

Curriculum vitae of James J. Elser

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Personal:

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Education:

Ph.D., 1990, Ecology, University of California, Davis, CA. Thesis: "Nutrients, algae, and grazers: complex interactions in lake ecosystems", major professor: C.R. Goldman
M.S., 1983, Ecology, University of Tennessee, Knoxville, TN. Thesis: "Nutrient availability for phytoplankton production along a headwater to mainstream reservoir gradient", major professor: B.L. Kimmel
B.S. (*summa cum laude*), 1981, Biology, University of Notre Dame, Notre Dame, IN

Professional appointments and teaching experience (since 1990):

2005-present Associate Director, Research and Training Initiatives, School of Life Sciences, ASU
2003 Visiting Research Fellow and Fulbright Scholar, Center for Advanced Study of the Norwegian Academy of Letters and Sciences and Department of Biology, University of Oslo, Oslo, Norway
2000-present Professor, School of Life Sciences, ASU. Core member of Ecology, Evolution, and Environmental Science faculty group; affiliated faculty member, Molecular and Cellular Biology Program; scientific member, Center for Insect Science.
1997 (spring) Visiting Research Scholar, Center for Ecological Research, Kyoto University, Kyoto, Japan
1996 (fall) Visiting professor, Biology Department, University of Minnesota, Duluth
1996-2000 Associate Professor, Biology (Zoology) Department, ASU
1990-1996 Assistant Professor, Zoology Department, Arizona State University
1990 Participant, National Geographic Society-sponsored expedition to Lake Baikal, Soviet Siberia. C.R. Goldman (P.I.)
1990 Postdoctoral researcher, Div. of Environmental Studies, UC-Davis
1990 Co-instructor, UC-Davis: EST 116, Introductory Oceanography

Awards, honors, nominations, and elected positions:

2008 Nominee, ASU College of Liberal Arts and Sciences Gary Krahenburhl Difference Maker Award
2007 Nominee, ASU College of Liberal Arts and Sciences Distinguished Teaching Award
2006 Nominee for the ECI Prize in Limnetic Ecology & for the Hutchinson Medal, American Society of Limnology and Oceanography
2004 Nominee, Hutchinson Medal, American Society of Limnology and Oceanography
Honoree for impact on student experience, ASU Office of Student Affairs
2003 Fulbright Scholar (Norway)
Nominee, ECI International Prize in Limnetic Ecology
2000 Rosemary Mackay Fund award (To Paul Frost as lead author; also with R. Stelzer and G. Lamberti), North American Benthological Society
1999 Nominee, Aquatic Ecology section leader, Ecological Society of America
Nominee, Aldo Leopold Leadership Fellowship Program, Ecological Society of America
1997 NSF Center for Global Partnerships US-Japan Fellowship
1996 Board of Directors (Member-at-large, elected), American Society of Limnology and Oceanography

- 1990 Recipient, Lindeman Award of the American Society of Limnology and Oceanography for the outstanding paper in 1988 by aquatic scientist under the age of 35
- 1989 Special Commendation for quality of dissertation research, Merton Love Student Seminar Competition, Graduate Group in Ecology, UC-Davis
- 1988 National Science Foundation Doctoral Dissertation Improvement Grant
UC-Davis Jastro-Shields Graduate Research Scholarship
- 1987 Sigma Xi Grant-in-Aid of Research
UC-Davis Jastro-Shields Graduate Research Scholarship
- 1986 Four-year UC-Davis Graduate Fellowship
UC-Davis Distinguished Scholar Research Award
- 1981 National Science Foundation Graduate Fellowship
Phi Beta Kappa honor society, Notre Dame Chapter

Research interests: biological stoichiometry, limnology, community and ecosystem studies, physiological ecology, biogeochemistry, life-history evolution, molecular evolution, cancer biology.

Professional societies: American Association for the Advancement of Science, American Society of Limnology and Oceanography, Ecological Society of America

RESEARCH

Publications:

(# indicates a paper with citation frequency in top 1% (or higher) of its field according to ISI Essential Science Indicators)

In press

- 154. Hessen, D.O., M. Venture, and J.J. Elser. Does variation in genome size reflect cellular competition for P between DNA and RNA? *Genome*.
- 153. Frost, P., and J.J. Elser. "Biological stoichiometry," entry in *Encyclopedia of Life Sciences*, John Wiley & Sons.
- 152. Elser, J.J. The big book of animal physiology (Review of Karasov and Martinez del Rio *Physiological Ecology*). *BioScience* (book review)
- 151. Sterner, R.W., and Elser, J.J. Ecological stoichiometry (main entry). In: *Encyclopedia of Ecology*, S. Jorgensen (editor). Elsevier.
- 150. Carson, E.W., J.J. Elser, and T.E. Dowling. Importance of exogenous selection in a fish hybrid zone: insights from reciprocal transplant experiments. *Copeia*.

2008

- 149. Souza, V., L. Eguiarte, J. Siefert, and J.J. Elser. 2008. Microbial endemism: does nutrient limitation enhance speciation? *Nature Reviews Microbiology* **6**: 559-564. (invited Opinion)
- 148. Gruner, D.S., J.E. Smith, E.W. Seabloom, S.A. Sandin, J.T. Ngai, H. Hillebrand, W.S. Harpole, J.J. Elser, E.E. Cleland, M.E.S. Bracken, E.T. Borer, B.M. Bolker. 2008. A cross-system synthesis of herbivore and nutrient resource control on producer biomass. *Ecology Letters* **11**: 740–755
- 147. Sterner, R.W., T. Andersen, J. J. Elser, D.O. Hessen, J. Hood, E. McCauley, and J. Urabe. Scale-dependent carbon:nitrogen:phosphorus seston stoichiometry in marine and freshwaters. *Limnol. Oceanogr.* **53**: 1169-1180.

2007

146. Hessen, D.O., T.C. Jensen, M. Kyle, and J.J. Elser. 2007. RNA responses to N- and P-limitation: reciprocal regulation of stoichiometry and growth rate in *Brachionus*. *Functional Ecology* **21**: 956–962.
145. Wang, H., H.L. Smith, Y. Kuang, and J.J. Elser. 2007. Dynamics of stoichiometric bacteria-algae interactions in the epilimnion. *SIAM Journal on Applied Mathematics* **68**: 503-522
144. Elser, J.J., M.E.S. Bracken, E.E. Cleland, D.S. Gruner, W.S. Harpole, H. Hillebrand, J.T. Ngai, E.W. Seabloom, J.B. Shurin, and J.E. Smith. 2007. Global analysis of nitrogen and phosphorus limitation of primary production in freshwater, marine, and terrestrial ecosystems. *Ecology Letters* **10**: 1135-1142. *Highlighted in News and Views article in Nature. *Highlighted by Faculty of 1000 (Biology)
143. Hillebrand, H., D. S. Gruner, E. Borer, M.E.S. Bracken, E.E. Cleland, J.J. Elser, W.S. Harpole, J.T. Ngai, E.W. Seabloom, J.B. Shurin, J.E. Smith. 2007. Plant community structure and ecosystem productivity regulate the intrinsic control of plant diversity across major ecosystem types. *Proc. Nat. Acad. Sci. USA* **104**: 10904-10909. *Highlighted by Faculty of 1000 (Biology)
142. Elser, J.J., M. Kyle, M. Smith, and J. Nagy. 2007. Biological stoichiometry in human cancer. *PLoS ONE* **2**: e1028. doi:10.1371/journal.pone.0001028
141. Elser, J.J., and A.L. Hamilton. 2007. Stoichiometry and the new biology: the future is now. *PLoS Biology* **5**: e181. doi:10.1371/journal.pbio.0050181 *Invited essay
140. Novotny, A., J.D. Schade, M. Kyle, A. Kay, S. Hobbie, P. Reich, and J.J. Elser. 2007. Stoichiometric response of nitrogen-fixing and non-fixing dicots to manipulations of CO₂, nitrogen, and diversity. *Oecologia* **151**: 687-696. *Highlighted by Faculty of 1000 (Biology)
139. Clasen, J.L., and J.J. Elser. 2007. The effect of host *Chlorella NC64a* carbon:phosphorus ratio on production of *Paramecium Chlorella virus-1*. *Freshwater Biol.* **52**: 112-122.

