Shaun Payne
EAHCP Coordinator
spayne@edwardsaquifer.org

Mr. Payne,

This is to indicate my willingness to serve as Ecological Modeling Expert as part of the Edwards Aquifer Habitat Conservation Plan – Adaptive Management Science Committee. This is also to serve as a statement of non-affiliation with any of the ecological model team members. Please find my cv as an attachment.

I have over 29 years of experience planning and executing limnological studies to assess the physical, biological and chemical character of surface water sources of contamination and nutrient loading. I have developed over 30 complex multidisciplinary scientific proposals, as a research scientist, assistant professor, post-doctoral researcher and graduate student. I have worked with biologists, engineers, ecologists, hydrologists, economists and statisticians. I have proposed modifications to existing statistical modeling approaches, using Bayesian methods for all of these proposals, in order to properly propagate uncertainty for use in water resources management decision-making. These proposals addressed prominent and large scale water resources issues, such as the eutrophication of Lake Okeechobee in South Florida, PCB contamination in Great Lakes Basin salmonids, lake and reservoir nutrient criteria development for the continental US, shrimp productivity in Louisiana estuaries, fecal coliform contamination of shellfish resource waters in both Louisiana and North Carolina, ecological water quality impacts of Hurricane Katrina, recent Great Lakes surface elevation declines, and eutrophication in Finnish lakes.

Thank you for your consideration.

E Conrad Lamon III
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Statistical Ecology Associates LLC
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cell: 830 660 3810

E. Conrad Lamon III, **Ph.D.**
Manager and President
Statistical Ecology Associates LLC
578 Pecan St.
Canyon Lake, TX 78133
Phone: 830-964-3155
Cell: 830-660-3810
eclamon@gmail.com

Professional Experience

Manager and President at Statistical Ecology Associates LLC
August 2008 - Present (5 years 7 months)
Ecological Modeling and Inference

Research Scientist**,** Nicholas School of the Environment and Earth Sciences, Duke University
Jan. 2005-June 2008. Ken Reckhow, Supervisor. 919-613-8026.
Completed U.S. EPA STAR project titled "Bayesian Methods for Regional-Scale Stressor-Response Models". Wrote peer reviewed journal articles. Wrote scientific research proposals for extramural funding. Mentored graduate students pursuing doctoral degrees.

Assistant Professor, Department of Environmental Studies, School of the Coast and Environment, Louisiana State University
Jan. 1998- Dec. 2004. Ralph Portier, Dept. Chair. 225-578-4287 Mobile: 225-921-1518.
Developed and taught Water Quality Modeling for Management (ENVS 7335), Water Quality Management (ENVS 7061) and Decision Theory and Environmental Risk Analysis (ENVS 7385). Wrote peer reviewed journal articles. Wrote over 20 scientific research proposals for extramural funding. Mentored graduate students pursuing masters and doctoral degrees.

Research Associate, Center for Limnology, University of Wisconsin – Madison, September, 1996 – December, 1997. Supervisor - Stephen Carpenter, 608-262-8690.
Applied extensive knowledge of aqueous chemistry, ecology, water quality modeling and applied statistics to study the cylcling of polychlorinated biphenyls in the Lake Michigan ecosystem. Wrote scientific research proposals for extramural funding. Mentored graduate students pursuing masters and doctoral degrees. Wrote peer reviewed journal articles.

Instructor, Nicholas School of the Environment, Duke University
Aug 1993-May 1994. (Former) Dean - Norm Christensen, 919-613-8052.
Revised course notes and taught Water Quality Management (ENV 236) in the Fall semester of 1993 and 1994. Supervised three teaching assistants.

Teaching Assistant, Nicholas School of the Environment, Duke University
Aug 1993- Dec. 1995. Supervisor – Prof. Merlise Clyde, 919 681-8440.
Teaching Assistant for Regression Analysis. Graded homework assignments and
examinations. Planned and taught laboratory sections, and held office hours to answer
questions for students.

Water Quality Modeling Intern, South Florida Water Management District
May – Aug, 1992. Supervisor, Larry Fink.
Performed limnological data analyses and modeling studies with the district's Wetland
Science Group. Wrote technical reports presenting my findings.

