

May 2006

## CURRICULUM VITAE OF FRANCES P. WILKERSON

### PERSONAL:

UK Citizen, USA Resident Alien (green card)

### CURRENT POSITION:

Lecturer and Adjunct Professor, Department of Biology,  
Senior Research Scientist, Romberg Tiburon Centers  
San Francisco State University, San Francisco, CA

### EDUCATION:

1974-77 New Hall, University of Cambridge, UK.  
1977 BA. Natural Sciences (Honors), University of Cambridge, UK.  
1977-80 Botany Department, University of Bristol, UK.  
1980 MA. University of Cambridge, UK.  
1980 Ph.D. University of Bristol, UK., Advisor: Sir David C. Smith F.R.S.

### POSITIONS HELD:

1973-74 Junior Technician, Royal Postgraduate Medical School, London, UK.  
1977-79 Undergraduate Tutor, Goldney Hall, University of Bristol, UK.  
1978-80 Undergraduate Demonstrator, Department of Botany, University of Bristol, UK.  
Instructor, Brunel Technical College, Bristol, UK.  
1981-82 Visiting Postdoctoral Fellow, University of California, Los Angeles, CA,  
1983-84 Visiting Postdoctoral Fellow, University of California, Santa Barbara, CA  
1984-89 Research Associate, Allan Hancock Foundation, University of Southern  
California  
1985 Consultant, Woodward Clyde Associates on behalf of the Greek Government  
1985 Visiting Scientist, Station Zoologique, Villefranche-sur-Mer, France  
1989- Assistant Research Professor, Department of Biological Sciences, University of  
Southern California  
1994 Visiting Scientist, Institute of Marine Biology, Crete, Greece  
1996 Associate Research Faculty, Department. Biological Sciences, University of  
Southern California  
1996 Acting Director, Graduate Program in Ocean Sciences, University of Southern  
California  
1996 Lecturer, Adjunct Faculty, Department of Biology, San Francisco State  
University, San Francisco, CA

## **HONORS/AWARDS:**

1977-80 Natural Environment Research Council (NERC) Research Scholarship  
1980-83 NERC-NATO Postdoctoral Fellowship  
1981 Pauley Foundation Grant-In-Aid, Hawaii Institute of Marine Biology  
1983-89 Allan Hancock Fellow, University of Southern California, Los Angeles  
2004 Honorary Fellow, California Academy of Sciences

## **PROFESSIONAL ACTIVITIES/MEMBERSHIPS/ABILITIES:**

Editor, *Advances in Space Research*  
Journal Reviewer for *Limnology & Oceanography*, *Biological Bulletin*, *Marine Biology*, *Estuaries*, *Marine Ecology Progress Series*, *Coral Reefs*, *Journal of Exp. Marine Biology and Ecology*, *Deep Sea Research*, *Harmful Algal Blooms* etc.  
Proposal Reviewer for NSF Biological Oceanography, NSF Chemical Oceanography, NSF Polar Programs, SeaGrant, NOAA  
Panel Member, EcoHAB  
Annotator for *Thalassiosira pseudonana* complete genome sequencing project, Joint Genome Institute 2003  
Conference Organizer for AGU Chapman Conference, The role of diatom production and silica flux and burial in the regulation of global cycles. Paros, Greece, 2003  
Organizer, Equatorial Oceanography Workshop for Teachers, RTC, 2004  
Member, American Society of Limnology & Oceanography, Biological Society of Washington, Phycological Society of America, The Oceanography Society, American Geophysical Union, Estuarine Research Federation  
Certified scuba diver (NAUI), French, German

## **RESEARCH INTERESTS:**

Nitrogen dynamics of algae (oceanographic, physiological and molecular)  
Biological oceanography of upwelling  
Effects of El Niño on oceanographic processes  
Diatoms  
Marine impact of sewage outfalls  
Symbiotic associations  
Coral reef biology, cnidarians and jellyfish

## PUBLICATIONS:

(\*reviewed, no published abstracts included here)

1. Wilkerson, F.P. 1980. Phosphorus in the green hydra symbiosis. Ph.D. Thesis, University of Bristol, UK. 164 p.
- \* 2. Wilkerson, F.P. 1980. Bacterial symbionts on green hydra and their effect on phosphate uptake. Microbial Ecology 6: 85-92.
- \* 3. Wilkerson, F.P. The phosphorus economy of green hydra symbiosis. In: Nutrition in the Lower Metazoa. D.C. Smith and Y. Tiffon (Eds). Pergamon Press. pp. 149-156.
4. Wilkerson, F.P. Symbionts involved in phosphate uptake by green hydra. 1980. In: Endocytobiology, Endosymbiosis and Cell Biology. Vol. 1. W. Schwemmler and H.E.A. Schenk (Eds). pp. 269-277.
- \* 5. Wilkerson, F.P., G. Muller Parker and L. Muscatine. 1983. Temporal patterns of cell division in natural populations of endosymbiotic algae. Limnology and Oceanography 28: 1009-1014.
- \* 6. Wilkerson, F.P. and L. Muscatine. 1984. Uptake and assimilation of dissolved inorganic nitrogen by a tropical sea anemone. Proceedings of the Royal Society, London. B 221: 71-86.
7. Wilkerson, F.P. and R.C. Dugdale. 1984. Possible connections between sewage effluent, nutrient levels and jelly-fish blooms. In: Proceedings of the workshop on jelly-fish blooms in the Mediterranean Sea, UNEP. pp. 195-201.
- \* 8. Wilkerson, F.P. and R.K. Trench. 1985. Nitrate assimilation by zooxanthellae. Marine Chemistry 16: 385-393.
9. Dugdale, R.C. and F.P. Wilkerson. 1985. Primary production in the Cap Blanc region. In: International Symposium on Upwelling of West Africa., Inst. Inv. Pesq. C. Bas, R. Margalef and P. Rubies (Eds.), Barcelona 1: 233-243.
10. Dugdale, R.C. and F.P. Wilkerson. 1985. Athens Project: far-field impact of surface versus deep sewage outfall, Woodward Clyde Associates Report 1, 28pp.
11. Dugdale, R.C. and F.P. Wilkerson. 1985. The design of the outfall diffuser system for the effluent from the treatment works on Psytallia Island and its diffusion in the Saronikos Gulf: Analysis of far-field impact, Woodward Clyde Associates Report 2, 50pp.
- \* 12. Dugdale, R.C. and F.P. Wilkerson. 1986. The use of <sup>15</sup>N to measure nitrogen uptake in eutrophic oceans; experimental considerations. Limnology and Oceanography 31: 673-689.
- \* 13. Muscatine, L., F.P. Wilkerson and L.R. McCloskey. 1986. Regulation of population density of symbiotic algae in a tropical marine jellyfish (Mastigias sp.). Marine Ecology Progress Series 32: 279-290.
- \* 14. Wilkerson, F.P. and R.K. Trench. 1986. Uptake of dissolved inorganic nitrogen by the symbiotic clam Tridacna gigas and the coral Acropora sp. Marine Biology 93: 237-246.
- \* 15. Wilkerson, F.P. and R.C. Dugdale. 1987. The use of large shipboard barrels and drifters to study the effects of coastal upwelling on phytoplankton nutrient dynamics. Limnology and Oceanography 32: 368-382.

