



Fish drying
Photo: Steve Hillebrand, USFWS

7. References

- Abell, R., M. L. Thieme, C. Revenga, M. Bryer, M. Kottelat, N. Bogutskaya, B. Coad, N. Mandrak, S. C. Balderas, and W. Bussing. 2008. Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation. *AIBS Bulletin* **58**:403-414.
- Aerts, R., J. Cornelissen, and E. Dorrepaal. 2006. Plant performance in a warmer world: general responses of plants from cold, northern biomes and the importance of winter and spring events. Pages 65-78 *Plants and Climate Change*. Springer.
- AMAP. 2011. Snow, water, ice and permafrost in the ARCTIC (SWIPA): climate change and the cryosphere. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.
- Appelberg, M., H.-M. Berger, T. Hesthagen, E. Kleiven, M. Kurkilahti, J. Raitaniemi, and M. Rask. 1995. Development and intercalibration of methods in Nordic freshwater fish monitoring. *Water, Air, and Soil Pollution* **85**:401-406.
- Armitage, P., D. Moss, J. Wright, and M. Furse. 1983. The performance of a new biological water quality score system based on macroinvertebrates over a wide range of unpolluted running-water sites. *Water Research* **17**:333-347.
- Arvola, L., M. Järvinen, and T. Tulonen. 2011. Long-term trends and regional differences of phytoplankton in large Finnish lakes. *Hydrobiologia* **660**:125-134.
- Avis, C. A., A. J. Weaver, and K. J. Meissner. 2011. Reduction in areal extent of high-latitude wetlands in response to permafrost thaw. *Nature Geoscience* **4**:444.
- Balsler, A. W., J. B. Jones, and R. Gens. 2014. Timing of retrogressive thaw slump initiation in the Noatak Basin, northwest Alaska, USA. *Journal of Geophysical Research: Earth Surface* **119**:1106-1120.
- Barry, T., T. Christensen, J. Payne, and M. Gill. 2013. Circumpolar Biodiversity Monitoring Program Strategic Plan, 2013-2017: Phase II Implementation of the CBMP. CAFF Monitoring Series Report Nr. 8. CAFF International Secretariat. Akureyri, Iceland.
- Baselga, A. 2010. Partitioning the turnover and nestedness components of beta diversity. *Global Ecology and Biogeography* **19**:134-143.
- Baselga, A., and C. D. L. Orme. 2012. betapart: an R package for the study of beta diversity. *Methods in Ecology and Evolution* **3**:808-812.
- Baselga, A., D. Orme, S. Villeger, J. De Bortoli, and F. Leprieur. 2012. Partitioning beta diversity into turnover and nestedness components. Package 'betapart', Version **1**.
- Blaen, P. J., L. E. Brown, D. M. Hannah, and A. M. Milner. 2014. Environmental drivers of macroinvertebrate communities in high Arctic rivers (Svalbard). *Freshwater Biology* **59**:378-391.
- Bonilla, S., V. Villeneuve, and W. F. Vincent. 2005. Benthic and planktonic algal communities in a high arctic lake: pigment structure and contrasting responses to nutrient enrichment. *Journal of Phycology* **41**:1120-1130.
- Borgström, R. 2001. Relationship between spring snow depth and growth of brown trout, *Salmo trutta*, in an alpine lake: predicting consequences of climate change. *Arctic, Antarctic, and Alpine Research*:476-480.
- Bowden, W. B., M. N. Gooseff, A. Balsler, A. Green, B. J. Peterson, and J. Bradford. 2008. Sediment and nutrient delivery from thermokarst features in the foothills of the North Slope, Alaska: Potential impacts on headwater stream ecosystems. *Journal of Geophysical Research-Biogeosciences* **113**.
- Brown, J., O. Ferrians, J. A. Heginbottom, and E. Melnikov. 2002. Circum-Arctic Map of Permafrost and Ground-Ice Conditions, Version 2. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. Accessed August 14, 2017.
- Brown, L. E., K. Khamis, M. Wilkes, P. Blaen, J. E. Brittain, J. L. Carrivick, S. Fell, N. Friberg, L. Füreder, and G. M. Gislason. 2018. Functional diversity and community assembly of river invertebrates show globally consistent responses to decreasing glacier cover. *Nature ecology & evolution* **2**:325.
- Brown, L. E., and A. M. Milner. 2012. Rapid loss of glacial ice reveals stream community assembly processes. *Global Change Biology* **18**:2195-2204.
- Buss, D. F., D. M. Carlisle, T.-S. Chon, J. Culp, J. S. Harding, H. E. Keizer-Vlek, W. A. Robinson, S. Strachan, C. Thirion, and R. M. Hughes. 2015. Stream biomonitoring using macroinvertebrates around the globe: a comparison of large-scale programs. *Environmental Monitoring and Assessment* **187**:4132.
- CAFF. 2013. Arctic Biodiversity Assessment: Report for Policy Makers. CAFF, Akureyri, Iceland.
- Carpenter, S. R., and D. M. Lodge. 1986. Effects of submersed macrophytes on ecosystem processes. *Aquatic Botany* **26**:341-370.
- Carrivick, J. L., and D. J. Quincey. 2014. Progressive increase in number and volume of ice-marginal lakes on the western margin of the Greenland Ice Sheet. *Global and Planetary Change* **116**:156-163.
- Castella, E., H. Adalsteinsson, J. E. Brittain, G. M. Gislason, A. Lehmann, V. Lencioni, B. Lods-Crozet, B. Maiolini, A. M. Milner, J. S. Olafsson, S. J. Saltveit, and D. L. Snook. 2001. Macroinvertebrate richness and composition along a latitudinal gradient of European glacier-fed streams. *Freshwater Biology* **46**:1811-1831.
- Chambers, P., P. Lacoul, K. Murphy, and S. Thomaz. 2008. Global diversity of aquatic macrophytes in freshwater. *Hydrobiologia* **595**:9-26.
- Chertoprud, M. V., D. M. Palatov, and I. Dimante-Deimantovica. 2017. Macroinvertebrate communities in water bodies and streams of Svalbard, Norway. *Journal of Natural History* **51**:2809-2825.
- Chin, K. S., J. Lento, J. M. Culp, D. Lacelle, and S. V. Kokelj. 2016. Permafrost thaw and intense thermokarst activity decreases abundance of stream benthic macroinvertebrates. *Global Change Biology* **22**:2715-2728.
- Christensen, T., S. Longan, T. Barry, C. Price, and K. F. Lárusson. 2018. Circumpolar Biodiversity Monitoring Program Strategic Plan 2018-2021. CAFF Monitoring Series Report No. 29. Conservation of Arctic Flora and Fauna, Akureyri, Iceland.
