synergistic Activities:

I moved to UCSB this past academic year from the University of Wisconsin, where I was associated with the NTL LTER. I would like to extend the research I was doing in Wisconsin on the human/social disproportionalities in the creation of environmental harms to the coastal systems exemplified by the SBC LTER. The foothills of the Santa Barbara region are an ideal system to study this phenomenon because of the high diversity of land use within and among watersheds and the highly skewed distributions of anthropogenic inputs within and among streams that empty into the ocean. I have been involved in the planning of a new seminar course for LTER grad students that is aimed at integrating the social and biological sciences in ecosystem management. I serve as a co-advisor to a graduate student in the Bren School of Environmental Science and Management, and I have volunteered to attend and make a presentation at the LTER 2003 All-Scientists Meeting in Seattle in September.

Five publications most closely related to project:

Freudenburg, William R. and Margarita Alario. 1999. What Ecologists can Learn from Nuclear Scientists. Ecosystems 2: 286-91.

Freudenburg, William R. 2001. Risk, Responsibility and Recreancy. Research in Social Problems and Public Policy 9: 87-108.

Freudenburg, William R. and Robert Gramling. 2002. Scientific Expertise and Natural Resource Decisions: Social Science Participation on Interdisciplinary Scientific Committees. Social Science Quarterly 83 (#1, March): 119-36.

Freudenburg, William R. and Lisa J. Wilson. 2002. Mining the Data: Analyzing the Economic Effects of Mining on Rural Communities. Sociological Inquiry 72 (#4, Fall): 549-75.

Freudenburg, William R. 2003. Can We Learn from Failure? Examining U.S. Experiences with Nuclear Repository Siting. Journal of Risk Research, in press.

JAMES FREW
Donald Bren School of Environmental Science & Management
University of California
Santa Barbara, CA 93106-5131
Telephone: 805-893-7356
Fax: 805-893-7612
Email: frew@bren.ucsb

Area of Expertise: Information management, Earth system science, geography

Education:

B.A.	Geography, University of California, Santa Barbara	1977
M.A.	Geography, University of California, Santa Barbara	1980
Ph.D.	Geography, University of California, Santa Barbara	1990

Academic Employment:

1997 – present	Assistant Professor, Donald Bren School of Environmental Science and Management, University of California, Santa Barbara (UCSB)
1993- 1997	Specialist, Institute for Computational Earth System Science and Center for Computational Science and Engineering, UCSB
1991- 1993	Research Engineer, Electronics Research Laboratory, University of California, Berkeley
1988- 1991	Computing Resources Manager, Computer Systems Laboratory, UCSB
1988	Lecturer, Department of Geography, UCSB
1986- 1988	Programmer/Analyst, Computer Systems Laboratory and Department of Geography, UCSB
1983- 1986	Research Assistant, Computer Systems Laboratory and Department of Geography, UCSB
1980- 1981	Lecturer, Department of Geography and Department of Computer Science, UCSB

SBC LTER Synergistic Activities:
Lead PI on SBC LTER collaborative ITR proposal to develop and implement a Peer Modeling Framework (PMF) to facilitate cross-disciplinary modeling in the Earth and environmental sciences. The implementation of the PMF will model the fluxes of ecological subsidies to the kelp forests of the Santa Barbara Channel, Serves SBC LTER data management committee, Committee on Environmental Satellite Data Utilization, Space Studies Board, National Research Council. Executive and Interoperability Committees, Federation of Earth Science Information Partners. Consultant, National Aeronautics and Space Administration, Strategic Evolution of ESE Data Systems.

Five publications most closely related to project:

Frew, J. and J. Dozier. 1997. Data management for Earth system science. SIGMOD Record 26(1): 27-31.

Frew, J., M. Freeston, L. Hill, G. Janee, M. Larsgaard, and Q. Zheng. 1999. Generic query metadata for geospatial digital libraries. Third IEEE META-DATA Conference, April 6-7, 1999, National Institutes of Health, Bethesda, MD.

Frew, J., M. Freeston, N. Freitas, L. Hill, G. Janee, K. Lovette, R. Nideffer, T. Smith, and Q. Zheng. 2000. The Alexandria Digital Library architecture. International Journal on Digital Libraries 2(4): 259-268.

Frew, J. and R. Bose. 2001. Earth System Science Workbench: a data management infrastructure for Earth science products. 13th International Conference on Scientific and Statistical Database Management, July 18-20, 2001, George Mason University, Fairfax, VA.

Janee, G. and J. Frew. 2002. The ADEPT digital library architecture. Proceeding of the Second ACM/IEEE-CS Joint Conference on Digital Libraries, July 13-17, 2002, Portland, OR. 342-350.

STEVEN D. GAINES
Department of Ecology, Evolution & Marine Biology
Marine Science Institute
University of California
Santa Barbara, California 93106-9610
Telephone: 805-893-7379
Email: gaines@lifesci.ucsb.edu

Area of Expertise: Marine conservation, Biogeography, Effects of climate change on coastal ecosystems, Effects of ocean circulation on dispersal

Education:

B.S.	Biology, Magna Cum Laude, University of California, Irvine	1977
Ph.D.	Ecology , Oregon State University	1982

Academic Employment:

2002-present	Acting Vice Chancellor for Research, UCSB
1997-present	Director, Marine Science Institute, UCSB
1998- present	Professor, University of California, Santa Barbara
1994-1998	Associate Professor, University of California, Santa Barbara
1993-1994	Associate Professor, Brown University
1987-1993	Assistant Professor, Brown University
1986-1987	Research Associate, Stanford University
1983-84	Lecturer, Moss Landing Marine Laboratory
1982-1986	Postdoctoral Fellow, Stanford University, with Jon Roughgarden

SBC LTER Synergistic Activities:
Executive Committee Member, Research on dynamics of reef species, coupling between physical oceanography and population demographics, biogeography, and responses of coastal ecosystems to climate change, Liaison to PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans) project for collaborative research on the larger scale context of the SBC-LTER.

Five Recent Publications Relevant To This Project:

R. D. Sagarin and S. D. Gaines. 2002. Geographical abundance distributions of coastal invertebrates: using one-dimensional ranges to test biogeographic hypotheses. Journal of Biogeography. 29:985-998.

Sax, D., S. D. Gaines, and J. Brown. 2002. Species invasions exceed extinctions on islands world-wide: a comparative study of plants and birds. *American Naturalist*. 160:766-783.

Gaines, S. D., B. Gaylord, and J. Largier. 2003. Avoiding current oversights in marine reserve design. Ecological Applications. 13:S32-46

Allison, G., S. Gaines, J. Lubchenco, and H. Possingham. 2003. Ensuring persistence of marine reserves: Catastrophes require adopting an insurance factor. Ecological Applications 13:S8-24

Kinlan, B. and S. D. Gaines. 2003. A comparative analysis of dispersal scales in marine and terrestrial systems. Ecology. In press.

BRIAN GAYLORD
Marine Science Institute
University of California
Santa Barbara, California 93106-6150
Telephone: 805-680-2248
Fax: 805-893-4724
Email: gaylord@lifesci.ucsb.edu

Area of Expertise: Ecological biomechanics, focusing on questions of form and function, with a mechanistic emphasis on how the scaling of physical processes places bounds on organismal design and ecological pattern.

Education:

B.S.	Mechanical Engineering, Stanford University	1988
Ph.D.	Biological Sciences, Stanford University	1997

Academic Employment:

2001-present	Professional Research Biologist (Assistant level), University of California, Santa Barbara
1997-2000	Post-doctoral researcher, University of California, Santa Barbara.

SBC LTER Synergistic Activities:
Current research efforts leverage strongly off of the SBC LTER, exploiting data collected as part of ongoing kelp biomass production monitoring. Kelp plant morphological measurements provide a basic but extensive foundation for quantifying shape parameters fundamental to biomechanical models of seaweed motion, which ultimately will be used to develop quantitative predictions of rates of wave-driven disturbance in subtidal and intertidal macroalgal populations. Concomitant field tests of these biomechanical models benefit from and supplement complementary SBC LTER sampling protocols. As part of potential future research associated with a proposed Center for Oceans and Human Health, SBC LTER oceanographic resources would be linked to an expanded network of instrumentation and used to develop a regional understanding of coastal transport of human pathogens.

Five publications most closely related to project:

Gaylord, B., C.A. Blanchette, and M.W. Denny. 1994. Mechanical consequences of size in wave-swept algae. Ecol. Monogr. 64: 287-313.

Gaylord, B. 2000. Biological implications of surf-zone flow complexity. Limnol. Oceanogr. 45: 174-188.

Gaylord, B., B.B. Hale, and M.W. Denny. 2001. Consequences of transient fluid forces for compliant benthic organisms. J. Exp. Biol. 204: 1347-1360.

Gaylord, B., D.C. Reed, P.T. Raimondi, L. Washburn, and S.R. McLean. 2002. A physically based model of macroalgal spore dispersal in the wave and current-dominated nearshore. Ecology 83: 1239-1251.

Gaylord, B., M.W. Denny, and M.A.R. Koehl. 2003. Modulation of wave forces on kelp canopies by alongshore currents. Limnol. Oceanogr. 48: 860-871.

SALLY J. HOLBROOK
Department of Ecology, Evolution and Marine Biology
Coastal Research Center, Marine Science Institute
University of California
Santa Barbara, CA 93106-9610
Telephone: 805-893-3956
Fax: 805-893-3777
Email: Holbrook@lifesci.ucsb.edu

Area of Expertise: Temporal patterns in reef communities & Development of restoration techniques for surfgrass

Education:

B.A.	Biology (Summa Cum Laude), Smith College, Northampton, MA	1970
Ph.D.	Zoology, University of California, Berkeley	1975

Academic Employment:

1975- present	Assistant, Associate (1981), Full (1987) Professor, Dept. Ecology, Evolution and Marine Biology, University of California, Santa Barbara

SBC LTER Synergistic Activities:
PI and Member of SB LTER Executive Committee. Participant in SB LTER investigations of trophic structure and interactions on rocky reefs. Assisted in design of field experiments and sampling protocols. Chair, co-chair and member of dissertation committees of graduate students conducting research in context of LTER.

Five publications most closely related to project *(75 total publications)*:

Holbrook, S.J. and R.J. Schmitt. 1996. On the dynamics and structure of reef fish communities: are resources tracked? Pp. 9-48 *in* M.L. Cody and J.A. Smallwood (eds.) Long-term Studies of Vertebrate Communities. Academic Press, Inc.

Holbrook, S.J., R.J. Schmitt, and J.S. Stephens Jr. 1997. Changes in an assemblage of temperate reef fishes associated with a climate shift. Ecological Applications 7: 1299-1310.

Holbrook, S.J. and R.J. Schmitt. 1998. Have field experiments aided in the understanding of abundance and dynamics of temperate reef fishes? Pp. 152-169 *in* W.J. Resetarits and J. Bernado (eds.) Experimental Ecology: Issues and Perspectives. Oxford University Press.

Holbrook, S.J., D.C. Reed, K. Hansen, and C.A. Blanchette. 2000. Spatial and temporal patterns of predation on seeds of surfgrass, *Phyllospadix torreyi*. Marine Biology 136: 739-747.

Brooks, A.J., R.J. Schmitt, and S.J. Holbrook. 2002. Declines in regional fish populations: have species responded similarly to environmental change? Marine and Freshwater Research 53: 189-198.

PATRICIA A. HOLDEN
Donald Bren School of Environmental Science & Management
University of California
Santa Barbara, CA 93106-5131
Telephone: 805-893-3195
Fax: 805-893-7612
Email: holden@bren.ucsb.edu

Area of Expertise: Origins and fate of human pathogens in the coastal environment, using LTER GIS data; fate of fecal indicator bacteria through the Arroyo Burro Lagoon; watershed efflux of nutrients and sediments with which pathogenic bacteria are frequently associated

Education:

B.S.	Civil Engineering, University of Tennessee, Knoxville	1981
M.S.	Civil Engineering, Purdue University, West Lafayette	1983
M. Eng.	Civil / Environmental Engineering, University of California, Berkeley	1992
Ph.D.	Soil Microbiology, University of California, Berkeley	1995

Academic Employment:

1997 – present	Assistant Professor of Environmental Microbiology, University of California, Santa Barbara; jointly appointed in Mechanical & Environmental Engineering & Geological Sciences
1995- 1997	Postdoctoral Researcher, University of California, Berkeley
1988- 1990	Environmental Engineer, EMCS Design Group, Milwaukee, Wisconsin
1985- 1988	Civil/Environmental Engineer, City of Albany, Oregon
1983- 1984	Environmental Engineer, CH2M Hill, Gainesville, Florida

SBC LTER Synergistic Activities:
My interests in coastal water quality regard the origins and fate of human pathogens in the coastal environment. In our studies of Santa Barbara creeks (Arroyo Burro and Mission Creek), we have used LTER GIS data to develop graphs of bacterial diversity in creek water versus watershed urbanization. The SBC LTER GIS personnel and database were essential to our interpretation of our diversity data against a backdrop of varying sub-watershed development. LTER PIs have also been consultants to our work regarding the fate of fecal indicator bacteria through the Arroyo Burro Lagoon (Steets and Holden, 2003). We have also worked closely with LTER personnel in preparing a response to the recent NIH/NSF call in Oceans and Human Health. If funded, the new Center for the Study of Pathogens in Environments along Coastlines (CSPEC) would involve several LTER PIs and other LTER scientists as CSPEC Co-PIs. The SBC LTER intellectual and physical infrastructure contributed significantly to the strong justification for proposing CSPEC out of UCSB. On an ongoing basis, our work is significantly informed by the SBC LTER data regarding watershed efflux of nutrients and sediments with which pathogenic bacteria are frequently associated.

Five publications most closely related to project:

Holden, P.A., M.G. LaMontagne, A.K. Bruce, W.G. Miller, and S. Lindow. 2002. Assessing the role of *Pseudomonas aeruginosa* surface-active gene expression to hexadecane biodegradation in sand. Appl. Environ. Microbiol. 68: 2509-18.

Steets, B. and P.A. Holden. 2003. A mechanistic model of runoff-associated fecal coliform fate and transport through a coastal lagoon. Wat. Res. 37: 589-608.

Fierer, N., J.P. Schimel, and P.A. Holden. 2003. Influence of drying-rewetting frequency on soil bacterial community structure. Microb. Ecol. 45: 63-71.

LaMontagne, M.G. and P.A. Holden. 2003. Comparison of free-living and particle-associated bacterial communities in a coastal lagoon. Microb. Ecol., in press.

LaMontagne, M.G., J.P. Schimel, and P.A. Holden. 2003. Comparison of subsurface and surface soil bacterial communities in California grassland as assessed by terminal restriction fragment length polymorphisms of PCR-amplified 16S rDNA. Microb. Ecol., in press.

ARTURO A. KELLER
Bren School of Environmental Science and Management
University of California
Santa Barbara, CA 93106-5131
Telephone: 805-893-7548
Fax: 805-893-6113
Email: keller@bren.ucsb.edu

Area of Expertise: Fate, transport and remediation of pollutants at various scales, in particular in aquatic and soil systems

Education:

B.S.	Chemical Engineering (Cum Laude), Cornell University	1980
B.A.	Chemistry, Cornell University	1980
M.S.	Civil (Environmental) Engineering, Stanford University	1992
Ph.D.	Civil (Environmental) Engineering, minor in Petroleum Eng., Stanford	1996

Professional Employment:
1996-present Associate Professor, Bren School of Environmental Science and Management UCSB

SBC LTER Synergistic Activities:
Tim Robinson, a Ph.D. student co-advised by A. Keller, is conducting research the sources of nutrient loading in a core SBC LTER watershed that eventually reaches the coastal regions. Tim's work has been instrumental in understanding the spatial and temporal nature of the loading from various land-uses in the area. We are currently preparing to expand this work to cover pesticide loads, and possibly endocrine-disrupting chemicals.

Five publications most closely related to project:

Fernandez, L.F. and A.A. Keller. 2000. Cost Benefit Analysis of MTBE and Alternative Gasoline Formulations. Environmental Science and Policy 3: 173-188.

Keller, A.A., A. Wilson, and P. Holden. 2001. Modelling the seasonal variation in bioavailability of residual NAPL in vadose zone, in *Int. Assoc. of Hydro. Sciences, Groundwater Quality 2001*, Sheffield, UK.

Keller, A.A. and M. Chen. 2002. Seasonal variation in bioavailability of residual NAPL in the vadose zone, in *Proceedings of the International Groundwater Symposium*, March 25-28, 2002 in Berkeley, CA, USA.

Robinson, T.H., A. Leydecker, J.M. Melack, and A.A. Keller. 2002. Nutrient concentrations in southern Californian streams related to landuse. Coastal Water Resources, AWRA 2002 Specialty Conference. American Water Resources Association.

Sirivithayapakorn, S. and A.A. Keller. 2003. Transport of colloids in saturated porous media: A pore scale observation of the size exclusion effect and colloid acceleration, Water Resources Research, in press.

BRUCE E. KENDALL
Donald Bren School of Environmental Science and Management
University of California
Santa Barbara, CA 93106-5131
Telephone: 805-893-7539
Fax: 805-893-7612
Email: kendall@bren.ucsb.edu

Area of Expertise: Theoretical Ecology

Education:

B.A.	Physics, Williams College	1986
Ph.D.	Ecology & Evolutionary Biology, University of Arizona	1996

Academic Employment:

1998-present	Assistant Professor, Donald Bren School of Environmental Science and Management, University of California, Santa Barbara, CA.
1996-1998	Postdoctoral Associate, National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara, CA.

SBC LTER Synergistic Activities: Develops population and community based models of kelp forests; Participates in weekly reef lunches. Co-PI on several projects that are actively collaborating with SBC LTER.

Five publications most closely related to project:

Kendall, B.E., J. Prendergast, and O.N. Bjørnstad. 1998. The macroecology of population dynamics: taxonomic and biogeographic patterns in population cycles. Ecology Letters 1: 160-164.

Kendall, B.E., C.J. Briggs, W.W. Murdoch, P. Turchin, S.P. Ellner, E. McCauley, R.M. Nisbet, and S.N. Wood. 1999. Why do populations cycle: a synthesis of statistical and mechanistic modeling approaches. Ecology, 80 (6): 1789-1805.

