**Curriculum vitae of James J. Elser**

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**Personal:**

March - November:
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December - February:
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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., 1981, Biology (*summa cum laude*), University of Notre Dame, Notre Dame, IN

**Academic appointments:**

2016 - present Director & Bierman Professor of Ecology, Flathead Lake Biological Station, University of Montana
2016 - present Research Professor, School of Life Sciences, ASU
2010 - present Distinguished Sustainability Scientist, Global Institute of Sustainability, ASU
2011 Fulbright Senior Lecturer, Universidad Nacional del Comahue, Bariloche, Argentina
2009 - 2016 Regents' Professor & Parents Association Professor, School of Life Sciences, ASU
2005 - 2011 Associate Director / Dean, Research & Training Initiatives, School of Life Sciences, ASU
2009 (fall) - 2010 (spring) Acting Dean, School of Life Sciences, ASU
2003 Fulbright Scholar & Visiting Research Fellow, Center for Advanced Study of the Norwegian Academy of Letters and Sciences & Dept. of Biology, University of Oslo, Oslo, Norway
2000 - 2009 Professor. Core member of Ecology, Evolution, & Environmental Science faculty group.
1997 Visiting Research Scholar, Center for Ecological Research, Kyoto University, Kyoto, Japan
1996 Visiting professor, Biology Department, University of Minnesota, Duluth
1996 - 2000 Associate Professor, Biology (Zoology) Department
1990 - 1996 Assistant Professor, Zoology Department, Arizona State University
1990 Postdoctoral researcher, Div. of Environmental Studies, UC-Davis

**Awards, honors, elected positions, and nominations:**

2019 - present Member, National Academy of Sciences (Environ. Sciences & Ecology section; elected April 2019)
2012 - 2018 President-elect, President, Past-President, Association for the Sciences of Limnology and Oceanography (ASLO)
2015 ASU Founders' Day Research Achievement Award for sustainability research (See: http://tinyurl.com/nawqftf)
2014 ASU School of Life Sciences Teaching Excellence & Innovation Award
2013 Elected as foreign member of Norwegian Academy of Sciences and Letters
Visiting Fellow, Griffith University (Brisbane, Australia) Climate Change Response Program
2012 G. Evelyn Hutchinson Award of the Association for the Sciences of Limnology & Oceanography (ASLO) to recognize excellence in aquatic research (See: http://tinyurl.com/ks4tb5l)
2011 Fulbright Scholar (Senior Lecturer, Argentina)
2009 ASU Regents' Professor
ASU Professor of the Year (ASU Parents Association)
2008 Fellow, American Association for the Advancement of Science (Biological Sciences Section)
ASU College of Liberal Arts and Sciences Distinguished Faculty Award
Inaugural recipient, Distinguished Alumni Award, Dept. of Biology, University of Notre Dame
Nominee, ASU College of Liberal Arts and Sciences Gary Krahenbuhl Difference Maker Award
2006 Nominee for the ECI Prize in Limnetic Ecology
2004 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 ecology, ecosystem ecology, physiological ecology, biogeochemistry, life-history evolution, molecular evolution, astrobiology, sustainability

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

## RESEARCH

### Publications:

ISI Web of Science (ResearcherID: A-7082-2008; ORCID: 0000-0002-1460-2155) reports 305 entries with citation data, 24,463 citations for journal articles, and *h*-index of 76. *Ecological Stoichiometry* has been cited 2674 times since 2002 (SCI). Google Scholar reports 42,289 citations (including 4695 citations of *Ecological Stoichiometry*), an overall *h*-index of 91, and an *h*-index since 2015 of 65.

In press

286. Yu, J., M, Xia, W. Zhen, R. Shen, H. He, B. Guan, J. J. Elser, and Z. Liu. Density-dependent effects of omnivorous bitterling (*Acheilognathus macropterus*) on nutrient and plankton communities: implications for lake management and restoration. Hydrobiologia.
285. Yu, J., M. Xia, H. Hea, E. Jeppesen, B. Guana, Z. Ren, J.J. Elser, and Z. Liu. Negative effects on water quality by small omnivorous fish *Acheilognathus macropterus* are alleviated by their host mussel *Sinanodonta woodiana*: A mesocosm experiment. Freshwater Science.
284. Elser, J.J, and 27 others. Key rules of life and the fading cryosphere: impacts in alpine lakes and streams. Global Change Biology. doi:10.1111/gcb.15362

2020

283. Six, D. and J.J. Elser. 2020. Mutualism is not restricted to tree-killing bark beetles and fungi: The ecological stoichiometry of secondary bark beetles, fungi, and a scavenger. Ecol. Entomol. **45**: 1134-1145. doi.org/10.1111/een.12897
282. Ren, Z., D. Niu, P. Ma, Y. Wang, Z. Wang, H. Fu, and J.J. Elser. 2020. C:N:P stoichiometry and nutrient limitation of stream biofilms impacted by grassland degradation on the Qinghai-Tibet Plateau. Biogeochemistry Biogeochemistry **150**: 31-44. https://doi.org/10.1007/s10533-020-00685-4
281. Ren, Z., D. Niu, P. Ma, Y. Wang, Z. Wang, H. Fu, and J.J. Elser. 2020. Bacterial communities in stream biofilms in a degrading grassland watershed on the Qinghai-Tibet Plateau. Frontiers Microbiol. **11**: 1021.
280. Tong, Y., M. Wang, J. Peñuelas, X. Liu, H.W. Paerl, J.J. Elser, J. Sardans, R.-M. Couture,T. Larssen, H. Hu, X. Dong, W. He, W. Zhang, X. Wang, Y. Zhang, Y. Liu, S. Zeng, X. Kong, A. B.G. Janssen, and Y. Lin. 2020. Improvement in municipal wastewater treatment alters lake nitrogen to phosphorus ratios in populated regions. Proc. Nat. Acad. Sci. USA **117**: 11566-11572.

279. Y. Wang, Z. Ren, P. Ma, Z. Wang, D. Niu, H. Fu and J.J. Elser. 2020. Effects of grassland degradation on ecological stoichiometry of soil ecosystems on the Qinghai-Tibet Plateau. Sci. Tot. Environ. **722**: 137910
278. Baron, J.S., S. Chandra, and J. J. Elser. 2020. Understanding mountain lakes in a changing world: introduction to the special issue. Inland Waters **82**: 57.
277. Qin, B., J. Zhou, J.J. Elser, W. Gardner, J. Deng, and J. Brookes. 2020. Water depth underpins the relative role and fates of nitrogen and phosphorus in lakes. Environ. Sci. Tech. **54**: 3191-3198.
276. Chen. C., O. Butler, T. Lewis, M. Rezaei Rashti, S. Maunsell, and J.J. Elser. 2020. The multi-element stoichiometry of wet eucalypt forest is transformed by recent, frequent fire. Plant and Soil. **447**: 447-461.
275. Okie, J.G., A.T. Poret-Peterson, Z. M.P. Lee, A. Richter, L.D. Alcaraz, L.E. Eguiarte, J.L. Siefert, V. Souza, C.L. Dupont, and J.J. Elser. 2020. Metagenomic signatures of microbial growth and trophic strategy in a replicated whole-ecosystem nutrient enrichment experiment. eLife **9**: e49816 doi: 10.7554/eLife.49816.
274. Kattge, J., G. Bönisch, G, S. Díaz, et al. 2020. TRY plant trait database – enhanced coverage and open access. Glob Change Biol. **26**: 119-188.
273. Zou, R., Z. Wu, L. Zhao, J. J. Elser, Y. Yu, Y. Chen, and Y. Liu. 2020. Seasonal algal blooms support sediment release of phosphorus via positive feedback in a eutrophic lake: Insights from a nutrient flux tracking modeling. Ecol. Modelling **416**: 108881.

2019

272. Evans-White, M.A., Z.G. Cardon, J.A. Schweitzer, J. Urabe, and J.J. Elser. 2019. Editorial: Emerging frontiers in ecological stoichiometry. Frontiers Ecol. Evol. **7**: 463.
271. Liu, Y., X. Qu, J.J. Elser, W. Peng, Z. Ren, H. Zhang, Y. Zhang and H. Yang. 2019. Impact of nutrient and stoichiometry gradients on microbial assemblages in Erhai Lake and its input streams. Water **11**: 1711.
270. Yuan, X., D. Niu, L.A. Gherardi, Y. Liu, Y. Wang, J.J. Elser, and H. Fu. 2019. Linkages of stoichiometric imbalances to soil microbial respiration with increasing nitrogen addition: Evidence from a long-term grassland experiment. Soil Biol. Biochem. **138**: 107580.
269. Butler, O., T. Lewis, M. Rezaei Rashti, S. Maunsell, J.J. Elser, and C. Chen. 2019. The stoichiometric legacy of fire regime regulates the roles of micro-organisms and invertebrates in decomposition. Ecology **100**: e02732.
268. Ren, Z., D. Niu, M. Panpan, Y. Wang, H. Fu, and J.J. Elser. 2019. Cascading influences of grassland degradation on nutrient limitation in a high mountain lake and its inflow streams. Ecology **100**: e02755.
267. Six, D.L., and J.J. Elser. 2019. Extreme ecological stoichiometry in a bark beetle-fungus mutualism. Ecol. Entomol. **44**: 543-551. doi: 10.1111/een.12731
266. Yan, K., Z. Yuan, S. Goldberg, W. Gao, A. Ostermann, J. Xu, F. Zhang, and J.J. Elser. 2019. Phosphorus mitigation remains critical in water protection: a review and meta-analysis from one of China's most eutrophicated lake. Sci. Tot. Environ. **689**: 1336-1347.
265. Xiong, X., C. Wu, J.J. Elser, Z. Mei, & Y. Hao. 2019. Occurrence and fate of microplastic debris in middle and lower reaches of the Yangtze River – From inland to the sea. Science of the Total Environment **659**: 66-73. doi.org/10.1016/j.scitotenv.2018.12.313

2018

264. Moody, E.K., J.R. Corman, H. Espinosa-Pérez, J. Ramos, J.L. Sabo, & J.J. Elser. 2018. Consumption explains intraspecific variation in nutrient recycling stoichiometry in a desert fish. Ecology **99**: 1552-1561
263. Moody, E.K., E.W. Carson, J.R. Corman, and H. Espinosa-Pérez. 2018. Animal-Mediated Nutrient Cycling in Aquatic Ecosystems of the Cuatro Ciénegas Basin, p. 141–152. *In* F. García-Oliva, J. Elser, and V. Souza [eds.], *Ecosystem Ecology and Geochemistry of Cuatro Cienegas: How to Survive in an Extremely Oligotrophic Site*. Springer International Publishing.
262. García-Oliva, F., J.J. Elser, and V. Souza [eds.]. 2018. *Ecosystem Ecology and Geochemistry of Cuatro Cienegas: How to Survive in an Extremely Oligotrophic Site*. Springer International Publishing.
261. Branco, P., M. Egas, J.J. Elser, and J. Huisman. 2018. Eco-evolutionary dynamics of ecological stoichiometry in plankton communities. Am. Nat. **192**: E1-E20.
260. Elser, J.J., N.I. Chan, J.R. Corman, and J. Stoltzfus. 2018. Save the P(ee)! The challenges of phosphorus sustainability and emerging solutions. Invited chapter in: *Dietary Phosphorus: Health, Nutrition, and Regulatory Aspects* (J. Uribarri and M.S. Calvo, editors). Taylor & Francis. ISBN 978-1498706964
259. Van de Waal, D. B., J. J. Elser, A. C. Martiny, R. W. Sterner, and J. B. Cotner. 2018. Editorial: Progress in ecological stoichiometry. Front. Microbiol. **9**: 1957.
258. Butler, O.M., J.J. Elser, T. Lewis, B. Mackey, and CR Chen. 2018. The phosphorus-rich signature of fire in the soil-plant system: a global meta-analysis. Ecology Letters **21**: 335-344.

258. Rivas-Ubach, A, A.T. Poret-Peterson, J. Sardans, M. Pérez-Trujillo, C. Legido-Quigley, M. Oravec, O. Urban, J. Peñuelas, and J.J. Elser. 2018. Coping with iron limitation: A metabolomic study of *Synechocystis* sp. PCC 6803. 2018. Acta Physiologiae Plantarum **40**: 28.
257. Niu, D., X. Yuan, A.J. Cease, H. Wen, C. Zhang, H. Fu, and J.J. Elser. 2018. The impact of nitrogen enrichment on grassland ecosystem stability depends on nitrogen addition level. Science of the Total Environment **618**: 1529-1538.