Research Associate, Duke University
Aug. 1991- May 1996. Supervisor Ken Reckhow, 919-613-8026.
Performed parametric and non-parametric statistical analyses of water quality data.
Wrote peer reviewed journal articles, as well as an M.S. thesis and doctoral dissertation.

Environmental Coordinator II, Lower Colorado River Authority
Apr. 1985 – July 1991. Supervisor – Chuck Dvorsky.
Developed work plans and budget estimates, designed and implemented the Wastewater
Monitoring Program, supervising a staff of two. Performed original hydrologic and water
quality studies. Wrote technical reports presenting the results of non-parametric water
quality trend analyses. Represented the LCRA in wastewater permit hearings before the
Texas Water Commission. Won Safe Supervisor Award in 1986. Interacted with the
General Manager, Assistant General Counsel, engineers, biologists and the general
public.

Professional Organizations

American Statistical Association, American Water Resources Association, Ecological
Society of America, North American Lake Management Society, Sigma Xi.

Education

Ph.D., Environmental Science, Duke University, 1996. "Prediction of chlorophyll a
concentrations in Lake Okeechobee, Florida." Ph.D. dissertation, Dept. of Environment,
Duke University, 1996, 132 pp. (Supervised by Dr. Kenneth H. Reckhow)

M.S., Statistics, Duke University, 1996. Thesis: "Prediction of chlorophyll a
concentrations in Lake Okeechobee using Bayesian nonparametric regression splines
with interactions." M.S. thesis, Institute for Statistics and Decision Sciences, Duke
University, 1996, 60 pp. (Supervised by Dr. Michael Lavine)

M.S., Environmental Management, University of Texas at San Antonio, 1981.

B.A., Biology, Southwestern University, 1978.

Selected Publications

Markewitz D, Lamon EC, Bustamante M, Chavez J, Figueiredo RO, Johnson M, Krusche A, Neil C, and Silva J, 2011. Discharge-calcium concentration relationships in Brazil: Soil or land use controlled, Biogeochemistry. Volume 105, Numbers 1-3, 19-35, DOI: 10.1007/s10533-011-9574-2

E. C. Lamon and C. A. Stow, 2010. Lake Superior water level fluctuation and climatic factors: A dynamic linear model analysis, Journal of Great Lakes Research 36 (2010) 172–178. Published March, 2010.

Freeman A.M., Lamon E.C. and Stow C.A., 2009. Nutrient criteria for lakes, ponds, and reservoirs: A Bayesian TREED model approach, ECOLOGICAL MODELLING, Volume: 220 Issue: 5 Pages: 630-639. Published: MAR 10 2009. Times Cited: 0

Stow, C.A, E.C. Lamon, T.K. Kratz, C.E. Sellinger, 2008, Lake level coherence supports a common driver, EOS, Transactions, American Geophysical Union, Vol. 89, No. 41, 389-340.

Lamon, E.C. and S. S. Qian, 2008. Regional Scale stressor-response models in aquatic ecosystems. Journal of the American Water Resources Association, 44(3):771-781. http://dx.doi.org/10.1111/j.1752-1688.2008.00205.x.

Lamon, E.C., O. Malve, O.P. Pietiläinen, 2008. Lake classification to enhance prediction of eutrophication endpoints in Finnish lakes, Environmental Modeling and Software, Volume 23, Issue 7, Pages 938-947. http://dx.doi.org/10.1016/j.envsoft.2007.10.008

Sellinger,C.E., C.A. Stow, E.C. Lamon, and S.S. Qian, 2008. Recent Water Level Declines in the Lake Michigan-Huron System, Environmental Science and Technology, 42:367-373.

C.A. Stow, K.H. Reckhow, S.S. Qian, E.C. Lamon, G.B. Arhonditsis, M.E. Borsuk, and D. Seo, 2007. Approaches to evaluate water quality model parameter uncertainty for adaptive TMDL implementation. Journal of the American Water Resources Association, 43(6):1-9.

Arhonditsis, G.B., S.S. Qian, C.A. Stow, E.C. Lamon and K.H. Reckhow, 2007. Eutrophication risk assessment using Bayesian calibration of process-based models: Application to a mesotrophic lake, Ecological Modelling, 208:215-229.