Kendall, B.E., O.N. Bjørnstad, J. Bascompte, T.H. Keitt, and W.F. Fagan. 2000. Dispersal, environmental correlation, and spatial synchrony in population dynamics. American Naturalist 155: 628-636.

Ellner, S.P., E. McCauley, B.E. Kendall, C.J. Briggs, P. Hosseini, S. Wood, A. Janssen, M.W. Sabelis, P. Turchin, R.M. Nisbet, and W.W. Murdoch. 2001. Spatial dynamics and population persistence in a multispecies metapopulation: are spatial models necessary? Nature 412: 538-543.

Kendall, B.E. and G.A. Fox. 2002. Effects of variation among individuals on demographic stochasticity. Conservation Biology 16: 109-116.

HUNTER LENIHAN
Donald Bren School of Environmental Science and Management
University of California
Santa Barbara, CA 93101-5131
Telephone: 805-893-8629
Fax: 805-893-6113
Email: lenihan@bren.ucsb.edu

Area of Expertise: Marine Community Ecology

Education:

B.S	Conservation of Natural Resources, University of California, Berkeley	1986
M.S.	Marine Sciences, Moss Landing Marine Laboratories,San Jose State University	1992
Ph.D.	Marine Sciences, University of North Carolina at Chapel Hill	1996

Academic Employment:

2001 – present	Assistant Professor, Donald Bren School of Environmental Science and Management, UCSB
2001	Marine Protected Areas Research, NOAA-National Marine Fisheries Service
1998- 2000	Postdoctoral Research, NSF, Office of Polar Programs
1996- 1997	Postdoctoral Research Associate, NRC, NOAA-National Marine Fisheries Service, Beaufort, NC, USA
1992- 1996	Research assistant, Institute of Marine Sciences, University of North Carolina at Chapel Hill, NC, USA.
1988- 1992	Research assistant, Moss Landing Marine Laboratories, Moss Landing, CA, USA.

SBC LTER Synergistic Activities:
Lenihan is involved in coordinating, designing, and conducting research on the population, community, and food web dynamics of reef ecosystems. His laboratory is responsible for collecting and processing various types of population and community-level samples collected at SBC LTER sites, and for analyzing data generated from both monitoring and experimental work in kelp forest habitat

Five publications most closely related to project:

Lenihan, H.S. 1999. Physical-biological coupling on oyster reefs: how habitat form influences individual performance. Ecological Monographs 69: 251-275.

Lenihan, H.S. and F. Micheli. 2000. Biological effects of shellfish harvesting on oyster reefs: resolving a fishery conflict using ecological experimentation. Fishery Bulletin 98: 86-95.

Jackson, J.B.C., M.X. Kirby, W.H. Berger, K.A. Bjorndal, L.W. Botsford, B.J. Bourque, R. Bradbury, R. Cooke, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner, and R.Warner. 2001. Historical overfishing and the collapse of marine ecosystems. Science 293: 629-638

Lenihan, H.S., C.H. Peterson, J.E. Byers, J.H. Grabowski, G.W. Thayer, and D.R. Colby. 2001. Cascading of habitat degradation: oyster reefs invaded by refugee fishes escaping stress. Ecological Applications 11: 748-764.

Lenihan, H.S., C.H. Peterson, S.L. Kim, K.E. Conlan, R. Fairey, C. McDonald, J.H. Grabowski, and J.S. Oliver. *In Press*. How variation in marine benthic community composition allows discrimination of multiple stressors. Marine Ecology Progress Series.

SALLY MACINTYRE
Marine Science Institute and Institute for Computational Earth System Science
University of California
Santa Barbara, CA 93106-6150
Telephone: 805-893-3951
Fax: 805-893-8062
Email: sally@icess.ucsb.edu

Area of Expertise: Physical, biological and chemical coupling, in particular: effects of physical processes, including turbulence, internal waves, and buoyancy driven flows, on ecology and physiology of aquatic organisms, nutrient fluxes and bacterial and primary productivity, formation and persistence of marine and lake snow, dispersion of pollutants, gas exchange in lakes and coastal waters.

Education:

B.A.	Zoology, Duke University	1972
Ph.D.	Zoology; minor - Fluid Mechanics, Duke University	1981

Academic Employment:

1985-present	Asst., Assoc., Res. Limnologist/Oceanographer, MSI & ICESS, UCSB
1996 -present	Lecturer, Dept. of Ecology, Evolution and Marine Biology, UCSB
1987-1989	Lecturer, Dept. of Biology, UCSB
1982-1985	Asst. Res. Engineer, Dept. of Mechanical Engineering., UCSB
1981-1982	NSF Postdoctoral Fellow, MSI, UCSB

SBC LTER Synergistic Activities:
Involved in studies of nitrate consumption, phytoplankton grazing, and community metabolism in kelp forests, Associate Editor: Limnology and Oceanography: Methods. Education and Human Resources Committee for ASLO. Served on Site Review Team for NSF's NTL LTER, MCM LTER, KITES and EEGLE

Five publications most closely related to project:

MacIntyre, S. 1993. Mixing in the euphotic zone of a shallow, turbid lake: Consequences for the phytoplankton. Limnol. Oceanogr. 38: 798-817.

MacIntyre, S., K.M. Flynn, R. Jellison, and J.R. Romero. 1999. Boundary mixing and nutrient flux in Mono Lake, CA. Limnol. Oceanogr. 44: 225-242.

MacIntyre, S. and R. Jellison. 2001. Nutrient fluxes from upwelling and enhanced turbulence at the top of the pycnocline in Mono Lake, CA. Hydrobiologia 466: 13-29.

Alldredge, A.L., T.J. Cowles, S. MacIntyre, J.E.B. Rines, P.L. Donaghay, C.F. Greenlaw, D.V. Holliday, M.M. Dekshenieks, J.M. Sullivan, and J.R.V. Zaneveld. 2002. Occurrence and mechanisms of formation of a dramatic thin layer of marine snow in a shallow Pacific fjord. Mar. Ecol. Prog. Ser. 233: 1-12.

MacIntyre, S., J.R. Romero, and G.W. Kling. 2002. Spatial-temporal variability in upwelling, mixed layer deepening and lateral advection in an embayment of Lake Victoria, East Africa. Limnol. Oceanogr. 47: 656-671.

JOHN M. MELACK
Bren School of Environmental Science and Management
Department of Ecology, Evolution and Marine Biology
University of California
Santa Barbara, CA 93106
Telephone: 805-893-3879
Fax: 805-893-4724
Email: melack@lifesci.ucsb.edu

Area of Expertise: Hydrological and biogeochemical aspects of small catchments; investigations of solute fluxes in temperate and tropical catchments

Education:

A.B.	Biological Sciences, Cornell University, Ithaca, NY	1969
Ph.D.	Zoology (Limnology), Duke University, Durham, NC	1976

Academic Employment:

1987 – present	Professor, Donald Bren School of Environmental Science and Management and Department of Ecology, Evolution and Marine Biology, UCSB
1982- 1987	Associate Professor, Department of Ecology, Evolution and Marine Biology UCSB
1977- 1982	Assistant Professor, Department of Ecology, Evolution and Marine Biology UCSB
1977	NSF Postdoctoral Fellow, University of Michigan

SBC LTER Synergistic Activities:

Melack supervises and coordinates the hydrological and hydrochemical studies of streams which includes measurements and modeling. He serves on the Executive Committee of the SBC LTER and runs graduate seminars that involve the full spectrum of participants. He currently serves on the NRC Committee on Geophysical and Environmental Data, and is an elected U. S. representative to the International Society of Limnology.

Five publications most closely related to project:

Lesack, L.F.W. and J.M. Melack. 1996. Elemental balance of a rainforest catchment in the central Amazon basin: Implications for elemental budgets in tropical rainforests. Biogeochemistry 32: 115-142.

Melack, J,M., J. Dozier, C.R. Goldman, D. Greenland, A. Milner, and R.J. Naiman. 1997. Effects of climate change on inland waters of the Pacific coastal mountains and western Great Basin of North America. Hydrological Processes 11: 971-992

Williams, M. R. and J.M. Melack. 1997. Effects of prescribed burning and drought on the solute chemistry of mixed-conifer forest streams of the Sierra Nevada, California. Biogeochemistry 39: 225-253

Richey, J.E., J.M. Melack, A.K. Aufdenkampe, V.M. Ballester, and L. Hess. 2002. Outgassing from Amazonian rivers and wetlands as a large tropical source of atmospheric carbon dioxide. Nature 416: 617-620.

Sickman, J.O., J.M. Melack, and J.L. Stoddard. 2002. Regional analysis of inorganic nitrogen yield and retention in high-elevation ecosystems of the Sierra Nevada and Rocky Mountains. Biogeochemistry 57/58: 341-374.

LEAL A.K. MERTES
Department of Geography
University of California
Santa Barbara, CA 93106-4060
Telephone: 805-893-7017
Fax: 805-893-7782
E-Mail: leal@geog.ucsb.edu

Area of Expertise: Geomorphic and hydrologic processes responsible for the development of wetlands and floodplains in continental-scale river systems and across watersheds using remote sensing, GIS, and modeling techniques for analysis of wetland and floodplain properties; Evaluation of MODIS imagery for plume sediment concentrations into coastal waters

Education:

B.S.	Biological Sciences and Geological Sciences, Stanford University	1980
M.S.	Geological Sciences, University of Washington	1985
Ph.D.	Geological Sciences, University of Washington	1990

Academic Employment:

2002-present	Professor, Department of Geography, UCSB
1997-2002	Associate Professor, Department of Geography, UCSB
1991-1997	Assistant Professor, Department of Geography, UCSB

SBC LTER SYNERGISTIC ACTIVITIES:
Involved in measuring flood output of coastal watersheds using field data and satellite imagery. Co-PI on Plumes and Blooms project. Serves on the National Academy of Sciences BIOS Committee and has served on the National Academy of Sciences International Advisory Board and as a panelist for the NSF Hydrological Sciences Program and NSF/EPA Water & Watersheds Program.

Five publications most closely related to project:

Mertes, L.A.K., M. Hickman, B. Waltenberger, A.L. Bortman, E. Inlander, C. McKenzie, and J. Dvorsky. 1998. Synoptic views of sediment plumes and coastal geography of the Santa Barbara Channel, California. Hydrological Processes 12(6): 967-979.

Mertes, L.A.K. 2000. Inundation hydrology, *in* Wohl, E. E., ed., Inland flood hazards: human, riparian, and aquatic communities. New York, Cambridge University Press, 145-166.

Mertes, L.A.K. and J.A. Warrick. 2001. Measuring flood output from 110 coastal watersheds in California with field measurements and SeaWiFS. Geology 29(7): 659-662.

Mertes, L.A.K. 2002. Remote sensing of riverine landscapes. Freshwater Biology 47(4): 799-816.

Mertes, L.A.K., A. Dekker, G.R. Brakenridge, C. Birkett, and G. Létourneau, in press, Rivers and Lakes, *in* Ustin, S. L., ed., Natural Resources and Environment: Manual of Remote Sensing. New York, John Wiley and Sons.

ROGER M. NISBET
Department of Ecology, Evolution & Marine Biology
University of California
Santa Barbara, CA 93106-9610
Telephone: 805-893-7115
Fax: 805-893-8062
Email: nisbet@lifesci.ucsb.edu

Area of Expertise: Ecological modeling

Education:

B.S.	Physics and Theoretical Physics (First Class Honors), Univ. of St. Andrews, Scotland	1968
Ph.D.	Theoretical Physics, University of St. Andrews, Scotland	1971

Academic Employment:

2001 - present	Chair, Department of Ecology, Evolution and Marine Biology, UCSB
1991 - present	Professor, Department of Biological Sciences, then in Department of Ecology, Evolution and Marine Biology, UCSB
1989	Professor, Department of Statistics and Modeling Science, University of Strathclyde.
1985	Visiting Research Biologist, University of California, Santa Barbara (6 months).
1985	Personal Professor in Applied Physics, University of Strathclyde. [1986-8 Chair, Department of Physics and Applied Physics, University of Strathclyde]. Reader in Applied Physics, University of Strathclyde.
1977- 1979	Seconded from Strathclyde to University of the South Pacific, Suva, Fiji, as Senior Lecturer in School of Natural Resources.
1972- 1985	Lecturer in Applied Physics, University of Strathclyde, Scotland.
1971- 1972	Post-doctoral, Biology, University of Sussex, England.

SBC LTER Synergistic Activities:
Ecological modeling of wetlands and kelp forests. Attends weekly reef group lunches and seves as the major advisor of LTER graduate student J. Kellner. Lead-PI of the Pacific Center for Estuarine Ecosystem Indicator Research (PEEIR), a large multi-investigator study of ecological indicators for wetlands that actively collaborates with SBC LTER. Undergraduate/graduate textbook on Ecological Dynamics that draws heavily on recent research.

Five publications most closely related to project:

Ellner, S.P., E. McCauley, B. Kendall, C.J. Briggs, P. Hosseini, S. Wood, A. Janssen, M.W. Sabelis, P. Turchin, R.M. Nisbet, and W.W. Murdoch. 2001. Habitat structure and population persistence in an experimental community. Nature 412: 538-543.

Muller, E.B., R.M. Nisbet, S.A.L.M. Kooijman, J.J. Elser, and E. McCauley. 2001. Stoichiometric Food quality, and herbivore dynamics. Ecology Letters 4: 519-529.

Amarasekare, P. and R.M. Nisbet. 2001. Spatial heterogeneity, source-sink dynamics and the local coexistence of competing species. Am. Nat. 158: 572-584.

Chase, J.M., P.A. Abrams, J.P. Grover, S. Diehl, P. Chesson, R.D. Holt, S.A. Richards, R.M. Nisbet, and T.J. Case. 2002. The interaction between predation and competition: a review and synthesis. Ecology Letters 5: 302-315.

Murdoch, W.W., B.E. Kendall, R.M. Nisbet, C.J. Briggs, E. McCauley, and R. Bolser. 2002. Single-species models for many-species food webs. Nature 417: 541-543.

GAIL OSHERENKO
Donald Bren School of Environmental Science & Policy
Marine Science Institute
University of California
Santa Barbara, CA 93106-5131
Telephone: 805-893-7234
Email: osherenko@bren.ucsb.edu

Area of Expertise: Law and policy

Education:

B.A.	English, Principia College	1969
J.D.	School of Law, University of California, Davis	1975

Academic Employment:

2003 - present	Instructor in Environmental Studies, UCSB and Research Scientist (law and policy), MSI, UCSB
1995-1999	Vermont Water Resource Board member
1990-1997	Co-editor and co-founder with Oran Young of Arctic Visions, a series of scholarly books published by University Press of New England, Hanover, NH.
1989-2002	Dartmouth College: Senior Fellow, Institute of Arctic Studies within the Dickey Center for International Understanding Research Fellow in Environmental Studies; Adjunct professor 1997, 2002; Master of Arts in Liberal Studies (MALS) program; Adjunct Professor and symposium coordinator for speaker series on Globalization, 1999
1988	Princeton University, Center for International Studies, Visiting Fellow (Jan.-May)
1981-1989	Professor , Center for Northern Studies, Wolcott, Vermont

SBC LTER Synergistic Activities:
The California Coastal Regime 1976-2006: Evaluating Institutional Effectiveness. Vermont Water Resource Board member. GRID-Arundal, Norway – wrote sections on Arctic socio-economics and urban issues for the UNEP, 2002 Global Environmental Outlook Report. AAAS review team of Environmental and Natural Resource Institute at University of Alaska, Anchorage. Pacific Environment – consultant and videographer, accompanied indigenous representatives from Russian North and Far East on study tour of Indigenous Land Rights and Resource Management in Washington State (Dec. 2000); filmed and edited 60 min. documentary of the trip in Russian and English.

Five publications most closely related to project:

Osherenko, G., S. Kaplan, and D. Bradley. 1982. Vermont Wetlands: Laws and Voluntary Techniques for Conservation, a report from Vermont Natural Resources Council to the Vermont Agency of Environmental Conservation.

Young, O. and G. Osherenko. 1984. Arctic Resource Conflicts: Sources and Solutions, in *United States Arctic Interests: the 1980s and 1990s*, Westermeyer and Schusterich, eds. New York: Springer-Verlag.

Osherenko, G. 1988. Wildlife Management in the North American Arctic: The Case for Co-Management in *Traditional Knowledge and Renewable Resource Management*, Milton M.R. Freeman and Ludwig N. Carbyn, eds. Edmonton: Boreal Institute. for Northern Studies, 1988.

Osherenko, G. and O. Young. 1989. The Age of the Arctic: Hot Conflicts and Cold Realities. Cambridge, UK: Cambridge University Press.

Osherenko, G. and O. Young, eds. 1993. Polar Politics: Creating International Environmental Regimes. Ithaca, NY: Cornell University Press.

HENRY M. PAGE
Marine Science Institute
University of California
Santa Barbara, CA 93106-6150
Telephone: 805-893-2675
Fax: 805-893-8062
Email: page@lifesci.ucsb.edu

Area of Expertise: Wetlands and Reef Ecology

Education:

B.S.	University of Southern California	1973
M.A.	University of California, Santa Barbara	1977
Ph.D.	University of California, Santa Barbara	1984

Academic Employment:

1985 – present	Assistant Research Biologist, Marine Science Institute, University of California, Santa Barbara
1984- 1998	Lecturer in Summer Session, Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara
1994- 1997	Instructor, Department of Biological Sciences, Santa Barbara City College
1983- 1985	Postgraduate Research Biologist, Marine Science Institute, University of California, Santa Barbara

SBC LTER Synergistic Activities:
I am collaborating with other SBC researchers in exploring the use of stable carbon and nitrogen isotope analysis to evaluate the relative contribution of potential sources to reef food webs. Our research has focused on characterizing variability in the isotope values of potential food sources (phytoplankton, kelp, and terrestrial POM); information needed to evaluate whether these isotopic values differ enough from one another to permit the use of mixing models to estimate the contribution of each source to the reef food web. I also participate in the weekly Reef Group Lunch meetings

Five Publications Relevant to the Current Proposal:

Page, H.M., R.L. Petty, and D.E. Meade. 1995. Influence of watershed run-off on nutrient dynamics in a southern California salt marsh. Estuar Cstl Shelf Sci 41: 163-180.