2017

256. Striebel, M., P. Frost, and J.J. Elser. 2017. Biological stoichiometry. In: *Encyclopedia of Life Sciences*. John Wiley & Sons Ltd, Chichester. http://www.els.net/ doi: 10.1002/9780470015902.a0021229.pub2
255. Ren, Z., H. Gao, and J.J. Elser. 2017. Longitudinal variation of microbial communities in benthic biofilms and association with hydrological and physicochemical conditions in glacier-fed streams. Freshwater Science **36**: 479-490.
254. Ren, Z., F. Wang, X. Qu, J.J. Elser, Y. Liu, & L. Chu. 2017. Taxonomic and functional differences between microbial communities in Qinghai Lake and its input streams. Front. Microbiol. **8**: 2319. doi:10.3389/fmicb.2017.02319
253. Ren, Z., H. Gao, and J. J. Elser. 2017. Microbial functional genes elucidate environmental drivers of biofilm metabolism in glacier-fed streams. Scientific Reports **7**: 12668. doi:10.1038/s41598-017-13086-9
252. Currier, C.C., and J.J. Elser. 2017. Beyond monoculture stoichiometry studies: Assessing growth, respiration, and feeding responses of three *Daphnia* species to P-enriched, low C:P lake seston. Inland Waters **7**: 348-357.
251. Guignard, M.S.,A.R. Leitch, C. Acquisti, C. Eizaguirre, J. J. Elser, D.O. Hessen, P.D. Jeyasingh, M. Neiman, A. E. Richardson, P.S. Soltis, D.E. Soltis, C.J. Stevens, M.T. Trimmer, L.J. Weider, G. Woodward, and I.J. Leitch. 2017. Impacts of nitrogen and phosphorus: from genomes to natural ecosystems and agriculture. Frontiers Beh. Evol. Ecol. **5**: 70. doi.org/10.3389/fevo.2017.00070
250. Zhang, J., and J.J. Elser. 2017. Carbon: nitrogen: phosphorus stoichiometry in fungi: A meta-analysis. Frontiers Microbiol. **8**: 1281.
249. Cease, A.J., J.F. Harrison, S. Hao, D.C. Niren, G. Zhang, L. Kang, and J.J. Elser. 2017. Nutritional imbalance suppresses migratory phenotypes of the Mongolian locust (*Oedaleus asiaticus*). Roy. Soc. open sci. **4**: 161039. http://dx.doi.org/10.1098/rsos.161039
248. Lee, Z. M.-P., A.T. Poret-Peterson, J.L. Siefert, D. Kaul, A. Moustafa, A.E. Allen, C.L. Dupont, L.E. Eguiarte, V. Souza, and J.J. Elser. 2017. Nutrient stoichiometry shapes microbial community structure in an evaporitic shallow pond. Frontiers Microbiol. **8**: 949. doi.org: 10.3389/fmicb.2017.00949
247. Moody, E.K. A.T. Rugenski, J.L. Sabo, B.L. Turner, and J. J. Elser. 2017. Does the growth rate hypothesis apply across temperatures? Variation in the growth rate and body phosphorus content of Neotropical benthic grazers. Frontiers Env. Sci. **5**: 14. doi: 10.3389/fenvs.2017.00014
246. Barnes, M.E., J.J. Elser, and S.E. Brownell. 2017. Impact of a two-week evolution module on students' perceived conflict between religion and evolution. Am. Biol. Teacher **79**: 104-111.

2016

245. Tapia-Torres, Y., M. Rodríguez-Torres, J.J. Elser, A. Islas, V. Souza, F. Garcia-Oliva, and G. Olmedo. How to live with phosphorus scarcity in soil and sediment: Lessons from bacteria. Appl. Environ. Microb. doi:10.1128/AEM.00160-16.
244. Corman, J.R., E. K Moody, and J.J. Elser. 2016. Calcium carbonate deposition drives nutrient cycling in a calcareous headwater stream. Ecol. Monogr. **86**: 448-461.
243. Chen, D., Q. Pa, S. Hu, J. Huang, Q. Wang, X. Han, S. Naeem, J.J. Elser, J. Wu, and Y. Bai. 2016. Effects of plant functional group loss on soil biota and net ecosystem exchange: A plant removal experiment in the Mongolian grassland. J. Ecology **104**: 734-743.
242. Pan, Q., T. Dashuan, S. Naeem, K. Auerswal, J.J. Elser, Y. Bai, J. Huang, Q. Wang, H. Wang, J. Wu and X. Han. 2016. Effects of functional diversity loss on ecosystem functions are influenced by compensation. Ecology **97**: 2293-2302.
241. Yan, Z., Han, W., Z. J. Peñuelas, J. Sardans, J.J. Elser, E. Du, P.B. Reich, and J. Fang. 2016. Phosphorus accumulates faster than nitrogen globally in freshwater ecosystems under anthropogenic impacts. Ecology Letters **19**: 1237-46.
240. Cherif, M., and J.J. Elser. 2016. Ecological Stoichiometry. In: *Oxford Bibliographies* in Ecology. doi: 10.1093/OBO/9780199830060-0146

239. Powers, S.M., T.P. Burt, N. Chan, J.J. Elser, P.M Haygarth, N.J.K. Howden, H.P. Jarvie, H.M. Peterson, J. Shen, F. Worrall, and A.N. Sharpley. 2016. Long-term accumulation and transport of anthropogenic phosphorus in three river basins. Nature Geoscience **9**: 353–356. doi:10.1038/ngeo2693 **ISI Highly Cited Paper *This paper won the Gene Likens Award of ESA Biogeosciences section for notable paper by an Early Career scientist (to Powers).*
238. Zhu, J., Q. Wang, N. He, M.D. Smith, J.J. Elser, J. Du, G. Yuan, G. Yu, and Q. Yu. 2016. Imbalanced atmospheric nitrogen and phosphorus depositions in China: Implications for nutrient limitation. J. Geophys. Res. Biogeosci. **121**, doi:10.1002/2016JG003393
237. Liu, X., H. Sheng, S. Jiang, Z. Yuan, C. Zhang, and J.J. Elser. 2016. Intensification of phosphorus cycling in China since the 1600s. Proc. Nat. Acad. Sci. USA **113**: 2609–2614.
236. Elser, J.J., L. Steger, M. Kyle, M.L. McCrackin, J. Learned, S. Schimpp, & A. Peace. 2016. Living on the stoichiometric knife-edge: effects of high and low food C:P ratio on growth, feeding, and respiration in multiple *Daphnia* species. Inland Waters **6**: 136-146.
235. Modenutti, B.E., M.A. Bastidas Navarro, Z.M. Lee, M.S. Souza, J.R. Corman, E.G. Balseiro, and J.J. Elser. 2016. Effects of volcanic pumice inputs on microbial community composition and dissolved C:P ratios in lake waters: an experimental approach. Microb. Ecol. **71**: 18-28.
234. Corman, J.R., A. Poret-Peterson, A. Uchitel, and J.J. Elser. 2016. Interaction between lithification and resource availability in the microbialites of Río Mesquites, Cuatro Ciénegas, México. Geobiology **14**:176-89. doi: 10.1111/gbi.12168
233. Luo, W., J. J. Elser, X.-T. Lü, Z. Wang, E. Bai, C. Yan, C. Wang, M.-H. Li, N.E. Zimmermann, X. Han, and Y. Jiang. 2016. Plant nutrients do not co-vary with soil nutrients under changing climatic conditions. Global Biogeochemical Cycles **29**:1298-1308.
232. Deng, Q., D. Hui, Y. Luo, J.J. Elser, Y.-P. Wang, I. Loladze, Q. Zhang, and S. Dennis. 2016. Down-regulation of tissue N:P ratio in terrestrial plants grown under elevated $CO_2$ levels. Ecology **96**:3354-3362.
231. Cease, A.J., M. Fay, J.J. Elser, and J.F. Harrison. 2016. Dietary phosphate affects food selection, post-ingestive P fate, and performance of a polyphagous herbivore. J. Exp. Biol. **219**:64-72. doi:10.1242/jeb.126847
230. Valdivia-Anistro, J.A., L.E. Eguiarte-Fruns, G. Delgado-Sapién, P. Márquez-Zacarías, J. Gasca-Pineda, J. Learned, J.J. Elser, G. Olmedo-Alvarez, and V. Souza. 2016. Variability of rRNA operon copy number and growth rate dynamics of *Bacillus* isolated from an extremely oligotrophic aquatic ecosystem. Frontiers in Microbiology **6**:01486. doi: 10.3389/fmicb.2015.01486
229. Neveu, M., A.T. Poret-Peterson, A.D. Anbar, and J.J. Elser. 2016. Ordinary stoichiometry of extraordinary microorganisms. Geobiology **14**: 33-53. doi:10.1111/gbi.12153

2015

228. Corman, J., E. Carlson, M. Dix, N. Girón, A. Roegner, J. Veselá, S. Chandra, J.J. Elser, E. Rejmánková. 2015. Nutrient dynamics and phytoplankton resource limitation in a deep tropical mountain lake. Inland Waters **5**: 371-386.
227. Goloran, J.B., C. Chen, I.R. Phillips, and J.J. Elser. 2015. Shifts in leaf N:P stoichiometry during rehabilitation in highly alkaline bauxite processing residue sand. Scientific Reports **5**:14811. doi: 10.1038/srep14811.
226. Wu, J., S. Naeem, J.J. Elser, Y. Bai, J. Huang, L. Kang, Q. Pan, Q. Wang, S. Hao, and X. Han. 2015. Testing biodiversity-ecosystem functioning relationship in the world's largest grassland: Overview of the IMGRE project. Landscape Ecology **30**: 1723-1736. doi: 10.1007/s10980-015-0155-y
225. Tapia-Torres, Y., J.J. Elser, V. Souza, and F. García-Oliva. 2015. Ecoenzymatic stoichiometry at the extremes: how microbes cope in an ultra-oligotrophic soil. Soil Biol. Biochem. **87**: 34-42.
224. Ponce-Soto, G.Y., E. Aguirre-von-Wobeser, L.E. Eguiarte, J.J. Elser, Z.M.-P. Lee, & V. Souza. 2015. Enrichment experiment changes microbial interactions in an ultra-oligotrophic environment. Frontiers in Microbiology **6**: 246. doi: 10.3389/fmicb.2015.00246
223. Laspoumaderes, C., B. Modenutti, J.J. Elser, and E. Balseiro. 2015. Does the stoichiometric carbon:phosphorus knife edge apply for predaceous copepods? Oecologia **178**: 557-569.
222. Cease, A.J., J.J. Elser, E.P. Fenichel, J.C. Hadrich, J.F. Harrison, B.E. Robinson. 2015. Living with locusts: connecting soil nitrogen, locust outbreaks, livelihoods, and livestock markets. BioScience **65**: 551-558. doi: 10.1093/biosci/biv048
221. Alijania, M.K, H. Wang, J. J. Elser. 2015. Modeling the bacterial contribution to planktonic community respiration in the regulation of solar energy and nutrient availability. Ecological Complexity **23**: 25-33.

220. Lee, Z.M.-P, L. Steger, J.R. Corman, A. Poret-Peterson, V. Souza and J.J. Elser. 2015. Response of a stoichiometrically imbalanced ecosystem to manipulation of nutrient supplies and ratios. PLOS ONE **10**: e0123949.
219. Withers, P.J.A., J.J. Elser, J. Hilton, J. Ohtake, W. Schipper, and K.C. van Dijk. 2015. Greening the global phosphorus cycle: How green chemistry can help achieve planetary P sustainability. Green Chem. **17**: 2087. doi: 10.1039/C4GC02445A
218. Elser, J.J., M. Bastidas-Navarro, J.R. Corman, H. Emick, M. Kellom, C. Laspoumaderes, Z. Lee, A. Poret-Peterson, E. Balseiro, and B. Modenutti. 2015. Community structure and biogeochemical impacts of microbial life on floating pumice. Appl. Envir. Microbiol. **81**:1542-49. doi: 10.1128/AEM.03160-14
217. Moody, E.K., J.R. Corman, J.J. Elser, and J.L. Sabo. 2015. Dietary composition affects fish excretion ratios. Freshwater Biol. **60**: 456-465. doi: 10.1111/fwb.12500
216. Bracken, M.E.S., H. Hillebrand, E. T. Borer, E.W. Seabloom, J. Cebrian, E. E. Cleland, J. J. Elser, D. S. Gruner, W.S. Harpole, J. T. Ngai, J. B. Shurin, and J.E. Smith. 2015. Responses of plant nutrient content to nitrogen and phosphorus additions: evidence for co-limitation. Oikos **124**:113-121. doi: 10.1111/oik.01215 (*Editor's Choice*)
215. Nie, Y., Z.J. Zhang, D. Raubenheimer, J.J. Elser, W. Wei, and F. Wei. 2015. Obligate herbivory in an evolutionary omnivore: the giant panda and bamboo from the perspective of nutritional geometry. Functional Ecology **29**: 26-34. doi:10.1111/1365-2435.12302

2014

214. Metson, G.S., V.H. Smith, D. Cordell, D.A. Vaccari, and J.J. Elser. 2014. Phosphorus is a key component of the resource demands for meat, eggs, and dairy production in the United States. Proc. Nat. Acad. Sci. USA **111**: E4906-E4907.
213. Haygarth, P.M., H.P. Jarvie, S.M. Powers, A. N. Sharpley, J.J. Elser, J. Shen, H.M. Peterson, N.I. Chan, N.J.K. Howden, T. Burt, F. Worrall, F.S. Zhang, and X.J. Liu. 2014. Sustainable phosphorus management and the need for a long-term perspective: the legacy hypothesis. Env. Sci. Tech. **48**: 8417-8419. doi: 10.1021/es502852s
212. Neveu, M., A. Poret-Peterson, Z. Lee, A. Anbar, and J.J. Elser. 2014. Cells separated from sediments are suitable for elemental composition analysis. Limnol. Oceanogr. Methods **12**: 519-529. doi: 10.4319/lom.2014.12.519
211. Zhang, Z.J., J.J. Elser, A.J. Cease, X.M. Zhang, Q. Yu, X. Han, and G. Zhang. 2014. Grasshoppers regulate N:P stoichiometric homeostasis by changing phosphorus contents in their frass. PLOS ONE **9**: e103697. doi: 10.1371/journal.pone.0103697
210. Zhang, C., D, Niu, S.J. Hall, H. Wen, X. Li, H. Fu, C. Wan, and J.J. Elser. 2014. Effects of simulated nitrogen deposition on soil respiration components and their temperature sensitivities in a semiarid grassland. Soil Biol. Biochem. **75**: 113-123.
209. Toberman, H, C. Chen, T. Lewis, and J.J. Elser. 2014. High frequency fire alters C:N:P stoichiometric coupling in forest litter. Global Change Biology **20**: 2321-31 doi: 10.1111/gcb.12432
208. Van de Waal, D.B., V.H. Smith, S.A.J. Declerck, E.C.M. Stam, and J.J. Elser. 2014. Stoichiometric regulation of phytoplankton toxins. Ecology Letters **17**: 736–742. doi: 10.1111/ele.12280
207. Elser, J.J., T.J. Elser, S.R. Carpenter, and W.A. Brock. 2014. Regime shift in fertilizer commodities indicates more turbulence ahead for food security. PLOS ONE **9**: e93998. doi: 10.1371/journal.pone.0093998