- \* 16. Wilkerson, F.P., R.C. Dugdale and R.T. Barber. 1987. Effects of El Nino on new, regenerated and total production in eastern boundary upwelling systems. Journal of Geophysical Research 92: 14347-14355.
- \* 17. Dugdale, R.C., F.P. Wilkerson, R.T. Barber, D. Blasco and T.T. Packard. 1987. Changes in nutrients, pH, light penetration and heat budget by migrating photosynthetic organisms. Oceanology Acta Spec. 6: 103-109.
- \* 18. Wilkerson, F.P., D. Kobayashi and L. Muscatine. 1988. Cell division and size of symbiotic algae in Caribbean reef corals. Coral Reefs 7: 29-36.
- \* 19. Dugdale, R.C. and F.P. Wilkerson. 1988. Nutrient sources and primary production in the Eastern Mediterranean. Oceanologia Acta Spec. 179-184.
- \* 20. Dugdale, R.C. and F.P. Wilkerson. 1989. New production in the upwelling center at Point Conception, California: temporal and spatial patterns. Deep-Sea Research, 36: 985-1007.
- \* 21. Dugdale, R.C., A. Morel, A. Bricaud and F.P. Wilkerson. 1989. Modeling new production in upwelling centers: II A case-study of modeling new production from remotely sensed temperature and color. Journal of Geophysical Research, 94: 18119-18133.
- 22. Dugdale, R.C. and F.P. Wilkerson. 1989. Regional perspectives in global new production. In: Oceanologie actualite et prospective, M.M. Denis (ed.), Proceedings of the Centennial of Station d'Endoume, Marseille, pp. 289-309.
- \* 23. Dugdale, R.C., F.P. Wilkerson and A. Morel. 1990. Modeling new production in upwelling centers: I Applications of a shift-up model to 3 upwelling areas. Limnology and Oceanography, 35: 822-829
- \* 24. Dugdale, R.C. and F.P. Wilkerson. 1990. Iron addition experiments in the Antarctic- a re-analysis. Global Biogeochemical Cycles. 4:13-19.
- \* 25. Wilkerson, F.P. and G. Grunseich. 1990. Formation of blooms by the symbiotic ciliate Mesodinium rubrum: the significance of nitrogen uptake. Journal Plankton Research . 12: 973-989.
- \* 26. Dugdale, R.C. and F.P. Wilkerson. 1991. Low specific nitrate uptake rate: a common feature of high-nutrient, low-chlorophyll marine ecosystems. Limnology and Oceanography, 36: 1678-1689.
- \* 27. Dugdale, R.C., F.P. Wilkerson, R.T. Barber and F.P. Chavez. 1992. Estimating new production in the equatorial Pacific Ocean at 150°W. Journal Geophysical Research. 97: 681-686.
- \* 28. Wilkerson, F.P. and R.C. Dugdale. 1992 Measurements of nitrogen productivity in the equatorial Pacific at 150°W. Journal Geophysical Research. 97: 669-679.
- \* 29. Dugdale, R.C. and F.P. Wilkerson. 1992. Nutrient limitation of new production. In: Primary Productivity and Biogeochemical Cycles in the Sea, P.G. Falkowski and A.D. Woodhead (eds.), Plenum Press, New York, pp. 107-122.
- \* 30. Wilkerson, F.P. and P. Kremer. 1992. DIN, DON and PO<sub>4</sub> uptake by a medusae with algal symbionts. Marine Ecology Prog. Ser. 90: 237-250
- \* 31. Minas, H.J., R.C. Dugdale, M. Minas and F.P. Wilkerson. 1993. New production in oligotrophic waters: a review of results and ideas induced by the "14C-method" controversy.

- \* 32. Dugdale, R.C., F.P. Wilkerson, D.Halpern, F.P. Chavez and R.T. Barber. 1994. Remote sensing of seasonal and annual variation of equatorial new production: a model for global estimates. Advances in Space Research. 14:169-178.
- \* 33. McCloskey, L.R., L. Muscatine and F.P. Wilkerson. 1994. Daily photosynthesis, respiration, and carbon budgets in a tropical marine jellyfish (*Mastigias* sp.). Marine Biology 119: 13-22.
- \*34. Dugdale, R.C., F.P. Wilkerson and H.J. Minas. 1994 The role of a silicate pump in driving new production. Deep-Sea Research 42: 697-719.
- \*35. Wilkerson, F.P. and R.C. Dugdale. 1996. Silicate versus nitrate limitation in the equatorial Pacific estimated from satellite-derived sea surface temperatures. Advances in Space Research. 18: 81-89.
- \*36. Raschke, E., V.V. Salomonson, R. Stuhlmann and F. Wilkerson. 1996. Satellite Data for Atmosphere, Continent and Ocean Research, p. 142, Elsevier Press.
- \*37. Dugdale, R.C., C.O. Davis and F.P. Wilkerson. 1997. Assessment of new production in the upwelling center at Point Conception, California estimated using remotely sensed sea-surface temperatures. Journal of Geophysical Research. 102: 573-8585
- 38. Wilkerson, F.P. and R.C. Dugdale. 1997. The effect of El Niño on coastal new production. In “California and the World Ocean ‘97, pp. 1554-1562.
- \*39. Dugdale, R.C. and F.P. Wilkerson. 1998. Silicate regulation of new production in the eastern equatorial Pacific, Nature. 391: 270:273.
- \*40. Wilkerson, F.P., R.C. Dugdale, F P Chavez, and R M Kudela. 2000. Biomass and productivity in Monterey Bay, California: contribution of the larger autotrophs. Deep-Sea Research II 47: 1003-1022.
- \*41. Dugdale, R.C. and F.P. Wilkerson. 2001. Sources and fates of silicon in the ocean: the role of diatoms in climate and glacial cycles. *Scientia Marina* 65: (Suppl. 2: A Marine Science Odyssey Into the 21<sup>st</sup> Century, J.M. Gili, J.L. Pretus and T.T. Packard, eds.) 141-152.
- 42. Hogue, V., F. Wilkerson, R. Dugdale and A. Marchi. 2001 Phytoplankton and nutrient dynamics in Suisun, San Pablo and Central Bays. Interagency Ecological Program Newsletter 14: 35-41.
- 43. Wilkerson, F.P. 2001. WEST initiates main field program. Coastal Ocean Processes (CoOP) Newsletter 14: 5
- \*44. Wilkerson, F.P., R.C. Dugdale, A. Marchi and C.O. Collins. 2002. Hydrography, nutrients and chlorophyll measured during El Niño and La Niña compared to normal years in the Gulf of the Farallones, CA. Progress in Oceanography 53: 293-310.
- \*45. Chai, F., R. C. Dugdale, T-H Peng, F. P. Wilkerson, and R. T. Barber. 2002. One dimensional ecosystem model of the equatorial Pacific upwelling system. Part I: Model development and silicon and nitrogen cycle. Deep-Sea Research II. 49: 2713—2747
- \*46. Dugdale, R.C., R. T. Barber, F. Chai, T.H. Peng, and F.P. Wilkerson. 2002. One dimensional ecosystem model of the equatorial Pacific upwelling system, Part II: Sensitivity analysis and comparison with JGOFS EqPac Data Deep-Sea Research II. 49: 2747-2769.

