SUPPLEMENTAL INFORMATION FOR:

Greenhouse gas emissions from lakes and impoundments: upscaling in the face of global change

Tonya DelSontro[1*‡], J. J. Beaulieu[2‡], John A. Downing[3]

1. Groupe de Recherche Interuniversitaire en Limnologie (GRIL), Département des sciences biologiques, Université du Québec à Montréal, Case postale 8888, succ. Centre-Ville, Montréal, QC, H3C 3P8 Canada

2. United States Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio, 45268 USA

3. University of Minnesota, Minnesota Sea Grant and Large Lakes Observatory, Duluth, Minnesota, USA

*Corresponding author: tdelsontro@gmail.com

[‡]These two authors made approximately equal contributions to the manuscript

Note 1: *Manuscript published March 2018 in Limnology & Oceanography Letters and found at* https://doi.org/10.1002/lol2.10073

Note 2: *Full supplementary dataset can be found online at* https://doi.org/10.6084/m9.figshare.5220001 *under 'siData.csv'*

Table S1. Source references for data used in this study. These references are also available as an Excel file at https://doi.org/10.6084/m9.figshare.5220001 ("Table S1-SI-reference-list.xlsx").

Full Citation for Data Source	**Metadata**
Åberg, J., Bergström, A.-K., Algesten, G., Söderback, K. & Jansson, M. A comparison of the carbon balances of a natural lake (L. Örträsket) and a hydroelectric reservoir (L. Skinnmuddselet) in northern Sweden. Water Res. 38, 531–538 (2004).	Reported in Deemer et al. (2016)

Full Citation for Data Source	Metadata
Abril, G. et al. Carbon dioxide and methane emissions and the carbon budget of a 10-year old tropical reservoir (Petit Saut, French Guiana). Glob. Biogeochem. Cycles 19, GB4007 (2005).	Reported in Deemer et al. (2016)
Adamczyk, E.M. & Shurin, J.B. Seasonal changes in plankton food web structure and carbon dioxide flux from southern California reservoirs. PLoS ONE 10, 1-20 (2015).	Reported in Deemer et al. (2016)
Aladin, N. V., Filippov, A. A., Plotnikov, I. S., Orlova, M. I., & Williams, W. D. (1998). Changes in the structure and function of biological communities in the Aral Sea, with particular reference to the northern part (Small Aral Sea), 1985-1994: A review. *International Journal of Salt Lake Research*, *7*(4), 301–343. http://doi.org/10.1023/A:1009009924839	Used for nutrient or chlorophyll data in large lakes
Algesten, G., Sobek, S., Bergström, A.-K., Jonsson, A., Tranvik, L. J., & Jansson, M. (2005). Contribution of sediment respiration to summer CO2 emission from low productive boreal and subarctic lakes. Microbial Ecology, 50(4), 529–35. http://doi.org/10.1007/s00248-005-5007-x	
Alin, S. R., & Johnson, T. C. (2007). Carbon cycling in large lakes of the world: A synthesis of production, burial, and lake-atmosphere exchange estimates. Global Biogeochemical Cycles, 21(3), 1–12. http://doi.org/10.1029/2006GB002881	Used data compiled for this study; Converted annual flux to daily flux; TP data found independently from sources below
Almeida, R.M. et al. High primary production contrasts with intense carbon emission in a eutrophic tropical reservoir. Front. Microbiol. 7, 1-13 (2016).	Reported in Deemer et al. (2016)
Alshboul, Z. & Lorke, A. Carbon dioxide emissions from reservoirs in the lower Jordan Watershed. PLoS ONE 10, 1-18 (2015).	Reported in Deemer et al. (2016)
Andrade, G. de S. D. Greenhouse gas emission (GHG) and atmospheric impacts accrue from hydroelectricity production: Case study of Volta Grande hydropower plant. (Unviersidade Federal de Minas Gerais PhD Thesis, 2014).	Reported in Deemer et al. (2016)
Bansal, S., Chakraborty, M., Katyal, D. & Garg, J. K. Methane flux from a subtropical reservoir located in the floodplains of river Yamuna, India. Appl. Ecol. Environ. Res. 13, (2015).	Reported in Deemer et al. (2016)
Barlow, G. W., et al. (1976). Chemical analyses of some crater lakes in relation to adjacent Lake Nicaragua, in Investigations of the Ichthyofauna of Nicaraguan Lakes, edited by T. B. Thorson, pp. 17-20, School of Life Sciences, Lincoln, Nebraska.	Reported in Alin and Johnson (2007)
Barros, N. et al. Carbon emission from hydroelectric reservoirs linked to reservoir age and latitude. Nat. Geosci. 4, 593–596 (2011).	Reported in Deemer et al. (2016)
Bastien, J., Tremblay, A. & LeDrew, L. Greenhouse gases fluxes from Smallwood Reservoir and natural water bodies in Labrador, Newfoundland, Canada. Verhandlungen Int. Ver. Theor. Angew. Limnol. 30, 858–861 (2009).	Reported in Deemer et al. (2016)

Full Citation for Data Source	**Metadata**
Bastien, J., Tremblay, A. & Scanlon, A. CO2 and CH4 fluxes from Tasmanian aquatic systems, Australia. Verh. Int. Ver. Limnol. 30, 854–857 (2009).	Reported in Deemer et al. (2016)
Bastviken, D., Cole, J., Pace, M., & Tranvik, L. (2004). Methane emissions from lakes: Dependence of lake characteristics, two regional assessments, and a global estimate. Global Biogeochemical Cycles, 18(4), 1–12, doi:10.1029/2004GB002238.	Used data compiled in Table 1 of this study; Was in contact with for individual flux and/or variable data
Bastviken, D., Ejlertsson, J., & Tranvik, L. (2002). Measurement of methane oxidation in lakes: a comparison of methods. Environmental Science & Technology, 36(15), 3354–61, doi:10.1021/es010311.	Reported in Bastviken et al. (2004)
Bauerle, E., et al. (1998). Some meteorological, hydrologica, and hydrodynamical aspects of Upper Lake Constance, Ergebnisse der Limnologie, 53, 31-83.	Reported in Alin and Johnson (2007)
Beaulieu et al. (2017) unpublished data	
Beaulieu, J. J. et al. Denitrification alternates between a source and sink of nitrous oxide in the hypolimnion of a thermally stratified reservoir. Limnol. Oceanogr. 59, 495–506 (2014).	Reported in Deemer et al. (2016)
Beaulieu, J. J., Smolenski, R. L., Nietch, C. T., Townsend-Small, A. & Elovitz, M. S. High methane emissions from a midlatitude reservoir draining an agricultural watershed. Environ. Sci. Technol. 48, 11100–11108 (2014).	Reported in Deemer et al. (2016)
Bell, G. L. (1980a). Eastern Lake Superior chemical and physical characteristics data for 1968, NOAA Data Report, Great Lakes Environmental Research Laboratory, Ann Arbor.	Reported in Alin and Johnson (2007)
Bell, G. L. (1980b). Lake Ontario chemical and physical characteristics data for 1972, NOAA Data Report, Great Lakes Environmental Research Laboratory, Ann Arbor.	Reported in Alin and Johnson (2007)
Bell, G. L. (1980c). Northern Lake Michigan chemical and physical characteristics data for 1970, NOAA Data Report, Great Lakes Environmental Research Laboratory, Ann Arbor.	Reported in Alin and Johnson (2007)
Bell, G. L. (1980d). Western Lake Superior chemical and physical characteristics data for 1969, NOAA Data Report, Great Lakes Environmental Research Laboratory, Ann Arbor.	Reported in Alin and Johnson (2007)
Bergier, I., Novo, E. M. L. M., Ramos, F. M., Mazzi, E. A. & Rasera, M. F. F. L. Carbon dioxide and methane fluxes in the littoral zone of a tropical savanna reservoir (Corumbá, Brazil). Oecologia Aust. 15, 666–681 (2011).	Reported in Deemer et al. (2016)
Bergström, A.-K., Algesten, G., Sobek, S., Tranvik, L. & Jansson, M. Emission of CO2 from hydroelectric reservoirs in northern Sweden. Arch. Hydrobiol. 159, 25–42 (2004).	Reported in Deemer et al. (2016)
Bevelhimer, M.S., Stewart, A.J., Fortner, A.M., Phillips, J.R. & Mosher, J.J. CO2 is dominants greenhouse gas emitted from six hydropower reservoirs in southeastern United State during peak summer emissions. Water 8, 1-14 (2016).	Reported in Deemer et al. (2016)