2013

206. Ximei, Z., L. Wei Liu, J.J. Elser, G. Zhang, and X. Han. 2013. Response of the abundance of key soil microbial nitrogen-cycling genes to multi-factorial global changes. PLOS ONE **8**: e76500
205. Hessen, D.O., J.J. Elser, R.W. Sterner, and J. Urabe. 2013. Ecological stoichiometry – an elementary approach using basic principles. Limnol. Oceanogr. **58**: 2219-2236.
204. Peace, A., Y.Q. Zhao, I. Loladze, J.J. Elser, and Y. Kuang. 2013. A stoichiometric producer-grazer model incorporating the effects of excess food-nutrient content on consumer dynamics. Mathematical Biosciences **244**: 107-115.
203. Domis, L.N.D., and others. 2013. Plankton dynamics under different climate conditions in tropical freshwater systems (a reply to the comment by Sarmiento et al. 2013). Freshwater Biology **58**: 2211- 2213.
202. Gilbert, J., C. Acquisti, H. Martinson, J. J. Elser, S. Kumar, and W.F. Fagan. 2013. GRASP [Genomic Resource Access for Stoichioproteomics]: Comparative explorations of the atomic content of 12 *Drosophila* proteomes. Genome Biology **14**: 599. doi: 10.1186/1471-2164-14-599.
201. Borer, E.T., M.E.S. Bracken, E. W. Seabloom, J. E. Smith, J. Cebrian, E. E. Cleland, J. J. Elser, D. S. Gruner, W. S. Harpole, H. Hillebrand, A.J. Kerkhoff, and J.T. Ngai. 2013. Global biogeography of autotroph chemistry: is insolation a driving force? Oikos **122**: 1121-1130.

200. Elser, J.J., W. Roberts, and P. Haygarth. 2013. P is for phosphorus: the biology and ecology of phosphorus in biota, natural ecosystems, and agroecosystems. In: K. Wyant, J. Corman, and J.J. Elser, *Phosphorus, Food, and Our Future*. Oxford University Press, New York City, New York.
199. Wyant, K., J. Corman, and J.J. Elser (editors). 2013. *Phosphorus, Food, and Our Future*. Oxford University Press. New York City, New York.
198. Modenutti, B.E., E. G. Balseiro, J.J. Elser, M. Bastidas Navarro, F. Cuassolo, C. Laspoumaderes, M. S. Souza and V. Díaz Villanueva. 2013. Effect of volcanic eruption on nutrients, light, and phytoplankton in oligotrophic lakes. Limnol. Oceanogr. **58**: 1165-1175.

2012

197. Wang, H., R.W. Sterner, and J.J. Elser. 2012. On the "strict homeostasis" assumption in ecological stoichiometry. Ecological Modelling **243**: 81-88.
196. Domis, L.N.D., and others. 2012. Plankton dynamics under different climatic conditions in space and time. Freshwater Biology **58**: 463-482.
195. Metson, G, E. Bennett, and J.J. Elser. 2012. The role of diet in phosphorus demand. Environmental Research Letters **7**: 044043 doi:10.1088/1748-9326/7/4/044043
194. Sommer, U. and others. 2012. Beyond the PEG-model: mechanisms driving plankton succession. Ann. Rev. Ecol. Syst. **43**: 429-448. **ISI Highly Cited Paper*
193. Elser, J.J., I. Loladze, A. Peace, and Y. Kuang. 2012. Lotka re-loaded: modeling trophic interactions under stoichiometric constraints. Ecological Modeling **245**: 3-11. 10.1016/j.ecolmodel.2012.02.006
192. Swenson, N., and others. 2012. The biogeography and filtering of woody plant functional diversity in North and South America. Global Ecol. Biogeogr. **21**: 798–808. doi: 10.1111/j.1466-8238.2011.00727.x
191. Souza, V., L.E. Eguiarte, M. Travisano, J.J. Elser, C. Rooks, and J.L. Siefert. 2012. Travel, sex, and food: what's speciation got to do with it? Astrobiology **12**: 634-640.
190. Souza, V., J. Siefert, A.E. Escalante, J.J. Elser, and L.E. Eguiarte. 2012. The Cuatro Ciénegas Basin in Coahuila, México: an astrobiological Precambrian park. Astrobiology **12**: 641-647.
189. Elser, J.J., and Y. Kuang. 2012. Ecological stoichiometry. Pages 718-722 in: Hastings, A., and L.J. Gross (eds.), *Encyclopedia of Theoretical Ecology*, University of California Press, Berkeley, CA.
188. Gaxiola, R.A., Sanchez, C.A., Paez-Valencia, J., Ayre, B.G., & Elser, J.J. 2012. Genetic manipulation of a "vacuolar" H(+)-PPase: from salt tolerance to yield enhancement under phosphorus-deficient soils. Plant Physiol. **159**: 3-11.
187. Elser, J.J. 2012. Phosphorus: limiting nutrient for humanity? Curr. Opin. Biotech. **23**: 1-6 (Invited). 10.1016/j.copbio.2012.03.001
186. Yu, Q., H. Wu, N. He, X. Lu, Z. Wang, J.J. Elser, J. Wu, and X. Han. 2012. Testing the growth rate hypothesis in vascular plants with above- and below-ground biomass. PLOS ONE **7**: e32162. doi:10.1371/journal.pone.0032162
185. McCrackin, M., and J.J. Elser. 2012. Denitrification kinetics and denitrifier abundances in sediments of lakes receiving atmospheric nitrogen deposition (Colorado, USA). Biogeochemistry **108**: 39-54. doi:10.1029/2010GB003897
184. Cease, A.J., J.J. Elser, C.F. Ford, S. Hao, L. Kang, and J.F. Harrison. 2012. Livestock overgrazing promotes locust outbreaks by lowering plant nitrogen content. Science **335**: 467-469.

2011

183. Elser, J.J. 2011. A world awash in nitrogen. Science **334**: 1504-1505. **Invited Perspective*.
182. Niu, D., S. J. Hall, H. Fu, J. Kang, Y. Qin, and J. J. Elser. 2011. Grazing exclusion alters ecosystem carbon pools in Alxa desert steppe. New Zealand Journal of Agricultural Research **54**:127-142.
181. McCrackin, M., and J.J. Elser. 2011. Greenhouse gas dynamics in lakes receiving atmospheric nitrogen deposition. Global Biogeochemical Cycles **25**: GB4005 doi: 10.1029/2010GB003897.
180. Elser, J.J., and E. Bennett. 2011. Phosphorus: a broken biogeochemical cycle. Nature **478**: 29-31. **Invited Commentary*.
179. Kattge, J., and others. TRY – a global database of plant traits. 2011. Global Change Biology **17**: 2905-2935. **Highly cited paper of 2012 in GCB (top 3%). *ISI Highly Cited Paper*
178. Gaxiola, R., M. Edwards, and J.J. Elser. 2011. A transgenic approach to enhance phosphorus use efficiency in crops as part of a comprehensive strategy for sustainable agriculture. Chemosphere **84**: 840-845.

177. Harpole, W.S., J.T. Ngai, E.E. Cleland, E.T. Borer, M.E.S. Bracken, J.J. Elser, D.S. Gruner, H. Hillebrand, E.W. Seabloom, J.B. Shurin, and J.E. Smith. 2011. Nutrient co-limitation of primary producer communities. Ecology Letters **14**: 852–862. **Highlighted in F1000 (Must Read) *ISI Highly Cited Paper*
176. Yu, Q., J.J. Elser, N. He, H. Wu, Q. Chen, G. Zhang, L. Zhang, and X. Han. 2011. Stoichiometric homeostasis of vascular plants in the Inner Mongolia grassland. Oecologia **166**: 1-10.
175. Zhang, G., X. Han, and J.J. Elser. 2011. Rapid top-down regulation of plant C:N:P stoichiometry by grasshoppers in an Inner Mongolia grassland ecosystem. Oecologia **166**: 253-264.
174. Wojewodzic, M.W., M. Kyle, J.J. Elser, D.O. Hessen, and T. Andersen. 2011. Joint effect of phosphorus limitation and temperature on alkaline phosphatase activity and somatic growth in *Daphnia magna*. Oecologia **165**:837-846. DOI: 10.1007/s00442-010-1863-2
173. Childers, D.L., J. Corman, M. Edwards, and J.J. Elser. 2011. Sustainability challenges of phosphorus and food: Solutions from closing the human phosphorus cycle. Bioscience **61**: 117-124. **This paper was highlighted by the* BioScience *editor*.
172. Loladze, I., and J.J. Elser. 2011. The origins of the Redfield nitrogen-to-phosphorus ratio are in a homoeostatic protein-to-RNA ratio. Ecology Letters **14**: 244-250. **This paper was highlighted as Editor's Choice in* Science *magazine*. **Highlighted in F1000 (Recommended)*

2010

171. Elser, J.J., C. Acquisti, and S. Kumar. 2010. Stoichiogenomics: the evolutionary ecology of macromolecular elemental composition. Trends Ecol. Evol. **26**: 38-44.
170. Yu, Q., Q. Chen, J.J. Elser, N. He, H. Wu, G. Zhang, J. Wu, Y. Bai, and X. Han. 2010. Linking stoichiometric homeostasis with ecosystem structure, functioning, and stability. Ecology Letters **13**: 1390-1399.
169. Elser, J.J., M. Kyle, M.W. Wojewodzic, A. Peace, M.L. McCrackin, T. Andersen, and D.O. Hessen. 2010. Atmospheric nitrogen deposition is associated with elevated phosphorus limitation of lake zooplankton. Ecology Letters **13**: 1256-1261.
168. Cease, A.J., S. Hao, L. Kang, J. J. Elser, and J. F. Harrison. 2010. Are color or high rearing density related to migratory polyphenism in the band-winged grasshopper, *Oedaleus asiaticus*? J. Insect Physiology **56**: 926-936.
167. Urabe, J., S. Naeem, D. Raubenheimer, and J.J. Elser. 2010. The evolution of biological stoichiometry under global change. Oikos **119**: 737-740.
166. McCrackin, M., and J.J. Elser. 2010. Atmospheric nitrogen deposition influences denitrification and nitrous oxide production in lakes. Ecology **91**: 528-539.
165. Elser, J.J., W.F. Fagan, A.J. Kerkhoff, and B. Enquist. 2010. Biological stoichiometry of plant production: metabolism, scaling, and ecosystem response to global change. New Phytologist **186**: 593-608. (Invited Tansley review). doi: 10.1111/j.1469-8137.2010.03214.x **ISI Highly Cited Paper*
164. Reich, P.B., J. Oleksyn, I.J. Wright, K.J. Niklas, L. Hedin, and J.J. Elser. 2010. Evidence of a general 2/3-power leaf nitrogen to phosphorus scaling among major plant groups and biomes. Proc. Roy. Soc. Ser. B. **277**: 877-883.
163. Glass, J.B., F. Wolfe-Simon, J.J. Elser, and A.D. Anbar. 2010. Molybdenum-nitrogen co-limitation in freshwater and coastal heterocystous cyanobacteria. Limnol. Oceanogr. **55**: 667-676.