- Christiansen, J. S., J. D. Reist, R. J. Brown, V. A. Brykov, G. Christensen, K. S. Christoffersen, P. Cott, P. Crane, J. B. Dempson, M. Docker, K. Dunmall, A. Finstad, V. F. Gallucci, J. Hammar, L. N. Harris, J. Heino, E. Ivanov, O. V. Karamushko, A. Kirillov, A. Kucheryavy, H. Lehtonen, A. Lynghammar, C. W. Mecklenburg, P. D. R. Møller, T. Mustonen, A. G. Oleinik, M. Power, Y. S. Reshetnikov, V. I. Romanov, O.-T. Sandlund, C. D. Sawatzky, M. Svenning, H. K. Swanson, and F. J. Wrona. 2013. Chapter 6: Fishes. Pages 193-245 in H. Meltofte, editor. Arctic Biodiversity Assessment. Status and Trends in Arctic Biodiversity. Conservation of Arctic Flora and Fauna (CAFF), Akureyri, Iceland.
- Christoffersen, K. S. 1996. Ecological implications of cyanobacterial toxins in aquatic food webs. *Phycologia* **35**:42-50.
- Christoffersen, K. S., S. L. Amsinck, F. Landkildehus, T. L. Lauridsen, and E. Jeppesen. 2008. Lake flora and fauna in relation to ice-melt, water temperature and chemistry at Zackenberg. Pages 371-390 in H. Meltofte, T. R. Christensen, B. Elberling, M. C. Forchhammer, and M. Rasch, editors. High-arctic ecosystem dynamics in a changing climate. Ten years of monitoring and

- research at Zackenberg. Academic Press, London.
- Colwell, R. K. 2013. EstimateS: Statistical estimation of species richness and shared species from samples. Version 9. User's Guide and application published at: <http://purl.oclc.org/estimates>.
- Colwell, R. K., A. Chao, N. J. Gotelli, S.-Y. Lin, C. X. Mao, R. L. Chazdon, and J. T. Longino. 2012. Models and estimators linking individual-based and sample-based rarefaction, extrapolation and comparison of assemblages. *Journal of plant ecology* **5**:3-21.
- Colwell, R. K., and J. E. Elsensohn. 2014. EstimateS turns 20: statistical estimation of species richness and shared species from samples, with non-parametric extrapolation. *Ecography* **37**:609-613.
- Colwell, R. K., C. X. Mao, and J. Chang. 2004. Interpolating, extrapolating, and comparing incidence-based species accumulation curves. *Ecology* **85**:2717-2727.
- Convention on Biological Diversity. 2010. Decisions Adopted by the Conference of the Parties to the Convention of Biological Diversity at its Tent Meeting. <https://www.cbd.int/doc/decisions/cop-10/full/cop-10-dec-en.pdf>. Nagoya, Japan, 18-29 October 2010.
- Culp, J., J. Lento, A. Curry, E. Luiker, and D. Halliwell. In Press. Arctic river biodiversity declines in response to latitudinal change in the abiotic template. *Freshwater Science*.
- Culp, J. M., W. Goedkoop, J. Lento, K. S. Christoffersen, S. Frenzel, G. Guðbergsson, P. Liljaniemi, S. Sandøy, M. Svoboda, J. Brittain, J. Hammar, D. Jacobsen, B. Jones, C. Juillet, M. Kahlert, K. Kidd, E. Luiker, J. Olafsson, M. Power, M. Rautio, A. Ritcey, R. Striegler, M. Svenning, J. Sweetman, and M. Whitman. 2012a. The Arctic Freshwater Biodiversity Monitoring Plan. CAFF International Secretariat, CAFF Monitoring Series Report Nr. 7, Akureyri, Iceland.
- Culp, J. M., J. Lento, W. Goedkoop, M. Power, M. Rautio, K. S. Christoffersen, G. Guðbergsson, D. Lau, P. Liljaniemi, S. Sandøy, and M. Svoboda. 2012b. Developing a circumpolar monitoring framework for Arctic freshwater biodiversity. *Biodiversity* **13**:215-227.
- Danks, H. V. 1992. Arctic insects as indicators of environmental change. *Arctic* **45**:159-166.
- Danks, H. V., O. Kukal, and R. A. Ring. 1994. Insect cold-hardiness: Insights from the Arctic. *Arctic* **47**:391-404.
- de Wit, H. A., J. Mulder, A. Hindar, and L. Hole. 2007. Long-term increase in dissolved organic carbon in streamwaters in Norway is response to reduced acid deposition. *Environmental Science & Technology* **41**:7706-7713.
- de Wit, H. A., S. Valinia, G. A. Weyhenmeyer, M. N. Futter, P. Kortelainen, K. Austnes, D. O. Hessen, A. Rälke, H. Laudon, and J. Vuorenmaa. 2016. Current browning of surface waters will be further promoted by wetter climate. *Environmental Science & Technology Letters* **3**:430-435.
- Dias, M. S., T. Oberdorff, B. Hugueny, F. Leprieur, C. Jézéquel, J. F. Cornu, S. Brosse, G. Grenouillet, and P. A. Tedesco. 2014. Global imprint of historical connectivity on freshwater fish biodiversity. *Ecology Letters* **17**:1130-1140.
- Duffy, J. E., B. J. Cardinale, K. E. France, P. B. McIntyre, E. Thébaud, and M. Loreau. 2007. The functional role of biodiversity in ecosystems: incorporating trophic complexity. *Ecology Letters* **10**:522-538.
- Dyke, A.S., Moore, A. And Robertson, L. 2003 : Deglaciation of North America, Geological Survey of Canada Open File 1574
- Edwards, M., P. Anderson, L. Brubaker, T. Ager, A. Andreev, N. Bigelow, L. Cwynar, W. R. Eisner, S. Harrison, and F. S. Hu. 2000. Pollen-based biomes for Beringia 18,000, 6000 and 0 14C yr bp. *Journal of Biogeography* **27**:521-554.
- Eimers, M. C., S. A. Watmough, A. M. Paterson, P. J. Dillon, and H. Yao. 2009. Long-term declines in phosphorus export from forested catchments in south-central Ontario. *Canadian Journal of Fisheries and Aquatic Sciences* **66**:1682-1692.
- Elliott, J. M., and J. A. Elliott. 2010. Temperature requirements of Atlantic salmon *Salmo salar*, brown trout *Salmo trutta* and Arctic charr *Salvelinus alpinus*: predicting the effects of climate change. *Journal of Fish Biology* **77**:1793-1817.
- Elmendorf, S. C., G. H. Henry, R. D. Hollister, R. G. Björk, N. Boulanger-Lapointe, E. J. Cooper, J. H. Cornelissen, T. A. Day, E. Dorrepaal, and T. G. Elumeeva. 2012. Plot-scale evidence of tundra vegetation change and links to recent summer warming. *Nature Climate Change* **2**:453.
- Erkinaro, J., Y. Czorlich, P. Orell, J. Kuusela, M. Falkegård, M. Lämsman, H. Pulkkinen, C. R. Primmer, and E. Niemelä. 2018. Life history variation across four decades in a diverse population complex of Atlantic salmon in a large subarctic river. *Canadian Journal of Fisheries and Aquatic Sciences* **Early Online**.
