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| FW879: Advanced Limnology Reading List |
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**** NOTE – you should read the ‘background reading’ FIRST wherever it is assigned.**

January 11 – none

January 13 – Limnology review

NRC. 1996. Chapter 2: Limnology, the science of inland waters: Evolution and current status. In Freshwater ecosystems: Revitalizing educational programs in limnology. National Academy Press, Washington DC. 364 pp.

January 18 – none, MLK Day

January 20 – Organizing paradigms: nutrients and foodwebs

Background reading

Ahlgren, I., T. Frisk, and L. Kamp-Neilsen. 1988. Empirical and theoretical models of phosphorus loading, retention and concentration vs. lake trophic state. *Hydrobiologia* 170:285-303. **Read pg 285- 296, and 300-301 (ignore different dynamic P loading models such as EAWAG, Glumshoe, etc.)**

Carpenter, S. R., J. F. Kitchell, and J. R. Hodgson. 1985. Cascading trophic interactions and lake productivity. *BioScience* 35: 634-639.

Brooks, J. L. and S. I. Dodson. 1965. Predation, body size, and composition of plankton. *Science*. 150:28-35.

January 25 – none

January 27 – Nutrient limitation of phytoplankton

Elser, J. J., Marzolf, E. R., Goldman C.H. 1990. Phosphorus and nitrogen limitation of phytoplankton growth in the freshwaters of North America: a review and critique of experimental enrichments. *Can. J. Fish. Aquat. Sci.* 47: 1468-1477.

Elser, J.J., and others. 2007. Global analysis of nitrogen and phosphorus limitation of primary producers in freshwater, marine and terrestrial ecosystems. *Ecology Letters* 10:1135-1142.

Background reading:

Schindler, D. W. 1977. Evolution of phosphorus limitation in lakes. *Science* 195: 260-262.

Schindler, D.W. 1974. Eutrophication and recovery in experimental lakes: Implications for lake management. *Science* 184:897-899.

Tilman, D. 1976. Ecological competition between algae: Experimental confirmation of resource-based competition theory. *Science* 192: 463-465.

Feb 1 – DISCUSSION: Nutrient limitation

Kosten, S., V.L.M. Huszar, N. Mazzeo, M. Scheffer, L. Da S.L. Sternberg, and E. Jeppesen. 2009. Lake and watershed characteristics rather than climate influence nutrient limitation in shallow lakes. *Ecological Applications* 19:1791-1804.

Feb 3 – Trophic cascades and foodweb interactions

Findlay, D.L., M.J. Vanni, M. Paterson, K.H. Mills, S.E.M. Kasian, W.J. Findlay, and A.G. Salki. 2005. Dynamics of a boreal lake ecosystem during a long-term manipulation of top predators. *Ecosystems*. 8:603-618.

Vadeboncoeur, Y., K.S. McCann, M.J. Vander Zanden, and J.B. Rasmussen. 2005. Effects of multi-chain omnivory on the strength of trophic control in lakes. *Ecosystems* 8:682-693.

Background reading:

Carpenter, S.R., J.F. Kitchell, K.L. Cottingham, D.E. Schindler, D.L. Christensen, D.M. Post and N. Voichick. 1996. Chlorophyll variability, nutrient input and grazing: Evidence from whole-lake experiments. *Ecology* 77: 725-735.

February 8 – Stoichiometry

Elser, J.J., T.H. Chrzanowski, R.W. Sterner and K.H. Mills. 1998. Stoichiometric constraints on food-web dynamics: a whole-lake experiment on the Canadian Shield. *Ecosystems* 1:120-136.

Background reading:

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.

Elser, J.J., D.R. Dobberfuhl, N.A. MacKay and J.H. Schampel. 1996. Organism size, life history, and N:P Stoichiometry. *BioScience* 46(9):674-684.

February 10 – DISCUSSION: Stoichiometry

Hall SR, Leibold MA, Lytle DA, et al. 2004. Stoichiometry and planktonic grazer composition over gradients of light, nutrients, and predation risk. *Ecology* 85 (8): 2291-2301.

Background reading:

Sterner et al. 1997. The light and nutrient balance in lakes: the balance of energy and materials affects ecosystem structure and process. *American Naturalist* 150:663-684.