2009

162. Elser, J.J., T. Andersen, J.S. Baron, A.-K. Bergström, M. Jansson, M. Kyle, K.R. Nydick, L. Steger, and D.O. Hessen. 2009. Shifts in lake N:P stoichiometry and nutrient limitation driven by atmospheric nitrogen deposition. Science **326**: 835-837. **ISI Highly Cited Paper. This paper was highlighted in* This Week in Science *(6 Nov 2009). News coverage appeared in ~133 newspapers and other media outlets*.
161. Wang, H., K. Dunning, J.J. Elser, and Y. Kuang. *Daphnia* species invasion, competitive exclusion, and chaotic coexistence. Discr. Cont. Dynam. Syst., Ser. B **12**: 481-493.
160. Mulder, C., and J.J. Elser. Soil acidity, ecological stoichiometry and allometric scaling in grassland food webs. Global Change Biology **11**: 2730-2738. *This paper was highlighted in a* Nature *News & Views piece (13 Aug 2009). *Highlighted in F1000 (Recommended)*
159. Carpenter, S.R. V. Armbrust, P. Arzberger, F.S. Chapin, III, J.J. Elser, E. Hackett, A. R. Ives, P. Kareiva, M. Leibold, P. Lundberg, M. Mangel, N. Merchant, W. Murdoch, M. Palmer, D. Peters, S. Pickett, K. Smith, D. H. Wall, and A. Zimmerman. 2009. Synthesis must be accelerated in ecology and environmental sciences. BioScience **59**: 699-701.
158. Elser, J.J., M. Kyle, L. Steger, K.R. Nydick and J.S. Baron. 2009. Nutrient availability and phytoplankton nutrient limitation across a gradient of atmospheric nitrogen deposition. Ecology **90**: 3062-3073. **ISI Web of Science Highly Cited Paper*

157. Sterner, R.W., and J.J. Elser. 2009. Ecological stoichiometry. Pages 376-385 in: *Princeton Guide to Ecology*, S.R. Carpenter, B. Walker, S.A. Levin, D.S. Wilcove, A.P. Kinzig (Editors), Princeton University Press.
156. Striebel, M., Frost, P., and J.J. Elser. 2009. Biological stoichiometry. In: *Encyclopedia of Life Sciences*. John Wiley & Sons Ltd, Chichester. http://www.els.net/ doi: 10.1002/9780470015902.a0020887
155. Hillebrand, H., E.T. Borer, M. E.S. Bracken, B.J. Cardinale, J. Cebrian, E.E. Cleland, K. Cottingham, J.J. Elser , D. S. Gruner, W.S. Harpole, C. de Mazancourt, J.T. Ngai, S. Sandin, E.W. Seabloom, J.B. Shurin, J.E. Smith, M.D. Smith, and E.M. Wolkovich. 2009. Metabolic and stoichiometric constraints on herbivory across organisms and ecosystems. Ecology Letters **12**: 516-527.
154. Acquisti C., S. Kumar, and Elser J.J. 2009. Signatures of nitrogen limitation in the elemental composition of the catabolic apparatus. Proc. R. Soc. B **276**: 2605-2610. doi:10.1098/rspb.2008.1960.
153. Acquisti, C., J.J. Elser, and S. Kumar. 2009. Ecological nitrogen limitation shapes the DNA composition of plant genomes. Mol. Biol. Evol. **26**: 953-956. **Highlighted in F1000 (Two evaluations: Must Read & Recommended)*

2008

152. Carson, E.W., J.J. Elser, and T.E. Dowling. 2008. Importance of exogenous selection in a fish hybrid zone: insights from reciprocal transplant experiments. Copeia **2008**: 794-800.
151. Hessen, D.O., M. Ventura, and J.J. Elser. 2008. Does variation in genome size reflect cellular competition for P between DNA and RNA? Genome **51**: 685-691.
150. Sterner, R.W., and Elser, J.J. 2008. Ecological stoichiometry: overview. In: Jorgensen, S.E. & B.D. Fath (eds.), *Encyclopedia of Ecology*, 1st Edition, Elsevier B.V., Oxford.
149. Elser, J.J. 2008. The big book of animal physiology. (Review of Karasov and Martinez del Rio: *Physiological Ecology*). BioScience **58**: 762-763. (book review)
148. 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 article*.
147. 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.
146. Sterner, R.W., T. Andersen, J. J. Elser, D.O. Hessen, J. Hood, E. McCauley, and J Urabe. 2008. Scale-dependent carbon:nitrogen:phosphorus seston stoichiometry in marine and freshwaters. Limnol. Oceanogr. **53**: 1169-1180.

2007

145. 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.
144. 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
143. 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. **Identified as "Emerging Research Front" paper by ISI Web of Science (Dec 2008).* **Highlighted in F1000 (Exceptional) *ISI Highly Cited Paper*
142. 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, and J.E. Smith. 2007. Consumer versus resource control of producer diversity depends on ecosystem type and producer community structure. Proc. Nat. Acad. Sci. USA **104**: 10904-10909. **Highlighted in F1000 (Recommended)*
141. 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.
140. 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*
139. 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 $CO_2$, nitrogen, and diversity. Oecologia **151**: 687-696. **Highlighted in F1000 (Recommended)*
138. 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

137. Elser, J.J. 2006. Biological stoichiometry: a chemical bridge between ecosystem ecology and evolutionary biology. The American Naturalist **168**: S25-S35.
136. 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.
135. 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
134. 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.
133. 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 "Editor's Choice: Highlights of the Recent Literature" in* Science *magazine*.
132. 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.
131. 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.
130. Boersma, M., and J.J. Elser. 2006. Too much of a good thing: on balanced diets and maximal growth. Ecology **87**: 1325-1330. **Highlighted in F1000 (Must Read)*
129. 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.
128. 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.
127. 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

126. 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.
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 $PO_4$ 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 $PO_4$ 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 ecophysiological 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, O. Kinne O, T. Fenchel, E. Fee, R. Hesslein, J. Elser, M. Scranton, J. Cole, N. Hairston, E. Canuel, R. Glud, C. Nielsen, P. Beninger, R. Waagbo, G.I. Hemre, G. Hulata, T. Hoisaeter, D. McLusky, R. Kneib , S. Shumway, R. Warwick, L. Hagerman, P.S. Larsen, J. Ott, P.C. Dworschak, F. Boero, J.M.Gili, K. Philippart, and M. Seaman. 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, J.M., C.B. Field, and B. Moldan. (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 and the chemical composition of poikilothermic 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.
70. Elser, J.J. 2000. Stoichiometric analysis of pelagic ecosystems: the biogeochemistry of planktonic food webs. Pages 389-406 in: Sala, O.E., R.B. Jackson, H.A. Mooney, R. Howarth (editors). *Methods in Ecosystem Science*. Springer-Verlag, Berlin.

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. Högberg, 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. 2000. 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.
58. Jeremiason, J.D., S.J. Eisenreich, M.J. Paterson, K.G. Beaty, R. Hecky, and J.J. Elser. 1999. Biogeochemical cycling of PCBs in lakes of variable trophic status: a paired-lake experiment. Limnol. Oceanogr. **44**: 889-902.
57. Markow, T.A., B. Raphael, D. Dobberfuhl, C.M. Breitmeyer, J.J. Elser, and E. Pfeiler. Elemental stoichiometry of *Drosophila* and their hosts. 1999. Functional Ecology **13**: 78-84.
56. Elser, J.J., and J. Urabe. 1999. The stoichiometry of consumer-driven nutrient recycling: theory, observations, and consequences. Ecology **80**: 745-751. **This paper was highlighted in the September 1999 issue of the SCOPE newsletter (published by the Centre Europeen D'Etudes Des Polyphosphates)*

1998

55. Elser, J.J. Catalyst for paradigmatic change. 1998. Limnol. Oceanogr. **43**: 1401-1402 (book review)
54. Pfeiler, E., V.A. Lindley, and J.J. Elser. 1998. Elemental (C, N, and P) analysis of metamorphosing bonefish leptocephali: relationship to catabolism of endogenous organic compounds, tissue remodeling, and feeding ecology. Mar. Biol. **132**: 21-28.
53. Elser, J.J., and D.K. Foster. 1998. N:P stoichiometry of sedimentation in lakes of the Canadian Shield: relationships with seston and zooplankton elemental composition. Écoscience **5**: 56-63.
52. MacKay, N.A., and J.J. Elser. 1998. Factors that may prevent a trophic cascade: food quality, invertebrate predation, and their interaction. Limnol. Oceanogr. **43**: 339-347.
51. MacKay, N.A., and J.J. Elser. 1998. Differential nutrient recycling by *Daphnia* reduces nitrogen fixation by cyanobacteria. Limnol. Oceanogr. **43**: 347-354.
50. Elser, J.J., T.H. Chrzanowski, R.W. Sterner, and K. Mills. 1998. Stoichiometric constraints on food web dynamics: a whole-lake experiment on the Canadian Shield. Ecosystems **1**: 120-136.

1997

49. Muller-Solger, A., M.T. Brett, C. Luecke, J.J. Elser, and C.R. Goldman. 1997. The effects of planktivorous fish (golden shiners) on the ciliate community of a mesotrophic lake. J. Plankton Res. **19**: 1815-1828.

48. Sterner, R.W., J.J. Elser, E.J. Fee, S.J. Guildford, and T.H. Chrzanowski. 1997. The light:nutrient balance in lakes: the balance of energy and materials affects ecosystem structure and process. Am. Nat. **150**: 663-684.
47. Main, T., D.R. Dobberfuhl, and J.J. Elser. 1997. N:P stoichiometry and ontogeny in crustacean zooplankton: a test of the growth rate hypothesis. Limnol. Oceanogr. **42**: 1474-1478.
46. Hassett, R.P., B. Cardinale, L.B. Stabler, and J.J. Elser. 1997. Ecological stoichiometry of N and P in lakes and oceans with emphasis on the zooplankton-phytoplankton interaction. Limnol. Oceanogr. **42**: 648-662.
45. Dobberfuhl, D.R., R. Miller, and J.J. Elser. 1997. Effects of a cyclopoid copepod (*Diacyclops thomasi*) on phytoplankton and the microbial food web. Aquat. Microb. Ecol. **12**: 29-37.

1996

44. Chrzanowski, T.H., M. Kyle, J.J. Elser, and R.W. Sterner. 1996. Element ratios and growth dynamics of bacteria in an oligotrophic Canadian shield lake. Aquat. Microb. Ecol. **11**: 119-125.
43. Goldman, C.R., J.J. Elser, R.C. Richards, J.E. Reuter, J.C. Priscu, and A.L. Levin. 1996. Thermal stratification, nutrient dynamics, and phytoplankton productivity during the onset of spring phytoplankton growth in Lake Baikal, Russia. Hydrobiologia **331**: 9-14
42. Elser, J.J., D.R. Dobberfuhl, N.A. MacKay, and J.H. Schampel. 1996. Organism size, life history, and N:P stoichiometry: toward a unified view of cellular and ecosystem processes. BioScience **46**: 674-684. **This paper highlighted in* Readings in Ecology *(S. Dodson et al., eds. Oxford Univ. Press, 1999).*
41. Sterner, R.W., J.J. Elser, T.H. Chrzanowski, J.H. Schampel, and N.B. George. 1996. Biogeochemistry and trophic ecology: a new food web diagram. Pages 72-80 in: G. Polis and K.O. Winemiller (eds.), *Food Webs: Integration of Patterns and Dynamics*, Chapman and Hall.

1995

40. Elser, J.J., D.K. Foster, and R.E. Hecky. 1995. Effects of zooplankton on sedimentation in pelagic ecosystems: theory and test in two lakes of the Canadian Shield. Biogeochemistry **30**: 143-170.
39. Elser, J.J., L.B. Stabler, and R.P. Hassett**.** 1995. Nutrient limitation of bacterial growth and rates of bacterivory in lakes and oceans: a comparative study. Aquat. Microb. Ecol. **9**: 105-110.
38. Elser, J.J., F.S. Lubnow, M.T. Brett, E.R. Marzolf, G. Dion and C.R. Goldman. 1995. Factors associated with inter- and intra-annual variation of nutrient limitation of phytoplankton growth in Castle Lake, California. Can. J. Fish. Aquat. Sci. **52**: 93-104.
37. Elser, J.J., C. Luecke, M.T. Brett, and C.R. Goldman. 1995. Limnological effects of food web compensation after manipulation of rainbow trout in an oligotrophic lake. Ecology **76**: 52-69.
36. Elser, J.J., and D.L. Frees. 1995. Microconsumer grazing and sources of limiting nutrients for phytoplankton growth: application and complications of a nutrient deletion / dilution gradient technique. Limnol. Oceanogr. **40**: 1-16.
35. Elser, J.J, R.W. Sterner, T.H. Chrzanowski, J.H. Schampel, and D.K. Foster. 1995. Elemental ratios and the uptake and release of nutrients by phytoplankton and bacteria in three lakes of the Canadian Shield. Microb. Ecol. **29**: 145-162.
34. Brett, M.T., K. Wiackowski, F.S. Lubnow, A. Mueller-Solger, J.J. Elser, and C.R. Goldman. 1995. *Diacyclops*, *Daphnia*, *Diaptomus*, and *Holopedium* effects on planktonic ecosystem structure in Castle Lake, California. Ecology **75**: 2243-2254.
33. Chrzanowski, T.H., R.W. Sterner, and J.J. Elser. 1995. Nutrient enrichment and nutrient regeneration stimulate bacterioplankton growth. Microb. Ecol. **29**: 221-230.
32. Sterner, R.W., Chrzanowski, T.H., J.J. Elser, and N.B. George. 1995. Sources of nitrogen and phosphorus supporting the growth of bacterio- and phytoplankton in an oligotrophic Canadian Shield lake. Limnol. Oceanogr. **40**: 242-249.

1994

31. Elser, J.J., and R.P. Hassett. 1994. A stoichiometric analysis of the zooplankton-phytoplankton interaction in marine and freshwater ecosystems. Nature **370**: 211-213.
30. Elser, J.J., C. Junge, and C.R. Goldman. 1994. Population structure and ecological effects of the Pacific crayfish, *Pacifasticus lenisculus*, in Castle Lake, California. Great Basin Naturalist **54**: 162-169.

1993

29. Elser, J.J., and N.B. George. 1993. The stoichiometry of N and P in the pelagic zone of Castle Lake, California. J. Plankton Res. **15**: 977-992.