Page, H.M. 1995. Variation in the natural abundance of ^{15}N in the halophyte, *Salicornia virginica*, associated with ground water subsidies of nitrogen in a southern California salt marsh. Oecologia 104: 181-188.

Page, H.M. 1997. Importance of vascular plant and algal production to macroinvertebrate consumers in a southern California salt marsh. Estuar Cstl Shelf Sci 45: 823-834.

Page, H.M., J.E. Dugan, D.S. Dugan, J.B. Richards, and D.M. Hubbard. 1999. Effects of an offshore platform on the distribution and abundance of commercially important crab species. Mar Ecol Prog Ser 185: 47-57.

Page, H.M. and M. Lastra 2003. Diet of intertidal bivalves in the Ria de Arosa (NW Spain): evidence from stable C and N isotope analysis. Mar Biol. . *in press.*

DANIEL C. REED
Marine Science Institute
University of California
Santa Barbara, CA, 93106-6150
Telephone: 805-893-8363
Fax: 805-893-3376
Email: reed@lifesci.ucsb.edu

Area of Expertise: Kelp forest ecology

Education:

B.A.	Biology, Moss Landing Marine Labs and San Francisco State University	1978
M.A.	Biology, Moss Landing Marine Labs and San Francisco State University	1981
Ph.D.	Biological Sciences, University of California, Santa Barbara	1989

Academic Employment:

2000 – present	Research Biologist, Marine Science Institute, UCSB
1994- 2000	Associate Research Biologist, Marine Science Institute, UCSB
1989- 1994	Assistant Research Biologist, Marine Science Institute, UCSB

SBC LTER Synergistic Activities:
Lead PI, site representative on LTER network Coordinating Committee, SBC Executive Committee member. Co-direct research on kelp primary production, kelp forest community dynamics, reef food webs, and experiments of trophic interactions in kelp forests. Co-advise five SBC grad students, and I mentor many SBC undergraduate students, including REU students.

Five publications most closely related to project:

Harrold, C. and D.C. Reed. 1985. Sea urchins, food availability and kelp forest community structure. Ecology 66: 1160-1169.

Reed, D.C., A.W. Ebeling, T.W. Anderson, and M. Anghera. 1996. Differential reproductive responses to fluctuating resources in two seaweeds with different reproductive strategies. Ecology 77: 300-316.

Reed, D.C., A.W. Ebeling, T.W. Anderson, and M. Anghera. 1997. The role of reproductive synchrony in the colonization potential of kelp. Ecology 78: 2443-2457.

Reed, D.C., P.T. Raimondi, M.H. Carr, and L. Goldwasser. 2000. The role of dispersal and disturbance in determining spatial heterogeneity in sedentary kelp-forest organisms. Ecology 81: 2011-2026.

Gaylord, B., D.C. Reed, P.T. Raimondi, L. Washburn, and S.R. McLean. 2002. A physically-based model of macroalgal spore dispersal in the wave and current-dominated nearshore. Ecology 83: 1239-1251.

JOSHUA P. SCHIMEL
Department of Ecology, Evolution, and Marine Biology
University of California
Santa Barbara, CA 93106-9610
Telephone: 805-893-7688
Fax: 805-893-4724
Email: schimel@lifesci.lscf.ucsb.edu

Area of Expertise: Ecosystem controls on nutrient flows into streams and on nutrient processing within streams; Factors regulating ecosystem "leakiness" and nutrient leaching to ground and surface waters; Role of seasonal transitions in causing losses of nutrients from ecosystems

Education:

B.A.	Chemistry (Cum Laude), Middlebury College	1979
Ph.D.	Soil Science, U.C. Berkeley	1987

Academic Employment:

1995 – present	Professor, Assoc. Prof. & Asst. Prof. of Soil and Ecosystem Ecology, Univ. California, Santa Barbara.
1989- 1994	Assistant Prof. of Microbial Ecology, University of Alaska-Fairbanks
1988	Post-doctoral, Soil Microbiology, Michigan State University
1987	Post-doctoral, Plant/Soil Interactions, Univ. Aberdeen

SBC LTER Synergistic Activities:
Serve on the LTER Executive Committee. Part of the Watershed research group.NSF Advisory Committee on Environmental Research and Education. Committee of Visitors, IGERT program. NSF Office of Polar Programs Advisory Committee. Visiting expert- linking microbial populations and biogeochemical models, European Union Conference: COST Action 627: "Carbon stores in European grasslands." Organizing committee, NSF/ESA Workshop on Linking Ecology and Geoscience. Editor, Ecology. NSF Arctic System Science, Land-Atmosphere-Ice Interactions program, steering committee. Regional Editor, Soil Biology & Biochemistry. Chair, Soil Ecology Section, Ecological Society of America.

Five publications most closely related to project:

Schimel, J.P., J.M. Gulledge, J.S. Clein-Curley, J.E. Lindstrom, and J.F. Braddock. 1999. Moisture effects on microbial activity and community structure in decomposing birch litter in the Alaskan taiga. Soil Biology & Biochemistry 31: 831-838.

Schimel, J.P. 2001. Biogeochemical models: implicit vs. explicit microbiology. In: *Global Biogeochemical Cycles in the Climate System*. E.D. Schulze, S.P. Harrison, M. Heimann, E.A. Holland, J.J. LLoyd, I.C. Prentice, and D. Schimel (Eds). Academic Press, in press.

Fierer, N. and J.P. Schimel. 2002. Effects of drying-rewetting frequency on soil carbon and nitrogen transformations. Soil Biol. Biochem. 34: 777-787.

Fierer, N., J.P Schimel, and P.A. Holden. 2003. Variations in microbial community composition through two soil depth profiles. Soil Biology & Biochemistry 35: 167-176.

Fierer, N. and J.P. Schimel. A proposed mechanism for the pulse in CO_2 production commonly observed following the rapid rewetting of a dry soil. Soil Science Society of America, *in press*.

RUSSELL J. SCHMITT
Department of Ecology, Evolution, and Marine Biology
University of California
Santa Barbara, CA 93106-9610
Telephone: 805-893-2051
Fax: 805-893-3777
Email: schmitt@lifesci.ucsb.edu

Area of Expertise: Population and community ecology; dynamics and regulation of populations; trophic and consumer-resource interactions; ecological controls of biodiversity; ecological effects of environmental forcing.

Education:

B.A.	Environmental Biology, University of Colorado, Boulder	1972
M.S.	Marine Science, University of the Pacific, Stockton	1974
Ph.D.	Biology, University of California, Los Angeles	1979

Academic Employment:

1994 - present	Professor, University of California, Santa Barbara
1993- 1994	Associate Professor, University of California, Santa Barbara
1992- 1993	Research Biologist, University of California, Santa Barbara
1987- 1992	Associate Research Biologist, University of California, Santa Barbara
1981- 1987	Assistant Research Biologist, University of California, Santa Barbara
1981	Post-doctoral, Ecology, University of California, Santa Barbara

SBC LTER Synergistic Activities:
Participant in SB LTER explorations of trophic interactions and cascades on rocky reefs. Assisted in design of field experiments, sampling protocols and sample processing; member of the LTER Reef Group. Participant in weekly Reef Group meetings. PI on research project associated with SB LTER funded by US DOI (MMS contract no. 14-35-01-00-CA-30758 Task Order 14181). Chair, co-chair and member of dissertation committees of graduate students conducting research in context of LTER.

Five publications most closely related to project:

Schmitt, R.J. and S.J. Holbrook. 1990. Contrasting effects of giant kelp on dynamics of surfperch populations. Oecologia 84: 419-429.

Schmitt, R.J. and S.J. Holbrook. 1990. Density compensation by surfperch released from competition. Ecology 71: 1653-1665.

Holbrook, S.J., R.J. Schmitt, and R.F. Ambrose. 1990. Biogenic habitat structure and characteristics of temperate reef fish assemblages. Australian Journal of Ecology 15: 489-503.

Schmitt, R.J. and S.J. Holbrook. 1999. Mortality of Juvenile Damselfish: Implications for Assessing Processes that Determine Abundance. Ecology 80: 35-50.

Brooks, A.J., R.J. Schmitt, and S.J. Holbrook. 2002. Declines in regional fish populations: have species responded similarly to environmental change? Marine and Freshwater Research 53: 189-198.

DAVID ALAN SIEGEL
Institute for Computational Earth System Science
University of California
Santa Barbara, CA 93106-3060
Telephone: 805-893-4547
Fax: 805-893-2578
Email: davey@icess.ucsb.edu

Area of Expertise: Ocean color remote sensing and optical oceanography

Education:

B.S.	Engineering Sciences, University of California, San Diego	1982
B.A.	Chemistry, University of California, San Diego	1982
M.S.	Geological Sciences, University of Southern California	1986
Ph.D.	Geological Sciences/Ocean Physics, University of Southern California	1988

Academic Employment:

2002-present	Director, Institute for Computational Earth System Science, UCSB.
1998-present	Professor, Department of Geography, UCSB.
2001	Adjunct Scientist, Woods Hole Oceanographic Institution.
1998-2001	Professor, Donald Bren School of Environmental Science and Management, UCSB.
1993-1998	Associate Professor, Department of Geography, UCSB.
1990-1993	Assistant Professor, Department of Geography, UCSB.
1989	Postdoctoral Scholar, Woods Hole Oceanographic Institution.

SBC LTER Synergistic Activities:
Serves on SBC Executive Committee. Directs ocean remote sensing work and participates on UNOLS cruises. Lead PI of Plumes and Blooms, a partner study to SBC that examines the relationships between runoff plumes and phytoplankton blooms in the Santa Barbara Channel. Served on a science panel for siting marine protected areas around the Channel Islands, California. Provided algorithms for use in the operational product stream for the SeaWiFS mission and regularly advise project staff.

Five publications most closely related to project:

Siegel, D.A. 1998. Resource competition in a discrete environment: Why are plankton distributions paradoxical? Limnology and Oceanography 43: 1133-1146.

Toole, D.A. and D.A. Siegel. 2001. Modes and mechanisms of ocean color variability in the Santa Barbara Channel. Journal of Geophysical Research 106: 26,985-27,000.

Shipe, R.F., U. Passow, M.A. Brzezinski, D.A. Siegel, and A.L. Alldredge. 2002. Effects of the 1997-98 El Nino on seasonal variations in suspended and sinking particles in the Santa Barbara Basin. Progress in Oceanography 54: 105-127.

Siegel, D.A., B.P. Kinlan, B. Gaylord, and S.D. Gaines. 2003. Lagrangian descriptions of marine larval dispersion. Marine Ecology Progress Series, *in press*.

Otero, M.P. and D.A. Siegel. 2003. Spatial and temporal characteristics of sediment plumes and phytoplankton blooms in the Santa Barbara Channel. Submitted to Deep-Sea Research, Part II.

ROBERT R. WARNER
Department of Ecology, Evolution, and Marine Biology
University of California
Santa Barbara, CA 93106-9610
Telephone: 805-893-2941
Fax: 805-893-4724
Email: warner@lifesci.ucsb.edu

Area of Expertise: Recruitment and population connectivity, using trace element and stable isotope chemistry in calcareous structures of fishes and invertebrates

Education:

B.A.	Vertebrate Zoology, UC Berkeley	1968
Ph.D.	Marine Biology, Scripps Institution of Oceanography	1973

Academic Employment:

1975 – present	Assistant (1981)/Associate (1985)/Full Professor (present) of Marine Biology, Biological Sciences, UC Santa Barbara
1995-98	Chair, Dept. Ecology, Evolution, and Marine Biology, UC Santa Barbara
1995	Acting Chair, Dept. of Biological Sciences, UC Santa Barbara
1990-95	Vice-Chair, Dept. of Biological Sciences, UC Santa Barbara
1973	Instructor, San Diego City College, CA

SBC LTER Synergistic Activities:
I will help coordinate studies of the nearshore kelp-forest environment carried out by the Partnership for the Interdisciplinary Study of Coastal Oceans (PISCO) and the SBC LTER. In addition, I provide advice and research resources for studies of recruitment and population connectivity using trace element and stable isotope chemistry in calcareous structures of fishes and invertebrates.

Five publications most closely related to project:

Warner, R.R. and P.L. Chesson. 1985. Coexistence mediated by environmental variability: a field guide to the storage effect. Amer. Natur. 125: 769-787.

Warner, R.R. and T.P. Hughes. 1988. The population dynamics of reef fishes. Proc. Sixth Int. Coral Reef Congress 1: 149-155.

Caselle, J.E. and R.R. Warner. 1996. Variability in recruitment in coral reef fishes: importance of habitat at large and small spatial scales. Ecology 77: 2488-2504.

S.E. Swearer, J.E. Caselle, D.W. Lea, and R.R. Warner. 1999. Larval retention and recruitment in an island population of a coral-reef fish. Nature 402: 799-802.

Warner, R.R. and R.K. Cowen. 2002. Local retention of production in marine populations: evidence, mechanisms, and consequences. Bulletin of Marine Science 70: 245-249.

LIBE WASHBURN
Department of Geography and Institute for Computational Earth Systems Science
University of California
Santa Barbara, CA 93106-4060
Telephone: 805-893-7367
Fax: 805-893-2578
Email: washburn@icess.ucsb.edu

Area of Expertise: Dynamic processes which transport water constituents such as nutrients and propagules of organisms; distributions of sub-tidal and inter-tidal organisms; dynamics of natural hydrocarbon seepage

Education:

B.S.	Mechanical Engineering, Univ. of Arizona	1974
M.S.	Engineering Science, University of California at San Diego	1978
Ph.D.	Engineering Science, University of California at San Diego	1982

Academic Employment:

1998- present	Professor, Department of Geography, UCSB
1993- 1998	Associate Professor, Department of Geography, UCSB
1991- 1993	Assistant Professor, Department of Geography, UCSB
1985- 1990	Res. Assist. Prof. of Phys. Oceanography, Center for Earth Sci., USC, Los Angeles, CA
1982- 1985	Postgraduate Research Oceanographer, Scripps Institution of Oceanography, La Jolla, California
1977- 1982	Research Assistant and Teaching Assistant, Dept. of Applied Mechanics and Engineering Sciences, University of California, San Diego, CA
1975- 1977	Aeroballistics Engineer, General Dynamics, Convair Division, San Diego, CA

SBC LTER Synergistic Activities:
My LTER-related research involves extensive collaboration with marine ecologists and oceanographers working on the project. A principal focus of my work is to identify and characterize the various dynamic processes which transport water constituents such as nutrients and propagules of organisms to the inner shelf where kelp beds occur. Accomplishing this requires interdisciplinary approaches which is one reason the LTER greatly interests me. LTER colleagues and I are using variety of observation strategies to identify the important processes including: moored time series, basin-scale ship board surveys, local surveys around sites, and event sampling of storm water plumes. I work with post-docs, graduate students, and undergraduate students on all aspects of my LTER research activities. I am also working to incorporate some of our LTER results in my teaching. In research related to the LTER, I also collaborate with colleagues in the Partnership for Interdisciplinary Studies of the Coastal Ocean (PISCO) to understand the factors controlling distributions of sub-tidal and inter-tidal organisms in the Southern California Bight and on the Central California Coast. Observations from the LTER have also benefited another interdisciplinary research program of mine, a collaboration with geologists and geochemists, which is directed at understanding the dynamics of natural hydrocarbon seepage in the Santa Barbara Channel.

Five publications most closely related to project:

Clark J.F., Washburn L, Hornafius J.S., Luyendyk B.P. 2000. Dissolved hydrocarbon flux from natural marine seeps to the southern California Bight. J. Geophys. Res-Oceans 105 (C5): 11509-11522.

Washburn L., C. Johnson, C.G. Gotschalk, and E.T. Egland. 2001. A gas-capture buoy for measuring bubbling gas flux in oceans and lakes. J. Atmos. and Oceanic Tech. 18: 1411 – 1420.

Nishimoto, M.M. and L. Washburn. 2002. Patterns of coastal eddy circulation and abundance of pelagic juvenile fish in the Santa Barbara Channel, California, USA. Marine Ecological Progress Series 241: 183-199.

Gaylord B., D. Reed., P. Raimondi, L. Washburn, and S. McLean. 2002. Macroalgal spore dispersal in the wave and current dominated nearshore. Ecology 83(5): 1239-1251.

Washburn, L., K.A. McClure, B.H. Jones, and S.M. Bay. 2002. Spatial scales and evolution of stormwater plumes in Santa Monica Bay. Marine Environmental Research, *in press*.

RICHARD C. ZIMMERMAN
Moss Landing Marine Laboratories
Moss Landing CA 95039
After 1 August 2003: Dept. Ocean, Earth & Atmospheric Sciences
Old Dominion University
Norfolk, VA 23529-0276

Area of Expertise: Ecological plant physiology, systems ecology and numerical modeling

Education:

B.S.	University of Southern California	1975
M.S.	University of Southern California	1979
Ph.D.	University of Southern California	1983

Academic Employment:

2003 - present	Professor and Chair, Dept. Ocean, Earth & Atmospheric Sciences, Old Dominion University, Norfolk, VA
1999-2003	Adjunct Professor, Moss Landing Marine Laboratories
1997- 2001	Vice-President and Senior Scientist, HOBI Labs, Inc., Marina, CA
1996- 2003	Associate Research Scientist, San Jose State University Foundation, Moss Landing Marine Laboratories, Moss Landing CA
1992-1996	Asst. Research Scientist, Dept. Biology, University of California, Los Angeles
1987-1992	Research Associate (Instructor), Dept. Molecular Genetics & Cell Biology, University of Chicago.
1986-1987	Postdoctoral Research Associate, Dept. Molecular Genetics & Cell Biology, University of Chicago.
1986	Instructor, Biology Dept., California State University, Long Beach
1983-1986	Post-doctoral Research Associate, Allan Hancock Foundation, Univ. So. Calif.