Mason, D.M., T.B. Johnson, C.J. Harvey, J.F. Kitchell, S.T. Schram, C.R. Bronte, M.H. Hoff, S.T. Lozano, A.S. Trebitz, D.R. Schreiner, E.C. Lamon, T. Hrabik, 2005. Hydroacoustic estimates of abundance and spatial distribution of pelagic fishes in western Lake Superior, Journal of Great Lakes Research, 31: 426-438.

Lamon, E.C., S. Qian and D.D. Richter, 2004. Temporal changes in the Yadkin River flow vs. suspended sediment concentration relationship, Journal of the American Water Resources Association, 40(5):1219-1229.

Lamon, E. C. and C. A. Stow, 2004. Bayesian Methods for Regional Scale Lake Eutrophication Models, Water Research, 38(11): 2764-2774.

Lamon, E.C., 2004. Commentary on Predictive Assessment of fish health and fish kills in the Neuse River estuary using elicited expert judgment, by Mark Borsuk. Human and Ecological Risk Assessment. Volume 10(2): 435-436.

Stow, C. A., Lamon, E. C. and Qian, S.S., Shrank, C. S., 2004. Will Lake Trout PCB Concentrations Meet the Great Lakes Strategy 2002 Goal?, Environmental Science and Technology, 38: 359-363.

Haas, H., E. C. Lamon, K. Rose, R. Shaw, 2001, Environmental and biological factors associated with stage-specific brown shrimp abundances in Louisiana: applying a new combination of statistical techniques to recruitment data, Canadian Journal of Fisheries and Aquatic Sciences, 58(11): 2258-2270.

Lamon, E. C. and M. Clyde, 2000. Accounting for model uncertainty in prediction of chlorophyll a in Lake Okeechobee, Journal of Agricultural, Biological and Environmental Statistics, 5(3): 297-322.

Lamon, E. C., S. R. Carpenter and C. A. Stow, 2000. Depuration of PCBs in the Lake Michigan Ecosystem, Ecosystems, 3(4): 332-343.

Lamon, E. C. and C. A. Stow, 1999. Sources of variability in microcontaminant data for Lake Michigan salmonids: statistical models and implication for trend detection, Canadian Journal of Fisheries and Aquatic Sciences. 56, Supplement 1: 71-85.

Lamon, E. C., S. R. Carpenter and C. A. Stow, 1999. Rates of decrease of PCB concentrations in five species of Lake Michigan salmonids, Canadian Journal of Fisheries and Aquatic Sciences, 56: 53-59.

Lamon, E. C., S. R. Carpenter and C. A. Stow, 1998. Forecasting PCB concentrations in Lake Michigan salmonids: A dynamic linear model approach, Ecological Applications, 8(3): 659-668.

Lamon, E. C., K. H. Reckhow, K. E. Havens, 1996. Using generalized additive models for prediction of chlorophyll a in Lake Okeechobee, Florida, Lakes and Reservoirs: Research and Management, 2:37-46.

Lamon, E. C., 1995. A regression model for the prediction of chlorophyll a in Lake Okeechobee, Lake and Reservoir Management, 11(4): 283-290.

Articles in Progress

Lamon EC and Walker H. Models as a Framework for Examining the National Lakes Assessment 2007 Probabilistic Survey.

Other Publications

Prediction of chlorophyll *a* concentrations in Lake Okeechobee using Bayesian nonparametric regression splines with interactions. M.S. thesis, Institute for Statistics and Decision Sciences, Duke University, 1996, 60 pp. (Supervised by Dr. Michael Lavine)

Prediction of chlorophyll *a* concentrations in Lake Okeechobee, Florida. Ph.D. dissertation, Dept. of Environment, Duke University, 1996, 132 pp. (Supervised by Dr. Kenneth H. Reckhow)

Lamon, E.C., Qian, S.S., Goodall, J. (2006). Hurricane Katrina: Impact Considerations for the Reoccupation of New Orleans. Post-Event Consequence Projections, Vol. 2., Chapter 20: Environmental Impacts (Water), IEM/TEC06-047.