2006

138. Elser, J.J. 2006. Biological stoichiometry: a chemical bridge between ecosystem ecology and evolutionary biology. *The American Naturalist* **168**: S25-S35.
137. Kyle, M., K. Acharya, L.J. Weider, K. Looper, and J.J. Elser. 2006. Coupling of growth rate and body stoichiometry in *Daphnia*: a role for maintenance processes? *Freshwater Biol.* **51**: 2087-2095.
136. Bertram, S., J.D. Schade, and J.J. Elser. 2006. Signaling and phosphorus: correlations between mate signaling effort and body elemental composition in crickets. *Animal Behavior* **72**: 899-907
135. Kerkhoff, A., W.F. Fagan, J.J. Elser, and B.J. Enquist. 2006. Phylogenetic and functional variation in the scaling of nitrogen and phosphorus in the seed plants. *The American Naturalist*. **168**: E103-E122
134. Elser, J.J., W.F. Fagan, S. Subramanian, and S. Kumar. 2006. Signatures of ecological resource availability in the animal and plant proteomes. *Molecular Biology and Evolution* **23**: 10.1093. *Featured as an "Editor's Choice: Highlights of the Recent Literature" in *Science magazine*.
133. Elser, J.J., T. Watts, and T.A. Markow. 2006. Ontogenetic coupling among growth rate, RNA allocation, and P content in five species of *Drosophila*. *Func. Ecol.* **20**: 846-856.
132. Acharya, K., P. A. Bukaveckas, J. D. Jack, M. Kyle, and J. J. Elser. 2006. Consumer growth linked to diet and RNA – P stoichiometry: Response of *Bosmina* to natural and experimental variation in food resources. *Limnol. Oceanogr.* **51**: 1859-1869.
131. Boersma, M., and J.J. Elser. 2006. Too much of a good thing: on balanced diets and maximal growth. *Ecology* **87**: 1325-1330.
130. Watts, T., H.A. Woods, S. Hargand, J.J. Elser, and T.A. Markow. 2006. Biological stoichiometry of growth in *Drosophila melanogaster*. *J. Insect Sci.* **52**: 187-193.
129. Souza, V., L. Espinosa-Asur, A Escalante, L.E. Eguiarte, J. Farmer, L. Forney, L. Lloret, J. M Rodríguez Martínez, X. Soberon, R. Dirzo, and J.J. Elser. 2006. An endangered oasis of aquatic microbial biodiversity in the Chihuahuan desert. *Proc. Nat. Acad. Sci. USA* **103**: 6565-6570.

128. Elser, J.J., J. Watts, J.H. Schampel, and J. Farmer. 2006. Early food-webs on a trophic knife-edge? Experimental data from a modern microbialite-based ecosystem. *Ecology Letters* **9**: 295-303.

2005

127. Weider, L. J., W. Makino, K. Acharya, K. L. Glenn, M. Kyle, J. Urabe, and J. J. Elser. 2005. Genotype x environment interactions, stoichiometric food quality effects, and clonal coexistence in *Daphnia pulex*. *Oecologia* **143**:537-547.
126. Kuang, Y, W. Fan, I. Loladze, and J. J. Elser. 2005. Dynamics of a stoichiometric discrete producer-grazer model. *J. Diff. Equat. Analysis* **11**: 347-364
125. Gillooly, J.F., A.P. Allen, J.H. Brown, J.J. Elser, V.M. Savage, G.B. West, W.H. Woodruff, and H.A. Woods. 2005. The metabolic basis of whole-organism RNA and phosphorus stoichiometry. *Proc. Nat. Acad. Sci. USA* **102**: 11923 – 11927.
124. Weider, L.J., J.J. Elser, T.J. Crease, M. Mateos, T.M. Markow, and J.B. Cotner. 2005. Functional significance of ribosomal (r)DNA variation in the ecology of organisms. *Annual Review of Ecology, Evolution, and Systematics* **36**: 219-242.
123. Kerkhoff, A.J., Enquist, B.J., J.J. Elser, J.J., W.F. Fagan. 2005. Plant allometry, stoichiometry and the temperature-dependence of terrestrial primary production. *Global Ecology and Biogeography* **14**: 585-598.
122. Elser, J.J., J. H. Schampel, F. Garcia-Pichel, B. Wade, V. Souza, L. Eguiarte, A. Escalante, and J. Farmer. 2005. Effects of PO₄ enrichment and grazing snails on microbial communities in an ecosystem with living stromatolites. *Freshwater Biol.* **50**: 1808-1825.
121. Elser, J.J., J. H. Schampel, M. Kyle, J. Watts, E. Carson, T. Dowling, C. Tang, and P. Roopnarine. 2005. Effects of PO₄ enrichment of microbial communities on hydrobiid snails in an ecosystem with living stromatolites. *Freshwater Biol.* **50**: 1826-1835.
120. Fan, M., I. Loladze, Y. Kuang and J. J. Elser. 2005. Dynamics of a stoichiometric discrete producer-grazer model. *J. Difference Equations and Applications* **11**: 347–364.
119. Elser, J.J., and D.O. Hessen. 2005. Biosimplicity via stoichiometry: the evolution of food-web structure and processes. Chapter 1 (pages 7-18) in: *Aquatic Food Webs: an Ecosystem Approach*, A. Belgrano, U. Scharler, J. Dunne, and R. Ulanowicz (eds), Oxford University Press.
118. Hessen, D. O., and J. J. Elser. 2005. Elements of ecology and evolution. *Oikos* **109**: 3-5.
117. Anderson, T.R., D.O. Hessen, J.J. Elser, and J. Urabe. 2005. Metabolic stoichiometry and the fate of excess carbon and nutrients in consumers. *Am. Nat.* **165**: 1-15.

2004

116. Woods, A., W.F. Fagan, J.F. Harrison, and J.J. Elser. 2004. Allometric and taxonomic-dependence of phosphorus content in insects and arachnids. *Functional Ecology* **18**: 103-109.
115. Andersen, T., J.J. Elser, and D.O. Hessen. 2004. Stoichiometry and population dynamics. *Ecology Letters* **7**: 884-900.
114. Miller, C.R., Y. Kuang, W.F. Fagan, and J.J. Elser. 2004. Modeling and analysis of stoichiometric two-patch consumer-resource systems. *Math. Biosciences* **189**: 153-184.
113. Kuang, Y, J. Huisman, and J.J. Elser. 2004. Stoichiometric plant-herbivore models and their interpretation. *Math. Biosci. Engin.* **1**: 215-222.
112. Hessen, D.O., G. I. Ågren, T.R. Anderson, J. J. Elser, and P. De Reuter. 2004. Carbon sequestration in ecosystems: the role of stoichiometry. *Ecology* **85**: 1179-1192.
111. Vrede, T., D.R. Dobberfuhl, S.A.L.M. Kooijman, and J.J. Elser. 2004. The stoichiometry of production: functional connections among organism C:N:P stoichiometry, macromolecular composition, and growth rate. *Ecology* **85**: 1217-1229.
110. Kerfoot, W.C., G. Mittelbach, N.G. Hairston, Jr., and J.J. Elser. 2004. Biocomplexity in aquatic ecosystems: overview. *Limnol. Oceanogr.* **49**: 1225-1228.
109. Acharya, K., M. Kyle, and J. J. Elser. 2004. Biological stoichiometry of *Daphnia* growth: an ecological test of the growth rate hypothesis. *Limnol. Oceanogr.* **49**: 656-665.

108. Acharya, K., M. Kyle, and J. J. Elser. 2004. Effects of stoichiometric dietary mixing on *Daphnia* growth and reproduction. *Oecologia* **138**: 333-340.
107. Weider, L.J., K.L. Glenn, M. Kyle, and J.J. Elser. 2004. Associations among ribosomal (r)DNA intergenic spacer length, growth rate, and C:N:P stoichiometry in the genus *Daphnia*. *Limnol. Oceanogr.* **49**:656-665.
106. Perkins, M.C. H.A. Woods, J.F. Harrison, and J.J. Elser. 2004. Dietary phosphorus affects the growth of larval *Manduca sexta*. *Arch. Insect Biochem.* **55**: 153-168.
105. Loladze, I., Y. Kuang, J.J. Elser, and W.F. Fagan. 2004. Competition and stoichiometry: coexistence of two predators on one prey. *J. Theor. Biol.* **65**: 1-15. **One of the top 25 most downloaded papers in JTB April 2003-March 2004.*