SBC LTER Synergistic Activities:
I am interested in the role of physical factors in regulating the productivity of kelp forest ecosystems. My work on the LTER has involved the development of in situ and remote sensing optical techniques for estimating giant kelp abundance and productivity. This work is leading to the development of nutrient and light-based models of kelp productivity that will be validated using data collected by the SBC-LTER

Five publications most closely related to project:

Zimmerman, R.C. and J.N. Kremer. 1984. Episodic nutrient supply to a kelp forest ecosystem in southern California. J. Mar. Res. 42(3): 591-604.

Kopczak, C.D., R.C. Zimmerman, and J.N. Kremer. 1991. Variation in nitrogen physiology and growth among geographically isolated populations of the giant kelp, *Macrocystis pyrifera* (Phaeophyta). J. Phycol. 27: 149-158.

Van Duin, E.H.S., G. Blom, F.J. Los, R. Maffione, R. Zimmerman, C.F. Cerco, M. Dortch, and E.P.H. Best. 2001. Modeling underwater light climate in relation to sedimentation, resuspension, water quality and autotrophic growth. Hydrobiol. 444: 25-42.

Dierssen, H.M., R.C. Zimmerman, R.A. Leathers, T.V. Downes, and C.O. Davis. 2003. Remote sensing of seagrass and bathymetry in the Bahamas Banks using high resolution airborne imagery. Limnol. Oceanogr. 48: 444-455.

Zimmerman, R.C. 2003. A bio-optical model of irradiance distribution and photosynthesis in seagrass canopies. Limnol. Oceanogr. 48: 568-585.

R. EDWARD BEIGHLEY
Marine Science Institute
University of California
Santa Barbara, CA 93106-6150
Telephone: 805-893-7801
Fax: 805-893-8062
Email: beighley@icess.ucsb.edu

Area of Expertise: Integrating hydrologic modeling, geographic information systems and watershed science for multidisciplinary research

Education:

B.S.	Civil and Environmental Engineering, Pennsylvania State University	1995
M.S.	Civil and Environmental Engineering, Pennsylvania State University	1996
Ph.D.	Civil and Environmental Engineering, University of Maryland	2001

Academic Employment:

2001 – present	Post-Doctoral Researcher, Marine Science Inst., UCSB
1998-2001	Graduate Research Assistant, Department of Civil and Environmental Engineering, University of Maryland
1995-1996	Graduate Research Assistant, Department of Civil and Environmental Engineering, Pennsylvania State University

SBC LTER Synergistic Activities:
Assisted in the design (i.e., spatial distribution) and installation of SBCLTER precipitation (8 installed, 4 additional to be installed summer 2003) and streamflow (27 installed) gauge networks. Developed an interactive simulation model for the SBCLTER outreach program to education school children on the effects of land use change on flooding and stream ecology. Evaluated available data, developed conceptual rainfall-runoff model for the SBCLTER region, and implemented both into the HEC-HMS rainfall runoff model. Calibrated and validated the model for the period, 10/1/1988 through 9/30/2002. Developed methods for mapping the spatial extent of dominant runoff components (surface, interflow and groundwater) and modeling (i.e., SBCLTER rainfall-runoff model) the export of water from each component from coastal watersheds in southern California draining into the Santa Barbara Channel. Currently, developing runoff volume frequency distributions for varied land use and climatic conditions from watersheds draining into the SBC. Future research, (1) develop relationships between land use, runoff event volume and watershed export (i.e., nutrients, sediment, etc.); (2) combine runoff volume frequency distributions with watershed export relationships to estimate annual watershed export on event basis; (3) incorporating nutrient, sediment and organic material export into the SBCLTER rainfall-runoff model; (4) linking rainfall forecasts from the Pennsylvania State University/ National Center for Atmospheric Research (PSU/NCAR) Mesoscale Model (MM5-V3) to a hydrologic model for real-time flood forecasting along the southern coast of California.

Five publications most closely related to project:

Beighley, R.E. and G.E. Moglen. 2002. Assessment of Stationarity in Rainfall - Runoff Behavior in Urbanizing Watersheds. Journal of Hydrologic Engineering, ASCE 7(1): 27-34.

Moglen, G.E. and R.E. Beighley. 2002. Spatially Explicit Hydrologic Modeling of Land Use Change. Journal of the American Water Resources Association 38(1): 241-253.

Strayer, D.L., R.E. Beighley, L.C. Thompson, S. Brooks, C. Nilsson, G. Pinay, and R.J. Naiman. Effects of land-cover change on stream ecosystems roles of empirical models & scaling issues. Ecosystems, *in press*.

Beighley, R.E. and G.E. Moglen. Adjusting Measured Peak Discharges from an Urbanizing Watershed to Reflect a Stationary Land Use Signal. Water Resources Research, *in press*.

McCuen, R.H. and R.E. Beighley. Seasonal flow frequency analysis. Journal of Hydrology, *in press*.

LILIAN B. BUSSE
Scripps Institution of Oceanography
Integrative Oceanography Division
9500 Gilman Drive
La Jolla, California, 92093-0227
Telephone: 858-534-4605
Fax: 858-534-6500
Email: busse@coast.ucsd

Area of Expertise: Algal ecology, streams, wetlands, eutrophication, indicators, food webs, stable isotopes

Education:

M.A.	Freshwater Ecology Technical University of Munich, Germany	1993
Ph.D.	Freshwater Ecology Technical University of Berlin, Germany	1999

Academic Employment:

2002 - present	NSF-Postdoctoral research fellow, Scripps Institution of Oceanography, University California, San Diego
2000- 2002	Post-doctoral research fellow, University of California, Santa Barbara
1999- 2000	Curator of the Robert-Holmes-Diatom-Collection, Museum of Systematics and Ecology, UCSB

SBC LTER Synergistic Activities:
With funding from SBC LTER I conducted research on the diatom assemblages in Carpinteria Salt Marsh and on nutrient-grazer effects on stream periphyton. The project on diatoms in Carpinteria was done in collaboration with Dr. U. Raeder from the Technical University in Munich, Germany, who is working on algal indicator systems. During this project I was supervising a German master's student. I submitted a proposal to NSF (Biological Survey and Inventories) about microalgae in wetlands in southern California. Carpinteria Salt Marsh is one of the study sites and we are planning a close collaboration with SBC LTER.

Five publications most closely related to project:

Raeder, U. and L.B. Busse. 2001. Composition and development of epipsammic diatoms in an oligotrophic lake (Lake Lustsee, Germany) under natural conditions and under artificial phosphate supply using enclosure experiments. In: Jahn, R., J.P. Kociolek, A. Witkowski and P. Compère (eds): Lange-Bertalot-Festschrift: Studies on Diatoms, Gantner, Ruggell. – ISBN 3-904144-26-X, 383-400.

Busse, L.B. and G. Gunkel. 2001. Riparian alder fens – source or sink for nutrients and dissolved organic carbon ? – 1. effects of water level fluctuations. Limnologica 31 (4): 307-315.

Busse, L.B. and G. Gunkel. 2002. Riparian alder fens – source or sink for nutrients and dissolved organic carbon ? – 2. input of leaf litter, denitrification and sedimentation. Limnologica 32: 44-53.

Busse, L.B. and S.D. Cooper. Effects of nutrients and grazers on periphyton assemblages in southern Californian streams. *in preparation*.

Busse, L.B., T. Rennebarth, S.D. Cooper, and U. Raeder. Diatom communities in Carpinteria Salt Marsh. *manuscript*.

AL LEYDECKER
3740 Alcamo Place, #A
Santa Barbara, CA 93105
Telephone: 805-569-1748 (H)
Email: al.leydecker@cox.net

Area of Expertise: Biogeochemistry, hydrology

Education:

B.S.	Civil Engineering, University of Tennessee, Knoxville	1968
Ph.D.	Biology, University of California, Santa Barbara	2000

Academic Employment:

2000 - present	Post Graduate Researcher, University of California, Santa Barbara
2000- 2001	Consultant, U.S.D.A., Pacific Southwest Research Station
1992- 2000	Research Assistant, University of California, Santa Barbara

SBC LTER Synergistic Activities:
Along with the occasional guest lecture, seminar talk and presentation to outside groups, I've been heavily involved with providing data to agencies and citizen groups monitoring streams in the LTER project area. Agencies include California State Parks, Ventura and Santa Barbara Counties, the City of Santa Barbara, Ojai Sanitary District and the Regional Water Quality Control Board (RWQCB). A major effort has been cooperative sampling with Santa Barbara Channel Keeper and the Ventura and Isla Vista Surf Riders organizations. I supply expertise for their sampling programs and act as a group leader on monthly sampling trips for the Ventura River (since Feb. 2001, under the auspices of the RWQCB and funded by Ventura County) and the Goleta Slough (since June 2002 with an RWQCB grant) programs, while the LTER project analyzes nutrient chemistry on collected samples. As of this date, over 500 volunteers have been involved in these sampling and educational efforts. The LTER will be involved in the RWQCB's "snap shot" day sampling later this May, providing dissolved nutrient analysis for approximately 60 coastal stream sampling locations in San Luis Obispo, Santa Barbara, and Ventura Counties.

Five publications most closely related to project:

Leydecker, A., J.O. Sickman, and J.M. Melack. 2001. Spatial Scaling of Hydrological and Biogeochemical Aspects of High Elevation Catchments in the Sierra Nevada, California. Arctic, Antarctic, and Alpine Research 33: 391-396.

Robinson, T.H., A. Leydecker, J.M. Melack and A.A. Keller. 2002. Nutrient concentrations in Southern California streams related to landuse, coastal Water Resources. *AWRA 2002 Spring Specialty Conference Proceedings*. Lesnick, John R. (Editor), American Water Resources Association, Middleburg, Virginia, TPS-02-1: 339-343.

Sickman, J.O., A. Leydecker, C.C.Y. Chang, C. Kendall, J.M. Melack, D.M. Lucero, and J. Schimel. 2003. Mechanisms Underlying export of nitrogen from high-elevation catchments during seasonal transitions. Biogeochemistry 64: 1-32.

Robinson, T.H., A. Leydecker, J.M. Melack, and A.A. Keller. 2003. Santa Barbara Coastal Long Term Ecological Research (LTER): Nutrient concentrations in coastal streams and variations with land use in the Carpinteria Valley, California. *California and the World Oceans '02 Conference*. American Society of Civil Engineers, Santa Barbara, California*, in press*.

Sickman, J.O., A. Leydecker, J.M. Melack and M.T. Colee. 2003. Do Variable Source Area Dynamics Control Nitrogen Export from High-Elevation Catchments? Water Resour. Res., *in press*.

ERIKA MCPHEE-SHAW
Institute for Computational Earth Systems Science
University of California
Santa Barbara, CA 93106-3060
Telephone: 805-893-7351
Fax: 805-893-2578
Email: eemcphee@icess.ucsb.edu

Area of Expertise: Coastal oceanography, sediment transport on continental slopes and shelves, stratified turbulence

Education:

B.A.	Physics, Dartmouth College	1992
Ph.D.	Oceanography, University of Washington	2000

Academic Employment:

2000 – present	Post-doctoral Researcher, UCSB
2002	Lecturer, Department of Geography, UCSB
1993-2000	Research assistant, Teaching assistant, University of Washington

SBC LTER Synergistic Activities

Collaborative research with LTER PIs: Analyzed and synthesized LTER oceanographic data; both from nearshore time series and from cruises. Presented results at a national conference (EPOC (Eastern Pacific Ocean Conference)) as well as at several UCSB departmental seminars. Participated on LTER cruises. Helped advise undergraduate REU Leah Ow in data processing and scientific analysis techniques. Taught graduate course "Applied Methods," which is generally taken by UCSB graduate students associated with oceanography, during Fall, 2002. Taught a series of lessons on ocean science and ecology at Franklin Elementary School with the 'Kids do Ecology' project sponsored by NCEAS (National Center for Ecological Analysis and Synthesis), spring 2002. Submitted a collaborative proposal to NSF to study cross-shelf transport processes which are closely tied to questions arising via analysis of LTER data. This research will use existing LTER measurements, as well as provide additional measurements from the mid- and outer- shelf to the LTER project.

Five publications most closely related to project:

McPhee-Shaw, E.E. and E. Kunze. 2002. Horizontal intrusions generated by internal-wave turbulence along a sloping boundary: a laboratory investigation. Journal of Geophysical Research. 10.1029/2001JC000801.

McPhee-Shaw, E.E., R.W. Sternberg, B. Mullenbach, and A.S. Ogston. 2002. Intermediate nepheloid layers and internal tide reflection on the Northern California Margin. Continental Shelf Research. *submitted*.

McPhee-Shaw, E.E., D. Siegel, L. Washburn, M. Brzezinski, and J. Jones. Mechanisms for nutrient delivery to the inner shelf: observations from the Santa Barbara Channel. Limnology and Oceanography, *in preparation*.

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Appendix V. SBC Graduate Student Profiles

CLARISSA ANDERSON
Department of Ecology, Evolution and Marine Biology
University of California, Santa Barbara, CA 93106-9610
c_anders@lifesci.ucsb.edu

Status: Ph.D. student, 3rd year

Program: Interdepartmental Graduate Program in Marine Science

Current Advisor: Mark Brzezinski

Undergraduate Major: Integrative Biology

Undergraduate Institution: University of California, Berkeley

Baccalaureate Degree Award Date: May 1999

Title of Graduate Research Project: FACTORS CONTROLLING PHYTOPLANKTON BLOOM FORMATION AND COMPOSITION IN THE SANTA BARBARA CHANNEL

Areas of Research: Phytoplankton Community Ecology; Bio-physical Coupling

Project Description:
I am investigating the physical processes that initiate phytoplankton bloom formation, particularly in Spring and Summer, in the Santa Barbara Channel. It is first important to characterize the interannual variability of the bloom community, one of the dominant players of which is the toxic diatom, *Pseudonitzschia* spp. Thus, along with characterizing the community as a whole, description of the bloom dynamics of this consortium of harmful species will comprise part of my dissertation work. The majority of my project is focused on the question of bloom initiation and maintenance in relation to some of the major physical features in the SB Channel, in particular, mesoscale eddy effects on phytoplankton biomass and species composition.

Conferences attended:
American Geochemical Union, 2001
American Society for Limnology and Oceanography, 2003
UC Toxic Substances Research Symposium, 2003

Presentations:
Poster presentation at ASLO, 2003
Poster presentation at UC TSRS, 2003

Publications:
None.

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
My dissertation research is currently fully funded by the SBC-LTER. As part of the research team working to fulfill the goals of the LTER project, I have so-far participated in three of our seasonal cruises and will be on board all subsequent cruises throughout the duration of my dissertation work here at UCSB. Almost the entirety of my dissertation data, including samples for assessing phytoplankton species composition in the SB Channel, is/will be collected using LTER resources, ship time, and personnel. In short, the goals I have proposed in my thesis project could not possibly be met if I were not working as part of an interdisciplinary, multiple PI project such as the LTER that expands the possibilities for studying large-scale questions pertinent to oceanography.

SHELLY ANGHERA
Department of Environmental Science and Engineering
University of California, Los Angeles, CA 90095-1772
anghera@ucla.edu

Status: Ph.D. student, 6th year

Program: Environmental Science and Engineering

Current Advisor: Richard Ambrose

Undergraduate Major: Aquatic Biology, B.S. with honors

Institution of Undergraduate Degree: University of California, Santa Barbara

Baccalaureate Degree Award Date: June 1995

Title of Graduate Research Project: DETECTING CONTAMINANT IMPACTS IN A MODERATELY CONTAMINATED COASTAL WETLAND

Areas of Research: Environmental toxicology, Marine benthic ecology

Project Description:
My dissertation attempts to link sediment contaminant concentrations to benthic organisms' distribution and abundance patterns in the wetland at Mugu Lagoon. Mugu Lagoon is a coastal wetland located inside the Naval Air Station Point Mugu, near Oxnard, California, and is the terminus for a large watershed. Water and sediment that flows into the lagoon is contaminated with pesticides and fertilizers from agricultural and urban runoff in addition to wastewater treatment plant discharges. Toxicity tests, chemistry and benthic community data will be combined to examine the relationship between infauna communities and contaminated sediment.

Conferences attended:
Toxic Substances Research & Teaching Program (UCTSR&TP), 1998
UC TSR&TP, 1999
International Society of Environmental Toxicology and Chemistry, 2000
UC TSR&TP, 2000
So. Cal. Society of Environmental Toxicology and Chemistry, 2000
National Society of Environmental Toxicology and Chemistry, 2000
UC TSR&TP, 2001
So. Cal. Society of Environmental Toxicology and Chemistry, 2001
National Society of Environmental Toxicology and Chemistry, 2001
UC TSR&TP, 2002
So. Cal. Society of Environmental Toxicology and Chemistry, 2002
National Society of Environmental Toxicology and Chemistry, 2002
Pellston Workshop on Sediment Quality Guidelines in Montana, 2002
UC TSR&TP, 2003
So. Cal. Society of Environmental Toxicology and Chemistry, 2003

Presentations:
Platform presentation, The first year's findings of the sea lion project. First Annual Sea Lion Research Symposium produced jointly by Fullerton College and University of Mexico City (UNAM), 1994.
Platform presentation, Distribution and sex ratio of nursing California Sea Lion yearlings at Isla Angel de la Guarda (Baja, Mexico). 19th International Marine Mammal Conference, 1994.
Platform presentation, A compilation of the 1993 and 1994 Mexican field data. Second Annual Sea Lion Research Symposium, 1995.