- Erlandsson, M., I. Buffam, J. Fölster, H. Laudon, J. Temnerud, G. A. Weyhenmeyer, and K. Bishop. 2008. Thirty-five years of synchrony in the organic matter concentrations of Swedish rivers explained by variation in flow and sulphate. *Global Change Biology* **14**:1191-1198.
- Evans, C. D., P. J. Chapman, J. M. Clark, D. T. Monteith, and M. S. Cresser. 2006. Alternative explanations for rising dissolved organic carbon export from organic soils. *Global Change Biology* **12**:2044-2053.
- Fick, S. E., and R. J. Hijmans. 2017. Worldclim 2: New 1-km spatial resolution climate surfaces for global land areas. *International Journal of Climatology* (online version).
- Field, C. B., M. J. Behrenfeld, J. T. Randerson, and P. Falkowski. 1998. Primary production of the biosphere: integrating terrestrial and oceanic components. *Science* **281**:237-240.
- Finstad, A. G., and C. L. Hein. 2012. Migrate or stay: terrestrial primary productivity and climate drive anadromy in Arctic char. *Global Change Biology* **18**:2487-2497.
- Fölster, J., R. K. Johnson, M. N. Futter, and A. Wilander. 2014. The Swedish monitoring of surface waters: 50 years of adaptive monitoring. *Ambio* **43**:3-18.
- Forsberg, C. 1992. Will an increased greenhouse impact in Fennoscandia give rise to more humic and coloured lakes? Pages 51-58 *Dissolved organic matter in lacustrine ecosystems*. Springer.
- Forsström, L., S. Sorvari, A. Korhola, and M. Rautio. 2005. Seasonality of phytoplankton in subarctic Lake Saanajärvi in NW Finnish Lapland. *Polar Biology* **28**:846-861.
- Fredskild, B. 1983. The Holocene development of some low and high arctic Greenland lakes. Pages 217-224 *Paleolimnology*. Springer.
- Fredskild, B. 1992. The Greenland limnophytes-their present distribution and Holocene history. *Acta Botanica Fennica*:93-113.
- Friberg, N., L. Sandin, M. T. Furse, S. E. Larsen, R. T. Clarke, and P. Haase. 2006. Comparison of macroinvertebrate sampling methods in Europe. Pages 365-378 *The Ecological Status of European Rivers: Evaluation and Intercalibration of Assessment Methods*.
- Geelhoed, J. S., T. Hiemstra, and W. H. Van Riemsdijk. 1997. Phosphate and sulfate adsorption on goethite: single anion and competitive adsorption. *Geochimica et cosmochimica acta* **61**:2389-2396.
- Gérard, F. 2016. Clay minerals, iron/aluminum oxides, and their contribution to phosphate sorption in soils—A myth revisited.

- Geoderma **262**:213-226.
- Gill, M. J., K. Crane, R. Hindrum, P. Arneberg, I. Bysveen, N. V. Denisenko, V. Gofman, A. Grant-Friedman, G. Gudmundsson, R. R. Hopcroft, K. Iken, A. Labansen, O. S. Liubina, E. A. Melnikov, S. E. Moore, J. D. Reist, B. I. Sirenko, J. Stow, F. Ugarte, D. Vongraven, and J. Watkins. 2011. Arctic Marine Biodiversity Monitoring Plan (CBMP-MARINE PLAN). CAFF Monitoring Series Report No. 3, CAFF International Secretariat, Akureyri, Iceland.
- Gotelli, N. J., and R. K. Colwell. 2001. Quantifying biodiversity: procedures and pitfalls in the measurement and comparison of species richness. *Ecology Letters* **4**:379-391.
- Gruneli, W. 2012. Brownification of lakes. Pages 117-119 *Encyclopedia of lakes and reservoirs*. Springer.
- Grenier, M., S. Campeau, I. Lavoie, Y. S. Park, and S. Lek. 2006. Diatom reference communities in Quebec (Canada) streams based on Kohonen self-organizing maps and multivariate analyses. *Canadian Journal of Fisheries and Aquatic Sciences* **63**:2087-2106.
- Griffiths, K., N. Michelutti, M. Sugar, M. S. Douglas, and J. P. Smol. 2017. Ice-cover is the principal driver of ecological change in High Arctic lakes and ponds. *PLoS one* **12**:e0172989.
- Gross, M. R., R. M. Coleman, and R. M. McDowall. 1988. Aquatic productivity and the evolution of diadromous fish migration. *Science* **239**:1291-1293.
- Gumbricht, T. 1993. Nutrient removal processes in freshwater submersed macrophyte systems. *Ecological Engineering* **2**:1-30.
- Harrison, J. C., M. R. St-Onge, O. V. Petrov, S. I. Strelnikov, B. G. Lopatin, F. H. Wilson, S. Tella, D. Paul, T. Lynds, S. P. Shokalsky, C. K. Hulst, S. Bergman, H. F. Jepsen, and A. Solli. 2011. Geological map of the Arctic / Carte géologique de l'Arctique. Geological Survey of Canada, "A" Series Map 2159A, 2011, 9 sheets; 1 DVD, <https://doi.org/10.4095/287868>.
- Hayden, B., J. P. Myllykangas, R. J. Rolls, and K. K. Kahilainen. 2017. Climate and productivity shape fish and invertebrate community structure in subarctic lakes. *Freshwater Biology* **62**:990-1003.
- Heim, K. C., M. S. Wipfli, M. S. Whitman, C. D. Arp, J. Adams, and J. A. Falke. 2016. Seasonal cues of Arctic grayling movement in a small Arctic stream: the importance of surface water connectivity. *Environmental biology of fishes* **99**:49-65.
- Heino, J., R. Virkkala, and H. Toivonen. 2009. Climate change and freshwater biodiversity: detected patterns, future trends and adaptations in northern regions. *Biological Reviews* **84**:39-54.
- Henriques-Silva, R., Z. Lindo, and P. R. Peres-Neto. 2013. A community of metacommunities: exploring patterns in species distributions across large geographical areas. *Ecology* **94**:627-639.
- Hugueny, B., T. Oberdorff, and P. A. Tedesco. 2010. Community ecology of river fishes: a large-scale perspective. Pages 29-62 *in American Fisheries Society Symposium*.
- Huser, B. J., M. N. Futter, R. Wang, and J. Fölster. 2018. Persistent and widespread long-term phosphorus declines in Boreal lakes in Sweden. *Science of the total environment* **613**:240-249.
- IPCC. 2007. *Climate Change 2007: An Assessment of the Intergovernmental Panel on Climate Change*.
- Irons III, J. G., L. K. Miller, and M. W. Oswood. 1993. Ecological adaptations of aquatic macroinvertebrates to overwintering in interior Alaska (USA) subarctic streams. *Canadian Journal of Zoology* **71**:98-108.
- Jeppesen, E., M. Sondergaard, M. Sondergaard, and K. Christofferson. 1998. *The Structuring Role of Submerged Macrophytes in Lakes*. Springer Science & Business Media.