28. Elser, J.J. 1993. Clearing the waters: integrated water quality and fisheries management, Wisconsin style. Ecology **74**: 2473-2474 (book review).
27. Burgi, H.-R., J.J. Elser, R.C. Richards, and C.R. Goldman. 1993. Zooplankton patchiness in Lake Tahoe and Castle Lake, CA. Verh. Internat. Verein. Limnol. **25**: 378-382.
26. Carpenter, S.R., J.A. Morrice, J.J. Elser, A. St. Amand, and N.A. MacKay. 1993. Phytoplankton community dynamics. Chapter 11 in: Carpenter, S.R., and J.F. Kitchell (eds.), *Trophic Cascades in Lakes*, Cambridge University Press, Cambridge, England.
25. Carpenter, S.R., J.A. Morrice, P.A. Soranno, J.J. Elser, N.A. MacKay, and A. St. Amand. 1993. Dynamics of primary production. Chapter 13 in: Carpenter, S.R., and J.F. Kitchell (eds.), *Trophic Cascades in Lakes*, Cambridge University Press, Cambridge, England.

1992

24. Elser, J.J. 1992. Phytoplankton dynamics and the role of grazers in Castle Lake, California. Ecology **73**: 887-902.
23. Sterner, R.W., J.J. Elser, and D.O. Hessen. 1992. Stoichiometric relationships among producers, consumers, and nutrient cycling in pelagic ecosystems. Biogeochemistry **17**: 49-67.

1991

22. Elser, J.J. and C.R. Goldman. 1991. Zooplankton effects on phytoplankton in lakes of contrasting trophic status. Limnol. Oceanogr. **36**: 64-90.
21. Elser, J.J., and C.R. Goldman. 1991. Experimental separation of the direct and indirect effects of zooplankton on phytoplankton in a subalpine lake. Verh. Internat. Verein. Limnol. **24**: 493-498.

1990

20. Elser, J.J., H.J. Carney, and C.R. Goldman. 1990. Nutrient supply and demand in pelagic ecosystems: a comparison of three large lakes. In: Poppoff, I.G., C.R. Goldman, S.L. Loeb, and L.B. Leopold (eds.), *International Mountain Watershed Symposium: Subalpine Processes and Water Quality*. pp. 528-543. Tahoe Resource Conservation District, South Lake Tahoe, CA.
19. Elser, J.J., H.J. Carney, and C.R. Goldman. 1990. The zooplankton-phytoplankton interface in lakes of contrasting trophic status: an experimental comparison. Hydrobiologia **200/201**: 69-82. (Proceedings of the International Conference on Biomanipulation, Amsterdam, August 1989).
18. Elser, J.J., E. Marzolf, and C.R. Goldman. 1990. The roles of phosphorus and nitrogen in limiting phytoplankton growth in freshwaters: a review of experimental enrichments. Can. J. Fish. Aquat. Sci. **47**: 1468-1477.
17. Carney, H.J., and J.J. Elser. 1990. Strength of zooplankton-phytoplankton coupling in relation to lake trophic state. In: Tilzer, M.M., and C. Serruya (eds.), *Ecological Structure and Function in Large Lakes*. Science Tech Publishers, Madison, WI. pp. 616-631.

1989

16. Elser, J.J., and N.A. MacKay. 1989. Experimental evaluation of effects of zooplankton biomass and size distribution on algal biomass and productivity in three nutrient-limited lakes. Arch. Hydrobiol. **114**: 481-496.
15. St. Amand, A.L., P.A. Soranno, S.R. Carpenter, and J.J. Elser. 1989. Algal nutrient deficiency: growth bioassays vs. physiological indicators. Lake and Res. Manage. **5**: 27-35.

1988

14. Elser, J.J., and S.R. Carpenter. 1988. Predation-driven dynamics of zooplankton and phytoplankton in a whole-lake experiment. Oecologia **76**: 148-154.
13. Elser, J.J., M.M. Elser, N.A. MacKay, and S.R. Carpenter. 1988. Zooplankton-mediated transitions between N and P limited algal growth. Limnol. Oceanogr. **33**: 1-14. **Winner of the 1990 Lindeman Award of the American Society of Limnology & Oceanography*.
12. Elser, J.J. 1988. Evaluation of size-related changes in chlorophyll-specific light extinction in some north temperate lakes. Arch. Hydrobiol. **111**: 171-182.
11. Carpenter, S.R., P.R. Leavitt, J.J. Elser, and M.M. Elser. 1988. Chlorophyll budgets: response to food web manipulation. Biogeochemistry **6**: 79-90.

1987

10. Elser, J.J., N.C. Goff, N.A. MacKay, A.L. St. Amand, M.M. Elser, and S.R. Carpenter. 1987. Species-specific algal responses to zooplankton: experimental and field observations in three north temperate lakes. J. Plankton Res. **9**: 699-717.
9. Carpenter, S.R., J.F. Kitchell, J.R. Hodgson, P.A. Cochran, J.J. Elser, M.M. Elser, D.M. Lodge, D. Kretchmer, X. He, and C.N. von Ende. 1987. Regulation of lake ecosystem primary productivity by food web structure in whole lake experiments. Ecology **68**: 1863-1876. **One of the ISI Top 10 most-cited papers in Ecology / Environmental Science (through 1992)*.
8. Dini, M.L., J. O'Donnell, S.R. Carpenter, M.M. Elser, J.J. Elser, and A.M. Bergquist. 1987. *Daphnia* size structure, vertical migration, and phosphorus redistribution. Hydrobiologia **150**: 185-191.

1986

7. Elser, J.J., M.M. Elser, and S.R. Carpenter. 1986. Size fractionation of algal chlorophyll, carbon fixation, and phosphatase activity: Relationships with species-specific size distributions and zooplankton community structure. J. Plankton Res. **8**: 365-383.
6. Carpenter, S.R., M.M. Elser, and J.J. Elser. 1986. Chlorophyll production, degradation, and sedimentation: implications for paleolimnology. Limnol. Oceanogr. **31**: 112-124.
5. Elser, M.M., J.J. Elser, and S.R. Carpenter. 1986. Paul and Peter lakes: a liming experiment revisited. Amer. Midl. Nat. **116**: 282-295.
4. Elser, J.J., and B.L. Kimmel. 1986. Alteration of phytoplankton phosphorus status during enrichment experiments: implications for interpreting nutrient enrichment bioassays. Hydrobiologia **133**: 217-222.

1985

3. Elser, J.J., and B.L. Kimmel. 1985. Photoinhibition of temperate lake phytoplankton by near-surface irradiance: evidence from vertical profiles and field experiments. J. Phycol. **21**: 419-427.
2. Elser, J.J., and B.L. Kimmel. 1985. Nutrient availability for phytoplankton production in a multiple impoundment series. Can. J. Fish. Aquat. Sci. **42**: 1359-1370.

1983

1. Carpenter, S.R., J.J. Elser, and K.M. Olson. 1983. Effects of roots of *Myriophyllum verticillatum* L. on sediment redox conditions. Aquat. Bot. **17**: 243-249.

In review or in preparation:

Elser, J.J., and P.M. Haygarth. *Phoshorus: Past and Future*.. Oxford University Press. (submitted)
Sun, X., A. Li, J. Huang, M. Wang, Y. Bai, L. Wang, S. Naeem, J.J. Elser, J. Wu, and X. Han. Responses of litter decomposition to biodiversity manipulation in a typical steppe, Inner Mongolia, China. Oecologia: in review.
Sheng, H. X. Liu, Z. Yuan, J. J. Elser, G. K. MacDonald, and C. Zhang. Improving regional equality of phosphorus accessibility via international trade. Nature Communications: in review.
Huang, J., H. Ren, J. Wu, A. Li, C. Clark, S. Naeem, J. J. Elser, Y. Bai, L. Wang, Q. Chen, and X. Han. Effects of biodiversity removal on soil nitrogen availability and retention in a natural steppe ecosystem. Oikos: in review.
Brownlie, W.J., D. Cordell, R. McDowell, G.S. Metson, P.J.A. Withers, T. Adhya, C. Cox, K. van Dijk, J.J. Elser, F. Kebede, C. Masso, K. Matsubae, V. de Melo Benites, M. Miranda, M. Nanda, M. Scholz, W. Schipper, J. Shen, M.A. Sutton, F. Zhang, and B.M. Spears. Connecting the dots on the global phosphorus challenge. J. Env. Quality.
Cease, A.J., J.F. Harrison, S. Hao, D. Niren, and J.J. Elser. Interactions among plants, nitrogen fertilization, and insect population density in the field: what triggers migration? Oecologia: in review.
Yuan, Z.Y., H.Y. H. Chen, Y. Qiang, J.J. Elser, and M. Smith. Global terrestrial net primary productivity in relation to climate and soil nutrients. New Phytol.: in review.
Poret-Peterson, A., S. Romaniello, J.J. Elser, E.L. Shock, H.E. Hartnett, and A.D. Anbar. Evidence for methanotrophy and methanogenesis in a terrestrial hydrothermal ecosystem. Environ. Microbiol.: in prep.
Cease, A., J.F. Harrison, J. Esman, S. Hao, D. Flynn, G. Zhang, and J.J. Elser. *Oedaleus asiaticus* locusts prefer low-nitrogen grasses. Ecological Entomology: in preparation.

**Other Publications:**

Elser, J.J., and B. Rittmann. A dirty way to feed 9 billion people. *Slate* magazine (appeared: 25 December 2013). http://tinyurl.com/mnhuyup *Resulted in 51,000 page views within first two weeks*.

Cease, A. J., and J.J. Elser. 2013. Biological Stoichiometry. *Nature Education Knowledge* **4**:1. http://www.nature.com/scitable/knowledge/library/biological-stoichiometry-102248897

Elser, J.J., and S. White. 2010. "Peak phosphorus" and "The new resource crunch." Foreign Policy Magazine (online, 4/22/10) (tinyurl.com/y5bnxpu and tinyurl.com/2d97o9w). *This piece was the most-read article in the magazine during the week after its appearance*.

Dunning, K.A., M. Kyle, Y. Kuang, and J.J. Elser. 2009. A mathematical and empirical analysis of stoichiometric effects of light intensity on *Daphnia* dynamics and coexistence. Journal of Young Investigators **19**.

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.

**Databases**

Kumar, S, B. Van Emden, C. Acquisti, W.F. Fagan, and J.J. Elser. 2008. GRASP: Genomic Resource Access for Stoichioproteomics. Arizona State University, Tempe, Arizona 85282. www.graspdb.net

**Invited Seminars / Plenary Lectures / Keynote Talks / Panels (since 2000)**

February, 2019. Institute for Genomics and Evolutionary Medicine, Temple University.
February, 2019. *Graduate student invited speaker*, Department of Biological Sciences, Kent State University.
October, 2019. *Invited keynote*, Phosphorus 350: A Turning Point in Phosphorus Stewardship, Lancaster University, Lancaster, England.
October, 2019. Department of Geography, McGill University, Montreal, Canada.
May, 2019. Invited lecture, Division of Environmental Biology & Division of Molecular & Cellular Biology, National Science Foundation, Washington, DC
April, 2019. Systems Ecology Program seminar series, University of Montana.
March, 2019. *Invited plenary*, Montana Lakes Conference, Whitefish, MT
September, 2018. *Invited plenary*, Argentina Limnology Congress (by videoconference)
May, 2018. Department of Environmental Sciences, Nanjing University
May, 2018. Nanjing Institute of Geography & Limnology Chinese Academy of Sciences, Nanjing, China.
May, 2018. Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, China.
May, 2018. 4th International Conference on Environmental Pollution and Health, Nankai University, Tianjin, China.
April, 2017. Natural Resources Ecology Laboratory, Colorado State University, Fort Collins, CO
February, 2017. Center for Environmental Research, Education, & Outreach, Washington State University, Pullman, WA
February, 2017. "Aquatic Sciences for All", plenary talk introducing Dr Marcia McNutt (President, National Academy of Sciences). 2017 ASLO Aquatic Sciences Meeting, Honolulu, HI.
January, 2017. *Distinguished Speaker Series*, University of Florida Water Institute, Gainesville, FL
September, 2016. Water Flow seminar series, University of Montana, Missoula, MT
August, 2016. *Invited keynote*, 5th International Sustainable Phosphorus Summit, Kunming, China
April, 2016. Department of Biology, Indiana University, Bloomington, IN
January, 2016. *Glaser Distinguished Lecturer*, Department of Biological Sciences, Florida International University, South Miami, FL
December, 2015. *Vanzant Lecture Series,* Department of BioSciences, Rice University, Houston, TX
October, 2015. *Invited speaker in "Frontera en Ecologia y Evolucion"* series, Instituto de Ecologia, UNAM, Mexico City, Mexico
July, 2015. Department of Water Resources, China Institute of Water Resources and Hydropower Research. Beijing, China
July, 2015. Science & Technology Department, Qinghai Normal University, Xining, China
July, 2015. Key Laboratory of Grassland Agro-ecosystems, Lanzhou University, Lanzhou, China
June, 2015. *David Schindler Professorship in Aquatic Science Lecture*, Trent University
April, 2015. *Graduate student invited speaker*, Department of Biology, West Virginia University
April, 2015. *Graduate student invited speaker*, Duke Ecology Program weekend retreat, Duke Marine Lab.
March, 2015. CRU Phosphates 2015 industry conference, Tampa, FL
November, 2014. Hugh Hanson Ecology Seminar, School of Life Sciences, ASU, Tempe, AZ.
October, 2014. Symposium on Water Resources & Rebounding Cities, Kent State University, Kent, OH.