- \*47. Dugdale, R. C. A. G. Wischmeyer, F.P. Wilkerson, R.T. Barber, F. Chai, M. Jiang and T-H. Peng. 2002. Meridional asymmetry of source nutrients to the equatorial Pacific upwelling ecosystem and it's potential impact on ocean-atmosphere CO<sub>2</sub> flux; a data and modeling approach. Deep-Sea Research II. 49: 2513-2533.
- \*48. Jiang, M-S, F. Chai, R.C. Dugdale, F.P. Wilkerson, T-H Peng and R.T. Barber. 2003. A nitrate and silicate budget in the equatorial Pacific Ocean: a coupled physical-biological model study. Deep-Sea Research II 50: 2971-2996
- \*49. Dugdale, R.C., M. Lyle, A. Wischmeyer, F.P. Wilkerson, F. Chai, R.T. Barber, T-H Peng. 2004. Influence of equatorial diatom processes on Si deposition and atmospheric CO<sub>2</sub> cycles at glacial/interglacial time scales, Paleoceanography, Vol.19, No.3, PA3011, 10.1029/2003PA000929
- \*50. Armbrust et al., (incl. Wilkerson) 2004 The genome of the diatom *Thalassiosira pseudonana*-ecology, evolution and metabolism. Science. 306: 79-86.
- \*51. Hogue, V., F.P. Wilkerson and R.C. Dugdale. 2005 Effects of ultraviolet-B radiation on natural phytoplankton assemblages in central San Francisco Bay. Estuaries. 28: 190-204.
- \*52 Takabayashi, M., F.P. Wilkerson, D. Robertson,. 2005. Response of glutamine synthetase gene transcription and enzyme activity to external nitrogen sources in the diatom, *Skeletonema costatum* (Bacillariophyceae). J. Phycology 41: 84-94
- \*53 Wilkerson, F.P., R.C. Dugdale, V.E. Hogue and A. Marchi. Phytoplankton blooms and nitrogen productivity in San Francisco estuary. 2006 in press, Estuaries. Takabayashi, M., K. Lew, A. Johnson, A. Marchi, R. Dugdale, F.P. Wilkerson. Changes in chain length of a diatom, *Skeletonema costatum*, measured with a Cytobuoy field cytometer. Journal of Plankton Research. (in review)
- \*54 Wilkerson, F.P. R.C. Dugdale, A. Marchi, V. Hogue, A. Lassiter. The phytoplankton bloom response to wind events and upwelled nutrients during the CoOP-WEST Study. Deep-Sea Res II (in press)
- \*55 Lassiter, A.M, F. Wilkerson, R.Dugdale and V. Hogue. Functiona phytoplankton groups in the CoOP\_West upwelling region: the *Chaetoceros* complex. Deep-Sea Res II (in press).
- \*56 Dugdale, R.C., F.P. Wilkerson, A.Marchi and V.Hogue. Nutrient controls on new production in the Bodega Bay, California, coastal upwelling plume. Deep-Sea Res II (in press).
- \*57 Wilkerson, F. and R.C. Dugdale. Nitrogen in Coastal Upwelling. Chapter in Nitrogen in the Sea (in review)

Dugdale, R.C., F.P. Wilkerson, V.E. Hogue and A. Marchi. Spring phytoplankton bloom development in San Francisco Estuary: the role of ammonium and nitrate. Submitted to Estuarine, Coastal and Shelf Science

Song, B., F. Wilkerson and B.B. Ward. Seasonal variation in marine phytoplankton at Monterey Bay detected by high affinity nitrate transporter genes. (in prep for *Journal of Phycology*)

Robertson, D.L., Takabayashi, M., Wilkerson, F. P. Molecular evolution of glutamine synthetase in protists. (in prep)