- Jia, G. J., H. E. Epstein, and D. A. Walker. 2003. Greening of arctic Alaska, 1981–2001. *Geophysical Research Letters* **30**.
- Jia, G. J., H. E. Epstein, and D. A. Walker. 2009. Vegetation greening in the Canadian Arctic related to decadal warming. *Journal of Environmental Monitoring* **11**:2231-2238.
- Johnson, R. K., and W. Goedkoop. 2002. Littoral macroinvertebrate communities: spatial scale and ecological relationships. *Freshwater Biology* **47**:1840-1854.
- Jorgenson, J. K., H. E. Welch, and M. F. Curtis. 1992. Response of Amphipoda and Trichoptera to lake fertilization in the Canadian Arctic. *Canadian Journal of Fisheries and Aquatic Sciences* **49**:2354-2362.
- Jorgenson, M. T., Y. L. Shur, and E. R. Pullman. 2006. Abrupt increase in permafrost degradation in Arctic Alaska. *Geophysical Research Letters* **33**:L02503.
- Jost, L. 2007. Partitioning diversity into independent alpha and beta components. *Ecology* **88**:2427-2439.
- Karlsson, J., P. Byström, J. Ask, P. Ask, L. Persson, and M. Jansson. 2009. Light limitation of nutrient-poor lake ecosystems. *Nature* **460**:506.
- Karlsson, P. E., G. P. Karlsson, S. Hellsten, and C. Akselsson. 2018. Utveckling av en indikator för totalt nedfall av kväve till barrskog inom miljö kvalitetsmålet Ingen övergödning.
- Keatley, B. E., M. S. Douglas, and J. P. Smol. 2008. Prolonged ice cover dampens diatom community responses to recent climatic change in High Arctic lakes. *Arctic, Antarctic, and Alpine Research* **40**:364-372.
- Keller, W., A. M. Paterson, K. M. Somers, P. J. Dillon, J. Heneberry, and A. Ford. 2008. Relationships between dissolved organic carbon concentrations, weather, and acidification in small Boreal Shield lakes. *Canadian Journal of Fisheries and Aquatic Sciences* **65**:786-795.
- Klemetsen, A. 2010. The charr problem revisited: exceptional phenotypic plasticity promotes ecological speciation in postglacial lakes. *Freshwater Reviews* **3**:49-74.
- Knudsen, R., P.-A. Amundsen, R. Primicerio, A. Klemetsen, and P. Sørensen. 2007. Contrasting niche-based variation in trophic morphology within Arctic charr populations. *Evolutionary Ecology Research* **9**:1005-1021.
- Kokelj, S. V., D. Lacelle, T. C. Lantz, J. Tunnicliffe, L. Malone, I. D. Clark, and K. S. Chin. 2013. Thawing of massive ground ice in mega slumps drives increases in stream sediment and solute flux across a range of watershed scales. *Journal of Geophysical Research: Earth Surface* **118**:681-692.
- Kokelj, S. V., J. Tunnicliffe, D. Lacelle, T. C. Lantz, K. S. Chin, and R. Fraser. 2015. Increased precipitation drives mega slump development and destabilization of ice-rich permafrost terrain, northwestern Canada. *Global and Planetary Change* **129**:56-68.
- Kokelj, S. V., B. Zajdlik, and M. S. Thompson. 2009. The impacts of thawing permafrost on the chemistry of lakes across the subarctic boreal-tundra transition, Mackenzie Delta region, Canada. *Permafrost and Periglacial Processes* **20**:185-199.
- Kolkwitz, R., and M. Marsson. 1909. *Ökologie der tierischen Saprobien. Beiträge zur Lehre von der biologischen Gewässerbeurteilung. Internationale Revue der Gesamten Hydrobiologie und Hydrographie* **2**:126-152.
- Lacelle, D., J. Bjornson, and B. Lauriol. 2010. Climatic and geomorphic factors affecting contemporary (1950-2004) activity of retrogressive thaw slumps on the Aklavik Plateau, Richardson Mountains, NWT, Canada. *Permafrost and Periglacial Processes* **21**:1-15.
- Lantz, T. C., and S. V. Kokelj. 2008. Increasing rates of retrogressive thaw slump activity in the Mackenzie Delta region, NWT, Canada. *Geophysical Research Letters* **35**.
- Laske, S. M., T. B. Haynes, A. E. Rosenberger, J. C. Koch, M. S. Wipfli,

- M. Whitman, and C. E. Zimmerman. 2016. Surface water connectivity drives richness and composition of Arctic lake fish assemblages. *Freshwater Biology* **61**:1090-1104.
- Lau, D. C., T. Vrede, and W. Goedkoop. 2017. Lake responses to long-term disturbances and management practices. *Freshwater Biology* **62**:792-806.
- Lehner, B., and G. Grill. 2013. Global river hydrography and network routing: baseline data and new approaches to study the world's large river systems. *Hydrological Processes* **27**:2171-2186.
- Lento, J., W. A. Monk, J. M. Culp, R. A. Curry, D. Cote, and E. Luiker. 2013. Responses of low Arctic stream benthic macroinvertebrate communities to environmental drivers at nested spatial scales. *Arctic, Antarctic, and Alpine Research* **45**:538-551.
- Lento, J., and A. Morin. 2014. Filling the gaps in stream size spectra: using electroshocking to collect large macroinvertebrates. *Hydrobiologia*.
- Les, D. H., D. J. Crawford, R. T. Kimball, M. L. Moody, and E. Landolt. 2003. Biogeography of discontinuously distributed hydrophytes: a molecular appraisal of intercontinental disjunctions. *International Journal of Plant Sciences* **164**:917-932.
- Levenstein, B. 2016. Impacts of retrogressive thaw slump disturbances on biological structure and function in Arctic streams, Peel Plateau, NWT. MSc Thesis. University of New Brunswick.
- Levenstein, B., J. Culp, and J. Lento. 2018. Sediment Inputs from retrogressive thaw slumps drive algal biomass accumulation but not decomposition in Arctic streams, NWT. *Freshwater Biology* **63**:1300-1315.
- Lindenmayer, D. B., and G. E. Likens. 2009. Adaptive monitoring: a new paradigm for long-term research and monitoring. *Trends in Ecology & Evolution* **24**:482-486.
- Lodge, D. M. 1991. Herbivory on freshwater macrophytes. *Aquatic Botany* **41**:195-224.
- Mariash, H. L., S. P. Devlin, L. Forsström, R. I. Jones, and M. Rautio. 2014. Benthic mats offer a potential subsidy to pelagic consumers in tundra pond food webs. *Limnology and Oceanography* **59**:733-744.
- Matthews, W. J. 1998. *Patterns in Freshwater Fish Ecology*. Springer Science & Business Media.
- Mecklenburg, C. W., T. A. Mecklenburg, and L. K. Thorsteinson. 2002. *Fishes of Alaska*.
- Meltofte, H., editor. 2013. *Arctic Biodiversity Assessment. Status and trends in Arctic biodiversity. Conservation of Arctic Flora and Fauna (CAFF), Akureyri, Iceland*.