2003

104. Riisgard HU, Kinne O, Fenchel T, Fee E, Hesslein R, Elser J, Scranton M, Cole J, Hairston N, Canuel E, Glud R, Nielsen C, Beninger P, Waagbo R, Hemre GI, Hulata G, Hoisaeter T, McLusky D, Kneib R, Shumway S, Warwick R, Hagerman L, Larsen PS, Ott J, Dworschak PC, Boero F, Gili JM, Philippart K, Seaman M. 2003. Misuse of the peer-review system: time for countermeasures? *Mar. Ecol. Prog. Series* **258**: 297-309
103. Yoshida T., J. Urabe, and J.J. Elser. 2003. Assessment of 'top-down' and 'bottom-up' forces as determinants of rotifer distribution among lakes in Ontario, Canada. *Ecol. Res.* **18**: 639-650. **This paper won the Ecological Research Award of the Japanese Ecology Society, awarded to the best 3 papers published in Ecological Research in a given year.*
102. Elser, J.J. 2003. Biological stoichiometry: a theoretical framework connecting ecosystem ecology, evolution, and biochemistry for application in astrobiology. *International Journal of Astrobiology* **2**:185-193.
101. Elser, J.J., J. Nagy, and Y. Kuang. 2003. Biological stoichiometry: an ecological perspective on tumor dynamics. *BioScience* **53**: 1112-1120.
- #100. Elser, J.J., K. Acharya, M. Kyle, J. Cotner, W. Makino, T. Markow, T. Watts, S. Hobbie, W. Fagan, J. Schade, and R.W. Sterner. 2003. Growth rate – stoichiometry couplings in diverse biota. *Ecology Letters* **6**: 936-943.
99. Ågren, G.I., D.O. Hessen, T.R. Anderson, J.J. Elser, P. De Reuter. 2003. Element interactions: theoretical considerations. In: *Interactions of the Major Biogeochemical Cycles - Global Change and Human Impacts*, SCOPE 61. Melillo, M., Field, C B. Moldan B. (eds.). Island Press, Washington, D.C. pp. 135-150.
98. Urabe, J., J. Togari, and J.J. Elser. 2003. Stoichiometric impacts of increased carbon dioxide on a planktonic herbivore. *Global Change Biology* **9**: 818-825.
97. Kuang, Y, J. Nagy, and J.J. Elser. 2003. Biological stoichiometry of tumor dynamics: mathematical models and analysis. *Discr. Cont. Dynam. Systems, B* **4**: 221-240.
96. Woods, H.A., W. Makino, J.B. Cotner, S. Hobbie, J.F. Harrison, K. Acharya, and J.J. Elser. 2003. Temperature shifts cause systematic changes in chemical composition of ectothermic organisms. *Func. Ecology* **17**: 237-245.
95. Frost, P.C., S. Tank, M.A. Turner, and J.J. Elser. 2003. Elemental composition of littoral invertebrates from oligotrophic and eutrophic Canadian lakes. *Journal of the North American Benthological Society* **22**: 51-62.
94. Elser, J.J., M. Kyle, W. Makino, T. Yoshida, and J. Urabe. 2003. Algal and bacterial resource limitation and the microbial food web: a test of the light:nutrient hypothesis. *Aquat. Microb. Ecol.* **31**: 49-65.
93. Makino, W., J. B. Cotner, R.W. Sterner, and J.J. Elser. 2003. Are bacteria more like plants or animals? Growth rate and substrate dependence of bacterial C:N:P stoichiometry. *Func. Ecology* **17**:121-130.
92. Schade, J., M. Kyle, S. Hobbie, W. Fagan, and J.J. Elser. 2003. Stoichiometric tracking of soil nutrients by a desert insect herbivore. *Ecology Letters* **6**: 96-101.

91. Kyle M., T. Watts, J. Schade, and J.J. Elser. 2003. A microfluorometric method for quantifying RNA and DNA in terrestrial insects 7 pp. *Journal of Insect Science*, 3.1. Available online: insectscience.org/3.1

2002

90. Elser, J.J., M. Kyle, P. Frost, J. Urabe, and T. Andersen. 2002. Effects of light and nutrients on plankton stoichiometry and biomass in a P-limited lake. *Hydrobiologia* **481**: 101-112.
89. Urabe, J., W. Makino, K. Hayakawa, and J. J. Elser. 2002. Food quality determinants for *Daphnia* growth in P-limited lakes. *Verh. Internat. Verein. Limnol.* **28**: 1-6.
88. Gorokhova, E., T.A. Dowling, T. Crease, L.J. Weider, and J.J. Elser. 2002. Functional and ecological significance of rDNA IGS variation in a clonal organism under divergent selection for production rate. *Proc. Roy. Acad. Lond B* **269**: 2373-2379.
87. Fagan, W.F., E.H. Siemann, R.F. Denno, C. Mitter, A. Huberty, H.A. Woods, and J.J. Elser. 2002. Nitrogen in insects: implications for trophic complexity and species diversification. *The American Naturalist* **160**: 784-802.
86. Frost, P.C., R.S. Stelzer, G.A. Lamberti, and J.J. Elser. 2002. Ecological stoichiometry of trophic interactions in the benthos: Understanding the role of C:N:P ratios in lentic and lotic habitats. *Journal of the North American Benthological Society* **21**: 515-528.
85. Dobberfuhl, D.A., and J.J. Elser. 2002. Distribution and potential competitive effects of an exotic zooplankter (*Daphnia lumholtzi*) in Arizona reservoirs. *J. Arizona-Nevada Acad. Sci.* **342**: 89-94.
84. Woods, H.A., M.C. Perkins, J.J. Elser, and J.F. Harrison. 2002. Absorption and storage of phosphorus by larval *Manduca sexta*. *J. Insect Phys.* **48**: 555-564.
83. Urabe, J., J.J. Elser, M. Kyle, T. Sekino and Z. Kawabata. 2002. Herbivorous animals can mitigate unfavorable ratios of energy and material supplies by enhancing nutrient recycling. *Ecology Letters* **5**: 177-185.
82. Frost, P.C., and J.J. Elser. 2002. Growth responses of littoral mayflies to the phosphorus content of their food. *Ecology Letters* **5**: 232-241.
81. Urabe, J., M. Kyle, W. Makino, T. Yoshida, T. Andersen, and J.J. Elser. 2002. Reduced light increases herbivore production due to stoichiometric effects of light:nutrient balance. *Ecology* **83**: 619-627.
80. Xenopoulos, M.A., P.C. Frost, and J.J. Elser. 2002. Joint effects of ultraviolet radiation and phosphorus supply on phytoplankton growth rate and elemental composition. *Ecology* **83**: 423-435.
79. Makino, W., J. Urabe, J.J. Elser, and C. Yoshimizu. 2002. Evidence of phosphorus-limited individual and population growth of *Daphnia* in a Canadian Shield lake. *OIKOS* **96**: 197-205.
78. Frost, P.C., J.J. Elser, and M.A. Turner. 2002. Effects of caddisfly grazers on the elemental composition of epilithon in a boreal lake. *Journal of the North American Benthological Society* **21**: 54-63.
77. Frost, P.C., J.J. Elser, and M.A. Turner. 2002. Effects of light and nutrients on the accumulation and elemental composition of epilithon in boreal lakes. *Freshwater Biology* **47**: 173-184.
76. Sterner, R.W. and J.J. Elser (order of authorship determined by coin flip). 2002. *Ecological Stoichiometry: The Biology of Elements from Molecules to the Biosphere*. Princeton University Press, Princeton, NJ.

2001

75. Sterner, R.W., J.H. Schampel, K.L. Schulz, A.E. Galford, and J.J. Elser. 2001. Joint variation of zooplankton and seston stoichiometry in lakes and reservoirs. *Verh. Internat. Verein. Limnol.* **27**: 2996-3000.
74. Elser, J.J., L. Gudex, M. Kyle, T. Ishikawa, and J. Urabe. 2001. Effects of zooplankton on nutrient availability and seston C:N:P stoichiometry in inshore waters of Lake Biwa, Japan. *Limnology* **2**: 91-100.

73. Muller, E., 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.
- #72. Elser, J.J., H. Hayakawa, and J. Urabe. 2001. Nutrient limitation reduces food quality for zooplankton: *Daphnia* response to seston phosphorus enrichment. *Ecology* **82**: 898-903.

2000

71. Dobberfuhl, D.A., and J.J. Elser. 2000. Inferring threshold stoichiometric food quality from first principles: the influence of life-history strategy and maximum assimilation efficiencies of C and P. *Verh. Internat. Verein. Limnol.* **27**: 834-838.
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69. Loladze, I, Y. Kuang, and J.J. Elser. 2000. Stoichiometry in producer-grazer systems: linking energy flow and element cycling. *Bull. Math. Biol.* **62**: 1137-1162. **One of the top 10 most cited papers in BMB since 1999.*
- #68. Elser, J.J., W.F. Fagan, R.F. Denno, D.R. Dobberfuhl, A. Folarin, A. Huberty, S. Interlandi, S.S. Kilham, E. McCauley, K.L. Schulz, E.H. Siemann, and R.W. Sterner. 2000. Nutritional constraints in terrestrial and freshwater food webs. *Nature* **408**: 578-580.
67. IGBP Working Group on Carbon and Nutrients (Co-chairs and lead authors: P. Falkowski and R.J. Scholes; Members: E. Boyle, J. Canadell, D. Canfield, J. Elser, N. Gruber, K. Hibbard, P. Höglberg, S. Linder, F.T. Mackenzie, B. Moore III, T. Pedersen, Y. Rosenthal, S. Seitzinger, V. Smetacek, W. Steffen). The global carbon cycle: a test of our knowledge of Earth as a system. *Science* **290**: 291-296.
- #66. Elser, J.J., R.W. Sterner, E. Gorokhova, W.F. Fagan, T.A. Markow, J.B. Cotner, J.F. Harrison, S.E. Hobbie, G.M. Odell, L.J. Weider. 2000. Biological stoichiometry from genes to ecosystems. *Ecology Letters* **3**: 540-550.
65. Elser, J.J. From sea to lake to land: ecological stoichiometry and the flow of energy and matter in ecosystems. *Trends Ecol. Evol.* **15**: 393-394 (meeting summary)
64. Elser, J.J., T. Dowling, D.A. Dobberfuhl and J. O'Brien. 2000. The evolution of ecosystem processes: ecological stoichiometry of a key herbivore in temperate and arctic habitats. *J. Evol. Biol.* **13**: 845-853.
63. Dobberfuhl, D.R., and J.J. Elser. 2000. Ecological stoichiometry of lower food web components in temperate and arctic lakes. *J. Plankton Res.* **22**: 1341-1354.
62. Elser, J.J., R.W. Sterner, A.E. Galford, T.H. Chrzanowski, D.L. Findlay, K.H. Mills, M.J. Paterson, M.P. Stainton, and D.W. Schindler. 2000. Pelagic C:N:P stoichiometry in a eutrophied lake: responses to a whole-lake food-web manipulation. *Ecosystems* **3**: 293-307.