**Some published abstracts (1982-1996, incomplete list) :**

- Wilkerson, F.P., G. Muller Parker and L. Muscatine. Temporal patterns of cell division in natural populations of endosymbiotic algae. 1982. Eos 63: 945-946.
- Wilkerson, F.P. and L. Muscatine. 1984 .Enzymes involved in the assimilation of DIN by symbiotic algae. Eos 64: 1075-1076.
- Wilkerson, F.P. and R.C. Dugdale. 1985 The use of large shipboard containers during OPUS-1983 to observe and simulate the effects of upwelling on phytoplankton nitrogen dynamics. Eos 66: 1288.
- Dugdale, R.C. and F.P. Wilkerson. 1985. Nitrogen dynamics at Point Conception, California upwelling center during the non-El Niño and El Niño years, 1981 and 1983. Eos 66: 1288.
- Wilkerson, F.P. and R.C. Dugdale. 1986. Applying the concept of new and regenerated production to coral reef symbioses. Eos 67: 993.
- Wilkerson, F.P., R.C. Dugdale and G. Grunseich. 1987. The effect of light on DIN and DON uptake and bloom formation by *Mesodinium rubrum* in the Peru upwelling ecosystem at 15°S. Eos 68: 1707.
- Wilkerson, F.P. and R.C. Dugdale. 1988 Shift-up and acceleration of nitrogen uptake in eastern equatorial Pacific upwelling. Eos 69: 1104.
- Dugdale, R.C. and F.P. Wilkerson. 1988. New production in the eastern equatorial Pacific upwelling measured with 15N. Eos 69: 1135.
- Dugdale, R.C. and F.P. Wilkerson. 1990. Evidence for a critical nitrate concentration in upwelling systems: implications for operation of the biological pump in the CO<sub>2</sub> cycle. Eos 71: 111
- Wilkerson, F.P., R.C. Dugdale and C.D. Kopczak. 1990. Measurements of new and regenerated production in the water column over Fieberling Guyot. Eos 71: 173.
- Kopczak, C.D., F.P. Wilkerson and R.C. Dugdale. 1990. Structure of the nutricline near Fieberling Guyot (32°25'N, 127°47'W) in the eastern North Pacific. Eos 71: 174.
- Yang, S.R., R.C. Dugdale and F.P. Wilkerson. 1992. New production in the equatorial Pacific in El Nino and La Nina conditions. Eos 73:295.
- Wilkerson, F.P. and R.C. Dugdale. 1994. Can silicate versus nitrate limitation be evaluated from remotely-sensed sea-surface temperature? Eos 73: 57.
- White, K.K., R.C. Dugdale and F.P. Wilkerson. 1994. Silicate control of silicate and nitrate uptake in Monterey Bay, California. Eos 73: 57.
- Dugdale, R.C. and F.P. Wilkerson. 1994. The biological silicate pump: effects on new production. Eos 75: 57.
- Wilkerson, F.P., R.C. Dugdale, R.M. Kudela, W. Cochlan and T. Hayden. 1996. Seasonal new production at an upwelling site in Monterey Bay, CA; the contribution of the larger-celled autotrophs. Eos 76: 158.
- Chavez, F.P., G.E. Friederich, R.C. Dugdale and F.P. Wilkerson. 1996. A study of the role of biology in the air-sea flux of CO<sub>2</sub> during the Spring 95 MBL Experiment off Monterey Bay, CA, Eos 76: 129.
- Dugdale, R.C., G.E. Friederich, F.P. Chavez, T. Pennington, F.P. Wilkerson and T. Hayden. 1996. Spatial distribution of new production in Monterey Bay during CoOP95: implications for CO<sub>2</sub> air-sea flux. Eos 76: 158

## PRESENTATIONS:

- 1978 Bacteria associated with hydra. Society of Experimental Biology Symposium, Reading, U.K.
- 1979 The surface bacteria of hydra. Coelenterate Society, Oxford, U.K.
- The phosphorus economy of the green hydra symbiosis. Nutrition in the Lower Metazoa. Caen, France.
- 1980 The phosphorus metabolism of green hydra. Coelenterate Society, London, U.K.
- 1979 Symbionts involved in phosphate uptake by green hydra. Endocytobiology I. Tübingen, Germany.
- 1982 Temporal patterns of cell division in natural populations of endosymbiotic algae, AGU/ASLO San Francisco, CA.
- 1983 Tropical marine lakes of Palau, USC Seminar Series, Los Angeles, CA. Invited Seminar Speaker  
Possible connections between sewage effluent, nutrient levels and jelly-fish blooms. United Nations Environment Program Jellyfish Symposium, Athens, Greece. Invited Speaker
- 1984 Enzymes involved in the assimilation of DIN by symbiotic algae. AGU Ocean Sciences/ASLO, New Orleans, LA.
- Nitrogen metabolism of symbiotic cnidarians. West Coast Coelenterate Colloquium, Friday Harbor, WA.
- Growth of zooxanthellae in situ in a reef coral. ASLO, Vancouver, Canada.
- 1985 Significance of nitrate uptake in symbiotic clams and corals. ASLO, Minneapolis, MN.
- The impact of nutrients from domestic sewage in the Saronikos Gulf. Oceanography of the Mediterranean Sea: interdisciplinary aspects of the pelagic environment. Villefranche-sur-Mer, France.
- 1986 The use of large shipboard containers during OPUS-1983 to observe and simulate the effects of upwelling on phytoplankton nitrogen dynamics. AGU/ASLO New Orleans, LA.
- An ecological requirement for "surge" uptake in dinoflagellates. ASLO, Kingston, RI. Chairman of Symbiosis Special Session.

- A comparison of nitrogen dynamics observed during El Nino years at Point Conception, California and 15°S, Peru. AGU Chapman Conference on El Nino, Quayaquil, Ecuador.
- Applying the concept of new and regenerated production to coral reef symbioses. AGU/ASLO San Francisco.
- 1987 Biologie des cnidaires symbiotiques, Villefranche-sur-Mer, France.
- Changes in primary nutrient availability and sea level at Catalina Island, California during the 1983 El Nino. ASLO Madison, WI.
- 1988 The effect of light on DIN and DON uptake and bloom formation by *Mesodinium rubrum* in the Peru upwelling ecosystem at 15°S. AGU/ASLO Ocean Sciences, New Orleans, LA.
- Nitrogen flux in marine symbioses. Rosenthal School of Marine and Atmospheric Sciences, Miami, FL. Invited seminar.
- Shift-up and acceleration of nitrogen uptake in eastern equatorial Pacific upwelling. AGU/ASLO San Francisco, CA.
- 1989 Eastern equatorial Pacific measurements of nitrogen productivity used <sup>15</sup>N during the WEC88 cruise. The Oceanography Society, Monterey, CA.
- N-15 and nutrient measurements obtained during TOPO 89 cruise to Fieberling Guyot. Presentation at TOPO PI meeting, University of Washington, Seattle, WA.
- 1990 Measurements of new and regenerated production in the water column over Fieberling Guyot. AGU/ASLO, New Orleans, LA.
- Nitrogen flux in animals that harbor symbiotic algae. USC, Los Angeles, CA, Invited seminar.
- 1992 Dynamics of inorganic and organic nitrogen uptake by symbiotic algae in a nutrient limited system. 1992 ASLO Aquatic Sciences Mtg, Santa Fe. NM.
- New production in the equatorial Pacific in El Nino and La Nina conditions. AGU, San Francisco, Ca. AGU
- 1993 Spatial and temporal variability of new production in Monterey Bay, CA. The Oceanography Society Meeting, Seattle, WA. (Wilkerson, et al.)
- The role of silicate in global new production: a neglected nutrient. The Oceanography Society Meeting, Seattle, WA. (Dugdale, Wilkerson and Minas)
- Silicic acid and nitrate uptake interactions in a coastal upwelling system. The Oceanography Society Meeting, Seattle, WA. (White, Dugdale, and Wilkerson).