Craig A. Stow, E. Conrad Lamon, Song S. Qian, Patricia A. Soranno, Kenneth H. Reckhow, 2008. Bayesian Hierarchical/Multilevel Models for Inference and Prediction Using Cross-Sectional Lake Data, in "Real World Ecology: Large-scale and Long-term Case Studies and Methods", Eds. ShiLi Miao, Susan Carstenn, and Martha Nungesser., Approx. 400 p. 110 illus., Hardcover ISBN: 978-0-387-77941-6

Lamon EC, June 15, 2008, Bayesian Methods for Regional-Scale Stressor Response Models, Final Report under Environmental Protection Agency Agreement Number RD – 83088701-0.
http://cfpub2.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.publications/abstract/6135

Invited Lectures and Workshop Presentations

Lamon, E.C., Models as a Framework for Examining the National Lakes Assessment 2007 Probabilistic Survey, U.S. EPA ECOSYSTEM SERVICES RESEARCH PROGRAM SEMINAR SERIES, June 25, 2009, 3:00 - 4:30 pm EST by webinar through the U.S. EPA Environmental Science Connector.

Lamon, E.C., Bayesian Methods for Regional Eutrophication Models using the Nutrient Criteria Database, US EPA STAR Global Aquatic Ecosystems Services and Multi-stressor Progress Review Workshop, Washington, DC, June 8-9, 2006.

Lamon, E.C., Bayesian Methods for Regional Eutrophication Models: Part 1, Meta-Analysis of data for development of Nutrient Criteria Workshop, US EPA Region 5, Chicago, IL, January 30-31, 2006.

Lamon, E.C., Bayesian Methods for Regional Eutrophication Models: Part 2, Meta-Analysis of data for development of Nutrient Criteria Workshop, US EPA Region 5, Chicago, IL, January 30-31, 2006.

Lamon, E.C., Bayesian Methods for Regional Eutrophication Models, Michigan State University/EPA National Lake Assessment Planning Program Workshop, E. Lansing, MI, November 17-18, 2005.

Lamon, E.C., Bayesian Methods for Regional-Scale Eutrophication Models, Michigan State University, EPA-National Lake Assessment Planning Program (NLAPP) Workshop, Lansing, MI, November 17-18, 2005.

Lamon, E.C., Bayesian Methods for Regional-Scale Eutrophication Models using the Nutrient Criteria Database, Global Change and Ecosystem Protection Research STAR Progress Review Workshop, Arlington, VA, November 4, 2005.

Lamon, E.C., Bayesian Methods in Ecological Forecasting, NOAA Great Lakes Seminar Series, NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, MI, November 10, 2004.

Lamon, E.C., Bayesian Methods for Regional-Scale Eutrophication Models, Global Change and Ecosystem Protection Research STAR Progress Review Workshop, Old Town Alexandria, VA, June 17, 2004.

Lamon, E. C., Water Quality models for determination of the fate and transport of Toxic substances, Guest Lecturer in ENVS 4477, Environmental Toxicology: Introduction and Applications, Dept. of Environmental Studies, Louisiana State University, October 15, 2004.

Lamon, E. C., Water Quality models for determination of the fate and transport of Toxic substances, Guest Lecturer in ENVS 7100, Environmental Toxicology, Dept. of Environmental Studies, Louisiana State University, April, 2004.

Lamon, E. C., Water Quality models for determination of the fate and transport of Toxic substances, Guest Lecturer in ENVS 4477, Environmental Toxicology: Introduction and Applications, Dept. of Environmental Studies, Louisiana State University, November 11, 13, 2003.

Lamon, E. C., Water Quality models for determination of the fate and transport of Toxic substances, Guest Lecturer in ENVS 7100, Environmental Toxicology, Dept. of Environmental Studies, Louisiana State University, April 8,10, 2003.

Lamon, E. C., Bayesian Analysis of Long-Term Ecological Data, Long-Term Data Analysis Workshop, Long Term Ecological Research (LTER-NSF) All Scientist's Meeting, Snowbird UT, August 2-4, 2000.

Lamon, E. C., Depuration of PCBs in the Lake Michigan Ecosystem, Presented at a seminar in the Dept. of Civil & Environmental Engineering, Louisiana State University, October 15, 1999.

Lamon, E. C., Eutrophication Models for Louisiana Lakes, Presented at the LSU-IES Wednesday Seminar Series, Dec. 2, 1998.

Lamon, E. C., Ecological Forecasts: A Bayesian Approach, Presented to the Quantitative Ecology Group, Montana State University, Bozeman, MT, July 22, 1998.