- Mesquita, P. S., F. J. Wrona, and T. D. Prowse. 2010. Effects of retrogressive permafrost thaw slumping on sediment chemistry and submerged macrophytes in Arctic tundra lakes. *Freshwater Biology* **55**:2347-2358.
- Mette, E. M., M. J. Vanni, J. M. Newell, and M. J. González. 2011. Phytoplankton communities and stoichiometry are interactively affected by light, nutrients, and fish. *Limnology and Oceanography* **56**:1959-1975.
- Michelutti, N., J. M. Blais, M. L. Mallory, J. Brash, J. Thienpont, L. E. Kimpe, M. S. Douglas, and J. P. Smol. 2010. Trophic position influences the efficacy of seabirds as metal biovectors. *Proceedings of the National Academy of Sciences* **107**:10543-10548.
- Milner, A. M., J. E. Brittain, E. Castella, and G. E. Petts. 2001. Trends of macroinvertebrate community structure in glacier-fed rivers in relation to environmental conditions: a synthesis. *Freshwater Biology* **46**:1833-1847.
- Milner, A. M., K. Khamis, T. J. Battin, J. E. Brittain, N. E. Barrand, L. Füreder, S. Cauvy-Fraunié, G. M. Gíslason, D. Jacobsen, and D. M. Hannah. 2017. Glacier shrinkage driving global changes in downstream systems. *Proceedings of the National Academy of Sciences* **114**:9770-9778.
- Milner, A. M., and G. E. Petts. 1994. Glacial rivers: physical habitat and ecology. *Freshwater Biology* **32**:295-307.
- Mims, M., J. Olden, Z. Shattuck, and N. Poff. 2010. Life history trait diversity of native freshwater fishes in North America. *Ecology of Freshwater Fish* **19**:390-400.
- Monteith, D. T., J. L. Stoddard, C. D. Evans, H. A. De Wit, M. Forsius, T. Høgåsen, A. Wilander, B. L. Skjelkvåle, D. S. Jeffries, and J. Vuorenmaa. 2007. Dissolved organic carbon trends resulting from changes in atmospheric deposition chemistry. *Nature* **450**:537.
- Moquin, P. A., P. S. Mesquita, F. J. Wrona, and T. D. Prowse. 2014. Responses of benthic invertebrate communities to shoreline retrogressive thaw slumps in Arctic upland lakes. *Freshwater Science* **33**:1108-1118.
- Mormul, R. P., J. Ahlgren, M. K. Ekvall, L.-A. Hansson, and C. Brönmark. 2012. Water brownification may increase the invasibility of a submerged non-native macrophyte. *Biological Invasions* **14**:2091-2099.
- Müller-Navarra, D. C., M. T. Brett, A. M. Liston, and C. R. Goldman. 2000. A highly unsaturated fatty acid predicts carbon transfer between primary producers and consumers. *Nature* **403**:74.
- Muus, B. J., and P. Dahlström. 1971. *The Freshwater Fishes of Britain and Europe*. Collins.
- Nadelhoffer, K. J., G. R. Shaver, A. Giblin, and E. B. Rastetter. 1997. Potential impacts of climate change on nutrient cycling, decomposition, and productivity in arctic ecosystems. Pages 349-364 *Global Change and Arctic Terrestrial Ecosystems*. Springer.
- Newman, R. M. 1991. Herbivory and detritivory on freshwater macrophytes by invertebrates: a review. *Journal of the North American Benthological Society* **10**:89-114.
- Niemelä, E., J. Erkinaro, M. Julkunen, E. Hassinen, M. Lämsman, and S. Brørs. 2006. Temporal variation in abundance, return rate and life histories of previously spawned Atlantic salmon in a large subarctic river. *Journal of Fish Biology* **68**:1222-1240.
- NOAA National Centers for Environmental Information. 2015. State of the Climate: Global Climate Report for Annual 2014, published online January 2015, retrieved on June 1, 2018 from <https://www.ncdc.noaa.gov/sotc/global/201413>.
- Novichkova, A. A., and A. I. Azovsky. 2017. Factors affecting regional diversity and distribution of freshwater microcrustaceans (Cladocera, Copepoda) at high latitudes. *Polar Biology* **40**:185-198.
- O'Brien, W. J., M. Barfield, N. D. Bettez, G. M. Gettel, A. E. Hershey, M. E. McDonald, M. C. Miller, H. Mooers, J. Pastor, and C. Richards. 2004. Physical, chemical, and biotic effects on arctic zooplankton communities and diversity. *Limnology and Oceanography* **49**:1250-1261.
- Olefeldt, D., S. Goswami, G. Grosse, D. J. Hayes, G. Hugelius, P. Kuhry, B. Sannel, E. A. G. Schuur, and M. R. Turetsky. 2016. Arctic Circumpolar Distribution and Soil Carbon of Thermokarst Landscapes, 2015. ORNL DAAC, Oak Ridge, Tennessee, USA.
- Olson, D. M., E. Dinerstein, E. D. Wikramanayake, N. D. Burgess, G. V. N. Powell, E. C. Underwood, J. A. D'Amico, I. Itoua, H. E. Strand, J. C. Morrison, C. J. Loucks, T. F. Allnutt, T. H. Ricketts, Y. Kura, J. F. Lamoreux, W. W. Wettengel, P. Hedao, and K. R. Kassem. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. *BioScience* **51**:933-938.
- Oswood, M. W. 1997. Streams and rivers of Alaska. In: A.M. Milner and M.W. Oswood (eds.). *Freshwaters of Alaska: Ecological*

- Syntheses. *Ecological Studies* **119**:61-106.
- Paerl, H. W., and J. Huisman. 2008. Blooms like it hot. *Science* **320**:57-58.
- Pereira, H. M., S. Ferrier, M. Walters, G. N. Geller, R. Jongman, R. J. Scholes, M. W. Bruford, N. Brummitt, S. Butchart, and A. Cardoso. 2013. Essential biodiversity variables. *Science* **339**:277-278.
- Pettorelli, N., K. Safi, and W. Turner. 2014. Satellite remote sensing, biodiversity research and conservation of the future. The Royal Society.
- Pick, F. R., and D. R. Lean. 1987. The role of macronutrients (C, N, P) in controlling cyanobacterial dominance in temperate lakes. *New Zealand Journal of Marine and Freshwater Research* **21**:425-434.
- Pienitz, R., M. S. Douglas, J. P. Smol, and P. B. Hamilton. 2004. Algal indicators of environmental change in arctic and antarctic lakes and ponds. Pages 117-157 *Long-term Environmental Change in Arctic and Antarctic Lakes*. Springer.
- Poikane, S., R. K. Johnson, L. Sandin, A. K. Schartau, A. G. Solimini, G. Urbanič, K. Arbačiauskas, J. Aroviita, W. Gabriels, and O. Miler. 2016. Benthic macroinvertebrates in lake ecological assessment: A review of methods, intercalibration and practical recommendations. *Science of the total environment* **543**:123-134.