1999

61. Downing, J.A., M. McClain, R. Twilley, J.M. Melack, J.J. Elser, N.N. Rabalais, W.M. Lewis, Jr., R.E. Turner, J. Corredor, D. Soto, A. Yanez-Arancibia, J.A. Kopaska, and R.W. Howarth. 1999. The impact of accelerating land-use change on the N-cycle of tropical aquatic ecosystems: current conditions and projected changes. *Biogeochemistry* **46**: 109-148.
60. Elser, J.J. 1999. The pathway to noxious cyanobacteria blooms in lakes: the food web as the final turn. *Freshwater Biology* **42**: 537-543.
59. Dobberfuhl, D.A., and J.J. Elser. 1999. Development of dried algae food for use in zooplankton growth and nutrient release studies. *J. Plankton Res.* **21**: 957-970.
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In review or in preparation:

- Ngai, J., E. Cleland, S. Harpole, E. Seabloom, E. Borer, M. Bracken, J.J. Elser, D. Gruner, H. Hillebrand, and J. Smith. Multiple resource limitation of primary productivity: embracing the interaction. *American Naturalist*: in review.
- Mulder, C., and J.J. Elser. Biological stoichiometry and the regulation of soil fauna biomass spectra. *Ecology Letters*: in review.
- Acquisti, C., J.J. Elser, and S. Kumar. The effects of nitrogen limitation on the composition of genome sequences in plants. In preparation for *Science*.
- Elser, J.J., M. Kyle, L. Steger, K.R. and J.S. Baron. Nutrient availability and phytoplankton nutrient limitation across a gradient of atmospheric nitrogen deposition. In preparation for *Limnology and Oceanography*.

Publications in General Interest Outlets:

- Souza, V., A. Escalante, L. Espinoza, A. Valera, A. Cruz, L.E. Eguiarte, F. García-Pichel, and J.J. Elser. 2004. Los microbios de Cuatro Ciénegas: un laboratorio natural para el estudio de la Astrobiología. *Ciencias* **75**: 4-12.

Selected Recent Meeting Presentations (since 1995):

- Anbar, A., F. Wolfe-Simon, and J.J. Elser. 2007. "Elements of life," annual meeting of the Geological Society of America.
- Smith, V.H., M. Martín-Cereceda, M. Kyle, J.J. Elser. 2007. "Stoichiometry of C:N:P in heterotrophic bacteria: an example of elemental homeostasis in microorganisms". (poster) Congreso Sociedad Española de Microbiología,.

- Elser, J.J., M. Kyle, M. Smith, and J. Nagy. 2007. "Tumor limnology: a test of the growth rate hypothesis using paired biopsy samples of human tumors," annual meeting of the American Society of Limnology and Oceanography.
- Engstrom, M E, Watts, J M, Elser, J J 2007. "Amphipods on a stoichiometric knife edge? Effects of low food C:P ratio on growth and survival in *Hyalella azteca*," annual meeting of the American Society of Limnology and Oceanography. *This poster won an Award of Distinction at this meeting.*
- Kyle, M., J. Watts, and J.J. Elser. 2007. "Microbial resource limitation in Colorado alpine lakes across a gradient of atmospheric nitrogen deposition," annual meeting of the American Society of Limnology and Oceanography.
- Steger, L. M. Kyle, J. Watts, and J.J. Elser. 2007. "Phytoplankton nutrient limitation in Colorado alpine lakes across a gradient of atmospheric nitrogen deposition," annual meeting of the American Society of Limnology and Oceanography.
- Dunning, K., H. Wang, Y. Kuang, and J.J. Elser. 2007. "Effects of light intensity on *Daphnia* dynamics and coexistence," annual meeting of the American Society of Limnology and Oceanography.
- Elser, J.J., M. Kyle, M. Smith, and J. Nagy. 2007. "Biological stoichiometry of tumors: a test of the growth rate hypothesis using paired biopsy samples of human tumors," annual meeting of the Society for Integrative and Comparative Biology, Phoenix, AZ.
- Elser, J.J. 2005. "Biological stoichiometry: a chemical bridge between ecosystem ecology and evolutionary biology," invited talk in the Vice-President's Symposium, joint meeting of the American Society of Naturalists and the Society for the Study of Evolution, Fairbanks, Alaska.
- McCauley, E., D.O. Hessen, J.J. Elser, R.W. Sterner, T. Andersen, B. Faafeng, and J.A. Downing. 2005. "Effects of anthropogenic N deposition on nutrient stoichiometry and zooplankton: data from southern Norway." Annual meeting, American Society of Limnology and Oceanography, Salt Lake City, UT. (I delivered this talk, although I am not listed as first author.)
- Elser, J.J., J. Watts, J.H. Schampel, and J. Farmer. 2004. "Early food-webs on a stoichiometric knife-edge? Experimental data from a modern stromatolite-based ecosystem," annual meeting, Ecological Society of America, Portland, OR.
- Elser, J.J., J. Schampel, J. Watts, F. Garcia-Pichel, B. Wade, J. Farmer, V. Souza, L. Eguiarte. 2003. "Effects of grazers and PO₄ enrichment on biomass, C:N:P stoichiometry, and microbial community structure of oncoïd stromatolites at Cuatro Ciénegas, Coahuila, Mexico," annual meeting, American Society of Limnology and Oceanography, Salt Lake City, UT.
- Elser, J.J. 2003. "Biological stoichiometry from genes to ecosystems: ideas, plans, and realities," Invited talk in society-wide special symposium, annual meeting of the Society for Integrative and Comparative Biology, Toronto.
- Elser, J.J., and R.W. Sterner. 2002. "The Reiners road map: where we've been, where we're going in the search for a complementary stoichiometry paradigm," annual meeting, Ecological Society of America, Tucson, AZ.
- Elser, J.J., E. Gorokhova, T.A. Dowling, T. Crease, and L.J. Weider. 2002. "The genetic control of chemical factors in the environment: Stoichiometric impacts of rDNA intergenic spacer shifts within a *Daphnia* clone under divergent selection for production rate," annual meeting, American Society of Limnology and Oceanography, Victoria, B.C.
- Elser, J.J., M. Kyle, J. Schampel, and J. Watts. 2002. "Stoichiometric response of cyanobacteria and diatom mats to nutrient additions in a shallow saline pond, Cuatro Ciénegas, Mexico," annual meeting, American Society of Limnology and Oceanography, Victoria, B.C. (Watts, presenter)
- Elser, J.J., M. Kyle, J. Schampel, and J. Watts. 2002. "Ecological stoichiometry of stromatolitic cyanobacteria-diatom mats and hydrobiid snail grazers in thermal springs at Cuatro Ciénegas, Mexico." 2002 Astrobiology Science Conference, NASA Ames Research Center, CA.
- Elser, J. J., M. Kyle, T. Yoshida, W. Makino, T. Andersen, and J. Urabe. 2001. "Reduced light increases herbivore production due to stoichiometric effects of light:nutrient balance," annual meeting, American Society of Limnology and Oceanography, Albuquerque, NM.