Full Citation for Data Source	**Metadata**
Blackie, C. T., Weese, D. J., & Noakes, D. L. G. (2003). Evidence for resource polymorphism in the lake charr (Salvelinus namaycush) population of Great Bear Lake, Northwest Territories, Canada. *Écoscience*, *10*(4), 509–514. http://doi.org/10.1080/11956860.2003.11682799	Used for nutrient or chlorophyll data in large lakes
Brothers, S. M., del Giorgio, P. A., Teodoru, C. R., Prairie, Y. T. & Smith, R. Landscape heterogeneity influences carbon dioxide production in a young boreal reservoir. Can. J. Fish. Aquat. Sci. 69, 447–456 (2012).	Reported in Deemer et al. (2016)
Carmouze, J.-P., and J. Lemoalle (1983). The lacustrine environment, in Lake Chad: Ecology and Productivity of a Shallow Tropical Ecosystem, edited by J.-P. Carmouze, et al., pp. 27-64, Dr. W. Junk Publishers, The Hague.	Reported in Alin and Johnson (2007)
Carmouze, J.-P., et al. (1983). Physical and chemical characteristics of the waters, in Lake Chad: Ecology and Productivity of a Shallow Tropical Ecosystem, edited by J.-P. Carmouze, et al., pp. 65-94, Dr. W. Junk Publishers, Boston.	Reported in Alin and Johnson (2007)
Casper, P., Maberly, S. C., Hall, G. H., & Finlay, B. J. (2000). Fluxes of methane and carbon dioxide from a small productive lake to the atmosphere. Biogeochemistry, 49(1), 1–19.	Reported in Bastviken et al. (2004)
Castillo, I., Guerra, N., Caicedo, M., Prieto, M., Soto, L., Soto, L., & Lopez, C. (2015). Abundance of Planktonic Nanoflagellates and their relationship with physical and chemical factors in the straitof lake maracaibo. *CIENCIA*, *23*(4), 172–180.	Used for nutrient or chlorophyll data in large lakes
Chale, F. M. M. (2004). Inorganic nutrient concentrations and chlorophyll in the euphotic zone of Lake Tanganyika. *Hydrobiologia*, *523*(1–3), 189–197. http://doi.org/10.1023/B:HYDR.0000033125.87313.53	Used for nutrient or chlorophyll data in large lakes
Chanudet, V. et al. Gross CO2 and CH4 emissions from the Nam Ngum and Nam Leuk sub-tropical reservoirs in Lao PDR. Sci. Total Environ. 409, 5382–5391 (2011).	Reported in Deemer et al. (2016)
Chapra, S. C., & Dolan, D. M. (2012). Great Lakes total phosphorus revisited: 2. Mass balance modeling. *Journal of Great Lakes Research*, *38*(4), 741–754. http://doi.org/10.1016/j.jglr.2012.10.002	Used for nutrient or chlorophyll data in large lakes
Chau, Y. K., et al. (1977). Sampler for collecting evolved gases from sediment. Water Research 11(9): 807-809	Reported in Bastviken et al. (2004)
Chavula, G., Brezonik, P., Thenkabail, P., Johnson, T., & Bauer, M. (2009). Estimating chlorophyll concentration in Lake Malawi from MODIS satellite imagery. *Physics and Chemistry of the Earth*, *34*(13–16), 755–760. http://doi.org/10.1016/j.pce.2009.07.015	Used for nutrient or chlorophyll data in large lakes
Chen, H. et al. Methane emissions from the surface of the Three Gorges Reservoir. J. Geophys. Res. 116, D21306 (2011).	Reported in Deemer et al. (2016)

Full Citation for Data Source	Metadata
Chen, H., et al. (2011). Nitrous oxide fluxes from the littoral zone of a lake on the Qinghai-Tibetan Plateau. Environmental Monitoring and Assessment 182(1-4): 545-553.	
Chen, N., Chen, Z., Wu, Y. & Hu, A. Understanding gaseous nitrogen removal through direct measurement of dissolved N2 and N2O in a subtropical river-reservoir system. Ecol. Eng. 70, 56–67 (2014).	Reported in Deemer et al. (2016)
Deemer, B. R., Harrison, J. A. & Whitling, E. W. Microbial dinitrogen and nitrous oxide production in a small eutrophic reservoir: An in situ approach to quantifying hypolimnetic process rates. Limnol. Oceanogr. 56, 1189–1199 (2011).	Reported in Deemer et al. (2016)
Deemer, B. R., Harrison, J. A., Li, S., Beaulieu, J. J., DelSontro, T., Barros, N., … Vonk, J. A. (2016). Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis. BioScience, 66(11), 949–964; doi:10.1093/biosci/biw117.	Used impoundment data compiled for this synthesis; Was in contact with for individual flux and/or variable data
DelSontro, T. et al. Spatial heterogeneity of methane ebullition in a large tropical reservoir. Environ. Sci. Technol. 45, 9866–9873 (2011).	Reported in Deemer et al. (2016)
DelSontro, T., McGinnis, D. F., Sobek, S., Ostrovsky, I. & Wehrli, B. Extreme methane emissions from a Swiss hydropower reservoir: contribution from bubbling sediments. Environ. Sci. Technol. 44, 2419–2425 (2010).	Reported in Deemer et al. (2016)
Demarty, M., Bastien, J. & Tremblay, A. Annual follow-up of gross diffusive carbon dioxide and methane emissions from a boreal reservoir and two nearby lakes in Québec, Canada. Biogeosciences 8, 41–53 (2011).	Reported in Deemer et al. (2016)
Demarty, M., Bastien, J., Tremblay, A., Hesslein, R. H. & Gill, R. Greenhouse gas emissions from boreal reservoirs in Manitoba and Québec, Canada, measured with automated systems. Environ. Sci. Technol. 43, 8908–8915 (2009).	Reported in Deemer et al. (2016)
Deshmukh, C. et al. Physical controls on CH4 emissions from a newly flooded subtropical freshwater hydroelectric reservoir: Nam Theun 2. Biogeosciences 11, 4251–4269 (2014).	Reported in Deemer et al. (2016)
Deshmukh, C. Greenhouse gas emissions (CH4, CO2 and N2O) from a newly flooded hydroelectric reservoir in subtropical South Asia: The case of Nam Theun 2 Reservoir, Lao PDR. (Université Paul Sabatier- Toulouse III PhD Thesis, 2013).	Reported in Deemer et al. (2016)
Diem, T., Koch, S., Schwarzenbach, S., Wehrli, B. & Schubert, C. J. Greenhouse gas emissions (CO2, CH4, and N2O) from several perialpine and alpine hydropower reservoirs by diffusion and loss in turbines. Aquat. Sci. 74, 619–635 (2012).	Reported in Deemer et al. (2016)
Domagalski, J. L., et al. (1989). Organic geochemistry and brine composition in Great Salt, Mono, and Walker Lakes, Geochimica et Cosmochimica Acta, 53, 2857-2872.	Reported in Alin and Johnson (2007)