Poster presentation, Geographic variation in the duration of maternal care in California sea lions. University of California, Santa Barbara Undergraduate Research Symposium,1996.
Poster presentation, Geographic variation in the duration of maternal care in California sea lions. Otariid Symposium at the Smithsonian Institution, 1996.
Poster presentation, Geographic variation in the duration of maternal care in California sea lions. 21st International Marine Mammal Conference, 1996.
Poster presentation, Assessing the impacts of an electrokinetic metals remediation demonstration project on salt marsh plants and invertebrates at the Naval Air Station Pt. Mugu, CA. UC TSR&TP, 1998.
Poster presentation, Influence of contaminants on large-scale spatial distribution of benthic infauna at Mugu Lagoon, CA.UC TSR&TP, 1999.
Poster presentation, Influence of contaminants on large-scale spatial distribution of benthic infauna at Pt. Mugu, CA. UC TSR&TP, 2000.
Poster presentation, Influence of contaminants on large-scale spatial distribution of benthic infauna at Mugu Lagoon, CA. Best Poster Award. Southern California Chapter of SETAC, 2000.
Poster presentation, Influence of contaminants on benthic infauna in a contaminated wetland. National SETAC, 2000.
Poster presentation, Spatial patterns of contaminants and toxicity in wetland sediments. UC TSR&TP, 2001.
Platform presentation, Spatial patterns of contaminants and toxicity in wetland sediments: Implications for ecological impact assessment. International SETAC, 2001.
Platform presentation: Spatial patterns of contaminants and toxicity in wetland sediments: Implications for ecological impact assessment. Southern California Chapter of SETAC, 2000.
Poster presentation, Linking benthic infauna communities to toxicity and contaminants in a tidal wetland. National Society of Environmental Toxicology and Chemistry, 2001.
Poster presentation, The ten-day amphipod sediment toxicity test: Laboratory vs. Field. UC TSR&TP, 2002.
Poster presentation, Evaluating impacts of heavy metal and nitrogen deposition from aircraft in coastal wetlands. National Society of Environmental Toxicology and Chemistry, 2002.
Platform presentation, The ten-day amphipod sediment toxicity test: Laboratory vs. Field. National Society of Environmental Toxicology and Chemistry, 2002.
Poster presentation, Evaluating impacts of heavy metal and nitrogen deposition from aircraft in coastal wetlands. UC TSR&TP, 2003.

Publications:
None

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
The LTER has provided space and equipment for my experiments. I am a student at UCLA where there is no running seawater or adequate temperature control rooms necessary for my research. My connection to the Reed lab, and therefore the LTER lab has allowed me to utilize many UCSB benefits such as aquariums, temperature control rooms, specimen collectors and equipment such as glassware, balances, pipettes, storage space and prep space.

KATIE ARKEMA
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
arkema@lifesci.ucsb.edu

Status: Ph.D. student, 1st year

Current Advisor: Dan Reed and Sally Holbrook

Undergraduate Major: Ecology and Evolutionary Biology

Institution of Undergraduate Degree: Princeton University

Baccalaureate Degree Award Date: May 2000

Title of Graduate Research Project: Undecided

Areas of Research: Marine Ecology

Project Description:
Early lifestages of marine organisms are often sensitive to environmental conditions, yet the ecological processes that affect them are relatively under-studied. Numerous studies have documented the effects of changing conditions (turbulence, sedimentation, nutrient levels, light availability, temperature, and anthropogenic impacts) on adult macroalgae. However, addition of sessile individuals to a population is a complex process involving dispersal, settlement, juvenile recruitment and maturation to adulthood. Each step is critical to the persistence of a population. There has been a consistent gap in our knowledge about the ecological dynamics of the time between propagule settlement and recruitment in marine systems. I plan to identify the processes that most influence recruitment success of macroalgal species such as *Desmarestia ligulata*, by seeding plates with spores and outplanting them to SBC-LTER sites differing in abiotic and biotic conditions. In order to cope with such a variable ecosystem, macroalgae may employ a variety of strategies during their early lifestages. For instance, some annual macroalgal species add propagules to microscopic banks. These propagules may be considered functionally equivalent to dormant seeds. However, while terrestrial seeds cease to grow, macroalgal propagules continue to photosynthesize. To investigate the trade-off between growth and exposure to unfavorable conditions, I plan to vary the length of time that microscopic lifestages persist *in situ,* and manipulate the conditions that they experience (e.g. light and nutrient availability). An examination of early life stage strategies for persistence in variable environments will elucidate how processes that occur at this critical "in between" stage might mediate patterns of propagule settlement and juvenile recruitment, not only in macroalgae, but also in other sessile marine organisms.

Conferences attended:
Western Society of Naturalists, 2001
Western Society of Naturalists, 2002
UC TSR&TP, 2002 (University of California Toxic Substances Research and Teaching Program)
UC TSR&TP, 2003

Presentations:
None

Publications:
None

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
I applied to UC Santa Barbara specifically because of the Santa Barbara Coastal LTER. Although I am primarily interested in kelp forest community dynamics, I knew that my interests broadly involve two main

aspects of the SB LTER: the interface between terrestrial and marine systems, and the interface between human influences and the natural environment. As a graduate student I do not have the experience, funds or field assistance to collect data on ecosystem level processes. The SBC-LTER will provide me with large-scale data on between-site differences in kelp biomass and abiotic conditions, and long-term data on variation in macroalga recruitment. The SBC-LTER has already provided me with a framework in which to couch my project ideas and financial assistance with which to begin my course of study. As a research assistant I have been collecting subtidal data for both the annual survey and the monthly changes in *Macrocystis pyrifera* biomass since August. I am already familiar with the SBC-LTER sites and permanent transects. I plan to run my dissertation research at SBC-LTER sites so that I can use the data from the reef and ocean groups as a complement to the results of my specific research experiments, thereby enabling me to address large-scale spatial and temporal questions.

CORINNE BASSIN
Department of Ecology, Evolution and Marine Biology
University of California, Santa Barbara, CA 93106-9610
cbassin@umail.ucsb.edu

Status: Ph.D. student, 1st year

Program: Interdepartmental Graduate Program in Marine Science

Current Advisor: Libe Washburn

Undergraduate Major: Math/ Applied Science

Institution of Undergraduate Degree: University of California, Los Angles

Baccalaureate Degree Award Date: May 2001

Title of Graduate Research Project: Undecided

Areas of Research: Physical oceanography

Project Description:
The study of recently discovered small scale inner-shelf coastal eddies and their effect on nutrient transport. The creation mechanisms and implications of the eddies will be studied through remote sensing and *in situ* data. The eddies may have the ability to transport nutrients from depth across the continental slope to near shore areas. This could be an important mechanism for nutrient transport to kelp forests such as at Naples Reef, where one such eddy occurs.

Conferences attended:
None

Presentations:
None

Publications:
None

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
The LTER program will provide me with the opportunity to do interdisciplinary research on the coastal ecosystem. It will provide biological and physical data to augment the radar and satellite data. Biological data from LTER are needed to study the impacts of eddies on nutrient transport. LTER also provides a network of scientists from different areas to shed light on different aspects of the coastal system.

EDWIN BECKENBACH
Institute for Computational Earth System Science
Department of Geography
University of California, Santa Barbara, CA 93106-9610
edwin@icess.ucsb.edu

Status: Ph.D. Candidate, 5th year

Program: Interdepartmental Graduate Program in Marine Science

Current Advisor: Libe Washburn

Education

M.S. Civil Engineering, University of California, Berkeley, June 1997
B.S. Environmental Resources Engineering, Humboldt State University, California, May 1995

Title of Graduate Research Project: SURFACE CIRCULATION IN THE SANTA BARBARA CHANNEL, CALIFORNIA: AN APPLICATION OF HIGH FREQUENCY RADAR FOR DESCRIPTIVE PHYSICAL OCEANOGRAPHY OF THE COASTAL OCEAN.

Areas of Research: Physical oceanography of the coastal ocean.

Project Description:
My research focuses on observation and interpretation of circulation patterns in the Santa Barbara Channel with an emphasis on exploiting high-frequency radar for sampling surface currents at high resolution. The channel is a particularly interesting research subject because its flow patterns are intricate and surprisingly diverse. More importantly, the circulation patterns distribute and mix discrete water masses and organisms through the region producing a marked geographical transition in physical and biological characteristics. With high-frequency radar patterns of surface currents can be mapped hourly in great detail. These maps are combined with other physical measurements to explain circulation mechanistically. Combined with biological observations, they can also be to examine physical controls on species distribution.

Professional Presentations:
Beckenbach, E.H., and A.M. Happel, Methyl tertiary butyl ether plume evolution at California LUFT sites, in The Southwest Focused Ground Water Conference, National Ground Water Association, Anaheim, Calif., 1998.

Beckenbach, E.H., and A.M. Happel, Temporal Analysis of Methyl Tertiary Butyl Ether (MTBE) Plumes at California Leaking Underground Fuel tank Sites, in National Academy of Sciences, Committee on Intrinsic Remediation, Irvine, Calif., 1998.

Beckenbach, E.H., and K.N. Emerson, Temporal Analysis of Methyl Tertiary-butyl Ether (MTBE) Groundwater Plumes at California LUFT Sites, in American Geophysical Union, Fall Meeting, San Francisco, California, 1999.

Beckenbach, E.H., and L. Washburn, Maximum Likelihood Interpolation of CODAR Time Series, in Analysis and Acquisition of Observations of the Circulation on the California Continental Shelf, Scripps Institute of Oceanography, La Jolla, California, 2000.

Beckenbach, E.H., L. Washburn, B. Emery, and D. Salazar, Poster: Observation of Propagating Eddies in the Santa Barbara Channel, in American Geophysical Union, Fall Meeting, San Francisco, California, 2000.

Beckenbach, E.H., and L. Washburn, EOF and Maximum Likelihood Interpolation Applied to HF Radar Derived Surface Currents in the Santa Barbara Channel, in American Geophysical Union, Ocean Sciences Meeting, San Antonio, Texas, 2000.

Beckenbach, E.H., and L. Washburn, Observations of Wavelike Phenomena in the Santa Barbara Channel Using HF Radar, in Eastern Pacific Ocean Conference, Stanford Sierra Camp, South Lake Tahoe, California, 2001.

Beckenbach, E.H., and L. Washburn, Poster: Observations of Wavelike Phenomena in the Santa Barbara Channel Using HF Radar., in American Geophysical Union, Ocean Sciences Meeting, Honolulu, Hawaii, 2002.

Publications

Happel, A.M., E.H. Beckenbach, L. Savalin, H. Temko, R. Rempel, B. Dooher, and D. Rice, Analysis of dissolved benzene plumes and methyl tertiary butyl ether (MTBE) plumes in groundwater at leaking underground fuel tank (LUFT) sites in American Chemical Society Division of Environmental Chemistry, ACS, 37 (1), 409-411, 1997.

Happel, A.M., E.H. Beckenbach, and R.U. Halden, An evaluation of MTBE impacts to California groundwater resources, pp. 68 p., Lawrence Livermore National Laboratory, Livermore, Calif., 1998.

Beckenbach, E.H., K.N. Emerson, and A.M. Happel, Methyl tert-Butyl Ether at California Leaking Underground Fuel-Tank Sites: Observations and Implications, in Oxygenates in Gasoline, Environmental Aspects, edited by A.F. Diaz, and D.L. Droggos, Oxford University Press, 2001.

Beckenbach, E.H. and L. Washburn, Low-frequency waves in the Santa Barbara Channel observed by high-frequency radar, *Journal of Geophysical Research*, In Review, 2003.

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:

The high-frequency radar data that I currently use is independent of the LTER project as is my funding. However, the detailed current maps produced have been useful for planning and conducting LTER-related activities. In the future, the LTER and radar data can be used to complement each other for various research objectives. For example, the near-shore data collected as part of the LTER program presents an obvious extension to the offshore radar data. LTER observations will enable testing of the dynamic connection between offshore circulation and the near-shore zone. This subject is fundamental to the dispersal and recruitment of many marine organisms yet is still poorly understood.

MICHAEL D. BEHRENS
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
behrens@umail.ucsb.edu

Status: Ph.D. student, 4th year

Current Advisor: Steve Gaines and Kevin Lafferty

Undergraduate Major: Biology

Institution of Undergraduate Degree: California Polytechnic State University, San Luis Obispo

Baccalaureate Degree Award Date: August, 1996

Title of Graduate Research Project: THE KELP FOREST BARRENS DICHOTOMY: MULTIVARIATE DESCRIPTION; COMMUNITY PATTERNS, AND THE EFFECTS OF DISEASE AND MARINE RESERVES.

Areas of Research: Herbivory in Marine Systems; Effects of Marine Reserves and Disease on Kelp Forest; Urchin Barren Dynamics

Project Description:
Kelp forests and echinoderm barrens are alternative community states in temperate near-shore communities. Utilizing data from the Channel Islands National Park Service's Kelp Forest Monitoring database, I was able to conduct a discriminant function analysis to describe the continuum between these two states and quantify site/year combinations with respect to their similarity to kelp forests or barrens. I used this measure to determine which species associate with different states. I also tested the effect of no-take reserves on kelp forests, finding that areas inside reserves were more likely be kelp forests. We suggest that this results from cascading effects of fishing lobsters outside of reserves, which releases herbivores (urchins) from predation. Using a multivariate analysis of species density patterns, I determined that the community structure within kelp forests differs between areas inside and outside reserves. Additionally, I used the canonical scores from the discriminant analysis to determine the effect of urchin disease on kelp forest dynamics. I found that as disease prevalence increased sites shifted more towards kelp forests.

Conferences attended:
Western Society of Naturalists, 2001
Western Society of Naturalists, 2002
International Temperate Reefs Symposium, 2003

Presentations:
Invited talk, Conserving Marine Communities in the California Channel Islands. United States Geological Service, 2001

Invited talk, The kelp forest barrens dichotomy: multivariate description, community patterns, and the effects of reserves. Western Society of Naturalists, 2001

Invited talk, The Effects of Marine Reserves on Nearshore Rocky Communities: The Anacapa Island Reserve. CINMS, Sanctuary Education Team, 2002

Invited talk, Feeding ecology of the opaleye (*Girella nigricans*): comparison to past studies and the effects of habitat, body size, and temperature. Western Society of Naturalists, 2002

Invited talk, The kelp forest barrens dichotomy: multivariate description, community patterns, and the effects of reserves. International Temperate Reefs Symposium, 2003

Publications:

Behrens, M. D. and K. D. Lafferty. 2001. The kelp forest barrens dichotomy: multivariate description, community patterns, and the effects of reserves. *In preparation.*

Lafferty K.D., Behrens M.D., Davis G.E., Haaker P.L., Kushner D., Richards D.V., Taniguchi I.K. & Tegner M.J. Habitat of endangered white abalone, *Haliotis sorenseni*. Biological Conservation. *In press.*

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:

The goals and research of the SBC-LTER are closely related to all of my current research, not only in the research areas, but also the methods used. While my current research has involved limited use of LTER data (temperature data), the ongoing research provides data that are complementary to data I am currently collecting on trophic position of herbivorous fishes and data to address the effects of urchin predators and disease on kelp forest community dynamics. I anticipate that the data and information coming out of the SBC-LTER will only make my own research more robust and increase its generality.

RAJENDRA BOSE
Bren School of Environmental Science and Management
University of California, Santa Barbara
Santa Barbara, CA 93106-5131

Status: Ph.D. student, 5th year

Program: Environmental Science and Management

Current Advisor: Jim Frew, Bren

Undergraduate Major: Electrical Engineering

Institution of Undergraduate Degree: The Stevens Institute of Technology

Baccalaureate Degree Award Date: May 1989

Title of Graduate Research Project: COMPOSING AND MANAGING COMPUTATIONAL DATA LINEAGE TO SUPPORT ENVIRONMENTAL SCIENCE RESEARCH

Areas of Research: Environmental Information Systems; Ocean Color Remote Sensing

Project Description:
Researchers who plan and implement data management strategies for scientific projects are realizing the urgency of providing **data lineage** (also known as data provenance, data pedigree, derivation history, and other terms) to others as they adapt to new roles as online information providers. A given scientific data product possesses a history, or lineage, that may be revealed through sets of static metadata connected to each other, much like individuals in a family tree. The origins and processing details of the countless digital data products that drive the conclusions of contemporary scientific papers are largely obscure without systems in place to fully compose and manage lineage metadata.

I am preparing a prototype lineage system with a focus on the relevant and real example of creating ocean productivity data products from satellite imagery and ocean color algorithms that will ultimately support the Santa Barbara Coastal LTER. This prototype system will reflect concepts and lessons from the Earth System Science Workbench (ESSW) project, and has implications for proposed future work at the UCSB Institute for Computational Earth System Science (ICESS) on merging imagery from multiple satellite sensors in an effort to provide ocean color data products with more complete spatial and temporal coverage to the scientific community.

Conferences attended:
NASA Earth Science Information Partners Federation Meeting, 1999
American Association for the Advancement of Science, 2001
American Society of Photogrammetry and Remote Sensing Annual Conference, 2001
Association of Computing Machinery Special Interest Group on Management of Data International Conference on Management of Data, 2001
13th International Conference on Scientific and Statistical Database Management, 2001
First Annual Remote Sensing and Photogrammetric Society Conference, 2001
Workshop on Data Derivation and Provenance, 2002
14th International Conference on Scientific and Statistical Database Management, 2002
US Workshop on Annotation and Resource Discovery of Geographic Image Data (A Joint Workshop by the National Institute of Informatics (NII), Japan, and National
Center for Geographic Information and Analysis (NCGIA), USA), 2003

Presentations:
Invited talk, Behind Closed Doors in the Frew Lab: Streamlining Earth Science Research Computing, Bren School Student Colloquium, 2000

Invited talk, Introduction to LTER Metadata Issues, Long Term Ecosystem Research (LTER) Seminar, 2000

Poster presentation, Using Data Lineage to Document Environmental Science Research Computing, 2001

Seminar talk, Using Data Lineage to Document Environmental Science Research Computing, Bren School Ph.D. Seminar, 2001

Project demonstration, American Society of Photogrammetry and Remote Sensing Annual Conference, 2001

Invited talk, Delivering Data Lineage for Earth Science Research Computing, US Workshop on Annotation and Resource Discovery of Geographic Image Data, 2003

Publications:

J. Frew and R. Bose, "Earth System Science Workbench: A Data Management Infrastructure for Earth Science Products," Proceedings of the 13th International Conference on Scientific and Statistical Database Management, Fairfax, VA, 2001, pp. 180-189.

R. Bose, "A Conceptual Framework for Composing and Managing Scientific Data Lineage," Proceedings of the 14th International Conference on Scientific and Statistical Database Management, Edinburgh, Scotland, 2002, pp. 15-19.