Lamon, E. C., Forecasting PCB concentrations in five species of Lake Michigan salmonids, Presented at a meeting of the Environmental Graduate Organization, Louisiana State University, Baton Rouge, LA, April 1, 1998.

Lamon, E. C., Sources of variability in microcontaminant data for Lake Michigan salmonids, Center for Limnology Wednesday Seminar Series, Madison, WI, October 1, 1997.

Lamon, E. C., Prediction of chlorophyll a concentrations using regression splines with interactions: A Bayesian Model Averaging approach, Center for Limnology Wednesday Seminar Series, Madison, WI, September 18, 1996.

Papers Delivered at Professional Meetings

Markewitz D, Lamon EC, Bustamante M, Chavez J, Figueiredo RO, Johnson M, Krusche A, Neil C, and Silva J, 2011. Discharge-calcium concentration relationships in Brazil: Soil or land use controlled, Ecological Society of America Annual Meeting, 2011, Austin Texas.

Lamon, E.C. and S.S. Qian, Regional Scale Stressor-Response models in aquatic ecosystems, 2007 AWRA Annual Water Resources Conference, Albuquerque, New Mexico, November 12-15, 2007.

Lamon, E.C. and S.S. Qian, Regional Scale Stressor-Response models in aquatic ecosystems, 2007 WRRI Annual Conference, Raleigh, NC, March 27-28, 2007.

Lamon, E.C. and S.S. Qian, Regional Scale Stressor-Response models in aquatic ecosystems, Ecological Society of America 91st Annual Meeting, Memphis, TN, August 9, 2006.

Freeman, A.M., E.C. Lamon and C.A. Stow, Regional Scale Eutrophication Models: a Bayesian TREED Model Approach, Computational Environmetrics Conference,

American Statistical Assoc. Section on Statistics and Environment and University of Chicago Center for Integrating the Statistical and Environmental Science (CISES), Chicago Palmer House, October 22, 2004.

E.C. Lamon and Craig A. Stow, Bayesian Methods for Regional Eutrophication Models, ESOS VIII, Environmental State of the State Conference, October 10, 2003, University of New Orleans, New Orleans, LA.

Lamon, E. C., Juvenile White Shrimp Abundance in the LA Gulf of Mexico, ESOS VII, Environmental State of the State Conference, October 11, 2002, University of Louisiana-Lafayette, Lafayette, LA.

Beck, M., E.C. Lamon, J. Mitchell, Forecasting Fecal Coliform Contamination in Louisiana Oyster Leases Using a Dynamic Linear Model, May 15, 2002. American Water Resources Association's Spring Specialty Conference New Orleans, Louisana.

Ramcharan, C.W., and E.C. Lamon, Detecting Effects of A Perturbation Using RIA and DLM, Society of Canadian Limnologists Annual Meeting, January 2002, Vancouver, B.C.

Lamon, E. C., Regional Lake Eutrophication Models, ESOS VI, Environmental State of the State Conference, October 26, 2001, Nicholls State University, Thibodaux, LA.

Lamon, E. C., Regional Lake Eutrophication Models, ESOS VI, Environmental State of the State Conference, October 26, 2001, Nicholls State University, Thibodaux, LA.

Lamon, E. C., Depuration of PCBs in the Lake Michigan Ecosystem, Presented at the International Association of Great Lakes Research 41st Conference, Hamilton, ON, Canada, May 21, 1998.

Lamon, E. C., Sources of variability in microcontaminant data for Lake Michigan salmonids: Statistical models and implications for trend detection, Presented at the Spatial Processes Symposium of the American Fisheries Society Annual Meeting, Monterey, CA, August 27, 1997.

Lamon, E. C., Forecasting PCB concentrations in five species of Lake Michigan salmonids, Presented at the International Association of Great Lakes Research 40th Conference, Buffalo, NY. June 3, 1997.

Lamon, E. C., Determination of ecological zones of Lake Okeechobee, Florida. Presented at the International Union of Geodesy and Geophysics XXI General Assembly, American Geophysical Union, Boulder, CO, July 7, 1995.

Lamon, E. C., A regression model for the prediction of chlorophyll a in Lake Okeechobee. Presented at the Southeast Lake Conference of the North American Lake Management Society. Columbia, SC, March 5, 1994.