- 1994 Seasonal maps of nutrients and new production in Monterey Bay during 1992, Monterey Bay Symposium, Monterey
- Co-Organizer of Special Session: Silicate Limitation in Marine Systems, AGU Ocean Sciences, San Diego, CA.
- Can silicate versus nitrate limitation be evaluated from remotely-sensed sea surface temperature? AGU Ocean Sciences, San Diego, CA. (Wilkerson and Dugdale)
- Silicate control of silicate and nitrate uptake in Monterey Bay, CA., AGU Ocean Sciences, San Diego, CA. (White, Dugdale and Wilkerson)
- The biological silicate pump: effects on new production, AGU Ocean Sciences, San Diego, CA. (Dugdale and Wilkerson).
- Nitrogen budgets of cnidarians that possess endosymbiotic algae. Invited, ASLO, Miami, FL.
- Delineation of high nitrate, low silicate, low chlorophyll in offshore upwelled waters using satellite derived sea-surface temperatures, COSPAR, Frankfurt, Germany (Dugdale and Wilkerson)
- 1995 The importance of silicate in driving new production: implications for remote sensing models, University of Southampton and Rennell Center for Oceanography, England, UK. (Wilkerson and Dugdale)
- 1996 Organizer, Session on Eastern Boundary Systems off the California Coast, AGU-ASLO Ocean Sciences Mtg., San Diego, February
- Seasonal new production at an upwelling site in Monterey Bay, CA; the contribution of the larger-celled autotrophs, AGU-ASLO Ocean Sciences Mtg., San Diego, February (Wilkerson, Dugdale, Kudela, Cochlan and Hayden)
- A study of the role of biology in the air-sea flux of CO<sub>2</sub> during the Spring 95 MBL Experiment off Monterey Bay, CA, AGU-ASLO Ocean Sciences Mtg., San Diego, February Invited (Chavez, Friederich, Dugdale, Wilkerson)
- Spatial distribution of new production in Monterey Bay during CoOP95: implications for CO<sub>2</sub> air-sea flux, AGU-ASLO Ocean Sciences Mtg., San Diego, February (Dugdale, Friederich, Chavez, Pennington, Wilkerson and Hayden)
- The importance of the silicate pump in global ocean flux, OPALIO Workshop, University of Brest, France, June 1996 (Dugdale, Wilkerson and Minas). Invited

- The nutrient conditions required for order of magnitude changes in paleo-new production, AGU San Francisco, December 1996, Invited
- 1997 The relative importance of nitrate, ammonium and urea in determining estimates of eutrophic and oligotrophic new production. ASLO Ocean Sciences, Santa Fe, February Invited (Wilkerson and Dugdale)
- Is nitrate uptake the best candidate for measuring new production? ASLO Ocean Sciences, Santa Fe, February Invited (Dugdale and Wilkerson)
- The effect and prediction of El Nino on the coastal biological production of California. California and the World Ocean '97, San Diego, March 1997 (Dugdale and Wilkerson)
- Effects of massive flooding in January 1997 on the biology and physics of San Francisco Bay and the Gulf of the Farallones. ERF, Providence October. (Bollens, Collins, Dugdale, Wilkerson, Cordell, Cloe, Cloern, Murphee, Rago, Hayden, Avent and Franklin)
- 1998 Ratios of carbon to nitrogen uptake by the Monterey Bay phytoplankton assemblage. AGU-ASLO Ocean Sciences Mtg., San Diego, February (Wilkerson, Dugdale, Chavez, Kudela, Pennington)
- Effects of meridional nutrient asymmetry in equatorial undercurrent source water. AGU-ASLO Ocean Sciences Mtg., San Diego, February (Dugdale, Wilkerson, Barber).
- 1999 Nutrient concentrations and nutrient utilization in Central San Francisco Bay ASLO Ocean Sciences, Santa Fe, February (Dugdale, Marchi, Hogue, Tustin, and Wilkerson)
- Size fractionated nitrogen uptake and assimilation in Monterey Bay, Ca, ASLO Ocean Sciences, Santa Fe, February, Invited (Wilkerson, Dugdale, Schaefer, Marchi, Hogue)
- Development of molecular probes for functional genes of glutamine synthetase in marine phytoplankton. ASLO, Santa Fe, NM. (Schaefer, Wilkerson, Hogue)
- The fate of upwelled NO<sub>3</sub> in Monterey Bay: biogeochemical cycling and its molecular basis, DOE BIOMP Workshop, Santa Fe. (Wilkerson, Ward)
- High silicate:nitrate conditions in central San Francisco Bay, Esuarine Research Federation 99, New Orleans, September 1999, (Wilkerson, Dugdale, Marchi, Hogue, Tustin).
- Hydrography, nutrients and chlorophyll measured during El Niño (1998), La Niña (1999) compared to normal years (1997) in the Gulf of the Farallones, CA. El Nino Workshop, MBARI (December 1999)

- 2000 The conservation of glutamine synthetase and implications for nitrogen uptake in marine phytoplankton. ASLO, San Antonio TX. (Schaefer Wilkerson, Hogue)
- Comparing the impact of the 1998 El Nino versus the 1999 La Nina on the spring bloom in Central San Francisco Bay ASLO-Ocean Sciences, San Antonio TX (Wilkerson, Marchi, Hogue, Tustin, Dugdale).
- Nutrient dynamics between central San Francisco Bay and the Gulf of the Farallones: a comparison of El Nino and La Nina Years, ASLO, San Antonio TX, (Marchi, Dugdale, Wilkerson, Collins, Hogue, Tustin, Jarvis)
- Hydrography, nutrients, phytoplankton biomass and productivity across central San Francisco Bay from October 1997-99: the effect of El Niño vs. La Niña conditions, IEP (InterAgency Ecological Program), Asilomar, CA. Mar (Wilkerson, Dugdale, Marchi, Hogue)
- Development of functional probes in diatoms for the ammonium assimilation enzyme glutamine synthetase, BiOMP Workshop, Tallahassee (Wilkerson and Schaefer)
- Wind-driven Experiment of Shelf Transport (WEST):phytoplankton size and the fate of upwelled macro-nutrients and CO<sub>2</sub> off Bodega Bay, CA. EPOC Meeting, Victoria, Canada (Wilkerson, Dugdale, Marchi, Hogue, Lassiter, Righetti, Ferm)
- A comparison of phytoplankton bloom dynamics in North and Central San Francisco Bay (Suisun, San Pablo and Central Bays). CalFED Scientific Conference, Sacramento Wilkerson, Dugdale, Hogue, Marchi, Lassiter).
- Wind-driven Experiment of Shelf Transport (WEST): the role of wind-driven transport in shelf hydrography, nutrients and chlorophyll off Bodega Bay, CA. AGU, San Francisco, (Wilkerson, Dugdale, Garfield, Marchi, Hogue, Largier, Kudela)
- 2001 Wind-driven Experiment of Shelf Transport (WEST): the role of wind-driven transport in shelf hydrography, nutrients and chlorophyll off Bodega Bay, CA. ASLO, Albuquerque, New Mexico, February (Wilkerson, Dugdale, Marchi, Hogue, Lassiter)
- Spatial and temporal patterns of phytoplankton speciation off the coast of northern California. . ASLO, Albuquerque, New Mexico, February. (Lassiter, Hogue, Wilkerson)
- Phytoplankton and nutrient dynamics in North and Central San Francisco Bay (Suisun, San Pablo and Central Bays). ASLO, Albuquerque, New Mexico, February (Hogue, Lassiter, Marchi, Wilkerson, Dugdale)
- Nitrogen flux in marine animals that harbor symbiotic algae, Bodega Bay Marine Laboratory Seminar Series, Invited, April (Wilkerson)