- Gudex, L., J. Urabe, and J.J. Elser. 2001. "*Daphnia* growth on different size fractions of ambient and aged seston: effects of particle size and elemental and biochemical composition," annual meeting, American Society of Limnology and Oceanography, Albuquerque, NM.
- Nisbet, R. M., E.B. Muller, E. McCauley, S.A. Kooijman, and J.J. Elser. 2001. "Modeling the effects of herbivore stoichiometry on the stability of plant-herbivore systems," annual meeting, American Society of Limnology and Oceanography, Albuquerque, NM.
- Frost, P. C., and J.J. Elser. 2001. "Poor elemental food quality affects mayfly growth," annual meeting, American Society of Limnology and Oceanography, Albuquerque, NM.
- Clasen, J. L., and J.J. Elser. 2001. "Does phytoplankton nutrient status affect viral infections?" annual meeting, American Society of Limnology and Oceanography, Albuquerque, NM.
- Elser, J.J., H. Hayakawa, and J. Urabe. 2000. "Nutrient limitation reduces food quality for zooplankton: responses of *Daphnia* growth to short-term phosphorus amendment of natural seston," annual meeting, Ecological Society of America, Snowbird, UT.
- Elser, J.J., J. O'Brien, and D.A. Dobberfuhl. 1999. "The evolution of ecosystem processes: ecological stoichiometry of a keystone herbivore at temperate and arctic latitudes," annual meeting, American Society of Limnology and Oceanography, Santa Fe, NM.
- Dobberfuhl, D.A., and J.J. Elser. 1999. "Community patterns of ecological stoichiometry in the lower pelagic food web across a broad latitudinal gradient," annual meeting, American Society of Limnology and Oceanography, Santa Fe, NM.
- Tibbets, T.M., and J.J. Elser. 1999. "Ecological stoichiometry of consumers and resources in arctic and temperate streams," annual meeting, American Society of Limnology and Oceanography, Santa Fe, NM.
- Frost, P.C., J.J. Elser, and M.A. Turner. 1999. "Effects of light, carbon, and phosphorus on the stoichiometry of benthic algae growth," annual meeting, American Society of Limnology and Oceanography, Santa Fe, NM.
- Elser, J.J., and R.W. Sterner. 1998. "The good, the bad, and the ugly: stoichiometric food quality in marine, freshwater, and terrestrial ecosystems," (invited), joint meeting of the American Society of Limnology and Oceanography and the Ecological Society of America, St. Louis, MO.
- Dobberfuhl, D.A., and J.J. Elser. 1998. "Inferring threshold stoichiometric food quality from first principles: the influence of life history strategy and maximum assimilation efficiencies of C and P," triennial SIL meeting, Dublin, Ireland.
- Sterner, R.W., J.H. Schampel, K.L. Schulz, A.E. Galford, and J.J. Elser. 1998. "Joint variation of zooplankton and seston stoichiometry in lakes and reservoirs," triennial SIL meeting, Dublin, Ireland.
- Elser, J.J., and D.R. Dobberfuhl. 1997. "Cellular allocation and the biogeochemistry of animal growth: implications for nutrient cycling and food web dynamics," annual meeting, Ecological Society of America, Albuquerque, NM.
- Elser, J.J. 1997. "Biogeochemistry and the ribosome: biological stoichiometry in ecosystems," (invited), annual meeting, Japanese Ecological Society, Sapporo, Japan.
- Main, T., D.R. Dobberfuhl, and J.J. Elser. 1996. "N:P stoichiometry and ontogeny in crustacean zooplankton: a test of the growth rate hypothesis," annual meeting, American Society of Limnology and Oceanography, Milwaukee, WI. *This presentation won a Best Student Poster Award at this meeting.*
- MacKay, N.A., and J.J. Elser. 1996. "Factors that may prevent a trophic cascade: food quality, invertebrate predation, and their interaction," annual meeting, American Society of Limnology and Oceanography, Milwaukee, WI.
- Elser, J.J., T.H. Chrzanowski, R.W. Sterner, and K. Mills. 1996. "Stoichiometric constraints on food web dynamics: a whole-lake experiment on the Canadian Shield," (invited), annual meeting, American Society of Limnology and Oceanography, Milwaukee, WI.

Dobberfuhl, D.R., and J.J. Elser. 1996. "Body N:P stoichiometry in crustacean zooplankton: phylogenetic patterns and life history correlates," annual meeting, American Society of Limnology and Oceanography, Milwaukee, WI.

Funding:

Funded projects (active)

2006 National Science Foundation Ecosystems Program, "Collaborative research: testing biodiversity-ecosystem functioning relationships in an ecological stoichiometry framework: the Inner Mongolia Grassland Experiment", \$1.1M, co-PI with S. Naeem (Columbia) and J. Wu (ASU, lead PI).

National Science Foundation Bioinformatics program, "Developing a bioinformatics database for stoichio-proteomics," \$617,000; co-PI with S. Kumar and W. Fagan (U of Maryland, lead PI).

2005 National Science Foundation Ecology program, "Effects of atmospheric N deposition on P limitation of freshwater zooplankton," \$397,500.

2004 National Science Foundation DMS – NIH NIGMS Infrastructure Program, "Collaborative research: towards an integrated mechanistic theory of within-host disease dynamics", \$1.6M, co-PI with Y Kuang (ASU, lead PI) and 5 others.

National Science Foundation DUE Interdisciplinary Training in Mathematics and Biology program, "UBM: Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences at ASU," \$650,000; co-PI with ASU lead PI Y Kuang and 3 others.

Funded projects (completed)

2005 National Science Foundation Office of International Science and Engineering, "Ecological complexity and ecosystem services: opportunities for China-USA collaboration (Phase 2)," \$95,482.

2002 National Science Foundation International Programs, "Ecological complexity and ecosystem services: opportunities for China-USA collaboration," \$85,500.

2000 NASA Astrobiology Institute, "Evolution in microbe-based ecosystems: desert springs as analogues for the emergence and stabilization of ecological systems," \$760,000; module lead-PI with 9 others {T. Dowling, W. Minckley, W. Fagan (Biology), F. Garcia-Pichel (Microbiology), J. Farmer, C. Tang (Geology), G. Odell (U of Washington), V. Souza, L. Eguiarte (UNAM, Mexico)}.

National Science Foundation DMS Mathematical Biology Program: "Theoretical frameworks for ecological dynamics subject to stoichiometric constraints," \$229,011; co-PI with W. Fagan (Biology) and project director Y. Kuang (Mathematics).

1999 National Science Foundation Integrated Research Challenge in Environmental Biology Program, "Biological stoichiometry from genes to ecosystems," \$2,842,162; *project director* with 8 co-PIs Fagan, Harrison (ASU), Markow (U. Arizona), Sterner, Cotner, Hobbie (U. Minnesota), Weider (U. Oklahoma), and Odell (U. Washington).

National Science Foundation Undergraduate Mentoring in Environmental Biology (UMEB) Program, \$269,000; co-PI with 6 others at ASU; D. Pearson, project director.

Lake Biwa Research Institute, "Graduate support for Lake Biwa studies," \$7385.

1998 National Center for Ecological Analysis and Synthesis, "Ecological stoichiometry of plant-herbivore interactions," \$48,750, with co-PI W. Fagan (ASU)

1997 National Science Foundation Ecology Program, "Light, phosphorus, and ecological stoichiometry in pelagic communities," \$311,648 (Ecology Program) + \$14,087 (International Programs (Japan)), *project director* with co-PIs J. Urabe (Kyoto University) and T. Andersen (U of Oslo).

Supplements to this award

-1998 NSF Ecology Program (REU Supplement): \$7464.

1996 National Science Foundation International Programs, "US-Japan collaboration: ecological stoichiometry in lake ecosystems (medium-term visit)," \$17,000.

- 1995 National Science Foundation Ecosystems Program, "Latitudinal variation, natural selection, and variation in N:P stoichiometry in plankton: a test of the growth rate hypothesis", \$112,278.
Supplements to this award
 -1996 NSF Ecology Program (REU Supplement): \$3530.
 -1997 NSF Ecology Program (REU Supplement): \$5550.
 National Science Foundation International Programs, "U.S.-Mexico Collaboration: Environmental Biology of Deserts and Oceans", \$17,580 (a research workshop); with E. Pfeiler, ITESM-Guaymas, Guaymas, Mexico.
- 1993 National Science Foundation: "Research experiences for undergraduates in ecology," \$250,000; with 5 co-PI's in ASU Zoology Department..
 National Science Foundation Instrumentation and Instrument Development Program: "Analytical laboratory for research in environmental biology," \$170,000; with 8 co-PI's in ASU Zoology Department.
- 1992 National Science Foundation Ecology Program: "Food web structure and the stoichiometry of N and P in the pelagic food web," \$400,000 (\$200,000 ASU component, \$200,000 UTA component); *project director*, with co-PI's R.W. Sterner and T.H. Chrzanowski (University of Texas-Arlington)..
Supplements to this award
 -1994 NSF Ecology Program (REU Supplement): "Bacteria stoichiometry". \$3900.
 -1993 NSF Ecology Program (REU Supplement): "The effect of zooplankton on C, N, and P sedimentation". \$5200.
 -1992-93 NSF Ecology Program (LTER supplement): "Stoichiometric processes in marine and freshwater plankton ecosystems". \$48,000.
- 1990 National Science Foundation Ecology Program: "Community mechanisms for ecosystem variability in Castle Lake, California", co-PI with C.R. Goldman, P.J. Richerson (UC-Davis), and C. Luecke (Utah State University). \$83,210 ASU component.
Supplements to this award
 -1993 NSF Ecology Program (REU Supplement): "Lake plankton ecology". \$4950.
 -1992 NSF Ecology Program (REU Supplement): "Plankton ecology in Castle Lake, CA". \$4950.
 -1991 NSF Ecology Program (REU Supplement): "Planktonic interactions in the pelagic zone of Castle Lake, CA". \$5225..
- 1991 Arizona State University Faculty Grant-In-Aid: "How do energy costs affect vertical migration of aquatic animals? Studies of opossum shrimp in Lake Tahoe using advanced submersible and image analysis technology". \$4800.
- 1988 National Science Foundation Doctoral Dissertation Improvement Program: "Planktonic coupling in lakes of contrasting trophic status: a multi-level experimental approach", with C.R. Goldman (UC-Davis). \$6000.