Full Citation for Data Source	**Metadata**
Dos Santos, M. A., Rosa, L. P., Sikar, B., Sikar, E. & dos Santos, E. O. Gross greenhouse gas fluxes from hydro-power reservoir compared to thermo-power plants. Energy Policy 34, 481–488 (2006).	Reported in Deemer et al. (2016)
Downes, M. T. (1991). The Production and Consumption of Nitrate in an Eutrophic Lake during Early Stratification. Archiv Fur Hydrobiologie 122(3): 257-274.	
Duarte, C. M., Prairie, Y. T., Montes, C., Cole, J. J., Striegl, R., Melack, J., & Downing, J. A. (2008). CO2 emissions from saline lakes: A global estimate of a surprisingly large flux. Journal of Geophysical Research: Biogeosciences, 113(4), 1–7. http://doi.org/10.1029/2007JG000637	Was in contact with authors for individual flux and/or variable data
Duchemin, É. et al. Comparison of greenhouse gas emissions from an old tropical reservoir with those from other reservoirs worldwide. Verhandlungen Int. Ver. Theor. Angew. 27, 1391–1395 (2000).	Reported in Deemer et al. (2016)
Duchemin, É., Lucotte, M., Canuel, R. & Chamberland, A. Production of the greenhouse gases CH4 and CO2 by hydroelectric reservoirs of the boreal region. Glob. Biogeochem. Cycles 9, 529–540 (1995).	Reported in Deemer et al. (2016)
Edmond, J. M., et al. (1993). Nutrient chemistry of the water column of Lake Tanganyika, Limnology and Oceanography, 38, 725-738.	Reported in Alin and Johnson (2007)
Eugster, W., DelSontro, T. & Sobek, S. Eddy covariance flux measurements confirm extreme CH4 emissions from a Swiss hydropower reservoir and resolve their short-term variability. Biogeosciences 8, 2815–2831 (2011).	Reported in Deemer et al. (2016)
Fallon, R. D., Harrits, S., Hanson, R. S., & Brock, T. D. (1980). The role of methane in internal carbon cycling in Lake Mendota during summer stratification. Limnology and Oceanography, 25(2), 357–360. http://doi.org/10.4319/lo.1980.25.2.0357	Reported in Bastviken et al. (2004)
Fedorov, M.P. et al. Reservoir greenhouse gas emissions at Russian HPP. Power Technology and Engineering 49, 33-39 (2015).	Reported in Deemer et al. (2016)
Finlay, K., Vogt, R. J., Bogard, M. J., Wissel, B., Tutolo, B. M., Simpson, G. L., & Leavitt, P. R. (2015). Decrease in CO2 efflux from northern hardwater lakes with increasing atmospheric warming. Nature, 8. http://doi.org/10.1038/nature14172	Was in contact with authors for individual flux and/or variable data
Fish, C. J., and Associates (1960). Limnological Survey of Eastern and Central Lake Erie, United States Fish and Wildlife Service, Washington, D.C.	Reported in Alin and Johnson (2007)
Forsyth et al. (1998). The Lake Okaro ecosystem 1. Background Limnology New Zealand Journal of Marine and Freshwater Research. for morphometry.	
Frumin, G. T., et al. (1996). Lake Ladoga: chemical pollution and biochemical self-purification, Hydrobiologia, 322, 143-147.	Reported in Alin and Johnson (2007)

Full Citation for Data Source	Metadata
Goldman, C. R. (1988). Primary productivity, nutrients, and transparency during the early onset of eutrophication in ultra-oligotrophic Lake Tahoe, California-Nevada. *Limnology and Oceanography*, *33*(6), 1321–1333. http://doi.org/10.4319/lo.1988.33.6.1321	Used for nutrient or chlorophyll data in large lakes
Goldman, C. R. (1988). Primary productivity, nutrients, and transparency during the early onset of eutrophication in ultra-oligotrophic Lake Tahoe, California-Nevada. *Limnology and Oceanography*, *33*(6), 1321–1333. http://doi.org/10.4319/lo.1988.33.6.1321	Used for nutrient or chlorophyll data in large lakes
Gonfiantini, R., et al. (1979). Isotope investigation of Lake Malawi, in Isotopes in Lake Studies, edited, pp. 195-207, International Atomic Energy Agency.	Reported in Alin and Johnson (2007)
Gonzalez-Valencia, R. et al. Methane emissions from Mexican freshwater bodies: correlations with water pollution. Hydrobiologia 721, 9-22 (2014).	Reported in Deemer et al. (2016)
Gruca-Rokosz, R., Czerwieniec, E. & Tomaszek, J. A. Methane emission from the Nielisz reservoir. Environ. Prot. Eng. 37, 101–109 (2011).	Reported in Deemer et al. (2016)
Gruca-Rokosz, R., Tomaszek, J., Koszelnik, P. & Czerwieniec, E. Methane and carbon dioxide emission from some reservoirs in SE Poland. Limnol. Rev. 10, 15–21 (2010).	Reported in Deemer et al. (2016)
Guérin, F. et al. Methane and carbon dioxide emissions from tropical reservoirs: Significance of downstream rivers. Geophys. Res. Lett. 33, (2006).	Reported in Deemer et al. (2016)
Hampton, S. E., Izmest'eva, L. R., Moore, M. V., Katz, S. L., Dennis, B., & Silow, E. A. (2008). Sixty years of environmental change in the world's largest freshwater lake - Lake Baikal, Siberia. *Global Change Biology*, *14*(8), 1947–1958. http://doi.org/10.1111/j.1365-2486.2008.01616.x	Used for nutrient or chlorophyll data in large lakes
Harrison, J. A., Deemer, Bridget R., Birchfield, M.K. & Glavin, M.T. Water-level drawdown and eutrophication accelerate and may amplify methane emissions from Pacific Northwest U.S. reservoirs. Environ. Sci. Technol. In Revision.	Reported in Deemer et al. (2016)
Heath, R., Fahnenstiel, G. L., Gardner, W. S., Cavaletto, J., & Hwang, S. (1995). Ecosystem-level effects of zebra mussels (Dreissena polymorpha): An enclosure experiment in Saginaw Bay, Lake Huron. *Journal of Great Lakes Research*, *21*(4), 501–516.	Used for nutrient or chlorophyll data in large lakes
Hecky, R. E., Mugidde, R., Ramlal, P. S., Talbot, M. R., & Kling, G. W. (2010). Multiple stressors cause rapid ecosystem change in Lake Victoria. *Freshwater Biology*, *55*(SUPPL. 1), 19–42. http://doi.org/10.1111/j.1365-2427.2009.02374.x	Used for nutrient or chlorophyll data in large lakes
Hendzel, L. L. et al. Nitrous oxide fluxes in three experimental boreal forest reservoirs. Environ. Sci. Technol. 39, 4353–4360 (2005).	Reported in Deemer et al. (2016)