Nitrogen flux in marine animals that harbor symbiotic algae, City College of San Francisco Seminar Series, Invited, April (Wilkerson)

The coupling between carbon and nitrogen cycles in coastal upwelling ecosystems; biogeochemical cycling and its molecular basis, DOE-BiOMP Workshop, Savannah, April 2001 (Wilkerson)

Broadening the Marine Molecular Science Undergraduate Experience at San Francisco State University through Summer Internships and Education, DOE-BiOMP Workshop, Savannah, April 2001 (Wilkerson)

Nutrient Dynamics in Coastal Upwelling Systems of the Coast of California, CA, Invited Talk at Southern California Academy of Sciences Annual Meeting, Los Angeles, May (Wilkerson)

WEST: Nutrients and Chlorophyll off Bodega Bay, Gulf of Farallones Sanctuary Biennial Workshop, October (Wilkerson)

Chlorophyll measured in the Gulf of the Farallones during the upwelling season in 2000 and 2001, Gulf of Farallones Sanctuary Biennial Workshop, October (Lorenzi, Wilkerson, Marchi and Hogue)

Nutrient Dynamics in Coastal Upwelling Systems of the Coast of California, CA, Invited seminar at Romberg Tiburon Center, SFSU, November 2001 (Wilkerson)

The impact of diatoms on climate variability: comparison of model output and core data for opal and CO<sub>2</sub>, AGU, December (Dugdale, Wischmeyer, F.P. Wilkerson, Chai, Barber, Jiang and Peng)

2002 The response of phytoplankton processes to wind events and upwelled nutrients during the CoOP-WEST study. Ocean Sciences 2002 Honolulu, February (Wilkerson, Dugdale, Marchi, Hogue, A.M. Lassiter)

Climate impacts on primary production in central San Francisco Bay. Ocean Sciences 2002 Honolulu, February (Dugdale, Hogue, Marchi, Wilkerson)

Phytoplankton community structure and seasonal succession in Tomales Bay, CA. Ocean Sciences 2002 Honolulu, February (Judah, Wilkerson, Marchi, Braid, Friedman, Horner)

Temporal and spatial distributions of nutrients and phytoplankton productivity in a northern California upwelling region measured during CoOP-West. Ocean Sciences 2002 Honolulu, February (Hogue, Marchi, Dugdale, Wilkerson)

Inter and intra-annual patterns of phytoplankton assemblages during upwelling events off the coast of northern California (CoOP-WEST Study). Ocean Sciences 2002 Honolulu, February (Lassiter, Hogue, Marchi, Wilkerson)

Diversity of cyanobacterial nitrate reductase and development of molecular probes for nitrogen assimilation genes. Ocean Sciences 2002 Honolulu, February (Jenkins, Gibson, Cano, Wilkerson, Zehr).

Nutrient dynamics in coastal upwelling systems of the coast of California, CA, Invited seminar at Moss Landing Marine Labs, March 2002 (Wilkerson)

Is the chlorophyll produced at the WEST upwelling site transported off shore or held close to the coast and propagated southward along the shelf? EPOC 2002 Oregon, Sept 2002 (Wilkerson, Dugdale, Marchi, Hogue, Lassiter Lew, Lorenzi)

Productivity performance of the west upwelling region off Bodega Bay, CA: comparison with other well-studied coastal upwelling systems. EPOC 2002, Oregon Sept 2002. (Dugdale, Wilkerson, Hogue, Marchi and Lassiter)

The response of nutrients and pCO<sub>2</sub> to wind-driven coastal upwelling measured during the CoOP-WEST Study 2000-2002. AGU, 2002, San Francisco, CA, Dec 2002. (Marchi, Dugdale, Lew, Hogue, Lassiter, Wilkerson)

Productivity performance of the west upwelling region off Bodega Bay, CA: comparison with other coastal upwelling systems, AGU, 2002, San Francisco, CA, Dec 2002 (Hogue, Dugdale, Marchi, Lassiter Wilkerson)

Productivity Performance of the WEST Upwelling Region off Bodega Bay, CA. AGU, 2002, San Francisco, CA, Dec 2002 (Dugdale, Wilkerson, Hogue, Marchi, Lassiter)

The response of phytoplankton size spectra and chlorophyll biomass to wind-driven coastal upwelling off northern California during the CoOP-WEST study. AGU, 2002, San Francisco, CA, Dec 2002 (Wilkerson, Dugdale, Marchi, Hogue, Lew, Lassiter)

Patterns of phytoplankton assemblages across northern California Coast measured during wind events (CoOP-WEST Study) AGU, 2002, San Francisco, CA, Dec 2002 (Lassiter, Hogue, Marchi, Wilkerson)

Coupling biogeochemical and molecular approaches to study phytoplankton nitrogen assimilation in coastal upwelling ecosystems. 2002 BioTechnological Investigations of Ocean Margins Workshop, St. Petersburg, FL, Dec. 2002 (Wilkerson)

2003 Diatoms in control and at risk: climate feedbacks and anthropogenic forcing. Oceans, Paris. Jan 2003 (Dugdale, Wilkerson, Chai, Barber, Peng)

The spatial patterns of diatom based new production in the coastal upwelling region off Bodega, CA. ASLO Aquatic Sciences, Salt Lake City, UT, Feb 2003. (Wilkerson, Dugdale, Hogue, Marchi, Lassiter)

Ammonium inhibition of nitrate uptake and diatom blooms in estuarine and coastal regions. ASLO Aquatic Sciences, Salt Lake City, UT, Feb 2003. Invited talk (Dugdale, Wilkerson, Hogue, Marchi and Lassiter)

Evaluating carbon and nitrogen assimilation by diatoms using molecular probes. Aquatic Sciences Meeting, ASLO, Salt Lake City, UT. Feb 2003 (Takabayashi, Wilkerson)

Special abilities of diatoms for nutrient uptake and the effects of ammonium inhibition on nitrate uptake. AGU Chapman Conference, Paros, Greece, Sept. 2003 Invited talk. (Dugdale, Wilkerson.)