Contributions to Juried or Refereed Publications

Reviewer for Canadian Journal of Fisheries and Aquatic Sciences
Reviewer for Ecological Applications
Reviewer for Environmental Practice
Reviewer for Environmental Science and Technology
Reviewer for Human and Ecological Risk Assessment
Reviewer for Journal of the American Water Resources Association
Reviewer for Journal of Arid Environments
Reviewer for Journal of Environmental Management
Reviewer for Journal of Environmental Engineering
Reviewer for Journal of Hydrometeorology
Reviewer for Lake and Reservoir Management
Reviewer for Limnology and Oceanography
Reviewer for Water Research

Documentation of Teaching Activities

     Graduate Courses Developed at LSU:

          ENVS 7061 - Water Quality Management and Policy

          ENVS 7335 - Water Quality Modeling for Management

          ENVS 7385 – Decision Theory and Environmental Risk Analysis

     Graduate Courses Taught at LSU:

          ENVS 7061 - Water Quality Management and Policy - FALL 1998

          ENVS 7335 - Water Quality Modeling for Management, SPR 1999

          ENVS 7900-2 – Special Problems in Environmental Sciences, Sum 1999

          ENVS 7385 – Decision Theory and Environmental Risk Analysis, SPR 2000

          ENVS 7061 - Water Quality Management and Policy - FALL 2000

          ENVS 7900-2 – Special Problems in Environmental Sciences, Sum 2000

          ENVS 7385 – Decision Theory and Environmental Risk Analysis, SPR 2001

          ENVS 7385 – Decision Theory and Environmental Risk Analysis, FALL 2001

          ENVS 7335 - Water Quality Modeling for Management, SPR 2002

          ENVS 7335 - Water Quality Modeling for Management, Sum 2002, independent study

          ENVS 7385 – Decision Theory and Environmental Risk Analysis, FALL 2002

          ENVS 7385 – Decision Theory and Environmental Risk Analysis, FALL 2003

          ENVS 7335 - Water Quality Modeling for Management, SPRING 2004

          ENVS 7385 – Decision Theory and Environmental Risk Analysis, FALL 2004

     Graduate Students, M.S. Theses Directed and Graduation Dates:

     Eric Gagne – Fall, 1999. Non-thesis MS.

     Kristine Lesso – Fall, 1999. Predicting PM_{10} emissions from a water cooled incinerator".

     Felix Bernabel – Fall, 2000. "Rimac River Water Quality: an analysis of the response to mining waste loads to provide a basis for management decisions." (Joseph Martinez Award, Best Thesis – Environmental Planning and Management).

     Clint Rachal – Spring, 2002 Non-thesis MS

     John Walther – Fall, 2003. "Surface water pesticide contamination in the Upper Terrebone Basin".

     Jennifer Walton – Spring 2003. "Analysis of Tropospheric Ozone in the Baton Rouge Non-Attainment Area".

     Anindita Das – Summer, 2003. "Regional water quality models for the prediction of eutrophication endpoints".

     Angelina Freeman – Summer 2004. "Regional-Scale Eutrophication Models: A Bayesian TREED Model Approach".

Research/Teaching Assistants and/or paper graders:

Eric Gagne, LSU Graduate assistant. Louisiana Lake Water Quality data analyses. Non-thesis M.S., 1999.

Michael Beck, LSU Research Assistant – One month of Match required by Sea Grant (Improved Forecasts and Dissemination of   Oyster Fishery Closure Lines through the Gulf Oyster Industry Initiative). Met with RA extensively during Spring Semester for the purpose of instruction regarding the methods that we will use to forecast fecal coliform concentrations in water overlying oyster beds off the Louisiana Gulf coast. Michael Beck presented his graduate seminar and took his oral exam in June 2001, in the department of Experimental Statistics. This work was part of a research contract with LA Sea Grant, and I was on his committee.

Anindita Das, LSU Graduate Assistant – Aug, 2001-May, 2002 – Student worked to acquire WQ data for all lakes and reservoirs in the continental US. These data will be used to fit regional eutrophication models as part of Ms. Das's MS thesis, and several peer reviewed journal articles. Submitted grant proposal to JSF (May 2002) to fund Ms. Das's Summer research in this area.