- Post, E., M. C. Forchhammer, M. S. Bret-Harte, T. V. Callaghan, T. R. Christensen, B. Elberling, A. D. Fox, O. Gilg, D. S. Hik, and T. T. Høye. 2009. Ecological dynamics across the Arctic associated with recent climate change. *Science* **325**:1355-1358.
- Pouliot, D., R. Latifovic, and I. Olthof. 2009. Trends in vegetation NDVI from 1 km AVHRR data over Canada for the period 1985–2006. *International Journal of Remote Sensing* **30**:149-168.
- Power, G., and M. Power. 1995. Ecotones and fluvial regimes in arctic lotic environments. Pages 111-124 *The Importance of Aquatic-Terrestrial Ecotones for Freshwater Fish*. Springer.
- Prowse, T., K. Alfredsen, S. Beltaos, B. Bonsal, C. Duguay, A. Korhola, J. McNamara, W. F. Vincent, V. Vuglinsky, and G. A. Weyhenmeyer. 2011a. Arctic freshwater ice and its climatic role. *AMBIO: A Journal of the Human Environment* **40**:46-52.
- Prowse, T. D., K. Alfredsen, S. Beltaos, B. Bonsal, C. Duguay, A. Korhola, J. McNamara, R. Pienitz, W. F. Vincent, V. Vuglinski, and G. A. Weyhenmeyer. 2011b. Past and future changes in Arctic lake and river ice. *Ambio* **40**:53-62.
- Prowse, T. D., K. Alfredsen, S. Beltaos, B. R. Bonsal, W. B. Bowden, C. R. Duguay, A. Korhola, J. McNamara, W. F. Vincent, V. Vuglinski, K. M. W. Anthony, and G. A. Weyhenmeyer. 2011c. Effects of changes in Arctic lake and river ice. *Ambio* **40**:63-74.
- Prowse, T. D., and J. M. Culp. 2003. Ice breakup: a neglected factor in river ecology. *Canadian Journal of Civil Engineering* **30**:128-144.
- Prowse, T. D., F. J. Wrona, J. D. Reist, J. J. Gibson, J. E. Hobbie, L. M. J. Lévesque, and W. F. Vincent. 2006a. Historical changes in Arctic freshwater ecosystems. *Ambio* **35**:339-346.
- Prowse, T. D., F. J. Wrona, J. D. Reist, J. E. Hobbie, L. M. J. Lévesque, and W. F. Vincent. 2006b. General features of the Arctic relevant to climate change in freshwater ecosystems. *Ambio* **35**:330-338.
- Raddum, G. G., and A. Fjellheim. 1984. Acidification and early warning organisms in freshwater in western Norway: With 5 figures and 1 table in the text. *Internationale Vereinigung für theoretische und angewandte Limnologie: Verhandlungen* **22**:1973-1980.
- Rautio, M., I. A. E. Bayly, J. A. E. Gibson, and M. Nyman. 2008. Chapter 13: Zooplankton and zoobenthos in high-latitude water bodies. *in* W. F. Vincent and J. Laybourn-Parry, editors. *Polar Lakes and Rivers, Limnology of Arctic and Antarctic Aquatic Ecosystems*. Oxford University Press, New York.
- Rautio, M., F. Dufresne, I. Laurion, S. Bonilla, S. V. Warwick, and K. S. Christoffersen. 2011. Shallow freshwater ecosystems of the circumpolar Arctic. *Ecoscience* **18**:204-222.
- Rautio, M., and W. F. Vincent. 2006. Benthic and pelagic food resources for zooplankton in shallow high-latitude lakes and ponds. *Freshwater Biology* **51**:1038-1052.
- Ravet, J. L., M. T. Brett, and D. C. Müller-Navarra. 2003. A test of the role of polyunsaturated fatty acids in phytoplankton food quality for *Daphnia* using liposome supplementation. *Limnology and Oceanography* **48**:1938-1947.
- Reist, J. D., M. Power, and J. B. Dempson. 2013. Arctic charr (*Salvelinus alpinus*): a case study of the importance of understanding biodiversity and taxonomic issues in northern fishes. *Biodiversity* **14**:45-56.
- Reist, J. D., F. J. Wrona, T. D. Prowse, M. Power, J. B. Dempson, J. R. King, and R. J. Beamish. 2006. An overview of effects of climate change on selected Arctic freshwater and anadromous fishes. *Ambio* **35**:381-387.
- Reynolds, C. S. 2006. *The ecology of phytoplankton*. Cambridge University Press.
- Rosenberg, D. M., and V. H. Resh, editors. 1993. *Freshwater Biomonitoring and Benthic Macroinvertebrates*. Chapman & Hall, NY.
- Rühland, K., A. Priesnitz, and J. P. Smol. 2003. Paleolimnological evidence from diatoms for recent environmental changes in 50 lakes across Canadian Arctic treeline. *Arctic, Antarctic, and Alpine Research* **35**:110-123.
- Rühland, K. M., K. E. Hargan, A. Jeziorski, A. M. Paterson, W. Keller, and J. P. Smol. 2014. A multi-trophic exploratory survey of recent environmental changes using lake sediments in the Hudson Bay Lowlands, Ontario, Canada. *Arctic, Antarctic, and Alpine Research* **46**:139-158.
- Samchyshyna, L., L.-A. Hansson, and K. S. Christoffersen. 2008. Patterns in the distribution of Arctic freshwater zooplankton related to glaciation history. *Polar Biology* **31**:1427.
- Sand-Jensen, K. 1997. Macrophytes as biological engineers in the ecology of Danish streams. Pages 74-101 *Freshwater Biology. Priorities and Development in Danish Research*. Gad.
- Sand-Jensen, K., T. Riis, S. Markager, and W. F. Vincent. 1999. Slow growth and decomposition of mosses in Arctic lakes. *Canadian Journal of Fisheries and Aquatic Sciences* **56**:388-393.
- Santamaría, L., and M. Klaassen. 2002. Waterbird-mediated dispersal of aquatic organisms: an introduction. Elsevier Masson.
- Saros, J. E., R. M. Northington, D. S. Anderson, and N. J. Anderson. 2016. A whole-lake experiment confirms a small centric diatom species as an indicator of changing lake thermal structure. *Limnology and Oceanography Letters* **1**:27-35.
- Saulnier-Talbot, É., I. Larocque-Tobler, I. Gregory-Eaves, and R. Pienitz. 2015. Response of lacustrine biota to Late Holocene climate and environmental conditions in northernmost Ungava (Canada). *Arctic*:153-168.
- Scheffer, M. 1989. Alternative stable states in eutrophic, shallow freshwater systems: a minimal model. *Hydrobiological Bulletin* **23**:73-83.
- Schindler, D. W., and J. P. Smol. 2006. Cumulative effects of climate warming and other human activities on freshwaters of Arctic and subarctic North America. *AMBIO: A Journal of the Human Environment* **35**:160-168.