Full Citation for Data Source	Metadata
Hobson, M. M. (1977). Water chemistry of Lake Maracaibo, Venezuela, and adjoining rivers and lagoons, Congreso Geologico Venezolano, V, 1807-1828.	Reported in Alin and Johnson (2007)
Hobson, M. M. (1979). A preliminary geochemical study of Lake Maracaibo, Venezuela, Ph.D. thesis, 201 pp, University of Tulsa, Tulsa.	Reported in Alin and Johnson (2007)
Howard, D. L., et al. (1971). The potential for methane carbon cycling in Lake Erie. 14th Conference on Great Lakes Research, Int, Assoc. of Great Lakes Res. Ann Arbor, MI.	Reported in Bastviken et al. (2004)
Huttunen, J. T. et al. Fluxes of CH4, CO2, and N2O in hydroelectric reservoirs Lokka and Porttipahta in the northern boreal zone in Finland. Glob. Biogeochem. Cycles 16, 1003 (2002).	Reported in Deemer et al. (2016)
Huttunen, J. T., et al. (2003). Fluxes of methane, carbon dioxide and nitrous oxide in boreal lakes and potential anthropogenic effects on the aquatic greenhouse gas emissions. Chemosphere 52(3): 609-621.	
Iltis, A., et al. (1992). Physico-chemical properties of the water, in Lake Titicaca: A Synthesis of Limnological Knowledge, edited by C. Dejoux and A. Iltis, pp. 89-97, Kluwer Academic, Dordrecht.	Reported in Alin and Johnson (2007)
Imboden, D. M., et al. (1977). Lake Tahoe geochemical study. 1. Lake chemistry and tritium mixing study, Limnology and Oceanography, 22, 1039-1051.	Reported in Alin and Johnson (2007)
Institutionen for Miljoanalys [http://info1.ma.slu.se]	Reported in Alin and Johnson (2007)
International Joint Commission (1976). The Waters of Lake Huron and Lake Superior. Volume I: Summary and Recommendations, 236 pp, International Joint Commission, Windsor, Ontario.	Reported in Alin and Johnson (2007)
Itoh, M. et al. Effect of interannual variation in winter vertical mixing on CH4 dynamics in a subtropical reservoir. J. Geophys. Res. Biogeosci. 120, 1246-1261 (2015).	Reported in Deemer et al. (2016)
Jacinthe, P. A., Filippelli, G. M., Tedesco, L. P. & Raftis, R. Carbon storage and greenhouse gases emission from a fluvial reservoir in an agricultural landscape. Catena 94, 53–63 (2012).	Reported in Deemer et al. (2016)
JICA. (2000). *Control integral de la contaminacion del agua de la bahia interior de puno en el Lago Titicaca en la Republica del Peru*.	Used for nutrient or chlorophyll data in large lakes
Jones, J. R., Obrecht, D. V, Graham, J. L., Balmer, M. B., Filstrup, C. T., & Downing, J. A. (2016). Seasonal patterns in carbon dioxide in 15 mid-continent (USA) reservoirs. Inland Waters, 6, 265–272. http://doi.org/10.5268/IW-6.2.982	Converted annual flux to daily flux
Joyce, J. & Jewell, P. W. Physical controls on methane ebullition from reservoirs and lakes. Environ. Eng. Geosci. 9, 167–178 (2003).	Reported in Deemer et al. (2016)

Full Citation for Data Source	**Metadata**
Kalff, J. (1983). Phosphorus limitation in some tropical African lakes. *Hydrobiologia*, *100*(1), 101–112. http://doi.org/10.1007/BF00027425	Used for nutrient or chlorophyll data in large lakes
Katsev, S. (2017). When large lakes respond fast: A parsimonious model for phosphorus dynamics. *Journal of Great Lakes Research*, *43*(1), 199–204. http://doi.org/10.1016/j.jglr.2016.10.012	Used for nutrient or chlorophyll data in large lakes
Keller, M. & Stallard, R. F. Methane emission by bubbling from Gatun Lake, Panama. J. Geophys. Res. 99, 8307–8319 (1994).	Reported in Deemer et al. (2016)
Kelly, C. A. et al. Increases in fluxes of greenhouse gases and methyl mercury following flooding of an experimental reservoir. Environ. Sci. Technol. 31, 1334–1344 (1997).	Reported in Deemer et al. (2016)
Kelly, C. a., Fee, E., Ramlal, P. S., Rudd, J. W. M., Hesslein, R. H., Anema, C., & Schindler, E. U. (2001). Natural variability of carbon dioxide and net epilimnetic production in the surface waters of boreal lakes of different sizes. Limnology and Oceanography, 46(5), 1054–1064. http://doi.org/10.4319/lo.2001.46.5.1054	
Kelly, C. A., Rudd, J. W., St Louis, V. L. & Moore, T. Turning attention to reservoir surfaces, a neglected area in greenhouse studies. Eos Trans. Am. Geophys. Union 75, 332–333 (1994).	Reported in Deemer et al. (2016)
Kemenes, A., Forsberg, B. R. & Melack, J. M. CO2 emissions from a tropical hydroelectric reservoir (Balbina, Brazil). J. Geophys. Res. 116, G03004 (2011).	Reported in Deemer et al. (2016)
Kemenes, A., Forsberg, B. R. & Melack, J. M. Methane release below a tropical hydroelectric dam. Geophys. Res. Lett. 34, L12809 (2007).	Reported in Deemer et al. (2016)
Kling, G. W., Kipphut, G. W., & Miller, M. C. (1992). The flux of CO2 and CH4 from lakes and rivers in arctic Alaska. Hydrobiologia, 240, 23–36.	Reported in Bastviken et al. (2004)
Knoll, L. B., Vanni, M. J., Renwick, W. H., Dittman, E. K. & Gephart, J. A. Temperate reservoirs are large carbon sinks and small CO2 sources: Results from high-resolution carbon budgets. Glob. Biogeochem. Cycles 27, 52–64 (2013).	Reported in Deemer et al. (2016)
Kortelainen, P., Huttunen, J. T., Vaisanen, T., Mattsson, T., Karjalainen, P., & Martikainen, P. (2000). CH4, CO2 and N2O supersaturation in 12 Finnish lakes before and after ice melt. Verh. Int. Ver. Limnol., 27(3), 1410–1414.	Was in contact with authors for individual flux and/or variable data; Calculated flux using methods of Rantakari and Kortelainen (2005)
Kortelainen, P., Rantakari, M., Huttunen, J. T., Mattsson, T., Alm, J., Juutinen, S., … Martikainen, P. J. (2006). Sediment respiration and lake trophic state are important predictors of large CO2 evasion from small boreal lakes. Global Change Biology, 12(8), 1554–1567. http://doi.org/10.1111/j.1365-2486.2006.01167.x	Was in contact with authors for individual flux and/or variable data

Full Citation for Data Source	Metadata
Kozhova, O. M., and L. R. Izmest'eva (1998). Lake Baikal: Evolution and Biodiversity, Backhuys Publishers, Leiden.	Reported in Alin and Johnson (2007)
Kumar, A. & Sharma, M. P. Impact of water quality on GHG emissions from Hydropower Reservoir. J Mater Env. Sci 5, 95–100 (2014).	Reported in Deemer et al. (2016)
Kumar, A. & Sharma, M.P. Assessment of risk of GHG emissions from Tehri hydropower reservoir, India. Human and Ecological Risk Assessment 22, 71-85 (2016).	Reported in Deemer et al. (2016)
Lacayo, M. (1991). Physical and Chemical Features of Lake Xolotl . *Aquatic Ecology*, *25*(2), 111–116. Retrieved from http://www.springerlink.com/index/J73417G42240061V.pdf	Used for nutrient or chlorophyll data in large lakes
Lapierre, J.-F., Guillemette, F., Berggren, M., & Del Giorgio, P. a. (2013). Increases in terrestrially derived carbon stimulate organic carbon processing and CO2 emissions in boreal aquatic ecosystems. Nature Communications, 4, 2972. http://doi.org/10.1038/ncomms3972	Supplied by P. del Giorgio
Lazzarino, J. K., Bachmann, R. W., Hoyer, M. V., & Canfield, D. E. (2009). Carbon dioxide supersaturation in Florida lakes. Hydrobiologia, 627(1), 169–180. http://doi.org/10.1007/s10750-009-9723-y	Supplied by D. Canfield
Lehman, J. T., and D. K. Branstrator (1994). Nutrient dynamics and turnover rates of phosphate and sulfate in Lake Victoria, East Africa, Limnology and Oceanography, 39, 227-233.	Reported in Alin and Johnson (2007)
Lehman, J. T., et al. (1998). Nutrients and plankton biomass in the rift lake sources of the White Nile: lakes Albert and Edward, in Environmental Change and Response in East African Lakes, edited by J. T. Lehman, pp. 157-172, Kluwer Academic Publishers, Dordrecht, The Netherlands.	Reported in Alin and Johnson (2007)
Li, S. & Zhang, Q. Major ion chemistry and weathering processes of the Danjiangkou Reservoir, China. Hydrol. Sci. J. 55, 1385–1395 (2010).	Reported in Deemer et al. (2016)
Li, S. & Zhang, Q. Partial pressure of CO2 and CO2 emission in a monsoon-driven hydroelectric reservoir (Danjiangkou Reservoir), China. Ecol. Eng. 71, 401–414 (2014).	Reported in Deemer et al. (2016)
Li, S., Zhang, Q., Bush, R. T. & Sullivan, L. A. Methane and CO2 emissions from China's hydroelectric reservoirs: a new quantitative synthesis. Environ. Sci. Pollut. Res. 22, 5325–5339 (2015).	Reported in Deemer et al. (2016)
Li, Z. et al. Spatio-temporal variations of carbon dioxide and its gross emission regulated by artificial operation in a typical hydropower reservoir in China. Environ. Monit. Assess. 186, 3023–3039 (2014).	Reported in Deemer et al. (2016)
Lima, I. B. T. Biogeochemical distinction of methane releases from two Amazon hydroreservoirs. Chemosphere 59, 1697–1702 (2005).	Reported in Deemer et al. (2016)