Nitrogen limitation of estuarine primary production: the relative roles of anthropogenic ammonium versus nitrate in San Francisco Bay. ERF, Seattle, Sept. 2003 (Hogue, Dugdale, Marchi, Lassiter, Wilkerson)

A new dimension in the control of primary production in the San Francisco-Bay Delta Estuary: the impact of anthropogenic ammonium. 6<sup>th</sup> Biennial State of the Estuary Conference, Oakland CA, October 2003 (Dugdale, Hogue, Marchi, Lew, Lassiter, Wilkerson)

An assessment of nutrient dynamics on primary producers in central San Francisco Bay: the impact of ammonium on phytoplankton assemblages. 6<sup>th</sup> Biennial State of the Estuary Conference, Oakland CA, October 2003 (Marchi, Lew, Koch, Lorenzi, Hogue, Dugdale, Wilkerson)

Expression of glutamine synthetase I, II, III in the diatom *Thalassiosira pseudonana*. Society of Chicanos and Native Americans in Science (SACNAS) 2003 Conference, Albuquerque, October 2003 (Barada, Takabayashi, Griffin, Wilkerson)

2004 Expression of glutamine synthetase I, II, III in the diatom *Thalassiosira pseudonana*, BiOMP Workshop, Puerto Rico, Jan 2004 (Barada, Takabayashi, Griffin, Wilkerson)

Genetic characterization and quantification of nitrogen assimilation by marine phytoplankton. BiOMP Workshop, Puerto Rico, Jan 2004 (Wilkerson, Takabayashi, Allen, Gibson, Jenkins, Ward and Zehr)

Using shipboard enclosures to understand the controls on new production in upwelling ecosystems. AGU Ocean Sciences, Portland, OR, Feb 2004 (Hogue, Dugdale, Marchi, Lassiter, Wilkerson)

The importance of diatom blooms on biogeochemical transformations in the coastal upwelling ecosystem off Bodega Bay, CA. AGU Ocean Sciences, Portland, OR, Feb 2004 (Wilkerson, Lassiter, Marchi, Hogue)

Nutrient control of new production rates in coastal upwelling ecosystems. AGU Ocean Sciences, Portland, OR, Feb 2004 (Dugdale, Hogue, Wilkerson, Marchi)

Diversity of nitrogen assimilation genes in natural cyanobacterial populations. ASLO-TOS Ocean Research Conference, Hawaii, Feb.2004, (Jenkins, Gibson, Campbell, Wilkerson, Zehr).

Impact of anthropogenic ammonium on phytoplankton ecology in an urbanized estuary: San Francisco Bay. ASLO-TOS Ocean Research Conference, Hawaii, Feb 2004, Invited talk (Dugdale, Hogue, Marchi, Wilkerson)

The impact of diatom-based food webs on nutrient drawdown in coastal upwelling areas and their influence on biogeochemical cycling. ASLO-TOS Ocean Research Conference, Hawaii, Feb 2004, Invited talk (Wilkerson, Dugdale, Lassiter, Marchi and Hogue)

Application of real-time PCR to study the environmental regulation of gene expression of nitrogen assimilation in diatoms. ASLO-TOS Ocean Research Conference, Hawaii, Feb 2004, (Takabayashi, Griffin, Barada, Wilkerson)

The effect of temperature on diatom cell size, growth rates and biogenic silica content. Phycological Society Meeting, Williamsburg, August 2004. (Johnson, Dugdale, Wilkerson)

Studying gene expression in marine diatoms using Real-Time PCR. Phycological Society Meeting, Williamsburg, August 2004. (Takabayashi, Wilkerson, Barada)

Using experimental enclosures to monitor water quality of the San Francisco Bay-Delta for management purposes. CalFed Science Meeting, Sacramento, October 2004 (Dugdale Wilkerson, Hogue, Marchi, Koch, Lew, Lorenzi, Takabayashi)

Evaluating nutrient regimes and primary productivity in wetlands in the San Francisco Estuary. CalFed Science Meeting, Sacramento, October 2004 (Cohen, Wilkerson, Carpenter, Dugdale)

2005 From gene expression to ecological processes: nitrogen assimilation by phytoplankton. Salt Lake City, February 2005 (Wilkerson, Takabayashi, Brada, Lorenzi)

Assessing primary production in diatoms using genetic (real time PCR) and biogeochemical ( $^{14}\text{C}$  fixation) techniques, Salt Lake City, February 2005 (Lorenzi, Takabayashi and Wilkerson)

Selecting an appropriate internal control gene for relative real-time reverse transcription PCR. Salt Lake City, February 2005 (Barada, Takabayashi and Wilkerson)

Laila' conference paper

Tracking phytoplankton blooms and eutrophication with daily monitoring in Central San Francisco Bay. ERF, Norfolk, VA September 2005 (Wilkerson, Lew, Marchi, Hogue, Koch, Dugdale)

Anthropogenic ammonium as a control on estuarine primary production ERF, Norfolk, VA September 2005 (Parker, Hogue, Wilkerson, Dugdale).

How does nutrient availability relate to primary productivity in natural and restored wetlands in the San Francisco Estuary? ERF, Norfolk, VA September 2005 (Cohen, Wilkerson, Carpenter, Dugdale).

Daily monitoring of estuarine water quality (eutrophication and phytoplankton blooms) in San Francisco Bay. 7<sup>th</sup> Bienial State of the San Francisco Estuary Conference, Oakland, October 2005 (Fuller, Wilkerson, Lew, Dugdale, Marchi, Hogue, Koch).

Temporal and spatial variability of chlorophyll-a versus particulate carbon and nitrogen relationships in San Francisco Bay: importance for estimating biomass and ecosystem modeling. 7<sup>th</sup> Bienial State of the San Francisco Estuary Conference, Oakland, October 2005 (Kleckner, Parker, Lew, Hogue, Wilkerson).