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
Environmental informatics is an emerging area that applies advances in information technology to environmental fields, and at the same time, motivates information technology research through the unique requirements of environmental problems. Progress in this area requires a thorough understanding of real and significant case studies, familiarity with the conduct of scientific research, and working with researchers from different domains. The SBC-LTER serves as an ideal testbed for my prototype data lineage system, because it has allowed me to use real data sets to learn about real applications of oceanic primary production algorithms for ocean color remote sensing, and it has provided me access to a scientific research community open to new and interdisciplinary work.

JEFF BRINKMAN
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
brinkman@lifesci.ucsb.edu

Status: M.A. student, 3rd year

Degree Program: Ecology, Evolution, and Marine Biology

Current Advisor: Scott Cooper, EEMB

Undergraduate Major: Environmental Studies

Institution of Undergraduate Degree: University of California, Santa Barbara

Baccalaureate Degree Award Date: June 1996

Title of Graduate Research Project: BIOLOGICAL INDICATORS OF STREAM ECOSYSTEM INTEGRITY AND RELATIONSHIPS BETWEEN BIOLOGICAL COMMUNITY STRUCTURE, PHYSIOCHEMICAL PARAMETERS, AND ANTHROPOGENIC DISTURBANCE IN STREAMS IN COASTAL SANTA BARBARA COUNTY, CALIFORNIA.

Areas of Research: Stream Ecology, Bioassessment, Anthropogenic Impacts on Stream Biota

Project Description:
My research involved the study of 17 coastal watersheds in southern Santa Barbara County and western Ventura County over a three-year period from 2000 through 2002. Physiochemical and biological data were collected and analyzed annually from numerous individual stream reaches throughout the study area. Data were gathered through a combination of rapid bioassessment field surveys, laboratory analysis of water and BMI samples, spatial data analysis using geographic information system (GIS) software, and review of topographic maps and aerial photographs. Numerous physiochemical and biological parameters were calculated for each study reach based on the data collected. After the data set was finalized, statistical tests including analysis of variance (ANOVA) and multiple regression analysis were used to characterize relationships among biological parameters, physiochemical parameters, and human disturbance parameters (i.e., land use type, percent of watershed developed, and water pollution levels). The goals of my research are as follows:

1. Determine the strength and nature of natural relationships between local stream biota and physiochemical parameters including stream temperature, water chemistry, stream discharge, elevation, gradient, stream order, catchment area, etc.
2. Determine the strength and nature of relationships between local stream ecosystem integrity and human disturbance.
3. Determine which benthic macroinvertebrate and aquatic vertebrate taxa and biological community parameters (e.g., density, diversity, composition, etc.) are the most reliable indicators of local stream ecosystem integrity.

The original research project has evolved into the Santa Barbara County Creeks Bioassessment Program (Program), which is funded by County of Santa Barbara Project Clean Water (PCW) and City of Santa Barbara. PCW and the City envision the Program as a long-term effort to assess and monitor the integrity of local stream communities as they respond through time to changing environmental conditions shaped by natural processes and human factors.

Conferences attended:
Salmonid Restoration Federation/Urban Streams Conference, 2003

Presentations:
Salmonid Restoration Federation/Urban Streams Conference in San Luis Obispo, 2003
City of Santa Barbara Creeks Advisory Committee meeting, 2003

Project Clean Water Stakeholders meeting, 2002
A few times at lab group meetings (Cooper lab) in 2002 and 2003.

Publications:
Santa Barbara County Creeks Bioassessment Program, 2002 Annual Report, available for download at: www.countyofsb.org/project_cleanwater/Documents.htm#BMI_Report_2002 (grey literature)
Master's thesis in progress

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
I am conducting my research in streams that are being studied by the SBC LTER, and I have coordinated my efforts with Drs. Scott Cooper, John Melack, and Ed Beighley. I have provided the LTER with the locations of the stream reaches that I have been studying, and I have inputted their locations into a GIS database to facilitate our coordinated efforts. I am currently working with Scott and John in developing a partnership between SBC LTER, and the County and City of Santa Barbara on their ongoing annual stream bioassessment program. I am the County's and City's consultant for this project, which has grown out of my initial research.

BERNARDO R. BROITMAN
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
broitman@lifesci.ucsb.edu

Status: Ph.D. student, 4th year

Current Advisor: Steven D. Gaines

Undergraduate Major: Biological Sciences, B.A

Institution of Undergraduate Degree: P. Universidad Catolica de Chile

Baccalaureate Degree Award Date: December 1995

Title of Graduate Research Project: COASTAL ECOSYSTEM STRUCTURE: AN INTER-HEMISPHERICAL COMPARISON.

Areas of Research: Nearshore Oceanography, Community Ecology, Population Biology, Macroecology

Project Description: Utilize extensive physical-biological datasets to synthesize and compare spatial and temporal dynamics in coastal ecosystems.

Conferences attended:
Eastern Pacific Ocean Conference, 2002
Sociedad Chilena de Biologia, 2002
6th International Temperate Reef Symposium, 2003
Benthic Ecology Meeting, 2003

Presentations:
Invited talk, Recruitment dynamics of intertidal invertebrates in the temperate East Pacific. Eastern Pacific Ocean Conference, 2002
Invited talk, Escalas de regulación ambiental en procesos ecológicos. SCB (Sociedad Chilena de Biologia) meeting, 2002
Invited talk, Recruitment dynamics of intertidal invertebrates in the temperate East Pacific. International Temperate Reef Symposium, 2003
Invited talk, Coastal metapopulations and the benthic--pelagic coupling in upwelling ecosystems. Benthic Ecology Meeting, 2003

Publications:
B.R. Broitman, S.A. Navarrete, F. Smith and S.D. Gaines. 2001 Geographic Variation of Southeastern Pacific Intertidal Communities. Marine Ecology Progress Series 224: 21-34.
S.A. Navarrete, B.R. Broitman, E.A. Wieters, G.R. Finke, R.M. Venegas and A. Sotomayor. 2002 Recruitment of Intertidal Invertebrates in the Southeast Pacific: Inter-annual Variability and the 1997-1998 El Niño. Limnology and Oceanography 47: 791-802.

Describe how the SBC-LTER has provided opportunities for your graduate research and education: The large spatial and temporal extent of the SBC-LTER datasets provides a unique opportunity for the interhemispherical comparison I am developing. The LTER network will also foster future collaboration.

STUART GOLDBERG
Department of Ecology, Evolution and Marine Biology
University of California, Santa Barbara, CA 93106-9610
s_goldbe@lifesci.ucsb.edu

Status: Ph.D. student, 1st year

Program: Interdepartmental Graduate Program in Marine Science

Current Advisor: Dr. Craig Carlson

Undergraduate Major: Marine Science

Institution of Undergraduate Degree: University of Maine, Orono

Baccalaureate Degree Award Date: June 2000

Title of Graduate Research Project: SPATIAL AND TEMPORAL VARIATION OF MARINE DOC BIOREACTIVITY IN THE ATLANTIC OCEAN

Areas of Research: Characterization of Marine DOM/DOC; Microbial Ecology

Project Description:
I am funded as a GSRII on the NSF grant entitled Chromophoric DOM: An Ignored Photoactive Tracer of Geochemical Process. This proposal was awarded to Dr. David Siegel, Dr. Craig Carlson, and Dr. Norm Nelson in January 2003. My goal is to characterize the Dissolved Combined Neutral Sugar (DCNS) and Total Carbohydrate (PCHO) fractions of the DOC pool in a means to assess DOM bioreactivity as part of the Repeat Hydrography Program. I will be participating in two 25 day cruises in the Atlantic Ocean in Fall 2003.

Conferences attended:
ASLO 2000, 2002.

Presentations:
Invited talk, Bacterioplankton utilization of zooplankton derived DOM and differential utilization of neutral sugars. ASLO, 2000.
Invited talk, Characterization of DOC dynamics and subsequent response by microbial assemblages in mesocosm experiments performed at the Bermuda Atlantic Time Series Study Site. ASLO 2002.

Publications:
Goldberg S.J., Carlson C.A., Steinberg D.K., and B.R.Wheeler. 2000. Bacterioplankton utilization of zooplankton derived DOM and differential utilization of neutral sugars. EOS 80 (49): 49.
Carlson, C.A., Giovannoni, S,J., Hansell, D,A., Goldberg, S.J., Parsons, R., Otero, M.P., Vergin, K., and B.R.Wheeler. 2002. Effect of nutrient amendments on bacterioplankton production, community structure, and DOC utilization in the northwestern Sargasso Sea. Aquatic Microbial Ecology (30): 19-36.
Carlson, C.A., Giovannoni, S.J., Hansell, D.A., Goldberg, S.J., Parsons, R., and K. Vergin. 2003. Interactions between DOC, microbial processes, and community structure in the mesopelagic zone of the northwestern Sargasso Sea. *In rewiew*.

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
The SBC-LTER program has allowed me to sample the Santa Barbara Channel for DOC and DCNS therefore enabling me to compare coastal DOM bioreactivity to open ocean bioreactivity by via DCNS:DOC ratios.

DARCIE GOODMAN
Donald Bren School of Environmental Science and Management
University of California, Santa Barbara, CA 93106-5131
dgoodman@bren.ucsb.edu

Status: Ph.D. student, 1st year

Program: Environmental Science and Management

Current Advisor: John Melack

Undergraduate Major: Political Science and Marine Biology

Institution of Undergraduate Degree: University of California, Santa Barbara

Baccalaureate Degree Award Date: June 2001

Title of Graduate Research Project: Undecided

Areas of Research: Human disturbance effects of freshwater ecosystem and management efforts aimed at these disturbances

Project Description:
Human land use such as agriculture, urban development, and recreational activities, can create significant adverse impacts on freshwater ecosystems. My research interests concern the effects of human disturbances (such as nutrient input, watershed hydrology, and introduced species) on species composition and nutrient flux. My study sites are likely to be the Devereux and Goleta watersheds; both are impacted by agriculture, urban development and recreational activities. My research will be used to create a comprehensive management plan for the Devereux watershed that will be implemented and managed by Coal Oil Point reserve, University of California Natural Reserve System.

Conferences attended:
Lake Tahoe Presidential Forum,1997
Tahoe-Baikal Institute Conference, 2001.
Tahoe Baikal Institute Conference, 2001.
Western Society of Naturalists, 2002

Presentations:
Invited talk, Predictions of the Reintroduction of the Cutthroat Trout into Fallen Leaf Lake, Tahoe Baikal Institute, 2001
Invited talk, Reintroduction of Cormorants into Lake Baikal Region, Tahoe Baikal Institute, 2001
Human Disturbance Effects on Snowy Plover Population at Coal Oil Point Reserve, Santa Barbara, 2002

Publications:
Lafferty, K.D. et al, 2000. Status Trends and Conservation of Snowy Plover at Coal Oil Point Reserve, Museum of Systematics and Ecology Environmental Report No. 15, University of California, Santa Barbara.
Goodman, Darcie, Evgenia Mikhailovna Pyzhikova, Petr Olegovich Sharov, and Brent Wolfe. 2001. Reintroduction of Cormorants into Lake Baikal Region, Tahoe Baikal Institute, Project Reports.
Goodman, Darcie, Wolfe, Brent, 2001, Predictions of the Reintroduction of the Cutthroat Trout into Fallen Leaf Lake, Tahoe Baikal Institute, Project Reports.
Lafferty, K. D. et. al. 2001. Disturbance to Wintering Snowy Plovers. Biological Conservation 101: 315-325.
Lafferty, K. D., Goodman, D. and Sandoval, C. P. 2003. Response of Shorebirds to a Small Area from Disturbance, Biological Conservation, *in press*.

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
The SBC-LTER has provided me with the opportunity to obtain field experience. I have been collecting stream sample data for LTER researchers Tim Robinson and Scott Coombs for the past 1.5 years for storm nutrient loading data. I also will attempt to incorporate the Goleta watershed into the Santa Barbara LTER study sites once I begin conducting my field research on my watersheds. My involvement with the LTER will provide me with experience in sampling techniques, lab analysis and comparable studies on adjacent sites.

JULIE KELLNER
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9160
kellner@lifesci.ucsb.edu

Status: Ph.D. student, 6th year

Program: Ecology, Evolution, and Marine Biology

Current Advisor: Steve Gaines

Undergraduate Major: Ecology, Behavior and Evolution

Institution of Undergraduate Degree: UC San Diego

Baccalaureate Degree Award Date: June 1996

Title of Graduate Research Project: POPULATION DYNAMICS INFLUENCED BY POINT SOURCES OF DISTURBANCE IN COASTAL MARINE COMMUNITIES: THE ROLE OF TEMPORAL AND SPATIAL VARIABILITY

Areas of Research:
Marine Ecology; Mathematical Biology

Project Description:
One of the prevailing themes in ecology is the manner in which populations respond to spatial and temporal disturbances in their environment. In California, we experience large seasonal and geographic variability in pollutant loading to coastal environments correlated with climatic patterns and urbanization. Accordingly, I present a population-level model incorporating a spatio-temporal intermittent disturbance that emulates the supply of freshwater runoff (and its toxic constituents) to the nearshore environment. Environmental fluctuations in rainfall can alter growth and dispersal rates of nearshore organisms as well as temporally fragment the habitat of these coastal populations. The consequences of this periodic and patchy disturbance on population density and distribution are addressed through the use of various model simulations.

Conferences attended:
UC Toxic Substances and Research Symposium, 1999
UC Toxic Substances and Research Symposium, 2000
UC Toxic Substances and Research Symposium, 2001
UC Toxic Substances and Research Symposium, 2002
UC Toxic Substances and Research Symposium, 2003

Presentations:
None

Publications:
None

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
LTER monitoring conducted at local watersheds will provide background information on the seasonal patterns of watershed runoff that influence the nearshore environment. This information will be useful in both parameterizing and validating my population-level models.

BRIAN P. KINLAN
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
kinlan@lifesci.ucsb.edu

Status: Ph.D. student, 3rd year

Program: Ecology, Evolution, and Marine Biology

Current Advisor: Steven D. Gaines

Undergraduate Major: Biology (B.S.)

Undergraduate Institution: Yale University

Baccalaureate Degree Award Date: May, 1999

Title of Graduate Research Project: LINKING ENVIRONMENTAL FORCING, KELP FOREST HABITAT DYNAMICS, AND COMMUNITY STRUCTURE IN THE NORTHEAST PACIFIC

Areas of Research: kelp forest ecology, physical-biological coupling, climate change, spatial ecology, marine reserve design, biogeography

Project Description:
Habitat-forming species of large brown macroalgae (e.g., kelps) often differ from associated benthic species in resource requirements, sources of disturbance, and dispersal ability. Differences in environmental drivers and demographic processes may cause these habitats to fluctuate at spatial and temporal scales that differ from the "optimal" scale that would promote maximum abundance of any particular associate species. As a result, the spatiotemporal dynamics of habitat may exert important effects on benthic community structure and composition. To quantify the spatial and temporal dynamics of giant kelp (*Macrocystis pyrifera*), a key habitat-former in the NE Pacific, I analyzed a 34-year monthly time series of estimated canopy biomass spanning ~1500 km of coastline (7º of latitude) and digital maps of annual maximum canopy cover. Canopy biomass varied interannually at dominant periods of 4-5 y, 11-13 y and ~20 y, and spatial scales ranging from local (~30 km) to mesoscale (~100-150 km) and regional (~330 km). Temporal dynamics were strongly related to basin-scale climate fluctuations (El Niño-Southern Oscillation, Pacific Decadal Oscillation) and spatial patterns were correlated with coastline geomorphology. Digital canopy maps reveal that changes in biomass are associated with shifts in the spatial structure of the kelp habitat. I am currently using long-term subtidal community monitoring data from areas with different spatial and temporal scales of kelp forest habitat structure to examine the influence of habitat dynamics on the structure of kelp-associated communities. Future changes in the dynamics of Pacific climate fluctuations may have important implications for kelp forest community structure.

Conferences attended:
Ecological Society of America Annual Meeting, 2001
Western Society of Naturalists, 82nd Annual Meeting, 2001
Workshop on Modeling of Larval Dispersal, 2002
PISCO Marine Research Public Symposium, 2002
British Ecological Society Annual Meeting, 2002
Ecological Society of America Annual Meeting, 2002
V Larval Ecology Meeting, 2002
Western Society of Naturalists 83rd Annual Meeting, 2002
Practical Tools for the Design of Marine Reserves, Working Group, National Center for Ecological Analysis and Synthesis, 2002-2004.
6th International Temperate Reef Symposium, 2003
Phycological Society of America Annual Meeting, 2003

Presentations:

Invited talk, Control of periphyton on *Zostera marina* by the Eastern Mudsnail, *Ilyanassa obsoleta* (Say), in a shallow temperate estuary, General Scientific Meetings of the Marine Biological Laboratory, 1997

Invited talk, Persisting in an unpredictable world: arrested development of microscopic sporophytes as a mechanism for delayed recruitment in *Macrocystis*, Western Society of Naturalists, 82nd Annual Meeting, 2001

Poster presentation, Genetic estimates of larval dispersal: patterns and implications for management of marine communities, PISCO Public Symposium, 2002

Invited talk, A comparative analysis of dispersal scale in marine and terrestrial systems, British Ecological Society Annual Meeting, 2002

Invited talk, Propagule dispersal in marine and terrestrial environments: a community perspective, Ecological Society of America Annual Meeting, 2002

Invited talk, Consequences of life history and larval duration for the scale of larval transport, V Larval Ecology Meeting, 2002

Invited talk, Spatial and temporal variability of kelp forest habitat structure in the northeast Pacific, 6th International Temperate Reef Symposium, 2003

Invited talk, Linking environmental forcing, patch dynamics and community structure in kelp forest communities, Symposium on Linking Algae, Oceanography, and Marine Ecology, Phycological Society of America Annual Meeting, 2003

Publications:

Duffy, E. J., B.P. Kinlan, and I. Valiela. Influence of grazing and nitrogen loading on benthic microalgal biomass in estuaries of Waquoit Bay, Massachusetts. 1997. Biological Bulletin 193: 285-286.