Full Citation for Data Source	**Metadata**
Lima, I. B. T. et al. Methane, carbon dioxide and nitrous oxide emissions from two Amazonian Reservoirs during high water table. Verh. Int. Ver. Limnol. 28, 438–442 (2002).	Reported in Deemer et al. (2016)
Lima, I. B. T., de Moraes Novo, E. M. L., Ballester, M. V. R. & Ometto, J. P. Methane production, transport and emission in Amazon hydroelectric plants. in Geoscience and Remote Sensing Symposium Proceedings, 1998. IGARSS'98. 1998 IEEE International 5, 2529–2531 (IEEE, 1998).	Reported in Deemer et al. (2016)
Limon, J. G., et al. (1989). Long- and short-term variation in the physical and chemical limnology of a large, shallow, turbid tropical lake(Lake Chapala, Mexico), Archiv fur Hydrobiologie, Suppl. 83, 57-81.	Reported in Alin and Johnson (2007)
Liu, H. et al. Large CO2 effluxes at night and during synoptic weather events significantly contribute to CO2 emissions from a reservoir. Environ. Res. Letters 11, 1-8 (2016).	Reported in Deemer et al. (2016)
Liu, X.-L. et al. Spatiotemporal variations of nitrous oxide (N2O) emissions from two reservoirs in SW China. Atmos. Environ. 45, 5458–5468 (2011).	Reported in Deemer et al. (2016)
Lu, F. et al. Preliminary report on methane emissions from the Three Gorges Reservoir in the summer drainage period. J. Environ. Sci. 23, 2029–2033 (2011).	Reported in Deemer et al. (2016)
Lü, Y. C., Liu, C.-Q., Wang, S. L., Xu, G. & Liu, F. Seasonal variability of pCO2 in the two Karst reservoirs, Hongfeng and Baihua Lakes in Guizhou Province, China. Environ. Sci. 28, 2674–2681 (2007).	Reported in Deemer et al. (2016)
Maberly, S. C., Barker, P. a., Stott, A. W., Ville, D., & Mitzi, M. (2013). Catchment productivity controls CO2 emissions from lakes. Nature Climate Change, 3(4), 391–394. http://doi.org/10.1038/nclimate1748	Was in contact with authors for individual flux and/or variable data; Converted annual flux to daily flux
Macias, J. G. L., & Lind, O. (1990). The Management of Lake Chapala (México): Considerations After Significant Changes in the Water Regime. *Lake And Reservoir Management*, *6*(1), 61–70. http://doi.org/10.1080/07438149009354696	Used for nutrient or chlorophyll data in large lakes
Maeck, A. et al. Sediment trapping by dams creates methane emission hot spots. Environ. Sci. Technol. 47, 8130–8137 (2013).	Reported in Deemer et al. (2016)
Maeck, A., Hofmann, H. & Lorke, A. Pumping methane out of aquatic sediments- ebullition forcing mechanisms in an impounded river. Biogeosciences 11, 2925–2938 (2014).	Reported in Deemer et al. (2016)
Mandych, A. F. (Ed.) (1995). Enclosed Seas and Large Lakes of Eastern Europe and Middle Asia, SPB Academic Publishing, Amsterdam.	Reported in Alin and Johnson (2007)

Full Citation for Data Source	Metadata
Marcé, R., Obrador, B., Morguí, J.-A., Lluís Riera, J., López, P., & Armengol, J. (2015). Carbonate weathering as a driver of CO2 supersaturation in lakes. Nature Geoscience, 8, 107–111. http://doi.org/10.1038/ngeo2341	Was in contact with authors for individual flux and/or variable data
Marcelino, A.A. et al. Diffusive emission of methane and carbon dioxide from two hydropower reservoirs in Brazil. Braz. J. Biol. 75, 331-338 (2015).	Reported in Deemer et al. (2016)
Matthews, C. J. et al. Carbon dioxide and methane production in small reservoirs flooding upland boreal forest. Ecosystems 8, 267–285 (2005).	Reported in Deemer et al. (2016)
Mattson, M. D., & Likens, G. E. (1993). Redox reactions of organic matter decomposition in a soft water lake. Biogeochemistry, 19(3), 149–172. http://doi.org/10.1007/BF00000876	Reported in Bastviken et al. (2004)
Mccauley, E., Downing, J. A., & Watson, S. (1989). Sigmoid relationships between nutrients and chlorophyll among lakes. *Canadian Journal of Fisheries and Aquatic Sciences*, *46*, 1171–1175.	Used for nutrient or chlorophyll data in large lakes
McDonald, C. P., Stets, E. G., Striegl, R. G., & Butman, D. (2013). Inorganic carbon loading as a primary driver of dissolved carbon dioxide concentrations in the lakes and reservoirs of the contiguous United States. Global Biogeochemical Cycles, 27(2), 285–295. http://doi.org/10.1002/gbc.20032	Was in contact with authors for individual flux and/or variable data
Mello, N. A. S. T., Brighenti, L. S., Barbosa, F. A. R. & Neto, J. F. B. N. Spatial variability of methane (CH4) ebullition in a tropical hypereutrophic reservoir: silted areas as a bubble hotspot. (Universidade Federal de Minas Gerais, Brazil PhD Thesis, 2015)	Reported in Deemer et al. (2016)
Mengis, M., Gächter, R., & Wehrli, B. (1996). Nitrous oxide emissions to the atmosphere from an artificially oxygenated lake. Limnology and Oceanography, 41(3), 548–553. http://doi.org/10.4319/lo.1996.41.3.0548	
Michmerhuizen, C. M., Striegl, R. G., & Mcdonald, M. E. (1996). Potential methane emission from north-temperate lakes following ice melt. Limnology and Oceanography, 41(5), 985–991. http://doi.org/10.4319/lo.1996.41.5.0985	Reported in Bastviken et al. (2004)
Miettinen, H., Pumpanen, J., Heiskanen, J. J., Aaltonen, H., Mammarella, I., Ojala, A., … Rantakari, M. (2015). tTowards a more comprehensive understanding of lacustrine greenhouse gas dynamics — two- year measurements of concentrations and fluxes of CO2 , CH4 and N2O in a typical boreal lake surrounded by managed forests. Boreal Environment Research, 20, 75–89.	
Miyajima, T., et al. (1997). Distribution of greenhouse gases, nitrite, and delta C-13 of dissolved inorganic carbon in Lake Biwa: Implications for hypolimnetic metabolism. Biogeochemistry 36(2): 205-221.	Reported in Bastviken et al. (2004)