Angelina Freeman, LSU Graduate Assistant – Aug, 2003-May, 2004 – Student worked to develop regional-scale eutrophication models for use in the Total Maximum Daily Load (TMDL) process, utilizing Bayesian hierarchical techniques. Multiple environmental stressors will be associated with biological responses, and various sources of uncertainty in the water quality model quantified.

Jessica Rury, LSU Graduate Assistant – Aug, 2005-Dec., 2004 – Student worked to develop GIS data for regional-scale eutrophication models used in the Total Maximum Daily Load (TMDL) process.

Boknam Lee, Duke NSEES Graduate Assistant – Aug. 2005 – present. Student is currently involved in developing GIS data for regional-scale eutrophication models used in the Total Maximum Daily Load (TMDL) process. Upon completion of these task, student will assist in model fitting and testing.

University Service

Administrative Duties

Faculty Coordinator, LSU Dept. of Environmental Studies - Interdepartmental Concentration in Wetland Sciences and Management.

Other Service

Organized and led the first year of the LSU-IES Wednesday Seminar Series, Fall 1998 - Spring 1999.

Organized and led the second year of the LSU-IES Wednesday Seminar Series, Fall 1999.

Faculty advisor to the Environmental Graduate Organization, Fall 1998-Dec 2004 .

Chair - Quantitative methods core curriculum committee of the IES Faculty.

Faculty Senate Courses and Curricula Committee, Fall 1999 to August 2002.

Faculty Senate Academic Computing Committee, Fall 2001 to Dec 2004.

Member, Conflict of Interest Committee for ASI Agreement, May 11, 2000 to Dec 2004.

School of the Coast and Environment Courses and Curricula Committee, Fall 2000 to Dec 2004.

Departmental Program Review Team Participant, Department of Experimental Statistics, Louisiana State University, February, 2002.

Deans Representative on the Doctoral Committee of Donald I.Thompson, Dairy Science Dept., Louisiana State University.

Deans Representative, Doctoral Committee of Sandra M. Guzman, Dept Biol. Sciences, Louisiana State University.

Public Service

Reviewed USGS Maine Water Resources Research Institute Program Proposals, October, 2000.

Member, Johnston Science Foundation Environmental Science Advisory Committee (ESAC). Reviewed Grant proposals for J. Bennett Johnston Science Foundation (May 2001, 2002, 2003, 2004)

Reviewed grant proposals for LSU Sigma Xi Chapter Grant-in-Aid awards, 2001, 2003, 2004.

Reviewed the EPA Ecoregional Nutrient Criteria, for the Gulf Restoration Network, New Orleans, LA, May 2002.

Reviewed proposal for NOAA Coastal Ocean Program, August, 2003.

Reviewed grant proposals for Helsinki University Environmental Research Centre, HERC, 2005.

Statement of Research Interests

My research interests focus on aquatic ecosystem models for forecasting water quality, water quantity, toxicological and ecological endpoints for use in management and decision-making. The key to efficient ecosystem and natural resource management depends on the ability of managers to forecast the response of meaningful endpoints to a host of management alternatives. Forecasts of the response of these endpoints to management actions are needed to make optimal decisions regarding allocation of limited resources among management alternatives. Models for this purpose span a wide range of complexity, spatial and temporal detail, data requirements, and forecast uncertainty. Often, the modeler feels that as spatial and temporal detail and model complexity increase, model uncertainty will decrease. Unfortunately, the extent to which this is true often depends on the quality and quantity of data available to the modeler for the purpose of parameter estimation and model verification.

My research focuses on providing such models to inform management decisions. As a consequence of the scale of management actions, several assumptions inherent to classical statistical inference are violated. Among these are replication and controls, since at the ecosystem scale true replication and controls are either impractical due to budgetary constraints, or impossible due to the uniqueness of the subject ecosystems. For these and other reasons, I use Bayesian methods within a decision theoretic framework to make inference and communicate uncertainty. Bayesian methods provide probability distributions as outputs, which are directly useful in decision-making under uncertainty. Bayesian methods allow the combination of information from disparate sources, such as in meta-analysis, as well as the quantification and use of expert judgment, which is a

great advantage when data are scarce, unreliable or non-existent. This approach also provides a natural mechanism by which new information may be incorporated with existing information to update forecasting models, which make them appropriate for adaptive management strategies that attempt to use ecosystem management actions to learn about the managed systems.