Kinlan, B. P., E. J. Duffy, J. Cebrian, J. Hauxwell, and I. Valiela. 1997. Control of periphyton on *Zostera marina* by the Eastern Mudsnail, *Ilyanassa obsoleta* (Say), in a shallow temperate estuary. Biological Bulletin 193: 286-287.

Kinlan, B.P., M.H. Graham, E. Sala, and P.K. Dayton. 2003. Arrested development of embryonic sporophytes in the perennial giant kelp *Macrocystis pyrifera* (Phaeophyceae): a mechanism for delayed recruitment? Journal of Phycology 39(1): 47-57.

Kinlan, B.P. and S.D. Gaines. 2003. Propagule dispersal in marine and terrestrial environments: a community perspective. Ecology 84(6): *In press.*

Siegel, D., B.P. Kinlan, B. Gaylord and S.D. Gaines. 2003. Lagrangian descriptions of marine larval dispersion. Marine Ecology Progress Series *In press.*

Lester, S.E., S.D. Gaines, and B.P. Kinlan. Does dispersal ability determine species' range sizes? American Naturalist *In review.*

Describe how the SBC-LTER has provided opportunities for your graduate research and education:

The SBC-LTER group has facilitated a major component of my thesis work by assembling and making available an extensive database of historical kelp canopy biomass estimates collected over the past 35 years by ISP Alginates, Inc., a San Diego-based kelp harvesting company. Compilation of this database involved hundreds of hours of data entry, quality control and database maintenance by LTER technicians. A variety of LTER core datasets have been and will continue to be useful in my dissertation research. These include mooring-based records of ocean temperature, color and currents and extensive data on water chemistry and the spatial distribution of runoff inputs to kelp forest systems. SBC-LTER has also provided filespace to archive the large database of digitized aerial photographs that I have assembled over the past several years, and a web-based data-server to make relevant data available to the public. Finally, several LTER principal investigators (Reed, Gaines, Siegel) serve on my thesis committee and have played a critical advisory role in my research.

KRISTIE KLOSE
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
klose@lifesci.ucsb.edu

Status: Ph.D. student, 2cnd year

Program: Ecology, Evolution, and Marine Biology

Current Advisor: Dr. Scott Cooper

Undergraduate Major: Biological Science

Institution of Undergraduate Degree: University of California, Santa Barbara

Baccalaureate Degree Award Date: June 1990

Title of Graduate Research Project: EFFECTS OF AN INVASIVE CONSUMER ON STREAM BIOTA OF THE SANTA YNEZ RIVER, SANTA BARBARA COUNTY, CALIFORNIA

Areas of Research: Stream Ecology; Aquatic Invasive/Native Species Interactions; Aquatic Community Ecology

Project Description:
Several land use changes (i.e., construction of dams and canals, urbanization and the conversion of land to agriculture) have significant and long-term effects on freshwater biodiversity and ecosystem function. Many of these land use changes strongly increase the impact of invasive species in freshwater communities. The introduction or invasion of exotic species constitutes one of the most important global ecological problems. In particular, invasions of aquatic species have large potential for altering stream communities, including reductions in the abundances of indigenous taxa. Non-native generalized species often affect local taxa via competition and predation, which may translate into strong effects on freshwater biodiversity, as well as ecosystem structure and function. In Europe and North America, nonindigenous crayfishes have eliminated or reduced native crayfishes, amphibians, other invertebrates, and aquatic vegetation from lakes and streams, apparently displacing fish and invertebrates that use these resources. The red swamp crayfish, *Procambarus clarkii*, is an invasive macroinvertebrate in many lakes and streams throughout the western U.S., including Santa Barbara County, California. Because this species is a generalized omnivore, determining its potential impacts on native taxa is important for predicting community responses to this widespread exotic species in California and elsewhere. My project uses an experimental approach to delineate the effects of a widespread exotic species, the crayfish (*P. clarkii*), on benthic invertebrates and primary producers in the Santa Ynez River. Although previous experiments have demonstrated the important effects of crayfish on benthic stream communities, no studies have examined the effects of invasive crayfish on the abundance and distribution of local stream invertebrate, plant, and algal assemblages. My preliminary results are in agreement with similar studies detailing the effects of other crayfish species on benthic invertebrate prey, suggesting that crayfish have strong impacts on invertebrate prey (e.g., *Physella* sp.). My future research will focus on comparisons of the effects of this exotic crayfish on the biodiversity of the Santa Ynez River and streams elsewhere. This approach will allow me to draw generalizations about the effects of an exotic on native species, and determine responses of local stream biota to an invasive species. Furthermore, determining the effects of the same exotic species on the composition and structure of different communities is critical for predicting complex community responses to habitat encroachment by exotic species, thus providing essential knowledge for guiding resource management decisions.

Conferences attended:
UC Toxic Substances Research and Training Symposium, 1994
UC Toxic Substances Research and Training Symposium, 1995
Western Society of Naturalists, 2002

Presentations:

Poster presentation, Cascading trophic interactions at a eutrophic lake: a study of food web manipulations at Zaca Lake. UC Toxic Substances Research and Training Symposium, 1994

Poster presentation, Biomanipulation as a means of controlling algal biomass in eutrophic lakes. UC Toxic Substances Research and Training Symposium, 1995

Publications:

Girguis, P.R., J.J. Childress, J.K. Freytag, K. Klose, and R. Stuber. 2002. Effects of metabolite uptake on proton-equilvalent elimination by two species of deep-sea vestimentiferan tubeworm, *Riftia pachyptila* and *Lamellibrachia* cf *luymesi*: proton elimination is a necessary adaptation to sulfide-oxidizing chemoautotrophic symbionts. The Journal of Experimental Biology 205: 3055-3066.

Childress, J.J., R. Lee, J. Company, and K. Klose. Pathways of utilization and internal pools of inorganic nitrogen in the hydrothermal vent tubeworm, *Riftia pachyptila*, symbiosis. Journal of Experimental Biology. *in preparation.*

Childress, J.J., R. Lee, M.C.Kennicutt, K. Klose, N. Desaulniers, and R. Petty. Resolution of a paradox? Positive shift in delta ^{13}C of inorganic carbon in hydrothermal vent tubeworms. Limnology and Oceanography. *in preparation*.

Girguis, P.R., J.J. Childress, F. Zal, and K. Klose. Proton equivalent elimination by the tubeworm, *Riftia pachyptila*: ramifications for inorganic metabolite transport. The Journal of Experimental Biology. *in preparation*.

Girguis, P.R., J.J. Childress, K.Klose, and M.Delacruz. Growth and primary productivity in the deep sea: contributions of *Riftia pachyptila* to vent primary production. Deep-Sea Research. *in preparation*.

Girguis, P.R., J.J. Childress, and K.Klose. Nitrogen metabolism of the tubeworm, *Riftia pachyptila*: stable isotope evidence for symbiont sustained growth. *in preparation*.

Describe how the SBC-LTER has provided opportunities for your graduate research and education:

The funding I received from SBC-LTER during 2002 was critical to completing the first year of my Ph.D. research goals. The financial support awarded to me was used to pay for the cost of building materials, supplies, chemical analyses, and travel expenses in support of my research. SBC-LTER funding was imperative to completing the research that I performed during spring 2002, and will play a significant role in my ability to complete future research supporting the goals of SBC-LTER.

TITHOMIR KOSTADINOV
Institute for Computational Earth System Science
University of California, Santa Barbara, CA 93106-3060
tiho@icess.ucsb.edu

Status: M.S. / Ph.D. student, 1st year

Degree Program: Ph.D. in Geography

Current Advisor: David A. Siegel

Undergraduate Major: Biology

Institution of Undergraduate Degree: University of Richmond

Baccalaureate Degree Award Date: May 2002

Title of Graduate Research Project: PLUMES AND BLOOMS – DEVELOPMENT OF A UNIFIED CASE II OCEAN COLOR ALGORITHM.

Areas of Research: Optical Oceanography and Bio-optical algorithms

Project Description:
I work in the area of satellite optical oceanography, i.e., ocean color remote sensing. The color of the ocean, as determined by the spectral shape of the water leaving radiance, is influenced to a high degree by the biological, sediment, and colored dissolved organic matter (CDOM) load of the ocean water. For example, the higher the chlorophyll concentration, the greener the water, as chlorophyll absorbs blue and red light for photosynthesis. Purely empirical band-ratio algorithms work well in the open ocean, where only chlorophyll and covariates influence ocean color. But semi-analytic (SA) ocean color algorithms that simultaneously retrieve several unknowns are needed to characterize the state of optically complex (Case II) ocean water, which includes most coastal waters. For example, the GSM (Garver-Siegel-Maritorena) SA algorithm's retrievals are chlorophyll-a concentration, CDOM absorption and particulate backscattering at a reference wavelength. The model needs specific chlorophyll absorption, the spectral decay constant for CDOM, and the power-law exponent for the particulate backscattering coefficient as parameter inputs. Tuning the model amounts to choosing the input parameters such that the difference between in-situ observed values and the algorithm retrievals is minimized. The GSM model has been globally tuned, but the input parameter values are not necessarily valid in coastal waters, which are economically important. The Plumes and Blooms Project at UCSB led by Dr. David Siegel, has gathered an extensive in-situ optical dataset that allows for local tuning of the GSM model. In my research I intend to perform that local tuning for the Santa Barbara Channel, as well as for some other areas, and attempt to parametrically link these Case II sites in an effort to create a globally valid Case II algorithm. Model retrievals will be applied to satellite imagery and compared to in-situ datasets to evaluate model performance.

Conferences attended:
None

Presentations:
None

Publications:
None

Describe how the SBC-LTER has provided (or how you anticipate it will provide) opportunities for your graduate research and education:
My proposed research and the Plumes and Blooms project are an integral part of the Santa Barbara Channel LTER site. Since the primary goal of the SBC LTER group is to assess land and ocean ecosystem variables

controlling kelp forest distribution, dynamics and primary production, it is essential that good quality and high resolution (temporal and spatial) data be available on terrestrial runoff and sediment load in the channel as well as chlorophyll concentrations in the ocean water, and hence primary production. These data can best be gathered by satellite ocean color remote sensing, such as SeaWiFS and MODIS. Unfortunately, straightforward empirical band-ratio algorithms will NOT work in the Santa Barbara Channel waters, as they are optically complex, case II coastal waters. Thus, in order to retrieve valuable satellite data, locally tuned multiple-variable semi-analytical algorithms should be used, such as the Garver-Siegel-Maritorena model. My goal is to locally tune and test the GSM algorithm, which should provide the SBC LTER research team with reliable satellite retrievals of key variables. Thus, my research is closely tied to the main research goals of the SBC LTER and I expect to collaborate with other researchers in the group and actively participate in the site activities in the future.

SARAH E. LESTER
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
lester@lifesci.ucsb.edu

Status: Ph.D. student, 3rd year

Current Advisor: Steven D. Gaines

Degree Program: Ecology, Evolution, and Marine Biology

Undergraduate Major: Environmental Science & Engineering, BS

Institution of Undergraduate Degree: University of North Carolina at Chapel Hill

Baccalaureate Degree Award Date: May 1998

Title of Graduate Research Project: I haven't formally titled it, but tentatively: "THE EFFECT OF DISPERSAL ON MARINE SPECIES' DISTRIBUTIONS."

Areas of Research: Marine Biogeography and Determinants of Range Boundaries for Coastal Species; Temporal and Spatial Variability in Marine Communities; Marine Conservation and Fisheries Management

Project Description:
My thesis research examines the effect of dispersal on marine species' distributions at two different scales. At the global scale, dispersal ability has been suggested to be important in determining how widespread a species is. At the local scale, dispersal may play an important role in setting marine species' range boundaries. There is considerable variation in species' geographic range sizes, even among closely related species, and dispersal ability is one proposed explanation for this variation. I conducted one of the first rigorous tests of a positive range size-dispersal distance relationship using quantitative dispersal estimates for two marine datasets (Lester et al., in review). Contrary to expectations, my analyses indicate that dispersal ability and range size are not positively related. For the remainder of my graduate work, I will focus on a more local scale, examining the determinants of several coastal marine species' range limits. Traditionally, biologists have assumed that range boundaries usually result from a species reaching a physiological limit, such as maximum temperature tolerance. However, recent theoretical work for marine systems suggests that ocean circulation patterns and their interaction with species' dispersal potential may often be important in establishing range limits, but there is a lack of experimental work to validate this theory. I will conduct my research in the Santa Barbara Channel region because many species have range limits at Point Conception. The converging currents at Point Conception and the dramatically different thermal environments on either side of the point provide the ideal study system for examining the relative importance of dispersal barriers versus physiological tolerance limits in setting species' range limits.

Conferences attended:
Benthic Ecology Meeting, 1999
Benthic Ecology Meeting, 2000
Western Society of Naturalists, 2000
Ecological Society of America, 2001
Western Society of Naturalists, 2001
Larval Biology Meeting, 2002
Western Society of Malacologists, 2002
Western Society of Naturalists, 2002

Presentations:
Invited talk, Complexity, instability, and uncertainty regarding algal polyphenolics as herbivore deterrents. Benthic Ecology Meeting, 1999

Invited talk, Survivorship and growth of an herbivorous amphipod raised on a phlorotannin-rich diet. Benthic Ecology Meeting, 2000

Invited talk, Does dispersal ability determine species' range sizes? A macroecological investigation using marine datasets. Western Society of Naturalists Meeting, 2002

Invited talk, Temporal trends in shallow nearshore and deeper continental shelf fishes since 1977; do similar responses suggest a common mechanism behind observed declines? Southern California Academy of Sciences Meeting, 2003

Publications:

Lester, S. E., S. D. Gaines, and B. P. Kinlan. Does dispersal ability determine species' range sizes? American Naturalist *in review.*

Kubanek, J., M. E. Hay, S. E. Lester, and W. H. Fenical. Complexity of phlorotannin function in the brown alga *Fucus vesiculosus*: Deterrence of other metabolites confounds tannin activity. *in preparation.*

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:

My planned thesis work, investigating the effect of dispersal barriers in setting coastal species' geographic range boundaries, is related to several of the SBC-LTER research goals. Thus, by focusing on species with borders at Point Conception, at the western edge of the Santa Barbara Channel, I will benefit from the SBC-LTER work being done in this region. For one, the SBC-LTER is examining the effect of coastal ocean processes on population level parameters. The oceanographic data, particularly ocean circulation and temperature data, being collected by the LTER will provide me with important information for inferring how larval dispersal and recruitment and oceanographic conditions may be limiting species' distributions. Furthermore, the SBC-LTER is interested in reef community changes as a result of climatic shifts. My research is an integral part of this question. To predict how species' distributions will change in response to climatic and other regime shifts, we must first understand why species currently occur where they do. Whether the coincidence of species borders at Point Conception is driven by the sharp temperature gradient there, the complex circulation patterns that may limit larval recruitment, or some combination of these two factors, is crucial to understanding how species distributions and community composition may change along the California coast in the future.

STUART LEVENBACH
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
levenbac@lifesci.ucsb.edu

Status: Ph.D. student, 3rd year

Current Advisor: Russ Schmitt, Sally Holbrook

Program: Ph.D. in Ecology, Evolution, and Marine Biology

Undergraduate Major: Political Science, Biology

Institution of Undergraduate Degree: University of Michigan

Baccalaureate Degree Award Date: May 1996

Title of Graduate Research Project: HUMAN AND NATURAL CAUSES OF VARIATION IN BENTHIC COMMUNITIES ON NEARSHORE ROCKY REEFS

Areas of Research: Marine Community Ecology

Project Description:
My research focuses on physical and biological factors that influence the benthic community on nearshore rocky reefs. Specifically, I am investigating the interaction among colonial sea anemones, sea urchins, and algal turf and how these interactions are influenced by terrigenous inputs (i.e., silt). My research to date indicates that exposure to silt impairs growth and reproduction in anemones, and that the presence of these anemones can impede the movement of sea urchin grazers. Current research supplements lab results with in situ manipulations of urchin, anemone, and algal turf densities, as well as studying anemone demographic rates over a gradient of terrestrial input.

Conferences attended:
UC Toxic Substance Research and Teaching Program 13th Annual Research Symposium, 2000
LTER All Scientist Meeting, 2000
Ecological Society of America 2000
UC Toxic Substance Research and Teaching Program 14th Annual Research Symposium, 2001
Western Society of Naturalists, 2001
UC Toxic Substance Research and Teaching Program 15th Annual Research Symposium, 2002
Western Society of Naturalists, 2002
UC Toxic Substance Research and Teaching Program 16th Annual Research Symposium, 2003

Presentations:
Poster presentation, UC Toxic Substance Research and Teaching Program Research Symposium, 2000
Poster presentation, UC Toxic Substance Research and Teaching Program Research Symposium, 2001
Poster presentation, UC Toxic Substance Research and Teaching Program Research Symposium, 2002
Poster presentation, UC Toxic Substance Research and Teaching Program Research Symposium, 2003

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
The SBC-LTER has been instrumental in enabling me to pursue my research interests. Many of my hypotheses regarding benthic reef community structure were inspired in part by patterns observed in SBC LTER- generated data. Collaboration with the SBC LTER provided the data and ideas that enabled me to secure an extramural, 3-year grant from the University of California Marine Council. The SBC LTER has also generously supported me with boat time and funding for research materials. I continue to seek input from SBC LTER PIs on important issues such as experimental design, methods development, and data analysis.

CRAIG NELSON
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, 93106-xxx
cr_nelson@lifesci.ucsb.edu

Status: Ph.D student, 1st year

Program: Ecology, Evolution, and Marine Biology

Current Advisors: John Melack & Scott Cooper

Undergraduate Major: Double – Biology & English

Institution of Undergraduate Degree: UC Berkeley

Baccalaureate Degree Award Date: May 1998

Title of Graduate Research Project: Undecided

Areas of Research: Limnology; Microbial Ecology; Biogeochemistry

Project Description:
I am interested in connecting microbial community structure with biogeochemical transformations in freshwater systems. I also hope to incorporate some investigation of the broader linkages between community properties and nutrient processing. Currently I anticipate examining the role of microbial transformations of nitrogen in coastal runoff environments of the Southern California urban coastline. The Santa Barbara Coastal LTER is ideal for answering this question because of the data already integrated on land-use patterns, nutrient and toxicant loading, hydrology, and water chemistry of coastal catchments in urban, suburban and agricultural areas.