Full Citation for Data Source	Metadata
Montenegro-Guillen, S. (1991). Limnological perspective of Lake Xolotlan Managua): the PLALM, Hydrobiological Bulletin, 25, 105-109.	Reported in Alin and Johnson (2007)
Moore, W. (1980). Seasonal Distribution of Phytoplankton in Yellowknife Bay, Great Slave Lake. *Int. Revue Ges. Hydrobiol*, *65*(2), 283–293.	Used for nutrient or chlorophyll data in large lakes
Morales-Pineda, M., Cózar, A., Laiz, I., Úbeda, B. & Gálvez, J. Á. Daily, biweekly, and seasonal temporal scales of CO2 variability in two stratified Mediterranean reservoirs. J. Geophys. Res. Biogeosciences 119, 509–520 (2014).	Reported in Deemer et al. (2016)
Mosher,J.J. et al. Spatial and temporal correlates of greenhouse gas diffusion from a hydropower reservoir in the southern United States. Water 7, 5910-5927 (2015).	Reported in Deemer et al. (2016)
Musenze, R. S. et al. Assessing the spatial and temporal variability of diffusive methane and nitrous oxide emissions from subtropical freshwater reservoirs. Environ. Sci. Technol. 48, 14499–14507 (2014).	Reported in Deemer et al. (2016)
Nasrollahzadeh, H. S., Din, Z. Bin, Foong, S. Y., & Makhlough, A. (2008). Trophic status of the Iranian Caspian Sea based on water quality parameters and phytoplankton diversity. *Continental Shelf Research*, *28*(9), 1153–1165. http://doi.org/10.1016/j.csr.2008.02.015	Used for nutrient or chlorophyll data in large lakes
National Data Buoy Center [http://ndbc.noaa.gov]	Reported in Alin and Johnson (2007)
Navarro, M. B., Balseiro, E., & Modenutti, B. (2014). Bacterial Community Structure in Patagonian Andean Lakes Above and Below Timberline: From Community Composition to Community Function. *Microbial Ecology*, *68*(3), 528–541. http://doi.org/10.1007/s00248-014-0439-9	Used for nutrient or chlorophyll data in large lakes
Ogata, E. M., Wurtsbaugh, W. A., Smith, T. N., & Durham, S. L. (2017). Bioassay analysis of nutrient and Artemia franciscana effects on trophic interactions in the Great Salt Lake, USA. *Hydrobiologia*, *788*(1). http://doi.org/10.1007/s10750-016-2881-9	Used for nutrient or chlorophyll data in large lakes
Ojala, A., Bellido, J. L., Tulonen, T., Kankaala, P., & Huotari, J. (2011). Carbon gas fluxes from a brown-water and a clear-water lake in the boreal zone during a summer with extreme rain events. Limnology and Oceanography, 56(1), 61–76. http://doi.org/10.4319/lo.2011.56.1.0061	
Ometto, J. P. et al. Carbon emission as a function of energy generation in hydroelectric reservoirs in Brazilian dry tropical biome. Energy Policy 58, 109–116 (2013).	Reported in Deemer et al. (2016)

Full Citation for Data Source	**Metadata**
Outram, F. N. and K. M. Hiscock (2012). Indirect nitrous oxide emissions from surface water bodies in a lowland arable catchment: a significant contribution to agricultural greenhouse gas budgets? Environmental Science & Technology 46(15): 8156-8163.	
Pacheco, F. S. et al. The effects of river inflow and retention time on the spatial heterogeneity of chlorophyll and water–air CO2 fluxes in a tropical hydropower reservoir. Biogeosciences 12, 147–162 (2015).	Reported in Deemer et al. (2016)
Pacheco, F., Roland, F. & Downing, J. Eutrophication reverses whole-lake carbon budgets. Inland Waters 4, 41–48 (2013).	Reported in Deemer et al. (2016)
Parra-Pardi, G. (1983). Cone-Shaped Hypolimnion and Local Reactor as Outstanding Features in Eutrophication of Lake Maracaibo. *Journal of Great Lakes Research*, *9*(4), 439–451. http://doi.org/10.1016/S0380-1330(83)71918-0	Used for nutrient or chlorophyll data in large lakes
Patterson, G., and O. Kachinjika (1995). Limnology and phytoplankton ecology, in The Fishery Potential and Productivity of the Pelagic Zone of Lake Malawi/Niassa, edited by A. Menz, pp. 1-67, Natural Resources Institute, Chatham, UK.	Reported in Alin and Johnson (2007)
Petr, T. (1992). Lake Balkhash, Kazakhstan. *International Journal of Salt Lake Research*, *1*(1), 21–46. http://doi.org/10.1007/BF02904950	Used for nutrient or chlorophyll data in large lakes
Plisnier, P. D., Chitamwebwa, D., Mwape, L., Tshibangu, K., Langenberg, V., & Coenen, E. (1999). Limnological annual cycle inferred from physical-chemical fluctuations at three stations of Lake Tanganyika. In *From Limnology to Fisheries: Lake Tanganyika and Other Large Lakes* (pp. 45-58). Springer Netherlands.	Used for nutrient or chlorophyll data in large lakes
Popovskaya, G. I., Firsova, A. D., Bessudova, A. Y., Sakirko, M. V., Suturin, A. N., & Likhoshway, Y. V. (2012). Phytoplankton of the Irkutsk Reservoir as an indicator of water quality. *Oceanological and Hydrobiological Studies*, *41*(2), 29–38. http://doi.org/10.2478/s13545-012-0014-2	Used for nutrient or chlorophyll data in large lakes
Poste, A. E., Hecky, R. E., & Guildford, S. J. (2011). Evaluating microcystin exposure risk through fish consumption. *Environmental Science and Technology*, *45*(13), 5806–5811. http://doi.org/10.1021/es200285c	Used for nutrient or chlorophyll data in large lakes
Poste, A. E., Muir, D. C. G., Guildford, S. J., & Hecky, R. E. (2015). Bioaccumulation and biomagnification of mercury in African lakes: The importance of trophic status. *Science of the Total Environment*, *506–507*, 126–136. http://doi.org/10.1016/j.scitotenv.2014.10.094	Used for nutrient or chlorophyll data in large lakes
Pothoven, S. A., & Fahnenstiel, G. L. (2013). Recent change in summer chlorophyll a dynamics of southeastern Lake Michigan. *Journal of Great Lakes Research*, *39*(2), 287–294. http://doi.org/10.1016/j.jglr.2013.02.005	Used for nutrient or chlorophyll data in large lakes

Full Citation for Data Source	**Metadata**
Rantakari, M., & Kortelainen, P. (2005). Interannual variation and climatic regulation of the CO2 emission from large boreal lakes. Global Change Biology, 11(8), 1368–1380. http://doi.org/10.1111/j.1365-2486.2005.00982.x	Was in contact with authors for individual flux and/or variable data
Rasilo, T., Prairie, Y. T., & del Giorgio, P. A. (2015). Large-scale patterns in summer diffusive CH4 fluxes across boreal lakes, and contribution to diffusive C emissions. Global Change Biology, 21, 1124–1139, doi:10.1111/gcb.12741. http://doi.org/10.1111/gcb.12741	Supplied by P. del Giorgio
Riera, J. L., Schindler, J. E., & Kratz, T. K. (1999). Seasonal dynamics of carbon dioxide and methane in two clear-water lakes and two bog lakes in northern Wisconsin, U.S.A. Can J Fish Aquat Sci, 274, 1–10. http://doi.org/10.1139/f98-182	Reported in Bastviken et al. (2004)
Rinta, P., Bastviken, D., Schilder, J., Van Hardenbroek, M., Stötter, T., & Heiri, O. (2017). Higher late summer methane emission from central than northern European lakes. Journal of Limnology, 76(1), 52–67. http://doi.org/10.4081/jlimnol.2016.1475	
Roehm, C. & Tremblay, A. Role of turbines in the carbon dioxide emissions from two boreal reservoirs, Québec, Canada. J. Geophys. Res. 111, (2006).	Reported in Deemer et al. (2016)
Roland, F. et al. Variability of carbon dioxide flux from tropical (Cerrado) hydroelectric reservoirs. Aquat. Sci. 72, 283–293 (2010).	Reported in Deemer et al. (2016)
Rosa, L. P. et al. Biogenic gas production from major Amazon reservoirs, Brazil. Hydrol. Process. 17, 1443–1450 (2003).	Reported in Deemer et al. (2016)
Rosa, L. P., Dos Santos, M. A., Matvienko, B., dos Santos, E. O. & Sikar, E. Greenhouse gas emissions from hydroelectric reservoirs in tropical regions. Clim. Change 66, 9–21 (2004).	Reported in Deemer et al. (2016)
Rudd, J. W. M., & Hamilton, R. D. (1978). Methane cycling in a eutrophic shield lake and its effects on whole lake metabolism. Limnology and Oceanography, 23(2), 337–348. http://doi.org/10.4319/lo.1978.23.2.0337	Reported in Bastviken et al. (2004)
Rukhovets, L. A., Astrakhantsev, G. P., Menshutkin, V. V., Minina, T. R., Petrova, N. A., & Poloskov, V. N. (2003). Development of Lake Ladoga ecosystem models: Modeling of the phytoplankton succession in the eutrophication process. I. *Ecological Modelling*, *165*(1), 49–77. http://doi.org/10.1016/S0304-3800(03)00061-9	Used for nutrient or chlorophyll data in large lakes
Salk, K. R., et al. (2016). Ecosystem metabolism and greenhouse gas production in a mesotrophic northern temperate lake experiencing seasonal hypoxia. Biogeochemistry 131(3): 303-319.	