Funding from EPA through the Science to Achieve Results (STAR) program refocused my research on lake eutrophication issues, while maintaining emphasis on the use of Bayesian methods to develop models useful for decision-making. We used modern classification and regression trees and other Bayesian hierarchical techniques to link multiple environmental stressors to biological responses and quantify uncertainty in model predictions. A systematic method for identification and estimation of regional scale stressor-response models in aquatic ecosystems is useful in monitoring and assessment of aquatic resources, determination of Total Maximum Daily Load (TMDL's) and for increased understanding of the differences between regions. The modeling approach adopted for this research meets the goals for TMDL models set forth by the National Research Council in 2001. The report issued guidance for TMDL model selection, which included recommendations that models: 1) report prediction uncertainty, 2) be consistent with the amount of data available and 3) be flexible enough to permit updates and improvements. This work has led to international collaborations with the Finnish Environment Institute (SYKE), as well as collaborations with researchers funded through an EPA National Lake Assessment Planning Program (NLAPP) grant (PI: Patricia Sorrano, Michigan State University) and at EPA Region 5 Nutrient Criteria Development Regional Technical Advisory Group.

My research initially focused on traditional water quality issues, influenced by my tenure at the Lower Colorado River Authority from 1985 to 1991. As a result of my graduate education at Duke, and my postdoctoral assignment at the University of Wisconsin, Center for Limnology, there has been a gradual shift in the ecological endpoints analyzed in my research from more traditional, chemical indicators of water quality towards biological endpoints. As the subject ecosystems of my research have shifted towards Louisiana and the Gulf of Mexico, biological endpoints have grown to include both brown and white shrimp abundance, zooplankton abundance, and fecal coliform bacteria contamination of oyster beds. Research interests of my students, some of whom are employees of state environmental and agricultural agencies, have served both to extend my interests in environmental micro-contaminants to include Atrazine (in drinking water) and broadened my horizons to air quality issues (ozone in East Baton Rouge parish; PM_{10} emissions from incinerators).

Much of my research is reflected in the content of the courses that I have developed and taught. Emphasis on quantifying and communicating uncertainty regarding the state of environmental and ecological systems is a central part of each course. As an educator charged with training environmental management professionals, I draw heavily on my experience with the Lower Colorado River Authority (Austin, TX), both for inspiration and focus in curriculum design. LCRA suffered from a syndrome all too common among public agencies entrusted with ecosystem and natural resources management. This is the "data rich, information poor" syndrome. Though we spent hundreds of thousands of dollars each year on collection of water quality data, precious few of these data were used to inform policy. As chair of the Quantitative Core

Curriculum Committee of the Dept. of Environmental Studies at LSU, I worked with colleagues on the faculty to provide the quantitative rigor necessary for rational environmental decision-making and policy development.

The history of environmental quality over the last half century has taught us that problems sometimes develop over broad temporal and spatial scales. It is increasingly difficult to foresee tomorrow's problems, much less those of decades hence. It is therefore imperative that we prepare the ecosystem managers of tomorrow by providing quantitative methods with which they may learn about emerging environmental problems and adapt policies to mitigate them. Bayesian Hierarchical methods hold much promise as a "toolbox" to accomplish this goal. The advantages of these methods for ecological forecasting are that: (1) component models are relatively easy to parameterize; (2) correlations among model parameters are implicitly modeled through the conditional distribution or hierarchical structure of the model, thereby reducing model prediction uncertainty; (3) model predictions are based on the estimated posterior joint distribution of model parameters, and (4) model can be easily updated based on new data.

Stephen R. (Steve) Carpenter, Halverson Professor of Limnology and Professor of Zoology, University of Wisconsin Center for Limnology, 680 North Park Street, Madison WI 53706-1492.

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Fax   608-265-2340
Email: srcarpen@facstaff.wisc.edu
Web: http://limnology.wisc.edu/personnel/carpenter/carpenter.html

Craig Stow, NOAA Great Lakes Environmental Research Laboratory (GLERL), 2205 Commonwealth Blvd., Ann Arbor, MI 48105

Phone: 734-741-2268
Email: craig.stow@noaa.gov

Song S. Qian, Associate Research Professor, Environmental Sciences & Policy Division, Nicholas School of the Environment, Box 90328 Duke University, Levine Science Research Center, Durham, NC 27708

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