Invited Seminars / Plenary Lectures / Keynote Talks

- February, 2008. Eminent Ecologist lecture series, Ecology Center, Utah State University, Logan, UT.
 November, 2007. *Invited plenary speaker*, Colloquium on "Climate Change Effects on Aquatic Ecosystems: A Stoichiometric Perspective" (CLIMAQS), Amsterdam, The Netherlands.
 November, 2007. *Invited lecturer*, Master class on: "Climate Change Effects on Aquatic Ecosystems: A Stoichiometric Perspective" (CLIMAQS), Amsterdam, The Netherlands.
 October, 2007. Department of Biology, University of St. Thomas, St. Paul, MN
 October, 2007. Department of Biology, St. Olaf College, Northfield, MN
 October, 2007. Division of Plant Sciences, University of Missouri.
 May, 2007. Inner Mongolia Grassland Ecosystem Research Station, Inner Mongolia, China
 May, 2007. Institute of Botany, Chinese Academy of Sciences, Beijing, China
 May, 2007. Institute of Zoology, Chinese Academy of Sciences, Beijing, China

May, 2007. *Graduate student-invited speaker*, Dept. of Ecology and Evolution, UC-Irvine
 April, 2007. Department of Biology, Queens University
 March, 2007. Department of Ecology and Evolution, University of Chicago.
 April, 2006. Department of Ecology, Evolution, and Marine Biology, UCSB
 April, 2006. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA
 March, 2006. Department of Ecology and Evolution, SUNY-Stonybrook
 February, 2006. Virginia Institute of Marine Science, Hampton, Virginia
 January, 2006. Department of Zoology, University of Oklahoma
 August, 2005. *Graduate student-invited speaker*, Department of Biology, University of Louisville
 May, 2005. Department of Ecology and Evolutionary Biology, University of Kansas
 April, 2005. Department of Biology, University of Maryland
 February, 2005. Department of Biology, University of Utah
 December, 2004. Department of Zoology, University of British Columbia, Canada
 November, 2004. *Graduate student-invited speaker*, University of Groningen, The Netherlands
 November, 2004. Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, The Netherlands
 November, 2004. *Keynote speaker*, Symposium on Intersection of Functional Ecology and Evolution, Department of Wildlife and Fisheries Biology, Oregon State University
 April, 2004. Institute for Marine Studies, University of Southern California
 March, 2004. Forest Research Institute, Northern Arizona University
 November, 2003. Netherlands Institute of Ecology, Nieuursluis, The Netherlands
 November, 2003. *Invited plenary speaker*, Global Ecology Symposium, Wageningen The Netherlands
 November, 2003. Institute for Marine Studies, Kiel, Germany
 October, 2003. EAWAG, Zurich, Switzerland
 October, 2003. Limnological Institute, University of Konstanz, Germany
 September, 2003. Institute of Limnology, Uppsala University, Sweden
 September, 2003. Department of Systems Ecology, Stockholm University, Sweden
 September, 2003. Department of Biology, University of Oslo, Norway
 February, 2003. Department of Ecology and Evolution, Princeton University
 February, 2003. *Invited plenary speaker*, annual meeting of the American Society of Limnology and Oceanography, Salt Lake City, UT
 January, 2003. Department of Geology, Arizona State University
 June, 2002. Department of Biological Sciences, Stanford University
 May, 2002. Institute of Ecology and Evolution, Autonomous University of Mexico (UNAM), Mexico City, Mexico
 February, 2002. "Ecology, Theology, and Judeo-Christian Environmental Ethics," (*invited respondent*), Lilly Fellows Program conference, University of Notre Dame, Indiana
 February, 2002. Dauphin Island Sea Lab, Alabama
 December, 2001. Graduate Program in Hydrologic Sciences, University of Nevada-Reno
 September, 2001. Department of Biology, University of New Mexico
 March, 2001, *Graduate student-invited speaker*, Institute of Ecology, University of Georgia
 March, 2001. *Invited plenary speaker*, Gordon Research Conference on Plant-Herbivore Interactions, Ventura, California
 February, 2001. *Invited plenary speaker*, Annual meeting of the Scandinavian Ecology Society (OIKOS), Uppsala, Sweden
 November, 2000. Ecology, Evolution, and Behavior Program, UC-Davis
 September, 2000. Department of Ecology, Evolution, and Behavior, University of Arizona
 May, 2000. "Stoichiometric Constraints on C sequestration in Ecosystems", (*invited speaker*), an international workshop on ecological stoichiometry organized by D. Hessen and J. Bengtsson, University of Oslo, Oslo, Norway.

March, 2000. *Invited plenary speaker*, research integration workshop (“Ecological Determinants of the Oceanic Carbon Cycle”), sponsored by NSF Biological Oceanography program, Mt. Hood, Oregon

May, 1999. Department of Biology, University of Oslo, Oslo, Norway

May, 1999. Norwegian Institute of Water Research, Oslo, Norway

September, 1999. Department of Biology, Arizona State University, West Campus. Glendale, AZ

April, 1998. Center of Great Lakes Studies, University of Wisconsin-Milwaukee, Milwaukee, WI
 “Recent Advances in Limnology” lecture series

April, 1998. Institute for Ecosystem Studies, Cary Arboretum, Millbrook, NY

September, 1997. Marine Biological Laboratory, Semester in Environmental Science *Distinguished Scientist lecture series*, Woods Hole, MA

October, 1997. “Ecosystem Experimentation Workshop”, (*invited speaker*), a workshop sponsored by the University of Alberta (D. Schindler, organizer), Jasper, Alberta, Canada.

April, 1997. Lake Biwa Research Institute, Otsu, Japan

April, 1997. Center for Ecological Research, Kyoto University, Kyoto, Japan

April, 1997. Faculty of Fisheries, Hokkaido University, Hakodate, Japan

March, 1997. Institute for Cold Temperature Studies, Hokkaido University, Sapporo, Japan

November, 1996. Center for Limnology, University of Wisconsin, Madison, WI

November, 1996. Dept. of Ecology, Evolution, and Behavior, University of Minnesota, St. Paul, MN

November, 1996. Natural Resources Research Institute, University of Minnesota, Duluth, MN

October, 1996. Midwest Ecology Division, Environmental Protection Agency, Duluth, MN

September, 1996. Department of Biology, University of Minnesota, Duluth, MN

March, 1996. *Keynote speaker*, Sixth annual symposium of the Group for Inter-university Research in Limnology and Aquatic Environment, Saint-Michel-des-Saints, Quebec

February, 1996. Department of Biology, McGill University, Montreal, Quebec

February, 1996. Section of Ecology and Systematics, Cornell University, Ithaca, NY

November, 1995. Department of Biology, University of Notre Dame, Notre Dame, IN

April, 1995. Dept. Mathematics (Biomathematics group), Arizona State Univ., Tempe, AZ

February, 1995. Joint ELA-GFBI research symposium, Gray Freshwater Biological Institute, University of Minnesota, Navarre, MN

January, 1995. Department of Biology, University of Minnesota, Duluth, MN

November, 1991. Freshwater Institute, Dept. of Fisheries and Oceans, Winnipeg, MB

December, 1990. Department of Biology, University of California, Santa Barbara, CA

September, 1990. Department of Biological Sciences, University of Texas, Arlington

October, 1989. Department of Fisheries and Wildlife Biology, Utah State University, UT

TEACHING

Courses Taught:

Arizona State University

- 2007 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
 BIO591: Graduate Seminar (“Biological Stoichiometry”). Spring semester. Enrollment: 7.
- 2006 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
- 2005 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
 BIO494: Ecological Stoichiometry (3 credits). Spring semester. Enrollment: 6.
- 2004 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
- 2002 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
- 2001 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)