Full Citation for Data Source	**Metadata**
Sarmento, H., Isumbisho, M., & Descy, J. P. (2006). Phytoplankton ecology of Lake Kivu (eastern Africa). *Journal of Plankton Research*, *28*(9), 815–829. http://doi.org/10.1093/plankt/fbl017	Used for nutrient or chlorophyll data in large lakes
Sarmento, H., Isumbisho, M., Stenuite, S., Darchambeau, F., & Leporcq, B. (2009). Phytoplankton ecology of Lake Kivu (eastern Africa): biomass, production and elemental ratios. *Proceedings of the International Association of Theoretical and Applied Limnology*, *30*(January), 709–713.	Used for nutrient or chlorophyll data in large lakes
Savvaitova, K., and T. Petr (1992). Lake Issyk-kul, Kirgizia, International Journal of Salt Lake Research, 1, 21-46.	Reported in Alin and Johnson (2007)
Schilder, J., Bastviken, D., van Hardenbroek, M., Kankaala, P., Rinta, P., Stötter, T., & Heiri, O. (2013). Spatial heterogeneity and lake morphology affect diffusive greenhouse gas emission estimates of lakes. Geophysical Research Letters, 40(21), 5752–5756. http://doi.org/10.1002/2013GL057669	
Schindler, D. W. (1972). Production of phytoplankton and zooplankton in Canadian Shield Lakes, in Productivity Problems of Freshwaters, edited by Z. Kajak and A. Hillbricht-Ilkowska, pp. 309-331, Polish Scientific Publishers, Warsaw.	Reported in Alin and Johnson (2007)
Schulz, M., et al. (2001). The methane cycle in the epilimnion of Lake Constance. Archiv Fur Hydrobiologie 151(1): 157-176.	Reported in Bastviken et al. (2004)
Selvam, B. P., Natchimuthu, S., Arunachalam, L. & Bastviken, D. Methane and carbon dioxide emissions from inland waters in India - implications for large scale greenhouse gas balances. Glob. Change Biol. 20, 3397–3407 (2014).	Reported in Deemer et al. (2016)
Sharov, A. N., Berezina, N. A., Nazarova, L. E., Poliakova, T. N., & Chekryzheva, T. A. (2014). Links between biota and climate-related variables in the Baltic region using Lake Onega as an example. *Oceanologia*, *56*(2), 291–306. http://doi.org/10.5697/oc.56-2.291	Used for nutrient or chlorophyll data in large lakes
Smith, K., & Lewis, W. . (1992). Seasonality of methane emissions from five lakes and associated wetlands of the Colorado Rockies. Global Biogeochem. Cycles, 6(4), 323–338.	Reported in Bastviken et al. (2004)
Smith, L. K. & Lewis, W. M. J. Seasonality of methane emissions from five lakes and associated wetlands of the Colorado Rockies. Glob. Biogeochem. Cycles 6, 323–338 (1992).	Reported in Deemer et al. (2016)
Sommer, U., Gaedke, U., & Schweizer, A. (1993). The first decade of oligotrophication of Lake Constance. *Oecologia*, *93*, 276–284. http://doi.org/10.1007/BF00317682	Used for nutrient or chlorophyll data in large lakes
Soued, C., del Giorgio, P. A., & Maranger, R. (2016). Nitrous oxide sinks and emissions in boreal aquatic networks in Québec. Nature Geoscience, (December), 1–7. http://doi.org/10.1038/ngeo2611	Supplied by R. Maranger and P. del Giorgio

Full Citation for Data Source	Metadata
Soumis, N., Duchemin, É., Canuel, R. & Lucotte, M. Greenhouse gas emissions from reservoirs of the western United States. Glob. Biogeochem. Cycles 18, GB3022 (2004).	Reported in Deemer et al. (2016)
St. Louis, V. L., Kelly, C. A., Duchemin, É., Rudd, J. W. & Rosenberg, D. M. Reservoir surfaces as sources of greenhouse gases to the atmosphere: a global estimate. BioScience 50, 766–775 (2000).	Reported in Deemer et al. (2016)
Stabel, H.-H. (1986). Calcite precipitation in Lake Constance: chemical equilibrium, sedimentation, and nucleation by algae, Limnology and Oceanography, 31, 1081-1093.	Reported in Alin and Johnson (2007)
Strayer, R. F., & Tiedje, J. M. (1978). In situ methane production in a small, hypereutrophic, hard-water lake: Loss of methane from sediments by vertical diffusion and ebullition. Limnology and Oceanography, 23(6), 1201–1206. http://doi.org/10.4319/lo.1978.23.6.1201	Reported in Bastviken et al. (2004)
Sturm, K., Yuan, Z., Gibbes, B., Werner, U. & Grinham, A. Methane and nitrous oxide sources and emissions in a subtropical freshwater reservoir, South East Queensland, Australia. Biogeosciences 11, 5245–5258 (2014).	Reported in Deemer et al. (2016)
Tadonléké, R. D., Marty, J. & Planas, D. Assessing factors underlying variation of CO2 emissions in boreal lakes vs. reservoirs. FEMS Microbiol. Ecol. 79, 282–297 (2012).	Reported in Deemer et al. (2016)
Talling, J. F. (1963). Origin of stratification in an African rift lake, Limnology and Oceanography, 8, 68-78.	Reported in Alin and Johnson (2007)
Talling, J. F., and I. B. Talling (1965). The chemical composition of African lake waters, Int. Revue ges. Hydrobiol., 50, 421-463.	Reported in Alin and Johnson (2007)
Teodoru, C. R. et al. The net carbon footprint of a newly created boreal hydroelectric reservoir. Glob. Biogeochem. Cycles 26, GB2016 (2012).	Reported in Deemer et al. (2016)
Teodoru, C.R. et al. Dynamics of greenhouse gases (CO2,CH4,N2O) along the Zambezi River and major tributaries, and their importance in the riverine carbon budget. Biogeosciences 12, 2431-2453 (2015).	Reported in Deemer et al. (2016)
Therrien, J., Tremblay, A. & Jacques, R. B. in Greenhouse Gas Emissions- Fluxes and Processes: Hydroelectric Reservoirs and Natural Environments (eds. Tremblay, A., Varfalvy, L., Roehm, C. & Garneau, M.) (Springer, 2005).	Reported in Deemer et al. (2016)
Tremblay, A., Therrien, J., Hamlin, B., Wichmann, E. & LeDrew, L. J. in Greenhouse gas emissions-- fluxes and processes hydroelectric reservoirs and natural environments (eds. Tremblay, A., Varfalvy, L., Roehm, C. & Garneau, M.) 209–232 (Springer, 2005). at <http://public.eblib.com/choice/publicfullrecord.aspx?p=304099>	Reported in Deemer et al. (2016)