- Scott, R. W., D. R. Barton, M. S. Evans, and J. J. Keating. 2011. Latitudinal gradients and local control of aquatic insect richness in a large river system in northern Canada. *Journal of the North American Benthological Society* **30**:621-634.

- Scott, W., and E. Crossman. 1973. Freshwater fishes of Canada: Fisheries Research Board of Canada Bulletin, Vol. 184. Fisheries Research Board of Canada, Ottawa.
- Sheath, R. G. 1986. Seasonality of phytoplankton in northern tundra ponds. *Hydrobiologia* **138**:75-83.
- Shugar, D. H., J. J. Clague, J. L. Best, C. Schoof, M. J. Willis, L. Copland, and G. H. Roe. 2017. River piracy and drainage basin reorganization led by climate-driven glacier retreat. *Nature Geoscience* **10**:370.
- Shustova, N., I. Zalicheva, S. Kitaev, and V. Ganina. 2009. Assessment of surface waters acidification as indicated by zooplankton in the taiga zone of Northern European Russia. *Russian journal of ecology* **40**:495.
- Siwertsson, A., R. Knudsen, K. Kahilainen, K. Præbel, R. Primicerio, and P.-A. Amundsen. 2010. Sympatric diversification as influenced by ecological opportunity and historical contingency in a young species lineage of whitefish.
- Slavik, K., B. Peterson, L. Deegan, W. Bowden, A. E. Hershey, and J. Hobbie. 2004. Long-Term Responses Of The Kuparuk River Ecosystem To Phosphorus Fertilization. *Ecology* **85**:939-954.
- Smol, J. P., and M. S. Douglas. 2007. Crossing the final ecological threshold in high Arctic ponds. *Proceedings of the National Academy of Sciences* **104**:12395-12397.
- Smol, J. P., and E. F. Stoermer. 2010. *The Diatoms: Applications for the Environmental and Earth Sciences*. Cambridge University Press.
- Smol, J. P., A. P. Wolfe, H. J. B. Birks, M. S. V. Douglas, V. J. Jones, A. Korhola, R. Pienitz, K. Rühland, S. Sorvari, D. Antoniades, S. J. Brooks, M.-A. Fallu, M. Hughes, B. E. Keatley, T. E. Laing, N. Michelutti, L. Nazarova, M. Nyman, A. M. Paterson, B. Perren, R. Quinlan, M. Rautio, É. Saulnier-Talbot, S. Siitonen, N. Solovieva, and J. Weckström. 2005. Climate-driven regime shifts in the biological communities of arctic lakes. *Proceedings of the National Academy of Sciences of the United States of America* **102**:4397-4402.
- Snorrason, S. S., S. Skúlason, B. Jonsson, H. J. Malmquist, P. M. Jónasson, O. T. Sandlund, and T. Lindem. 1994. Trophic specialization in Arctic charr *Salvelinus alpinus* (Pisces; Salmonidae): morphological divergence and ontogenetic niche shifts. *Biological Journal of the Linnean Society* **52**:1-18.
- Socolar, J. B., J. J. Gilroy, W. E. Kunin, and D. P. Edwards. 2016. How should beta-diversity inform biodiversity conservation? *Trends in Ecology & Evolution* **31**:67-80.
- Soininen, J., J. Heino, and J. Wang. 2018. A meta-analysis of nestedness and turnover components of beta diversity across organisms and ecosystems. *Global Ecology and Biogeography* **27**:96-109.
- Søndergaard, M., L. S. Johansson, T. L. Lauridsen, T. B. JØRGENSEN, L. Liboriussen, and E. Jeppesen. 2010. Submerged macrophytes as indicators of the ecological quality of lakes. *Freshwater Biology* **55**:893-908.
- Stammler, K. L., W. D. Taylor, and M. N. Mohamed. 2017. Long-term decline in stream total phosphorus concentrations: A pervasive pattern in all watershed types in Ontario. *Journal of Great Lakes Research* **43**:930-937.
- Stein, A., K. Gerstner, and H. Kreft. 2014. Environmental heterogeneity as a universal driver of species richness across taxa, biomes and spatial scales. *Ecology Letters* **17**:866-880.
- Sterner, R. W., and J. J. Elser. 2002. *Ecological stoichiometry: the biology of elements from molecules to the biosphere*. Princeton University Press.
- Stevenson, R. J., and Y. Pan. 1999. Assessing environmental conditions in rivers and streams with diatoms. Pages 11-40 in E. F. Stoermer and J. P. Smol, editors. *The diatoms: applications for the environmental and earth sciences*.
- Stomp, M., J. Huisman, G. G. Mittelbach, E. Litchman, and C. A. Klausmeier. 2011. Large-scale biodiversity patterns in freshwater phytoplankton. *Ecology* **92**:2096-2107.
- Strecker, A. L., S. E. Arnott, N. D. Yan, and R. Girard. 2006. Variation in the response of crustacean zooplankton species richness and composition to the invasive predator *Bythotrephes longimanus*. *Canadian Journal of Fisheries and Aquatic Sciences* **63**:2126-2136.
- Svenning, M.-A., and N. Gullestad. 2002. Adaptations to stochastic environmental variations: the effects of seasonal temperatures on the migratory window of Svalbard Arctic charr. Pages 165-174 *Ecology, behaviour and conservation of the charrs, genus Salvelinus*. Springer.
- Syvitski, J. P. 2002. Sediment discharge variability in Arctic rivers: implications for a warmer future. *Polar Research* **21**:323-330.
- Thienpont, J. R., K. M. Rühland, M. F. J. Pisaric, S. V. Kokelj, L. E. Kimpe, J. M. Blais, and J. P. Smol. 2013. Biological responses to permafrost thaw slumping in Canadian Arctic lakes. *Freshwater Biology* **58**:337-353.
- Thompson, M. S., F. J. Wrona, and T. D. Prowse. 2012. Shifts in plankton, nutrient and light relationships in small tundra lakes caused by localized permafrost thaw. *Arctic*:367-376.
- Tonn, W. M. 1990. Climate change and fish communities: a conceptual framework. *Transactions of the American Fisheries Society* **119**:337-352.
- Torres-Ruiz, M., J. D. Wehr, and A. A. Perrone. 2007. Trophic relations in a stream food web: importance of fatty acids for macroinvertebrate consumers. *Journal of the North American Benthological Society* **26**:509-522.
- Trout-Haney, J. V., Z. T. Wood, and K. L. Cottingham. 2016. Presence of the cyanotoxin microcystin in Arctic lakes of Southwestern Greenland. *Toxins* **8**:256.
- Tuomisto, H. 2010a. A diversity of beta diversities: straightening up a concept gone awry. Part 1. Defining beta diversity as a function of alpha and gamma diversity. *Ecography* **33**:2-22.
- Tuomisto, H. 2010b. A diversity of beta diversities: straightening up a concept gone awry. Part 2. Quantifying beta diversity and related phenomena. *Ecography* **33**:23-45.