- 2000 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
 BIO591: Graduate Seminar ("Biological stoichiometry of microbial complexity: from the biosphere to the gene"). Fall semester. Enrollment: 10 (1 for writing credit).
- 1999 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Pearson)
 BIO426 and 426L: Limnology. Spring semester. Enrollment: 10.
 BIO412: Advanced Conservation Biology. Spring Semester. Enrollment: ~30. (taught for 3 weeks in conjunction with several other faculty; W. Minckley in charge)
- 1998 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ D. Capco).
 BIO426 and 426L: Limnology. Spring semester. Enrollment: 10.
 BIO591: Graduate Seminar ("Ecological Stoichiometry"). Spring semester. Enrollment: 6.
- 1997 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ N. MacKay).
- 1996 BIO426 and 426L: Limnology. Spring semester. Enrollment: 16.
 ZOO591: Graduate Seminar ("Stable Isotopes in Ecology and Environmental Biology"). Spring semester. Enrollment: 10.
- 1995 BIO426 and 426L: Limnology. Spring semester. Enrollment: 10.
 BIO100: The Living World. Fall semester. Enrollment: ca. 700 (w/ J. Alcock).
- 1994 BIO426 and 426L: Limnology. Spring semester. Enrollment: 20.
- 1993 BIO426 and 426L: Limnology. Spring semester. Enrollment: 14.
 BIO100: The Living World. Fall semester. Enrollment: ca. 750 (w/ S.H. Faeth).
 ZOO591: Graduate Seminar ("Elements in Organisms and Ecosystems"). Fall semester (w/ J. Harrison). Enrollment: 15. (Course taken for graduate writing credit in Ecology by 5 students).
- 1992 BIO426 and 426L: Limnology. Spring semester. Enrollment: 17.
 BIO100: The Living World. Fall semester. Enrollment: ca. 750 (w/ S.R. Rissing).
- 1991 BIO426 and 426L: Limnology. Spring semester. Enrollment: 11.
 BIO100: The Living World. Fall semester. Enrollment: ca. 400.
 ZOO591: Graduate Seminar ("Herbivory"). Fall semester. (w/ S.H. Faeth). Enrollment: 12.

University of California-Davis

- 1990 EST116: The Oceans. Winter quarter. Enrollment: ca. 300.
1989 EST100: General Ecology. Summer session. Enrollment: 30.

Students Supervised:

Postdoctoral

Shu-guang Hao, Fall 2007 - present.
 Claudia Acquisti, co-advised with S. Kumar, Fall 2006 - present
 Felisa Wolfe-Simon, co-advised with A. Anbar, 2006 - 2007
 Elena Gorokhova (Maytag postdoctoral fellow), co-supervised w/ T. Dowling, 1999 - 2001
 John Schade, co-advised w/ W. Fagan, 2000 - 2004
 Kumud Acharya, November 2000 - 2004

Graduate students

James Watts, Ph.D., Fall 2001 - present
 Michelle McCrackin, Ph.D., Fall 2006 - present
 Jen Harden, M.N.S., Fall 2002 - December 2004

Linda Gudex, M.S., completed, (Thesis: "Zooplankton-cyanobacteria interactions", Fall 1998 - Spring 2003
Jessica Clasen, M.S., completed (Thesis: "Aquatic Viral Ecology"), Fall 1998 - Fall 2000. Present position: Ph.D. student, University of British Columbia
Paul Frost, Ph.D. completed (Dissertation: "Ecological Stoichiometry in the Benthos"), Fall 1997 - Spring 2000. Current position: research assistant professor, Trent University
Dean Dobberfuhl, Ph.D. completed (Dissertation: "Elemental Stoichiometry in Crustacean Zooplankton: Phylogenetic Patterns, Physiological Mechanisms, and Ecological Consequences"), Fall 1993 - Spring 1999. Current position: staff scientist, St. John's River Water Management District
Neil MacKay, Ph.D. completed (Dissertation: "Ecological Stoichiometry of Zooplankton-Phytoplankton Interactions"), Fall 1992 - Fall 1996. Current position: associate professor, Scottsdale Community College
David Frees, M.S. completed (Thesis: "Intraguild Predation in the Pelagic Zone: Effects of *Diacyclops* on Contrasting Zooplankton Communities"), Fall 1991 - Spring 1994

Undergraduates

Joseph Murray, Summer 2007 - present, SOLUR apprentice (co-advised with A. Anbar)
Melanie Engstrom, Fall 2005 - present, SOLUR apprentice / researcher
Katherine Dunning, Spring 2005 - present, UBM REU student, Honors thesis (co-advised with Y. Kuang)
Stacy Schlichting, Fall 2006 - Spring 2007, SOLUR apprentice
Laura Steger, Summer 2006 and Summer 2007, NSF REU student
Rachel Jones, Fall 2004, SOLUR apprentice, Honors thesis
Amy Novotny, Fall 2001 - Spring 2005, Hughes BREU and UBM student, Honors thesis
Lynette Matthews, Fall 2001 - Spring 2003, Hughes BREU student, Honors thesis
Jared Niska, Spring 2000, UMEB student
Mariana Zylstra, Spring - Summer 2000, UMEB student
Elizabeth Yardumian, Summer 2000, NSF REU student
Amy Waggener, Summer 1999, NSF REU student
Eric Lohman, Summer - Fall 1999, Hughes BREU student
Craig Herbold (University of Southern California), Summer 1998, NSF REU student
Hannah Walsh (Wellsley College), Summer 1998, NSF REU student
Rachel Cisneros, Spring 1998 - Spring 1999, NSF ECOREU, MARC student
Teresa Tibbets, Spring 1997 - Spring 1999, NSF ECOREU, MARC student
Andrea Hoeffler, Spring - Summer 1996, NSF ECOREU student
Laura Chavez, Spring - Fall 1995, NSF ECOREU student
Amy Schwemm, Spring 1995, NSF ECOREU student
Traci Main, Summer, 1994 - Spring 1996, Hughes BREU student
Erica Feuerbacher, Summer - Fall, 1994, NSF ECOREU student
Kathy Patino, Spring, 1994, NSF ECOREU student
Karen Love, Spring, 1994, NSF ECOREU student
Dean Foster, Summer, 1992 - Spring, 1994, NSF REU student, Hughes BREU student
Rich Miller (Humboldt State University), Summer, 1993, NSF REU student.
Linda Brooke Stabler, Summer, 1993 - Spring, 1994
Diane Arnott, Fall 1992 - Spring 1993
Bradley Cardinale, Summer - Fall, 1992
Gerry Dion (UC-Davis), Summer, 1992, NSF REU student
Nicolas George, Summer - Fall, 1991, NSF REU student
Serene Ong, Summer, 1991

Others

Janet Zhou, Summer 2003 (HS intern from Peggy Payne Academy)
Xiaosong Li, Summer - Fall 2002 (visiting Chinese scholar)
Thalia Gonzalez, Spring 2000 (ASU postgraduate student)
Ted Judy, Summer 1995 (Acadia High School biology teacher)
Michael Guterrez, Summer 1995 (Thunderbird High School biology teacher)

Graduate Committees:

Doctoral

Dina Grayson (SoLS)
Rebecca Clark (SoLS)
Tamara Harms (SoLS)
Kevin McCluney (SoLS)
Jennifer Glass (SESE, Chem/Biochem)

Eric DeSimone (Physics, completed)
Jim Heffernan (completed)
Ryan Sponsellar (completed)
Hao Wang (Mathematics, completed)

John Roach (completed)	Mark Perkins (completed)
Evan Carson (completed)	Chris Miller (Mathematics, completed)
Paul Brunkow (completed)	Jay Jones (completed)
Greg Hocutt (1993-94)	Michael Horn (1993-1996)
Robert Holmes (completed)	Irakli Loladze (Mathematics, completed)
Tim Maret (completed)	John Nagy (completed)
Emily Stanley (completed)	Franziska Schulthess (1994-95)
Maurice Villette (completed)	Lisa Schmoetzer (1994-95)
Chris Breitmeyer (1995-96)	Lisa Dent (completed)
John Schade (completed)	Chris Bartholomew (Microbiology, 1998-2002)

Master's

Sam Norlin (completed)
Brian Wade (Microbiology, 2002 – 2003)
Anthony Fodor (1991-92)
Aisha Coppola (completed)
Julia Curro (completed)

SERVICE

Site Review Panel (NSF)

McMurdo Dry Valleys LTER site (January 2008)

Co-Organizer

Annual meeting, American Society of Limnology and Oceanography (Santa Fe 2007)

Board of Directors (elected)

American Society of Limnology and Oceanography (1996 – 1999)

Editor

Encyclopedia of Ecology (Elsevier Press), entries on Ecological Stoichiometry (2005-2007)

Associate Editor

Ecology Letters (2002 - present)
Limnology and Oceanography special issue on Biocomplexity (2003)
Ecological Applications (2001 - 2004)
American Naturalist (2000 – 2003)
Oecologia (1999 - 2002)

Panelist

National Science Foundation OISE Partnerships in International Research and Education (PIRE) review panel, June 2005
National Science Foundation Integrated Research Challenges in Environmental Biology (IRCEB) review panel, May 2001
National Science Foundation Biocomplexity Phase I review panel, August 1999
National Science Foundation / Environmental Protection Agency Water and Watersheds review panels, June 1995, July 1996