August, 2014. Woodstoich 3 international workshop on ecological stoichiometry. Sydney, Australia.
July, 2014. *Invited panelist*, AgTech Summit, Steinbeck Innovation Foundation, Monterey, CA.
June, 2014. University of the Chinese Academy of Sciences International Summer School on Frontier and Interdisciplinary Sciences, Beijing, China.
April, 2014. Smithsonian Tropical Research Institute, Panama City, Panama.
November, 2013. *Graduate student invited speaker*, Graduate Program in Ecology and Evolution, Dartmouth College, Dartmouth, New Hampshire.
September, 2013. *Graduate student invited speaker*, Department of Biology and Wildlife, University of Alaska-Fairbanks, Fairbanks, Alaska.
August, 2013. School of Biological Sciences, University of Sydney, Sydney, Australia.
July, 2013. Griffith Climate Change Response Program, Griffith University, Brisbane, Australia.
June, 2013. Key Laboratory of Grassland Agro-ecosystems, Lanzhou University, Lanzhou, China.
May, 2013. *Bingzhi Professor Honorary Lecture*, Chinese Academy of Sciences Institute of Zoology, Beijing.
April, 2013. *Panelist* on the science of global change, "Climate Change and the Common Good" conference, University of Notre Dame, Notre Dame, IN.
October, 2012. Southern Illinois University Center for Ecology *Distinguished Ecologist speaker series*, Carbondale, IL.
October, 2012. University of Notre Dame Global Change Initiative, Notre Dame, IN.
September, 2012. Universidad de Caldas, Manizales, Colombia.
April, 2012. Department of Chemistry, Emory University, Atlanta, GA.
September, 2011. CONICET Centro Nacional Patagonico (CeNPat), Puerto Madryn, Argentina.
May, 2011. *Invited presenter* on "Phosphorus as a critical material" in workshop "Critical Materials Flow in an Age of Constraint: Exploring Challenges & Solutions Across Materials," sponsored by W. Wilson Center Science & Technology Innovation Program and the U.S. Department of Energy Office of Intelligence, Science & Technology Division. Washington, DC. http://tinyurl.com/3chxblu
May, 2011. *Invited plenary speaker,* European Congress on Ecological Modeling, Riva del Garda, Italy.
May, 2011. Department of Biology, Drexel University, Philadelphia. PA.
April, 2011. Instituto de Investigaciones en Biodiversidad y Medioambiente (INIBIOMA), CONICET -Universidad Nacional del Comahue, Barliloche, Argentina.
March, 2011. *Kaiser Scholar lecturer*, University of Wisconsin, Madison, WI.
October, 2010. University Program in Ecology, Duke University, Durham, NC.
July, 2010. Gordon & Betty Moore Foundation, Marine Microbiology Initiative Investigators meeting, Palo Alto, CA.
March, 2010. Thermal Biology Institute, Montana State University, Bozeman, MT.
March, 2010. Department of Biological Sciences, University of Alabama.
January 2010. Divisional seminar, Division of Biological Sciences, UC-San Diego, San Diego, CA.
October 2009. *Invited speaker*, Agouron Institute Nitrogen meeting, Scottsdale, AZ
October 2009. Graduate Program in Biogeochemistry, Cornell University, Ithaca, NY.
August 2009. *Invited speaker*, Symposium on Regional and Global Network of Grassland Ecosystem Research: Ideas and Perspectives. Chinese Academy of Sciences, Institute of Botany, Beijing, China.
July, 2009. *Invited speaker*, Symposium on Integration of Evolutionary Biology and Ecosystem Ecology, EAWAG, Lake Lucerne, Switzerland
June, 2009. *Invited speaker*, Symposium on Global Change and Food Webs, Wilhelmshaven, Germany
May, 2009. *"Eminent Ecologist" lecturer*, Kellogg Biological Station, Michigan State University.
March, 2009. University of Illinois, Champaign-Urbana.
February, 2009. Center for Biological Physics "Chalk Talk", Arizona State University
February, 2009. Division of Environmental Studies and Department of Land, Air, and Water Resources, UC-Davis Centennial Speaker Series. View at https://breeze.ucdavis.edu/p43301593/
November, 2008. *Invited speaker*, "Phosphorus limitation and evolution at Cuatro Ciénegas, Mexico", Mexican Congress of Ecology, Merida, Mexico.
October, 2008. *Invited plenary speaker*, "Ecological stoichiometry of nutrient limitation in lakes and beyond," LEREC conference on "Ecological stoichiometry and feedbacks in aquatic food webs," Umeå University, Sweden.
October, 2008. *Distinguished alumni lecturer*, Department of Biology, University of Notre Dame.
September, 2008. Department of Biology, Northern Arizona University.
July, 2008. *Invited lecture*, "New frontiers in biological stoichiometry," Gordon Research Conference on Metabolic Ecology, University of New England, Maine (USA)
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, Nieursluis, 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. Bengsston, 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

**Selected Meeting Presentations (since 2000)**:

Elser, J.J., J. Giersch, T. Tappenbeck, and C. Muhlfeld. “In the nursery of newborn lakes: exploratory data from periglacial lakes of Glacier National Park (Montana, USA)”. Oral presentation at the 2017 ASLO Aquatic Sciences Meeting, Honolulu, HI, USA, Feb 2017

Elser, J.J. "These are "the best of times, the worst of times": the latest news from the NSF P Sustainability Research Coordination Network (P RCN) and the North American Partnership for Phosphorus Sustainability (NAPPS)". Invited keynote presentation, 5th International Sustainable Phosphorus Summit, Kunming, China, August 2016.

Elser, J.J., Z. Lee, J.R. Corman, A. Poret-Peterson, J. Okie, L. Steger, J. Learned, M. Neveu, C. Dupont, J. Siefert, A. Anbar, and V. Souza. "Nutrients, ribosomes, and genomes: a desert survival test for the growth rate hypothesis." Invited oral presentation at the 2016 ASLO Summer Meeting, Santa Fe, NM, USA, June 2016.

Elser, J.J., J. Learned, T. Bercel, A. Poret-Peterson, Z. Ren, J. Raymond, N. Decao, F. Hua. "'Mysterious lakes' amid mega-dunes: a limnological exploration of groundwater-fed ponds & lakes of Badain Jaran, China". Oral presentation at the 2015 Aquatic Sciences Meeting, Granada, Spain, February 2015.

Elser, J.J., "Introducing ASLO 2.0". Plenary presentation at the 2015 Aquatic Sciences Meeting, Granada, Spain, February 2015.

Elser, J.J, J.R. Corman, Z. Lee, J. Siefert, M. Bastidas, F. Cuassolo, C. Laspoumaderes, M. Sol Souza, B. Modenutti, and E. Balseiro. “Life on floating pumice.” Oral presentation at the 2014 Joint Aquatic Sciences Meeting, Portland, Oregon, USA, May 2014.

Elser, J.J., Z. Lee, C. Dupont, J. Siefert, and V. Souza. "Effects of nutrient enrichment and N:P stoichiometry on microbial community structure in an ancient (very) shallow remnant sea at Cuatro Cienegas, Mexico." Poster presentation at the 2014 Ocean Sciences Meeting, Honolulu, HI, 2February 2014.

Elser, J.J., L. Steger, M. Kyle, M.L. McCrackin, Jenni Learned, S. Schimpp, & A. Peace. "Living on the stoichiometric knife-edge: effects of high and low food C:P ratio on growth, feeding, and respiration in multiple *Daphnia* species". Oral presentation at the 2013 Association for the Sciences of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting, New Orleans, LA, February 2013.

Elser, J.J. 2012. “Phosphorus, food, and our future.” Invited lecture at the 2012 regional meeting of the National Science Teachers Association, Phoenix, AZ, December 2012.

Elser, J.J, J.R. Corman, Z. Lee, J. Siefert, M. Bastidas, F. Cuassolo, C. Laspoumaderes, M. Sol Souza, B. Modenutti, and E. Balseiro. 2012. “Life on floating pumice.” Oral presentation at the 2012 Association for the Sciences of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting, Lake Biwa, Shiga, Japan, July 2012.

Balseiro, E., B. Modenutti, M. Bastidas, F. Cuassolo, C. Laspoumaderes, M. Sol Souza, and J.J. Elser. 2012. “Impacts & ongoing recovery of Patagonian lakes from the Puyehue-Cordon Caulle mega-eruption.” Oral presentation at the 2012 Association for the Sciences of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting, Lake Biwa, Shiga, Japan, July 2012.

Modenutti, B., E. Balseiro, M. Bastidas, F. Cuassolo, C. Laspoumaderes, M. Sol Souza, and J.J. Elser. 2012. “Testing the mechanisms of impact of the Puyehue-Cordon Caulle mega-eruption on Patagonian lakes.” Oral presentation at the 2012 Association for the Sciences of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting, Lake Biwa, Shiga, Japan, July 2012.

Corman, J.R., V. Souza, and J.J. Elser. 2012. “Nutrient availability and calcification in lithifying freshwater microbialites.” Oral presentation at the 2012 Association for the Sciences of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting, Lake Biwa, Shiga, Japan, July 2012.

Elser, J.J., G. Metson, and E. Bennett. 2012. "Uncertain supplies, shifting demands, and the sustainability of the human phosphorus cycle," Invited talk, 9th INTECOL conference (with Society of Wetland Sciences), Orlando, FL, June 2012.

Elser, J.J., Z. Lee, J. Corman, J. Siefert, M. Bastidas, F. Cuassolo, C. Laspoumaderes, M. Souza, B. Modenutti, and E. Balseiro. "Life on floating pumice," Astrobiology Science Conference 2012, April 15-20, 2012 (poster), Atlanta, GA, April 2012.

Souza, V., J. Siefert, J.J. Elser, and L. Eguiarte. 2011. “The Cuatro Cienegas Bolson in Coahuila, Mexico: an astrobiological Precambrian park,” Origins 2011, conference of the International Society for the Study of the Origin of Life and Astrobiology Society (poster), Montpelier, France.

Cease, A.J., J.J. Elser, C.F. Ford, S. Hao, L. Kang, and J.F. Harrison. "Livestock grazing directs locust outbreaks by altering host plant nitrogen status," Annual meeting of the Entomological Society of America, Reno, NV, November 2011.

Elser, J.J., J.R. Corman, M. Edwards, and D. Childers. "Phosphorus, food, and our future: certainties and uncertainties in achieving a sustainable food system." Invited talk, International Conference on Sustainability Science (ICOSSE), Tucson, AZ. January 2011.

Corman, J.R., S. Chandra, C. Davis, M. Dix, N. Gíron, E. Rejmánková, A. Roegner, J. Veselá, and J.J. Elser. "Ecosystem effects of cultural eutrophication in a large, tropical lake." Annual meeting, American Geophysical Union, San Francisco, CA. December 2010.

Elser, J.J., and I. Loladze. "Ocean's 16: Optimal protein:RNA ratio has near Redfield nitrogen:phosphorus ratio." Annual meeting, American Geophysical Union, San Francisco, CA. December 2010.

Corman J. R., V. Souza V., and J.J. Elser. "Interactions of biogeochemical cycles in oncoid microbialites from Cuatro Ciénegas, Mexico". Astrobiology Science Conference 2010, Clear Lake, Texas April 24-29.

Cease, A.J., J.J. Elser, J., L. Kang, S. Hao, and J.F. Harrison. 2010. "Searching for the key to locust outbreaks in the Inner Mongolia grasslands." Annual meeting, American Association for the Advancement of Science. (poster) Feb 2010.

Cease, A.J., J.J. Elser, J., S. Hao, L. Kang, and J.F. Harrison 2010. "Grasshopper developmental plasticity in heavily-grazed Asian Steppe pastures." Society of Integrative and Comparative Biology. (poster) Jan 2010.

Mulder, C., and J.J. Elser. 2009. "Biological stoichiometry and the regulation of faunal allometric scaling: a new assessment in soil biota." 10th International Congress of Ecology, Brisbane, Australia.

Han, X., Y. Bai, J. Huang, J. Wu, J.J. Elser, and X. Lü. 2009. "Plant functional group removal alters soil nitrogen transformation and plant nitrogen use efficiency in a Eurasian grassland." Annual meeting of the Ecological Society of America, Albuquerque, NM.

Wu, J., S. Naeem, J.J. Elser, Y. Bai, J. Huang, L. Kang, C. Clark, Q. Wang, Q. Pan, and X. Han. 2009. "Testing biodiversity-ecosystem functioning relationships: Overview of the inner Mongolia grassland removal experiment." Annual meeting of the Ecological Society of America, Albuquerque, NM.

Mulder, C., and J.J. Elser. 2009. "Soil pH, ecological stoichiometry, and allometric scaling in soil biota." Annual meeting of the Ecological Society of America, Albuquerque, NM.

Elser, J.J. 2009. "Biological stoichiometry: Coupling and decoupling of element cycles in ecological and evolutionary time," *invited talk* at the annual meeting of the Ecological Society of America, Albuquerque, NM.

Glass, J., F. Wolfe-Simon, J.J. Elser, and A. Anbar. 2009. "Molybdenum storage: Connections to the nitrogen, carbon and sulfur cycles." 6th Annual Southern California Geobiology Symposium. April 2009.

Cease, A., S. Hao, J.J. Elser, L. Kang, J.F. Harrison. 2009. "High density and high nitrogen: A dual stressor for grasshoppers," annual meeting of the Society for Integrative and Comparative Biology, Boston, MA.