- Turner, W., S. Spector, N. Gardiner, M. Fladeland, E. Sterling, and M. Steininger. 2003. Remote sensing for biodiversity science and conservation. *Trends in Ecology & Evolution* **18**:306-314.
- Ulrich, M., A. Morgenstern, F. Günther, D. Reiss, K. Bauch, E. Hauber, S. Rössler, and L. Schirrmeister. 2010. Thermokarst in Siberian ice-rich permafrost: Comparison to asymmetric scalloped depressions on Mars. *Journal of Geophysical Research: Planets* **115**.
- Vadeboncoeur, Y., E. Jeppesen, M. J. V. Zanden, H. H. Schierup, K. S. Christoffersen, and D. M. Lodge. 2003. From Greenland to green lakes: cultural eutrophication and the loss of benthic pathways in lakes. *Limnology and Oceanography* **48**:1408-1418.
- Vandysch, O. 2002. Effect of acidification on zooplankton communities of small lakes in mountain tundra. *Water Resources* **29**:554-560.
- Villeneuve, A., B. Montuelle, S. Pesce, and A. Bouchez. 2013. *Environmental River Biofilms as Biological Indicators of the Impact of Chemical Contaminants*. Pages 443-456 *Encyclopedia of Aquatic Ecotoxicology*. Springer.
- Vincent, W. F. 2007. Cold tolerance in cyanobacteria and life in the cryosphere. Pages 287-301 in J. Seckbach, editor. *Algae and Cyanobacteria in Extreme Environments*. Springer.
- Vincent, W. F., T. V. Callaghan, D. Dahl-Jensen, M. Johansson, K. M. Kovacs, C. Michel, T. D. Prowse, J. D. Reist, and M. Sharp. 2011. Ecological implications of changes in the Arctic cryosphere. *Ambio* **40**:87-91.

- Vincent, W. F., and J. E. Hobbie. 2000. Ecology of Arctic lakes and rivers. *The Arctic: Environment, People, Policy*:197-231.
- Vincent, W. F., and J. Laybourn-Parry. 2008. Polar lakes and rivers: limnology of Arctic and Antarctic aquatic ecosystems. Oxford university press.
- Walker, D. A., M. K. Reynolds, F. J. A. Daniëls, E. Einarsson, A. Elvebakk, W. A. Gould, A. E. Katenin, S. S. Kholod, C. J. Markon, E. S. Melnikov, N. G. Moskalenko, S. S. Talbot, B. A. Yurtsev, and the other members of the CAVM Team. 2005. The Circumpolar Arctic vegetation map. *Journal of Vegetation Science* **16**:267-282.
- Wauthy, M., M. Rautio, K. S. Christoffersen, L. Forsström, I. Laurion, H. L. Mariash, S. Peura, and W. F. Vincent. 2017. Increasing dominance of terrigenous organic matter in circumpolar freshwaters due to permafrost thaw. *Limnology and Oceanography Letters* 186-198.
- Welch, H., and J. Kalff. 1974. Benthic photosynthesis and respiration in Char Lake. *Journal of the Fisheries Board of Canada* **31**:609-620.
- Welch, H. E., J. A. Legault, and H. J. Kling. 1989. Phytoplankton, nutrients, and primary production in fertilized and natural lakes at Saqvaqujac, NWT. *Canadian Journal of Fisheries and Aquatic Sciences* **46**:90-107.
- West, R. L., M. W. Smith, W. E. Barber, J. B. Reynolds, and H. Hop. 1992. Autumn migration and overwintering of Arctic grayling in coastal streams of the Arctic National Wildlife Refuge, Alaska. *Transactions of the American Fisheries Society* **121**:709-715.
- Wetzel, R. G. 2001. *Limnology: Lake and River Ecosystems*. Academic Press.
- Whittaker, R. H. 1972. Evolution and measurement of species diversity. *Taxon*:213-251.
- Wiederholm, T. 1980. Use of benthos in lake monitoring. *Journal (water Pollution Control Federation)*:537-547.
- Winder, M., and U. Sommer. 2012. Phytoplankton response to a changing climate. *Hydrobiologia* **698**:5-16.
- Woodward, G., D. M. Perkins, and L. E. Brown. 2010. Climate change and freshwater ecosystems: impacts across multiple levels of organization. *Philosophical Transactions of the Royal Society B: Biological Sciences* **365**:2093-2106.
- Wrona, F., T. Prowse, J. Reist, R. Beamish, J. Gibson, and J. Hobbie. 2005. Freshwater ecosystems, Chapter 8. *Arctic Climate Impact Assessment 2005*. New York, NY: Cambridge University Press.
- Wrona, F. J., T. D. Prowse, J. D. Reist, J. E. Hobbie, L. M. J. Lévesque, and W. F. Vincent. 2006a. Climate change effects on aquatic biota, ecosystem structure and function. *Ambio* **35**:359-369.
- Wrona, F. J., T. D. Prowse, J. D. Reist, J. E. Hobbie, L. M. J. Lévesque, and W. F. Vincent. 2006b. Climate impacts on Arctic freshwater ecosystems and fisheries: Background, rationale and approach of the Arctic Climate Impact Assessment (ACIA). *Ambio* **35**:326-329.
- Wrona, F. J., J. D. Reist, P.-A. Amundsen, P. A. Chambers, K. S. Christoffersen, J. M. Culp, P. D. di Cenzo, L. Forsström, J. Hammar, J. Heino, R. K. Heikkinen, K. K. Kahilainen, L. Lesack, H. Lehtonen, J. Lento, M. Luoto, P. Marsh, D. J. Marcogliese, P. A. Moquin, T. Mustonen, T. D. Prowse, M. Power, M. Rautio, H. Swanson, M. Thompson, H. Toivonen, R. Vasiliev, R. Virkkala, and S. Zavalko. 2013. Chapter 13: Freshwater Ecosystems. Pages 335-377 in H. Meltofte, editor. *Arctic Biodiversity Assessment. Status and Trends in Arctic Biodiversity. Conservation of Arctic Flora and Fauna (CAFF)*, Akureyri, Iceland.
- Yan, N., and R. Strus. 1980. Crustacean zooplankton communities of acidic, metal-contaminated lakes near Sudbury, Ontario. *Canadian Journal of Fisheries and Aquatic Sciences* **37**:2282-2293.
- Yan, N. D., W. I. Dunlop, T. W. Pawson, and L. E. MacKay. 1992. *Bythotrephes cederstroemi* (Schoedler) in Muskoka lakes: first records of the European invader in inland lakes in Canada. *Canadian Journal of Fisheries and Aquatic Sciences* **49**:422-426.
- Yan, N. D., K. M. Somers, R. E. Girard, A. M. Paterson, W. Keller, C. W. Ramcharan, J. A. Rusak, R. Ingram, G. E. Morgan, and J. M. Gunn. 2008. Long-term trends in zooplankton of Dorset, Ontario, lakes: the probable interactive effects of changes in pH, total phosphorus, dissolved organic carbon, and predators. *Canadian Journal of Fisheries and Aquatic Sciences* **65**:862-877.