February 15 – Dissolved organic carbon in lakes

Webster, K.E., P.A. Soranno, K.S. Cheruvilil, M.T. Bremigan, J.A. Downing, P. Vaux, T. Asplund, L.C. Bacon, and J. Connor. 2008. An empirical evaluation of the nutrient color paradigm for lakes. *Limnology and Oceanography*. 53(3):1137-1148.

Background reading:

Williamson, C.E. et al. 1999. Dissolved organic carbon and nutrients as regulators of lake ecosystems: Resurrection of a more integrated paradigm. *Limnology and Oceanography* 44:795-803.

February 17 – Dissolved organic carbon in lakes

Karlsson, J., P. Bystrom, J. Ask, P. Ask, L. Persson and M. Jansson. 2009. Light limitation of nutrient-poor lake ecosystems. *Nature* 460:506-510.

Hanson, Paul C., Darren L. Bade, Stephen R. Carpenter, and Timothy K. Kratz. 2003. Lake metabolism: Relationships with dissolved organic carbon and phosphorus. *Limnology and Oceanography* 48(3): 1112–1119.

February 22 – DISCUSSION: Support of lake foodwebs by terrestrial organic carbon

Cole, Jonathan J., Stephen R. Carpenter, Michael L. Pace, Matthew C. Van de Bogert, James L. Kitchell and James R. Hodgson. 2006. Differential support of lake food webs by three types of terrestrial organic carbon. *Ecology Letters* 9: 558–568.

February 24 – Special topic – Nutrient mediated effects of zebra mussels on toxic algae – Geoff Horst

REREAD!! -- Elser, J.J., and others. 2007. Global analysis of nitrogen and phosphorus limitation of primary producers in freshwater, marine and terrestrial ecosystems. *Ecology Letters* 10:1135-1142.

Van de Waal, Dedmer, J. Verspagen, M. Lurling, E. Van Donk, P. Visser and J. Juisman. 2009. The ecological stoichiometry of toxins produced by harmful cyanobacteria: an experimental test of the carbon-nutrient balance hypothesis. *Ecology Letters* 12: 1326-1335.

March 1 – none**March 3 – Special topic – Rapid evolution of invasive species – Andrea Jaeger Miehls**

Lambrinos, J.G. 2004. How interactions between ecology and evolution influence contemporary invasion dynamics. *Ecology* 85 (8): 2061-2070.

-- SPRING BREAK --

March 15 - none

March 17 – none

March 22 – none - Exam

March 24 – Ecology of littoral zone foodwebs

Vadeboncoeur, Y. M.J. Vander Zanden and D.M. Lodge. 2002. Putting the lake back together: Reintegrating benthic pathways into lake foodweb models. *BioScience* 52(1):44-54.

March 29 – Benthic-dominated lakes (i.e. Shallow lakes)

Sondergaard, M. and B. Moss. 1997. Impact of submerged macrophytes on phytoplankton in freshwater shallow lakes. *In* E. Jeppesen, M. Sondergaard, and K. Christoffersen (eds). The structuring role of submerged macrophytes in lakes. Springer Verlag, New York.

March 31 – Acid deposition effects on freshwaters

Schindler, D.W. 1988. Effects of acid rain on freshwater ecosystems. *Science* 239: 149-157.

Kahl, J.S., J. Stoddard, R. Haeuber, S. Paulsen, R. Birnbaum, F. Deviney, D. DeWalle, C. Driscoll, A. Herlihy, J. Kellogg, P. Murdoch, K. Roy, W. Sharpe, S. Urquhart, R. Webb, and K. Webster. 2004. Response of surface water chemistry to changes in acidic deposition: implications for future amendments to Clean Air Act. *Environmental Science and Technology*. 38:485-490.

April 5 – DISCUSSION – Multiple human stressors

Christensen, M.R. et al. 2006. Multiple anthropogenic stressors cause ecological surprised in Boreal lakes. *Global Change Biology* 12(12):2316-2322

April 7 – APPROACHES TO LIMNOLOGY - DISCUSSION

Prediction vs understanding in limnology

STUDENT PRESENTATIONS – Commonly used approaches in limnological studies

April 12 – Student lecture – Paleolimnology

April 14 - Student lecture - Modeling

April 19 – Linkages among freshwater ecosystems

April 21 - Student lecture - Whole lake studies

April 26 - Student lecture – Stable Isotopes

April 28 - Student lecture - Genetics