Elser, J.J. 2008. "Life under extreme phosphorus limitation: effects on ecosystems and evolution at Cuatro Cienegas," *invited talk* at the meeting of the Sociedad Cientifica Mexicana de Ecologîa, Merida, Mexico.

Anbar, A., F. Wolfe-Simon, and J.J. Elser. 2008. "Elements of life," annual meeting of the Geological Society of America, Houston, TX.

Smith, V.H., M. Martín-Cereceda, M. Kyle, and 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, Santa Fe, NM.

Engstrom, M E, Watts, J M, and J.J. Elser. 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, Santa Fe, NM. *This poster won an Award of Distinction.*

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, Santa Fe, NM.

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, Santa Fe, NM.

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, Santa Fe, NM.

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.

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 $PO_4$ enrichment on biomass, C:N:P stoichiometry, and microbial community structure of oncoid stromatolites at Cuatro Cienegas, 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 Cienegas, 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 Cienegas, 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.

**Public science lectures/events:**

2019 (March) KGEZ morning show (two appearances)
"A Glimpse of Fading Glaciers: Impacts on Life in Mountain Regions" (w/ Erich Peitzsch), public lecture of the Montana Lake Conference, Whitefish, MT

2018 (January) "The Long Alchemy of Becoming." Science-art film selected for Flathead Lake International Cinefest, Polson, MT.

2017 (October) "Phosphorus, food, and our future." Orcas Currents: Lectures on Science, Technology, and Culture, Eastsound, WA

2017 (October) "The Past, Present, and Future of Flathead Lake – and Lakes Beyond," Masumola Club, Polson, MT

2017 (March) “The Past, Present, and Future of Flathead Lake – and Lakes Beyond,” Flathead Valley Community College Honors Symposium Lecture Series, Kalispell, MT
2017 (March) “Invasive Mussels in Montana”, Consolidated Salish Kootenai Tribes info event, KwaTaqNuk Resort, Polson, MT
2016 "News from the BioStation" Rotary clubs of Polson and Kalispell, MT
2016 "News from the BioStation" Bigfork Chamber of Commerce, Bigfork, MT
2016 "News from the BioStation" Flathead Lakers annual meeting, Yellow Bay, MT
2016 "Semi-random tales from a life in limnology." Science On Tap Flathead, Bigfork, MT
2016 “Phosphorus, food, and our future.” FIU Distinguished Lecture Series, Miami, FL
2011 “Phosphorus, food, and our future.” Humanist Society of Greater Phoenix, Mesa, AZ
2011 “Phosphorus, food, and our future.” Paradise Valley Rotary Club, Paradise Valley, AZ
2011 “Phosphorus, food, and our future.” ASU STEM-Net annual meeting, plenary talk (dinner).
2010 “A weak link: phosphorus scarcity and our food chain.” CSPO Science Café, AZ Science Center
2010 “Phosphorus, food, and our future.” AZ Science Center
2010 “The future of phosphorus.” Spirit of the Senses salon group.
2009 “The future of phosphorus.” “Wise Guys” lunch group.

**Media coverage:**

“SubSurface: Resisting Montana's Underwater Invaders,” podcast interview with Montana Public Radio show hosted by N. Ouellet.
“Yangtze River: Longest River in Asia,” Article in LiveScience webite; I provided commentary on P and eutrophication in the basin. http://www.livescience.com/57905-yangtze-river-facts.html February 2017.
“Running low,” 15-min interview on *Science For The People* internet radio program, episode #260. http://www.scienceforthepeople.ca/episodes/running-low. March 2014.
“Phosphorus recovery,” 10-min interview w/ Bruce Rittmann on Channel 8 *Horizon* program. 2 February 2014.
“Phosphorus sustainability,” 7-min interview on Channel 8 *Horizon* program. 20 May 2013.
“Salvage job,” magazine article on P sustainability, *Science News*, Vol 183 #4m p. 20. Feb 23 2013.
“The end of phosphorus” Radio and web piece included interview about role of P in biology and its sustainability challenges. NPR Marketplace program. http://tinyurl.com/3urh33o September 2011.
“Gene pool offers way to save Mexican oasis” Article for *Nature* News item included interview about scientific importance of Cuatro Ciénegas field site. http://tinyurl.com/3vhuyqb August 2011.
“Simplifying teaching” Article in *The Scientist* included interview about how to "balance" teaching with research. http://tinyurl.com/64n425b May 2011.
“Elemental shortage” Article in *The Scientist* focused on various domains of my research related to P, including its role in ecosystems, cancer, and agricultural sustainability. http://tinyurl.com/4xe69ly November 2010.

**Funding (since 2000):**

Funded projects (active)

2019 NSF DEB Rules of Life track, “Collaborative Research: RoL: The rules of life were made to be broken - Connecting physiology, evolutionary ecology, and mathematics to identify a Growth Rate Rule”, $1,599,998 (to UM), lead PI with co-PIs M Church, SP B Hand, and collaborating institutions Oklahoma State University, $500,000; Arizona State University, $445,000)

2018 NSF Division of Mathematical Sciences, “Rules of Life: A Fading Cryosphere Shifting Temperature and Stoichiometry in Mountain Lakes and Streams,” $49,937, PI with two USA co-organizers & one Chinese counterpart.

NSF Division of Environmental Biology, “Forging the future of ecological stoichiometry: the fourth Woodstoich workshop,” $49,989, PI with one co-organizer.

Pending

Funded projects (completed)

University of Montana

2017 NSF Division of Mathematical Sciences, “Impacts of a changing cryosphere on lakes and streams in mountain regions: a US-China cooperative workshop,” $72,873, PI with U Maine co-organizer & two Chinese counterparts.

2016 NSF Field Stations and Marine Laboratories Program, "SensorSpace: A Cutting-edge Facility for Environmental Sensor Design, Production, and Deployment for Research and Education at Flathead Lake Biological Station," $413,065 (lead PI w co-PI C Youngbull).

ASU

2013 NSF Dynamics of Coupled Natural and Human Systems Program, "Living with locusts: linking livestock markets and grazing practices with the nutritional ecology of grasses and grasshoppers under alternative property rights regimes," $1.5M, co-I with five others (A. Cease, lead PI).

2012 NSF Research Coordination Networks (RCN-SEES) program, "RCN-SEES: Coordinating Phosphorus Research to Create a Sustainable Food System," $750,000; lead PI with co-PIs R. Aggarwal (ASU) and T. Rahman (U AZ).

2010 NSF Ecosystems Program (Microbial Systems in the Biosphere): "MSB: Collaborative Research: Biological stoichiometry of microbes under severe P limitation," $1.2M, project director with 2 co-PIs at ASU and Rice University.

2009 NSF Mathematical Biology program: "Robust theoretical frameworks for ecological dynamics subject to stoichiometric constraints," $472,000, co-PI with Y Kuang (Math Dept.).

2008 NASA Astrobiology Program: "Follow the elements," $7.5M, co-I with 13 others (A. Anbar, project director).

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) with one $6000 REU supplement.

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).

National Science Foundation Ecology program, "Effects of atmospheric N deposition on P limitation of freshwater zooplankton," $397,500, plus three $7500 REU supplements.

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

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.

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).

## TEACHING

**Courses Taught (since 2000):**

University of Montana

2019 BIOE342: Field Ecology (5 credits). Summer session. Enrollment: 15. (w/ D. Six)
2018 BIOE342: Field Ecology (5 credits). Summer session. Enrollment: 14. (w/ D. Six)

Arizona State University

2015 BIO151: Biological Thinking (4 credits). Fall semester. Enrollment: 130. (w/ C. Bang)

2015 BIO426: Limnology (4 credits). Spring semester. Enrollment: 22.

2014 BIO151: Biological Thinking (4 credits). Fall semester. Enrollment: 90.

2013 BIO100: Biological Thinking (4 credits). Fall semester. Enrollment: 60.
BIO494: Ecological Stoichiometry (3 credits). Spring semester. Enrollment: 8.

2012 BIO100: The Living World. Fall semester. Enrollment: ca. 620 (w/ D. Patterson)
Graduate course in Ecological Stoichiometry. Summer. Enrollment: 14. Alfred Wegener Institute for Polar and Marine Research (Bremerhaven, Germany).

2011 BIO100: How to Think About Life. Spring semester. Enrollment: ca. 95 (w/ A. Hamilton)
Graduate course in Ecological Stoichiometry. Fall. Enrollment: 24. Universidad de Comahue (Bariloche, Argentina).

2010 BIO591 / SOS 591: Graduate Seminar ("Sustainability of Global Nutrient Cycles"). Fall semester. Enrollment: 12. (w/ D. Childers)

2009 BIO100: The Living World. Fall semester. Enrollment: ca. 800 (w/ D. Pearson)

2008 BIO100: The Living World. Fall semester. Enrollment: ca. 750 (w/ D. Pearson)
BIO591: Graduate Seminar ("Recent Advances in Food Web ecology"). Fall. Enrollment: 6 (w/ J. Sabo)

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).

**Students Supervised:**

Postdoctoral

Amanda Rugenski, co-advised with J. Sabo, Fall 2013 - Fall 2015
Amisha Poret-Peterson, co-advised with A. Anbar, Spring 2009 - Fall 2015.
Arianne Cease, co-advised with J. Harrison, Fall 2013 - Summer 2014 (SEES Postdoctoral Fellow)
Zarraz Lee, Summer 2011 - Fall 2013
Hao Shuguang, Fall 2007 - Spring 2010.
Claudia Acquisti, co-advised with S. Kumar, Fall 2006 - Fall 2009.
Felisa Wolfe-Simon, co-advised with A. Anbar, 2006 - 2007
John Schade, co-advised w/ W. Fagan, 2000 - 2004
Kumud Acharya, November 2000 – 2004
Elena Gorokhova (Maytag postdoctoral fellow), co-advised w/ T. Dowling, 1999 - 2001

Graduate students

Joseph Vanderwall, PhD. student (U Montana Ecology & Evolution program, co-advised with A. Ballantyne), Fall 2018 - present.

Neng-Iong Chan, Ph.D, (ELS program ASU) completed (Dissertation: "The Story of Phosphorus in Urban Ecosystem and Its Sustainable Management"), Fall 2012 – Spring 2020.

Ze Ren, Ph.D. (Organismal Biology, Ecology, & Evolution, University of Montana) completed (Dissertation: "Ecological stoichiometry in watersheds: from land to water in the Qinghai Lake watershed"), Fall 2014 - Fall 2019. Current position: associate professor, Beijing Normal University at Zhuhai

Eric Moody, Ph.D. (Biology, ASU; co-advised with J. Sabo), completed (Dissertation: "Can consumer evolution affect ecosystem functions? Intraspecific variation in the elemental phenotype of aquatic consumers"), Fall 2013 - Spring 2017. Current position: assistant professor, Middlebury College.

Courtney Currier, M.S. (Biology, ASU) completed, (Thesis: "Rich in phosphorus, poor in quality: Assessing *Daphnia spp*. responses to a multi-species P-enriched diet"), Fall 2013 - Fall 2015). Current position: PhD student, Arizona State University.

Hilary Emick, Ph.D. student, (ELS program ASU; co-advised with A. Anbar), Fall 2012 - Spring 2015 (left program)

Jessica Corman (SFAz Graduate Fellow), Ph.D. (Biology, ASU), completed. (Dissertation: "Growing rocks: The effects of calcium carbonate deposition on phosphorus availability in streams"), Fall 2008 - Spring 2015. Current position: assistant professor, School of Natural Resources, University of Nebraska.

Michele Thorne (Knowlton) (SFAz Graduate Fellow), M.S. (Biology, ASU) completed, Fall 2009 - Fall 2012.

Arianne Cease, Ph.D. (ARCS Fellow), Ph.D. (Biology, ASU) completed (co-advised w/ J. Harrison). (Dissertation: "Locust outbreaks and migration in the Asian steppe: The influence of land management practices and host plant nutrient status"), Fall 2008 - Spring 2012). Current position: assistant professor, School of Sustainability, Arizona State University.

Michelle McCrackin (Fulbright Fellow - Norway), Ph.D. (Biology, ASU) completed (Dissertation: "Denitrification and greenhouse gas dynamics in lakes receiving atmospheric nitrogen deposition"), Fall 2006 - Fall 2010. Current position: Fellow, AAAS Science & Technology Policy program.

James Watts, Ph.D. candidate, Fall 2001 - Fall 2007 (left program).

Jen Harden, M.N.S. completed, Fall 2002 - December 2004.

Linda Gudex, M.S. (Biology, ASU), completed, (Thesis: "Zooplankton-cyanobacteria interactions"), Fall 1998 - Spring 2003.

Jessica Clasen, M.S. (Biology, ASU), completed, (Thesis: "Aquatic viral ecology"), Fall 1998 - Fall 2000. Current position: instructor, Douglas College.

Paul Frost, Ph.D. (Biology, ASU) completed (Dissertation: "Ecological stoichiometry in the benthos of boreal lakes"), Fall 1997 - Spring 2000. Current position: David Schindler Endowed Professor of Aquatic Science, Trent University.

Dean Dobberfuhl, Ph.D. (Biology, ASU) 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. (Biology, ASU) completed (Dissertation: "Ecological stoichiometry of zooplankton-phytoplankton interactions"), Fall 1992 - Fall 1996. Current position: professor, Scottsdale Community College.

David Frees, M.S. (Biology, ASU), completed (Thesis: "Intraguild predation in the pelagic zone: effects of *Diacyclops* on contrasting zooplankton communities"), Fall 1991 - Spring 1994.