Conferences attended:
None

Presentations:
None

Publications:
None

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
Although I am not currently funded by the LTER, I already have benefited greatly from the project. I have taken coursework in data management using the LTER as an example of the future of ecological databases. I have relied on the hydrology and hydrochemistry data from the terrestrial portion of the project to begin designing sampling protocols for investigations of nitrate amelioration in coastal runoff. Because of my interdisciplinary interests in microbial ecology, I have received considerable intellectual support from PI's, post-docs and graduate students who work on this topic in oceanic, nearshore, and terrestrial environments. I chose UC Santa Barbara as my graduate institution specifically because of the integrative nature of the LTER project here. This project emphasizes the linkages between basic science and management concerns and fosters collaboration between marine, freshwater and terrestrially-focused scientists; an environment which I felt would stimulate my interests in overlapping applied sciences with basic ecology and biogeochemistry. So far I have been honestly impressed with the degree of collaboration and the constant encouragment I have received to explore and integrate within and outside of the project.

SOPHIE PARKER
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
parker@lifesci.ucsb.edu

Status: Ph.D student, 2nd year

Current Advisor: Joshua Schimel

Degree Program: Ecology, Evolution, and Marine Biology

Undergraduate Major: Biological Sciences

Institution of Undergraduate Degree: Wellesley College

Baccalaureate Degree Award Date: May 1999

Title of Graduate Research Project: NITROGEN LOSSES FROM NATIVE PERENNIAL AND EXOTIC ANNUAL GRASSLANDS IN CALIFORNIA

Areas of Research: Ecosystem Ecology; Grassland Nutrient Cycling; Soil Ecology

Project Description:
Given that nitrogen is the most common limiting nutrient in California grassland soils, and that the introduction of even a single plant species can have large effects on nitrogen cycling in an ecosystem, the invasion of native perennial bunchgrass communities by exotic species of annual grasses from Europe raises many questions regarding the processing and retention of nitrogen in these systems. We have employed a mechanistic approach to understanding these changes by using experimental grassland plots with homogeneous initial soils. Plots were seeded with a mix of either native perennial grasses (*Nassella pulchra*, *Bromus carinatus*, and *Elymus glaucus*) or nonnative annuals (*Bromus hordeaceus*, *Bromus madritensis*, and *Hordeum murinum*). We quantified leaching losses of nitrate, ammonium, and dissolved organic nitrogen, and measured rates of microbial nitrogen transformations (mineralization, nitrification, and denitrification) to examine the relative importance of these different processes in contributing to nitrogen loss from each grassland type. Nitrogen fertilization was used as a tool to better understand process interactions. Exotic annual grass stands may be somewhat more "leaky" with regard to nitrogen than stands of native perennial grasses. Seasonal trends in microbial process rates that correspond with soil moisture indicate that rates of nitrification and denitrification, as well as leaching losses, are controlled by rainfall, or the lack thereof. In dry years, low soil moisture may be more important than species composition in determining nitrogen losses from grasslands, while the differences in plant phenology and microbial process rates in annual and perennial grassland soils may be more important in wetter years.

Conferences attended:
Ecological Society of America, 2002
Soil Ecological Society Meeting, 2003
Ecological Society of America, 2003

Presentations:
Nitrogen losses from native perennial and exotic annual grasslands in California, Soil Ecological Society Meeting, 2003.

Publications:
None

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
The SBC-LTER has provided me with funding during the winter and spring of 2003, and allowed me to focus intently on my research for the duration of these two quarters. During this period of time I have been

able to conduct some time-sensitive and weather-dependent analyses that would have been difficult to schedule, had I been committed to teach to support myself and pay tuition as a graduate student. In addition to the funding, the LTER retreat provided a valuable opportunity for me to link my research into a broader picture of the ecosystem processes that are happening along the Santa Barbara coastline.

ANDREW RASSWEILER
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
rassweil@lifesci.ucsb.edu

Status: Ph.D. student, 2nd year

Current Advisor: Sally Holbrook

Program: Ecology, Evolution, and Marine Biology

Undergraduate Major: Ecology and Evolutionary Biology

Institution of Undergraduate Degree: Princeton University

Baccalaureate Degree Award Date: June 2000

Title of Graduate Research Project: Undecided

Areas of Research: Marine ecology

Project Description:
In the Santa Barbara Channel, several distinct communities have been observed to persist for extended periods at adjacent sites that are physically similar to one another. Additionally, the species assemblage at each site exhibits major shifts site over time, suggesting that alternative assemblages may be possible. I am interested in two dramatically different states, one dominated by benthic macroalgae, and the other dominated by filter feeders, particularly the sea cucumber, *Pachythyone rubra,* and the brittle star, *Ophiothrix spiculata*. I will experimentally investigate how filter feeder dominated communities are maintained; testing how the reinvasion of macroalage is prevented at such sites. I will also test whether macroalgal communities can become established and persist in cleared areas within sites dominated by filter feeders. My research will add to our understanding of the forces that determine what assemblages are found on rocky reefs in the Santa Barbara channel.

Conferences attended:
9th International Coral Reef Symposium, 2000
Western society of Naturalists 2001
Western society of Naturalists, 2002
UC TSR&TP 2002 (University of California Toxic Substances Research and Teaching Program)
UC TSR&TP 2003

Presentations:
None

Publications:
None

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
The SBC-LTER has been central to my graduate education so far. It has provided me with stipend support and has given me the opportunity to get into the field regularly and get the experience necessary to do my own work on rocky reefs in the channel. Through diving with experienced scientists on an established project I have learned both the natural history of the system and the most effective ways to conduct science in it. The SBC-LTER has also placed my interest in the ecology of rocky reefs within a broader context. LTER based retreats and seminars have brought me together with faculty and graduate students who are working on the terrestrial and ocean components of the SBC-LTER and with whom I would not have otherwise interacted.

Though I have not begun field work on my own project, the LTER has helped by supplying the data and knowledge base necessary for me to effectively plan my work. Though the SBC-LTER has not accumulated a long enough dataset to evaluate how costal species assemblages change over time, it provides a valuable spatial extension to the dataset that has already been accumulated at island sites by the National Park Service. As I begin my own field work this summer, I anticipate that my association with the LTER will continue to be valuable; it will provide me with guidance in my research, technical advice and logistical support.

TIMOTHY H. ROBINSON
Bren School of Environmental Science and Management
University of California, Santa Barbara, CA 93106-5131
trobinson@bren.ucsb.edu

Status: Ph.D. student, 4th year

Current Advisors: Arturo A. Keller and John M. Melack

Program: Environmental Science and Management

Undergraduate Major: Geography

Institution of Undergraduate Degree: University of Oregon

Baccalaureate Degree Award Date: Bachelor's of Science, 1983

Master Major: Geography

Institution of Graduate Degree: University of California, Santa Barbara

Master Degree Award Date: Master of Arts, 1993

Title of Graduate Research Project: WATERSHED SCALE EFFECTS OF LAND USE ON NUTRIENT LOADING TO SOUTHERN CALIFORNIA STREAMS

Areas of Research: Water Quality, Watershed Analysis, and GIS Technologies

Project Description:
Along the southern California coast, near Santa Barbara, I am measuring nutrient runoff from specific landuses and developing a model to predict nutrient export at a watershed scale. The area is characterized by a Mediterranean climate and short steep catchments producing flashy runoff. The six landuse classes include chaparral, avocado orchards, greenhouse agriculture, open-field nurseries, residential, and commercial. Sampling sites are located on defined drainages or storm drains that collect runoff from relatively homogeneous areas representing each landuse. Stream water samples are taken once a week during the rainy season, every two weeks during the dry season and every one to four hours during storms. I model flow at all sampling sites from stage measurements derived from pressure transducers fixed to the bottom of the stream. Staff gauges are installed for monitoring stage during sampling. A watershed scale model is being developed and calibrated to simulate nutrient export using the field data. The model is based on land use, precipitation and antecedent soil moisture conditions. The objective is to create a robust model that uses derivable parameters in a simple and cost efficient manner that can be extended to all coastal watersheds with similar landuse and a Mediterranean climate. It is constructed in a dynamic environment of ArcGIS, Arc Hydro geodatabase model, Visual Basic for Applications (VBA) and MS Excel/Access. I am deriving export coefficients for NO_3-N, NH_4-N, and PO_4-P (SRP). The final phase of the research will be to loosely couple the nutrient export model with an urban growth model (SLEUTH, UCSB) that predicts future land use patterns in the Santa Barbara area. This tool will enable the evaluation of future water quality and potential best management practices.

Conferences attended:
University of California Toxic Substances Research & Teaching Program, Annual Symposium, Oakland, California, April, 2003
XXII Annual ESRI International User Conference, Environmental System Research Institute, San Diego, California, July, 2002
Spring Conference of Coastal Water Resources, American Water Resources Association, New Orleans, May, 2002
California and the World Ocean '02 Conference, Santa Barbara, California, October 2002
Southern California Wetlands Recovery Project 2002 Symposium, Ventura, California, October, 2002

University of California Toxic Substances Research & Teaching Program, Annual Symposium, Long Beach, California, April, 2002

Presentations:

Poster: University of California Toxic Substances Research & Teaching Program, Annual Symposium (4/03) , "Nutrient Loading to Carpinteria Valley Streams and Nutrient Export Coefficient Modeling", Oakland, California

Speaker: Wetlands Restoration Ecology seminar (11/2), "Nutrient Loading in Coastal Streams, Variation with Land Use in the Carpinteria Valley", UC Santa Barbara

Speaker: Carpinteria Salt Marsh Docents monthly seminar (10/02), "Nutrient Loading in Coastal Streams, Variation with Land Use in the Carpinteria Valley", Carpinteria

Speaker: California and the Worlds Oceans '02 Conference (10/02), "Santa Barbara Coastal Long Term Ecological Research (LTER): Nutrient Concentrations in Coastal Streams and Variations with Land Use in the Carpinteria Valley, California", Santa Barbara

Speaker: Watershed Science Group Lecture Series (10/02), "Nutrient Loading in Coastal Streams, Variation with Land Use in the Carpinteria Valley", UC Santa Barbara

Poster: Southern California Wetlands Recovery Project 2002 Symposium (10/02), "Nutrient Concentrations in Coastal Streams, Variations with Land Use in the Carpinteria Valley, California", Ventura

Speaker: Coastal Water Resources, American Water Resources Association 2002 Spring Conference (5/02), "Nutrient Concentrations in Southern Californian Streams Related to Land Use", New Orleans

Speaker: Santa Barbara Coastal LTER Seminar (5/02), "Nutrient Concentrations in Southern Californian Streams Related to Land Use", UC Santa Barbara

Poster: University of California Toxic Substances Research & Teaching Program, Annual Symposium (4/02) , "Nutrient Concentrations in Southern Californian Streams Related to Land Use", Long Beach, California

Speaker: PhD Seminar (4/02), "Nutrient Concentrations in Coastal Streams, Variation with Land Use in Carpinteria Valley", Bren School of Environmental Science and Management, UC Santa Barbara

Presenter: Jason XIV: From Shore to Sea (2/02). Educational Video produced by the JASON Foundation for Education, Needham Heights, Ma.

Publications:

Robinson, Timothy H., Al Leydecker, John M. Melack and Arturo A. Keller. 2003. Nutrient Concentrations in Coastal Streams and Variations with Land Use in the Carpinteria Valley, California. California and the World Ocean '02 Conference. American Society of Civil Engineers. Santa Barbara, California, October.

Robinson, Timothy H., Al Leydecker, John M. Melack and Arturo A. Keller. 2002. Nutrient Concentrations in Southern California Streams related to Landuse. Coastal Water Resources, AWRA 2002 Spring Specialty Conference Proceedings, Lesnick, John R. (Editor). American Water Resources Association, Middleburg, Virginia, TPS-02-1, pp 339-343.

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
The SBC-LTER project has paid for the laboratory analytical costs for most of the stream water samples I have taken over the last two years. This has been a significant financial assistance and contribution to my research. In addition, I have had two stream samplers during the last two years who are paid by the SBC-LTER project. They, plus a host of volunteers, compose the Carpinteria Stream Team who collect stream water samples during storms at my land use and LTER basin outlet sites in the Carpinteria area. I am deeply indebted to their efforts on my behalf as well as to the LTER project for the hourly salary given to two of my key stream team members. Collaboration with other LTER researchers at UCSB has also been extremely beneficial to my project and enhanced general learning, not only with the terrestrial component but the marine research as well.

NATALIE SENYK
Institute for Computational Earth System Science
University of California, Santa Barbara, CA 93106-3060
talia@icess.ucsb.edu

Status: Ph.D. student, 3rd year

Program: Geography

Current Advisor: David A. Siegel

Undergraduate Major: Environmental Science/Marine Science

Institution of Undergraduate Degree: Rutgers University

Baccalaureate Degree Award Date: May 2000

Title of Graduate Research Project: USING REMOTELY SENSED DATA TO MAP OPTIMAL HABITAT AND PERSISTENCE OF GIANT KELP, *MACROCYSTIS PYRIFERA*

Areas of Research: Oceanography, Marine Ecology

Project Description:
I am using remotely sensed data to develop a model for giant kelp optimal habitat. Optimal habitat is defined by four parameters: bathymetry, bottom type, sea surface temperature and maximum wave height. I am currently analyzing persistence patterns of kelp in the Santa Barbara Channel.

Conferences attended:
California and the World Ocean, 2002
American Society of Limnology and Oceanography, 2003

Presentations:
Poster presentation, California and the World Ocean, 2002

Publications:
Proceedings, California and the World Ocean

Describe how the SBC-LTER has provided (or how you anticipate that it will provide) opportunities for your graduate research and education:
The SBC-LTER has provided me with data on kelp productivity and a community with which to interact, assisting me in validating and optimizing the theoretical model.

JULIE SIMPSON
Department of Ecology, Evolution, and Marine Biology
University of California, Santa Barbara, CA 93106-9610
simpson@lifesci.ucsb.edu

Status: Ph.D. student, 4th year

Current Advisors: Scott Cooper, John Melack, Josh Schimel

Degree Program: Ecology, Evolution, and Marine Biology

Undergraduate Major: Biology, minor in Marine Science

Institution of Undergraduate Degree: State University of New York, Stony Brook

Baccalaureate Degree Award Date: May 1998

Title of Graduate Research Project: BIOLOGICAL UPTAKE AND TRANSFORMATIONS OF NITROGEN AND PHOSPHORUS IN SOUTHERN CALIFORNIA COASTAL STREAMS

Areas of Research: Freshwater and Estuarine Ecosystem Ecology; Plant and Algal Community Ecology; Limnology

Project Description:
The south coast of California has been subject to substantial development in recent decades, and the human population in this region continues to grow rapidly. Changes in both the intensity and the type of land use often result in increases in nutrient inputs (principally nitrogen and phosphorus) to nearby streams and rivers, and subsequent transport of these nutrients to the coastal ocean. Biological processing of nitrogen and phosphorus in stream water can alter both the form and the absolute amount of N and P which are delivered to coastal systems. I am conducting research to determine answers to the following questions: 1) How do changes in nutrient concentrations affect the composition of photosynthetic communities in streams and rivers, and 2) How do different components of the photosynthetic communities (algae, vascular plants, cyanobacteria) function with regard to nutrient processing, and how do those functions change across streams receiving a wide range of nutrient inputs? Through a combination of monitoring and experiments, I ultimately hope to develop a predictive model for the community-level and functional responses of stream communities to land use changes on the south coast of California.

Conferences attended:
Estuarine Research Federation, 1999
LTER All Scientists Meeting, 2000
Ecology Society of America, 2000

Presentations:
Poster presentation, Mechanisms of displacement of coastal marsh plants by the invasive grass *Phragmites australis*. Estuarine Research Federation 1999.

Publications:
Minchinton, T.E., J.C. Simpson, and M.D. Bertness. Mechanisms of displacement of coastal marsh plants by the invasive grass, *Phragmites australis*. *in preparation.*

Describe how the SBC-LTER has provided opportunities for your graduate research and education:
Being a part of the SBC-LTER has been a great educational experience for me. In addition to providing financial support for my research, it has been very interesting to see how my work fits into a larger context. My graduate education has been invaluably enriched by seminars and meetings with other LTER researchers who are working in such diverse fields as oceanography, hydrology, and kelp forest ecology. Conversations and collaborations with other researchers in the terrestrial group, who are working on

different aspects of the same coastal stream systems, have given me a much broader understanding of those systems and engendered new research questions, often requiring multi-disciplinary approaches to finding answers.

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Appendix VI Site Review Agenda and Schedule

Tentative Agenda
SBC LTER Site Review
June 1-3, 2003

Sunday June 1

8:00 PM	Panel and NSF observers meet at Upham Hotel for briefing

Monday June 2

7:30 AM	Van pickup at hotel for boat trip out of SB harbor
8:00 AM	Depart SB harbor for cruise of SB Channel (welcome by Dean Moskovits and SBC overview by Dan Reed)
12:00 PM	Return to Harbor - Lunch
1:00 PM	Depart for field trip of SB watersheds
4:30 PM	Return to hotel from field trips
5:00 PM	Review team caucus at hotel
5:30 PM	Van pickup at hotel for social at the Donald Bren School at UCSB
5:45 PM	Poster social with LTER graduate students
7:00 PM	Dinner with SBC Executive Committee
9:00 PM	Return from dinner to hotel

Tuesday –June 3

7:30 AM	Van pickup at hotel for project presentations at UCEN meeting room on UCSB campus
8:00 AM	Introduction to morning presentations
8:15 AM	Synthetic Research presentations and discussion
9:45 AM	Break
10:00 AM	SBC Outreach Program
10:30 AM	SBC Information Management
11:00 AM	IM Panelist meets with SBC IM team, other panelists meet with SBC Investigators and post docs
11:00 AM	NSF observers meet with UCSB administrators
12:00 PM	Lunch
1:00 PM	Panel deliberations and report preparations in Bren School conference room
4:30 PM	SBC Executive Committee meets with Panel to discuss report.
6:00 PM	Adjourn - Panel departures-(van transport to airport or hotel provided)