Invited Participant

"Comparing trophic structure across ecosystems", NCEAS working group (J. Shurin, H. Hillebrand, D. Gruner, PIs), Fall 2005 - present
"Nutrient Constraints on the Global Carbon Cycle", Synthesis Workshop sponsored by the IGBP and the Royal Swedish Academy of Science, 25 - 27 October 1999, Stockholm, Sweden
"Cyanobacteria Risk Assessment in Lake Biwa", a research planning workshop sponsored by the Lake Biwa Research Institute, January, 1999, Kyoto, Japan (due to teaching obligations, my Ph.D. student Linda Gudex attended as my designate)
"Cyanobacteria Risk Assessment in Lake Biwa", a research planning workshop sponsored by the Lake Biwa Research Institute, 15 - 19 September, 1997, Pacific Grove, California
"A Comparative Analysis of Nitrogen Cycling in the Temperate and Tropical Americas," a workshop of the International SCOPE Nitrogen Project, 2-6 December 1996, Termas de Chillan, Chile
Colorado River, Delta, and Upper Gulf of California Workshop, 17 May 1996, Mexicali, Baja California, Mexico
Elemental Cycles working group, Biosphere II scientific advisory committee, September 1995, Oracle, Arizona.
National Science Foundation planning workshop for the National Center for Ecological Synthesis and Analysis, October 1992, Albuquerque, New Mexico

Member

NASA Astrobiology Science Steering Group and Mars Exploration Payload Analysis Group, 2002
Colorado River, Delta, and Upper Gulf of California Management Task Force, 1996

External reviewer for tenure and promotion

University of Kansas (2002)
University of Oklahoma (1998, 2005)
Savannah River Ecology Laboratory (1998)

Organizer

U.S. organizer for NSF-funded international exchange ("Ecological complexity and ecosystem services: opportunities for China-USA collaboration"), January 2002 - December 2005

International research workshop (funded by Norwegian Academy of Letters and Science's Center for Advanced Study), "Woodstoich 2004: The Present and Future of Ecological Stoichiometry", Finse, Norway, 12-17 August 2004.

NSF-funded research workshop (w/ Ed. Pfeiler), "US-Mexico Collaboration: Environmental Biology of Deserts and Oceans", Guaymas, Mexico, 11-15 April 1996

Reviewer

Limnology and Oceanography (2-3 ms. per year), Ecology (~1-2 ms. per year), Ecology Letters (1-2 papers per year). Occasional: Science, Nature, Canadian Journal of Fisheries and Aquatic Sciences, BioScience, Evolution, Freshwater Biology, Journal of Plankton Research, Journal of Phycology, American Midland Naturalist, Archiv fur Hydrobiologie, Hydrobiologia, American Naturalist, Ecoscience, Marine and Freshwater Research.

National Environment Research Council (U.K.) research grant program, 1996

USDA National Research Initiative Competitive Grants Program, 1996

NSF Ecology and Ecosystem Programs, 1991- present

NSF Long-term Studies Program, 1995

NSF CAREER program, 2005

NSF Geology, Earth Sciences, and Paleontology Program, 1994

NSF Biological Oceanography Program, 1999

Glen Canyon Environmental Studies final report, 1995

Environmental Protection Agency Interagency Ecological Studies Program, 1991

American Society of Limnology and Oceanography's draft statement on the future of limnology, Fall, 1993

Sections on nutrient cycles in *Biology: Concepts and Applications*, by Cecie Starr, (textbook), 1992-93

University Committees

Search committee, for Chair of ASU West campus Department of Interdisciplinary Natural Sciences, fall 2006 – present.

Oversight committee for OVPREA self-review, 2007

SOLS Liason to Arizona Water Institute, Fall 2006 - present

OVPREA ad hoc committee to develop policy on Classified Research, 2006

College Committees

CLAS committee on implementation of Science and Society requirement, Fall 2005 – Fall 2006

Dean's Committee on Reorganization of the Life Sciences, Spring 2002 – Spring 2003

Departmental / School Committees

SoLS Ecology, Evolution, and Environmental Sciences faculty group personnel committee, fall 2006 - present

SoLS Research and Training Initiatives committee (chair), Spring 2005 - present

SoLS Septennial Review committee, Spring 2007 - present

SoLS search committee (chair) for Associate Director of Graduate Programs, Fall 2005

SoLS Research and Training Initiatives committee, Fall 2004 - Spring 2005

Biology Department Undergraduate Programs Committee, Fall 1998 - spring 2003; UG Programs Director beginning fall 1999 – spring 2003)

Biology Department Personnel Committee Fall 2001 - Spring 2002

Biology Department Advisory Committee, Fall 2000 - Fall 2002

Life Sciences Visualization Laboratory Advisory Committee, spring 1999

Biology and Society Steering Committee, Fall 1998 - Fall 2000

Biology Department Personnel Committee (chair), Spring 1998 - Spring 1999

Biology Department Urban Ecologist Search Committee, Fall 1997 - Spring 1998
Biology Department Personnel Committee, Fall 1997 - Spring 1998
Zoology Department Theoretical Ecologist Search Committee, Fall/Spring 1995/96
Zoology Department Integrative Biologist (2) Search Committee, Fall 1994
Hughes Program Capital Equipment Review Panel, Fall 1994 - Spring 1995
Zoology Department Advisory Committee, Fall 1994 - Fall 1997
Zoology-Botany Steering Committee for Ecology Concentration, Fall 1993 - Fall 1995
Zoology Department Graduate Programs Committee, Fall 1992 - Fall 1994
Zoology Department Service Committee, Fall 1990 - ?
Zoology Department Seminar Committee (co-chair), Fall 1991 - Spring 1993

Seminar Speakers Hosted

Dr. J. Baron, Colorado State University
Dr. D. Hessen, University of Oslo
Dr. S. Kilham, Drexel University
Dr. T. Andersen, Norwegian Water Institute, Oslo
Dr. J. Pastor, University of Minnesota, Duluth
Dr. T.H. Chrzanowski, University of Texas at Arlington
Dr. R.W. Sterner, University of Minnesota
Dr. V. Smith, University of Kansas
Dr. N.H. Hairston, Jr., Cornell University
Dr. C. Luecke, Utah State University
Dr. G.R. Marzolf, U.S.G.S., Boulder, Colorado
Dr. D.M. Lodge, University of Notre Dame
Dr. C.R. Goldman, University of California-Davis

Other Service

Special Session Organizer (w/ RW Sterner, U of Minnesota, and A. Anbar, ASU) of session on "Biological Stoichiometry Beyond the Periodic Table", ASLO winter meeting, Salt Lake City, UT, (January 2005)
Chair, Nominations Committee for ASLO elected offices (2002-03)
Special Session Organizer (w/ J. Cotner, U of Minnesota), of special session on "Biological Stoichiometry of Microbial Growth From the Genome to the Biosphere", ASLO summer meeting, Victoria, BC, (June 2002)
Special Session Organizer (w/ S. Neuer, ASU), of special session on "Revisiting Redfield: Ecological Stoichiometry in Marine and Freshwater Ecosystems", ASLO-AGU winter meeting, Albuquerque, NM (February 2001)
U.S. Congressional briefing on Biocomplexity, on behalf of the Ecological Society of America, Washington, D.C. (21 March 2000)
Special Session Organizer (w/ D. Karl, U of Hawaii), of special session on "Ecological Stoichiometry in Aquatic Ecosystems: New Directions for Navigating the Food Web in the Next Century", ASLO-AGU winter meeting, Santa Fe, NM (February 1999)
Chair, Selection Committee for ASLO's Hutchinson Medal (1998, 1999)
Session Chair, ESA meeting, Snowbird, UT (1995)
Special Session Organizer (w/ R.P. Hassett), of special session on "Consumer-driven nutrient recycling in marine and freshwater ecosystems", ASLO/AGU Ocean Sciences meeting, San Diego, CA (1994)
Judge, ASLO Student Poster Awards (1994, 2002)
Selection Committee for Lindeman Award, American Society of Limnology and Oceanography, (1994-95)
Nomination Committee, ESA Aquatic Ecology Section, Spring (1993)
Judge, Graduate Student Presentations, ESA meeting, Madison, WI, Summer (1993)

Judge, Broadmor Elementary School Science Fair, Tempe, AZ, Spring (1993, 1995, 1999)
Judge (Zoology category), Intel International Science Fair, Phoenix, AZ (May 2005)
Guest Speaker, Broadmor Elementary School Science Fair, Tempe, AZ, Spring (1992, 1994-6)
Guest speaker: "Careers in Aquatic Sciences"
Thunderbird High School, Phoenix, AZ (Fall, 1990 – 1991)
Deer Valley High School, Phoenix, AZ (Winter, 1992)
Organizer, plenary session (L. Real, speaker), Southwestern Association of Biologists fall meeting,
Prescott, AZ (November 1991)