<u>Visiting scholars & graduate exchange students</u>

Jinlei Yu, CSC visiting scholar (China), Nanjing Institute of Geography & Limnology (NIGLAS), Chinese Academy of Sciences (CAS), visiting professor, April 2019 – April 2020.

Xiong Xiong, CSC visiting scholar (China), Institute of Hydrobiology, Chinese Academy of Sciences. Postdoctoral scholar, May 2018 - April 2019

Wu Zhen, CSC exchange student (China), Peking University, Ph.D. student, Spring - Summer 2017.

Xin Liu, CSC exchange student (China), Nanjing University, Ph.D. student, Fall 2015 - Fall 2017.

Zhang Ji, CSC exchange student (China), Yunnan Academy of Agricultural Sciences, Fall 2015 - Fall 2016.

Cecilia Laspoumaderes, Fulbright Scholar (Argentina), Universidad de Comahue, (Fall 2014)

Yunuen Tapia Torres, exchange student (Mexico) UNAM, Fall 2013

Albert Rivas Ubach, exchange student (Spain), Autonomous University of Barcelona, Fall 2011.

Nie Yonggang, exchange student (China), Chinese Academy of Sciences Institute of Zoology, Spring 2011.

Yu Qiang, CSC exchange student (China), Chinese Academy of Sciences Institute of Botany, Ph.D., Fall 2009 - Spring 2010.

Niu Decao, CSC exchange student (China), Lanzhou University, Ph.D., Fall 2008 - Spring 2010.

Undergraduates (since 2000)

Mariah Durglo (Salish Kootenai College), (Summer 2020 - present)
Tyler Johnson (Oklahoma State University) (Summer 2019)
Tristyn Bercel (SESE) (Fall 2014 - Spring 2015)
Joseph Rittenhouse (Summer 2013 - Spring 2015)
Samantha Davis (Cronkite School of Journalism) (Spring 2014 - Spring 2015)
Jason Artigas (Spring 2013 - Spring 2014)
Meagan Brundage (Spring 2013 - Spring 2014)
Sarah Schimpp (Summer 2012 - Spring 2014; Honors thesis)
Nicole Nevarez (Fall 2011 - Spring 2013; Honors thesis)
Alex Van Houghton (Fall 2011 - Fall 2012)
Nicholas Macias (California State University), Summer 2011, NSF REU student
Eric Hughes, Summer 2008 - Spring 2011, SOLUR apprentice / researcher
Jared Regan, Fall 2010 - Spring 2011, Honors thesis
Kara Tarter, Fall 2010 - Spring 2011, Honors thesis
Colleen Ford, Summer 2009 and 2010, NSF REU student (co-supervised with J. Harrison)
Rebecca Percz, Spring 2009 - Fall 2009, UBM REU student (co-supervised with Y. Kuang)
Drew Bryck, Summer 2009, SOLUR apprentice
Angela McBryan, Spring 2008 - Summer 2009, UBM REU student (co-supervised with Y. Kuang)
Shelby Clements, Spring 2008 - Spring 2009, UBM REU student (co-supervised with Y. Kuang)
Erin Seybold (St. Olaf College), Summer 2008, NSF REU student
Yujin Zheng, Spring 2008 - Fall 2008, UBM REU student (co-supervised with Y. Kuang)
Michael Wang, Spring 2008 - Fall 2008, UBM REU student (co-supervised with Y. Kuang)
Aaron Packer, Spring 2008 - Fall 2008, UBM REU student (co-supervised with Y. Kuang)
Joseph Murray, Summer 2007 - Fall 2008, SOLUR apprentice (co-supervised with A. Anbar)
Melanie Engstrom, Fall 2005 - Fall 2008, SOLUR apprentice / researcher
Katherine Dunning, Spring 2005 - 2008, UBM REU student, Honors thesis (co-supervised w/ Y. Kuang)
Stacy Schlicting, Fall 2006 - Spring 2007, SOLUR apprentice
Laura Steger (U Colorado), Summers of 2006 and 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

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)

**Graduate Committees**:

Doctoral

University of Montana
Alana Shaw (Systems Ecology) 2019-present

Utah State University
Jiahao Wen (Ecology) 2020-present

ASU
Erik Alsop (SESE)
Adrienne Zillman (SOLS)
Matt Kellom (SESE, completed)
Marc Neveu (SESE, completed)
Karl Wyant (SoLS, completed)

Oliver Hyman (SoLS, completed)
Rebecca Clark (SoLS, completed)
Jennifer Glass (SESE, Chem/Biochem, completed)
Dan Flynn (Columbia University, completed)
Kevin McCluney (completed)
Tamara Harms (completed)
Eric DeSimone (Physics, completed)
Jim Heffernan (completed)
Ryan Sponsellar (completed)
Hao Wang (Mathematics, completed)
Fei Yuan (SoLS, left program)

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|---|---|
| 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

Megan Wolverton (completed)
Robin Greene (completed)
Darren Sversold (2009-2012)
Sam Norlin (completed)
Brian Wade (Microbiology, 2002 - 2003)
Anthony Fodor (1991- 92)
Aisha Coppola (completed)
Julia Curro (completed)

Honors thesis committee

Demetra Hamill (Susanne Neuer; completed)

## SERVICE

**Professional Service (since 2000):**

Past-President

Association for the Sciences of Limnology & Oceanography (2016 - 2018)

President

Association for the Sciences of Limnology & Oceanography (2014 - 2016)

President-Elect

Association for the Sciences of Limnology & Oceanography (2012 - 2014)

Founder & project leader

Sustainable Phosphorus Alliance (previously called North American Partnership for Phosphorus Sustainability, NAPPS), a consortium whose vision is to work with public and private sector to promote and foster the implementation of sustainable P solutions in both the private and public sectors. (2014 - present)

Panelist

Ford Foundation Fellowship review panel, 2020
National Science Foundation Macrosystems Biology review panel, 2016

National Science Foundation Ecological Studies review panel, 2008, 2016
National Science Foundation OISE Partnerships in Int'l Research and Education (PIRE) review panel, June 2005
National Science Foundation Integrated Research Challenges in Environmental Biology (IRCEB) review panel, May 2001

Handling Editor

*Frontiers* Research Focus "Progress in Ecological Stoichiometry" (w/ co-editors J. Cotner, R. Sterner, A. Martiny, D. Vander Waal, Fall 2016 - Fall 2017)

Associate Editor

*Ecosystems* (2019 - present)
*Proc. Nat. Acad. Sci. (USA)* (ad hoc; 2018, 2019, 2020)
*Ecology Letters* (2002 - 2011; 2012 - 2013)
*American Naturalist* (2001 – 2003, 2010 - 2011; 2012 - 2014)
*Limnology and Oceanography* special issue on Biocomplexity (2003)
*Ecological Applications* (2001 - 2004)
*Oecologia* (1999 - 2002)

Vice-chair

2012 Gordon Research Conference, Metabolic Basis of Ecology & Evolution (Summer 2010 - Summer 2012)

Scientific organizing committee

Fifth International Phosphorus Summit (Kunming, China; August 2016)
Fourth International Phosphorus Summit (Montpelier, France; September 2014)
Annual meeting, American Society of Limnology and Oceanography (Otsu, Japan, 2012)

Program Review

Department of Biological Sciences, University of Notre Dame (December 2010)

Site Review Panel (NSF)

McMurdo Dry Valleys LTER site (January 2008)

Co-Organizer

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

Editor

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

Board of Directors (elected)

American Society of Limnology and Oceanography (1996 - 1999)

Invited Participant

"Critical Materials Flow in an Age of Constraint: Exploring Challenges and Solutions Across Materials," 1-day workshop sponsored by Woodrow Wilson Center's Science and Technology Innovation Program and the U.S. Department of Energy's Office of Intelligence, Science and Technology Division. 25 May 2011, Washington, DC. http://tinyurl.com/3chxblu
"Think Tank on Macronutrient Cycles", Royal Society NERC / GERC, 8-9 February 2010, London, UK.
"The Future of Synthesis in Ecology", NSF-sponsored workshop (S.R. Carpenter, chair), 8-9 December 2008, Washington, DC.
"Comparing trophic structure across ecosystems", NCEAS working group (J. Shurin, H. Hillebrand, D. Gruner, PIs), Fall 2005 – Fall 2008.

Member

NASA Astrobiology Science Steering Group and Mars Exploration Payload Analysis Group, 2002

External reviewer for tenure and promotion

Colorado State University (2019)
University of Arkansas (2013)
University of Arkansas (2012)
Texas A&M University at Galveston (2012)
North Dakota School of Mines (2011)
University of California – Santa Barbara (2009)
Michigan State University (2008)
Kansas University (2002)
University of Oklahoma (1998, 2005)
Savannah River Ecology Laboratory (1998)

Organizer

International research workshop (funded by US National Science Foundation), "Forging the future of ecological stoichiometry: the fourth Woodstoich workshop," Flathead Lake Biological Station, 14-19-22 August 2019. Co-organizer and co-editor of papers with M. Evans-White (University of Arkansas)

International research workshop (funded by Global COE program and Tohoku University), "Woodstoich 2009: The Present and Future of Biological Stoichiometry," Sendai, Japan, 17-22 August 2009. Co-organizer and co-editor of papers with J. Urabe (Tohoku University)

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. Co-organizer and co-editor of papers with D. Hessen (University of Oslo)

Reviewer (8-10 manuscripts per year)

*Limnology and Oceanography* (1-2 ms. per year), Ecology (~1-2 ms. per year). Occasional: *Science, Nature, Canadian Journal of Fisheries and Aquatic Sciences, BioScience, Evolution, Freshwater Biology, Journal of Plankton Research, Journal of Phycology, Oikos, Oecologia, J. Molecular Evolution, Functional Ecology, New Phytologist, American Naturalist, Ecoscience, Marine and Freshwater Research*.

NSF Ecological Studies, Ecosystem, and Biological Oceanography Programs, 1991- present

NSF CAREER program, 2005

**University Service (since 2000):**

*University of Montana*

University Committees

*Ad hoc* committee on Montana Water Institute (co-chair), spring 2017 - present

*ASU*

Mentor

ASU Obama Scholars Program, fall 2009 - spring 2010

University Committees

Distinguished Teaching Academy, Fall 2010 – Fall 2016
Internal reviewer for ORSPA (PIRE competition), Fall 2008
Advisory committee, Origins Institute, Fall 2008 - Fall 2011
Search committee, for Chair of ASU West campus Department of Interdisciplinary Natural Sciences, Fall 2006 - Spring 2008.
Oversight committee for OVPREA self-review, 2007
SoLS liason to Arizona Water Institute, Fall 2006 - Fall 2009

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

Lisa Dent Fellowship selection committee, Spring 2011, Spring 2014
SoLS Executive Committee, Fall 2006 - Spring 2011
SoLS Ecology, Evolution, and Env. Sciences faculty personnel committee, Fall 2006 - Spring 2009
SoLS Research and Training Initiatives committee (chair), Spring 2005 - Spring 2011
SoLS Septennial Review committee, Spring 2007 - Spring 2008
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 Fall 1999 - Spring 2003)
Biology Department Personnel Committee Fall 2001 - Spring 2002
Biology Department Advisory Committee, Fall 2000 - Fall 2002

Seminar Speakers Hosted (UM / FLBS)

Dr Elizabeth Minor, U Minnesota-Duluth
Dr Michael Kaspari, U Oklahoma
Dr Helen Jarvie, NERC (UK)
Dr Punidan Jeyasingh, Oklahoma State University
Dr Nancy Grimm, Arizona State University
Dr Stephanie Hampton, Washington State University
Dr Mary Power, University of California, Berkeley
Dr. Jay Lennon, Indiana University

Seminar Speakers Hosted (ASU)

Dr. Mark Altabet, University of Massachusetts
Dr. Terry Hwa, University of California, San Diego
Dr. Travis Huxman, University of Arizona
Dr. Mark Edwards, ASU Polytechnic
Dr. Jill 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

Sabbatical Visitors and Visiting Scientists Hosted (ASU)

Dr. Decao Niu, Lanzhou University, Lanzhou University (w. O. Sala; March 2016 – August 2017)
Dr. Cecilia Laspoumaderes, Universidad de Comahue (Argentina) (Fulbright Scholar) (August - November 2014)
Dr. Marcela Bastidas, Universidad de Comahue (Argentina) (November 2013)
Dr. Shengkui Cao, Qinghai University (China), CSC Visiting Scholar (Fall 2013 - Fall 2014)
Dr. Esteban Balseiro, Universidad de Comahue (Argentina) (April 2013)
Dr. Beatriz Modenutti, Universidad de Comahue (Argentina) (April 2013)
Dr. Val Smith, University of Kansas (Fall 2012)

Dr. Kang Le, Institute of Zoology, Chinese Academy of Sciences (Spring 2010)
Dr. Dag Hessen, University of Oslo (Spring 2009)
Dr. Hans-Petter Leinaas, University of Oslo (Spring 2009)
Dr. Shelley Arnott, Queens University (Fall 2008)
Dr. Tom Andersen, University of Oslo (Spring - Summer 2008)

Other Service (since 2000)

Faculty advisor, SOLS Frontiers in Life Sciences conference ("Sustainable Phosphorus Summit", 2010-2011)
Chair, ASLO Meetings Committee (fall 2009 - spring 2012)
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)
Judge, ASLO Student Poster Awards (1994, 2002)