2006 Low silicate, the cause of the HNLC and high surface pCO<sub>2</sub> condition of the Eastern Equatorial Pacific. AGU Ocean Sciences, HI, February, 2006, (Dugdale, Chai, Brzezinski, Wilkerson, Feely)

The role of new production in coastal upwelling areas: comparison of different regions. AGU Ocean Sciences, HI, February, 2006 (Wilkerson, Dugdale, Hogue Marchi)

Silicate regulation on diatom growth in the eastern equatorial pacific evaluated with silicate/nitrate/TCO<sub>2</sub> distribution. AGU Ocean Sciences, HI, February, 2006. (Marchi, Marchi, Dugdale, Chai, Feeley, Brzeznski, Wilkerson)

Nutrient utilization and phytoplankton community response during enclosure experiments conducted in the eastern equatorial pacific: testing Fe vs. Si Limitation. AGU Ocean Sciences, HI, February, 2006 (Parker, Marchi, Hogue, Lew, Lorenzi, Greely, Feely Wilkerson, Dugdale)

### **SOME FIELD/SHIP EXPERIENCE: (1981-89)**

- 1981 Hawaii Institute of Marine Biology, Kaneohe, Hawaii. Nitrogen flux of corals and anemones
- 1982 Micronesian Mariculture Demonstration Center, Palau, W. Caroline Islands. Biology of the symbiotic jellyfish *Mastigias* sp.

- 1983 Discovery Bay Marine Laboratory, Jamaica. Effect of depth on coral reef zooxanthellae
- 1983 Micronesian Mariculture Demonstration Center, Palau, W. Caroline Islands. Nitrogen flux of giant clams
- 1984 Saronikos Gulf, Greece. Biology of jellyfish, DON uptake and stable isotope composition
- 1984 Paros, Greece. <sup>15</sup>N and sea anemones
- 1984 R/V VELERO IV, Point Conception, California. Sept. 16-28. Mapping upwelling plumes using shipboard analyses of nitrate reductase activity.
- 1987 Station Zoologique, France. Exploratory experiments to use <sup>15</sup>N to trace and estimate salp assimilation
- 1988 R/V WECOMA, Honolulu to Tahiti, Feb. 17-Mar 17. Measuring equatorial new and regenerated production using on-board mass spectrometry.
- 1988 R/V CALANUS, Bahamas, Apr. 29-May. Investigating light/nutrient relationships in the symbiotic jellyfish *Linuche*.
- 1989 R/V NEW HORIZON, off California coast: Fieberling Guyot. Sept. 8-22, Mapping nitrate, ammonium and N productivity around a seamount.

**WORKSHOPS ATTENDED (1983-89):**

- 1983 Workshop on Jellyfish Blooms, United Nation Environment Program, Athens, Greece.
- 1983 Coral Reef Workshop, American Society of Zoologists, Philadelphia, PA.
- 1984 Organization of Persistent Upwelling Structures (OPUS), P.I. Workshop. Lake Arrowhead, CA.
- 1984 Histocompatibility and Symbiosis of Aquatic Organisms, Los Angeles, CA.
- 1984 OPUS P.I. Workshop, Savannah, GA.
- 1985 SCOR Working Group 56 Symposium. Vertical motion in the equatorial upper ocean and its effects upon living resources and the atmosphere, Paris, France.
- 1988 Flow over Abrupt Topography workshop, Scripps, La Jolla, CA.
- 1989 TOPO PI meeting, Scripps Institute of Oceanography, La Jolla, CA
- 1989 TOPO PI Meeting, Seattle, WA.

**STUDENT ADVISOR:**

USC Grad Committee Member:

- Jack Costello (1984-6),
- Mary Montgomery (1987-9)
- Co-chair graduate student Brian Vagnoni (1989)
- Chair, MSc graduate student Darci Uetrecht (1990-1993)

SFSU Graduate Students: MA

- Victoria Hogue (1997-2000),
- Linda Judah (2000-2002)
- Adria Lassiter (1999-2003),
- Amber Johnson (2001-2004),
- Allison Lorenzi (2003-2006)
- Laila Barada (2004-

MA Committee Member: Ian Heathcote, John Miller, Tami Riccone, Toni Ignoffo, Brittany Huntington, Jennifer Yorty, Regina Radan

Undergraduate Students, Linda Righetti, Allison Lorenzi, Gabe Griffin, Laila Barada. Aubrey Cano, Amy Kleckner, Jim Fuler

High school volunteers, Scout Maceachron

## **INSTRUCTIONAL EXPERIENCE:**

Class teacher of community college level teaching (human biology, intro biology 1978-80)  
Occasional lectures and seminars given in marine biology topics at UCLA (1981-2)  
Given undergraduate instructional lectures in BISC 419 (Environmental Microbiology, 1985)

### Teaching at University of Southern California:

BISC 529 (Graduate Seminar Series in Marine Biology, 1984,85,86,90)  
BISC 532 (Water Column Biology Seminar, 2 credits) (1984, 85, 86, 89, 90)  
GEO 600 (Equatorial Pacific Ocean, 2 credits, 1991),  
BISC 582 (Adv. Biological Oceanography-4 credits, 1986, 88)  
Instructor in team-taught grad. core course BISC 599 (4 credits, 1990)  
Instructor in team-taught seminar grad. course (BISC 532, 2 credits, 1992), The effect of topographical features on the oceanography and marine biology of the surrounding water column  
Instructor in team-taught seminar grad. course (BISC 530, 2 credits, 1992, Changing paradigms in trophodynamics  
Instructor in team-taught seminar grad. course (BISC 532, 2 credits, 1993), The Southern Ocean  
Instructor of seminar graduate course (BISC 530, 2 credits, 1993 ), The Arabian Sea  
Instructor of grad. core course BISC 519 (Practical techniques in marine science, 4 credits, 1994)  
Instructor of undergraduate GE class (BISC 102, 4 credits, 1996), Humans and the Environment

### Teaching at San Francisco State University

Instructor/Lecturer of BISC 502 Biology of the Algae, 2 unit lecture with lab, Spring 1997, 1998, 1999, 2001, 2003, 2005  
Instructor/Lecturer of BISC 863 Graduate Seminar in Marine Symbioses, 2 units, Spring 1997, Spring 1998, Fall 2000, Fall 2002, 2004  
Instructor/Lecturer of BISC 863 Graduate Seminar in Biology Ecosystems Ecology: the California Current, 2 units, Fall 1997  
Instructor/Lecturer of BISC 863 Graduate Seminar in Biology Ecosystems Ecology: San Francisco Bay Ecology, 2 units, Fall 1999  
Instructor/Lecturer of BISC 863 Graduate Seminar in Biology Ecosystems Ecology: Gulf of the Farallones, 2 units, Fall 2001

Instructor/Lecturer of BISC 863 Graduate Seminar in Biology Ecosystems Ecology: Effect of El Nino on marine Systems, 2 units, Fall 2003

Instructor/Lecturer BIO 300 GE class, Nature Study, Spring 2002, Spring 2004, spring 2006

Guest Lecturer- Biotechnology Workshop, SFSU June 2000

Guest Lecturer- High School Teacher Workshop, RTC, April 2000

Guest Lecturer, BIO 584 Marine Microbial Ecology, Fall 2002, Spring 2004