Full Citation for Data Source	Metadata
Tsigelnaya, I. D. (1995). Issyk-Kul' lake, in Enclosed Seas and Large Lakes of Eastern Europe and Middle Asia, edited by A. F. Mandych, pp. 199-229, SPB Academic Publishing, Amsterdam.	Reported in Alin and Johnson (2007)
Utsumi, M., et al. (1998). Dynamics of dissolved methane and methane oxidation in dimictic Lake Nojiri during winter. Limnology and Oceanography 43(1): 10-17.	Reported in Bastviken et al. (2004)
Utsumi, M., et al. (1998). Oxidation of dissolved methane in a eutrophic, shallow lake: Lake Kasumigaura, Japan. Limnology and Oceanography 43(3): 471-480.	Reported in Bastviken et al. (2004)
Vammen, K., Tercero, J., & Guillén, S. (2006). Evaluación del proceso de eutroficación del lago cocibolca, nicaragua y sus causas en la cuenca. In *Eutrophication in South America: causes, consequences and technologies for management and control* (p. 25). Retrieved from http://www.bvsde.org.ni/Web_textos/CIRA/CIRA0018/proceso de eutrofizacion lago cocibolca.pdf	Used for nutrient or chlorophyll data in large lakes
Venkiteswaran, J. J. et al. Processes affecting greenhouse gas production in experimental boreal reservoirs. Glob. Biogeochem. Cycles 27, 567–577 (2013).	Reported in Deemer et al. (2016)
Vincent, W. F., Wurtsbaugh, W., Vincent, C. L., & Richerson, P. J. (1984). Seasonal dynamics of nutrient limitation in a tropical high-altitude lake (Lake Titicaca, Peru-Bolivia): Application of physiological bioassays. *Limnology and Oceanography*, *29*(3), 540–552. http://doi.org/10.4319/lo.1984.29.3.0540	Used for nutrient or chlorophyll data in large lakes
Wang, F. et al. Carbon dioxide emission from surface water in cascade reservoirs–river system on the Maotiao River, southwest of China. Atmos. Environ. 45, 3827–3834 (2011).	Reported in Deemer et al. (2016)
Wang, F. et al. Seasonal variation of CO2 diffusion flux from a large subtropical reservoir in East China. Atmos. Environ. 103, 129–137 (2015).	Reported in Deemer et al. (2016)
Wang, H. J., et al. (2006). Littoral zones as the hotspots of nitrous oxide (N2O) emission in a hyper-eutrophic lake in China. Atmospheric Environment 40(28): 5522-5527.	
Wang, H., Yang, L., Wang, W., Lu, J., & Yin, C. (2007). Nitrous oxide (N2O) fluxes and their relationships with water-sediment characteristics in a hyper-eutrophic shallow lake, China. Journal of Geophysical Research: Biogeosciences, 112(1), G01005. http://doi.org/10.1029/2005JG000129	
Wang, X., et al. (2017). Greenhouse gases concentrations and fluxes from subtropical small reservoirs in relation with watershed urbanization. Atmospheric Environment 154: 225-235.	
Wang, Y.-H., Huang, H.-H., Chu, C.-P. & Chuag, Y.-J. A preliminary survey of greenhouse gas emission from three reservoirs in Taiwan. Sustain. Environ. Res. 23, 215–225 (2013).	Reported in Deemer et al. (2016)

Full Citation for Data Source	**Metadata**
Weyhenmeyer, G. A., Kosten, S., Wallin, M. B., Tranvik, L. J., Jeppesen, E., & Roland, F. (2015). Significant fraction of CO2 emissions from boreal lakes derived from hydrologic inorganic carbon inputs. Nature Geosci, 8(12), 933–939. http://doi.org/10.1038/NGEO2582	Was in contact with authors for individual flux and/or variable data
Whitfield, C. J., et al. (2011). Controls on greenhouse gas concentrations in polymictic headwater lakes in Ireland. Science of the Total Environment 410-411: 217-225.	
Willén, E. (2001). Phytoplankton and water quality characterization: experiences from the Swedish large lakes Mälaren, Hjälmaren, Vättern and Vänern. *Ambio*, *30*(8), 529–537. http://doi.org/10.1579/0044-7447-30.8.529	Used for nutrient or chlorophyll data in large lakes
Wright, S. (1955). Limnological Survey of Western Lake Superior, United States Fish and Wildlife Service, Washington, D.C.	Reported in Alin and Johnson (2007)
Wu, Y. Greenhouse gas flux from newly created marshes in the drawdown area of the Three Gorges Reservoir. (Chongqing University Masters Thesis, 2012).	Reported in Deemer et al. (2016)
Xiao, S. et al. Diel and seasonal variation of methane and carbon dioxide fluxes at Site Guojiaba, the Three Gorges Reservoir. J. Environ. Sci. 25, 2065–2071 (2013).	Reported in Deemer et al. (2016)
Yang, H., Andersen, T., Dorsch, P., Tominaga, K., Thrane, J. E., & Hessen, D. O. (2015). Greenhouse gas metabolism in Nordic boreal lakes. Biogeochemistry, 126(1–2), 211–225. http://doi.org/10.1007/s10533-015-0154-8	Was in contact with authors for individual flux and/or variable data
Yang, L. et al. Spatial and seasonal variability of diffusive methane emissions from the Three Gorges Reservoir. J. Geophys. Res. Biogeosciences 118, 471–481 (2013).	Reported in Deemer et al. (2016)
Yu, Y. X. et al. Spatiotemporal characteristics and diffusion flux of partial pressure of dissolved carbon dioxide (pCO2) in Hongjiadu reservoir. Chin. J. Ecol. 27, 1193–1199 (2008).	Reported in Deemer et al. (2016)
Yuretich, R. F., and T. E. Cerling (1983). Hydrogeochemistry of Lake Turkana, Kenya: mass balance and mineral reactions in an alkaline lake, Geochimica et Cosmochimica Acta, 47, 1099-1109.	Reported in Alin and Johnson (2007)
Zhang, W., & Rao, Y. R. (2012). Application of a eutrophication model for assessing water quality in Lake Winnipeg. *Journal of Great Lakes Research*, *38*(SUPPL. 3), 158–173. http://doi.org/10.1016/j.jglr.2011.01.003	Used for nutrient or chlorophyll data in large lakes
Zhao, Y. et al. A comparison of methods for the measurement of CO2 and CH4 emissions from surface water reservoirs: Results from an international workshop held at Three Gorges Dam, June 2012. Limnol. Oceanogr. Methods 13, 15–29 (2015).	Reported in Deemer et al. (2016)
Zhao, Y., Wu, B. F. & Zeng, Y. Spatial and temporal patterns of greenhouse gas emissions from Three Gorges Reservoir of China. Biogeosciences 10, 1219–1230 (2013).	Reported in Deemer et al. (2016)

Full Citation for Data Source	Metadata
Zhen, F. Greenhouse gas emisison from Three Gorges Reservoir (upper Zhongxian County). (Postdoctoral report in the University of Chinese Academy of Sciences, China, 2012).	Reported in Deemer et al. (2016)
Zheng, H. et al. Spatial-temporal variations of methane emissions from the Ertan hydroelectric reservoir in southwest China. Hydrol. Process. 25, 1391–1396 (2011).	Reported in Deemer et al. (2016)
Zhu, D. et al. Nitrous oxide emissions from the surface of the Three Gorges Reservoir. Ecol. Eng. 60, 150–154 (2013).	Reported in Deemer et al. (2016)

Tables S2- S4. For convenience, tables from Downing et al. (2006), Verpoorter et al. (2014), and Messager et al. (2016), showing the joint distributions of size and productivity, are available as an Excel file at https://figshare.com/s/c6a4133f3595b67a9816 under "Tables_S2_S3_S4_SizeChlaDistributions.xlsx".

Table S2. Chlorophyll a (chla) distribution according to Sayer et al. 2015 propagated across Downing et al. 2006 surface area (SA) distribution

Downing et al. 2006		Chla fraction distribution (%)		28.45	13.97	11.07	9.14	7.69	6.17	5.00	4.24	3.21	2.59	1.90	1.34	1.21	0.86	0.72	0.48	0.31	0.34	0.28	0.03
		Chla (μg L^{-1})		2.5	7.5	12.5	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.5	57.5	62.5	67.5	72.5	77.5	82.5	87.5	92.5	97.5
		TP (μg L^{-1})		13	32	48	63	77	90	102	115	127	138	150	161	172	183	193	204	214	224	234	244
SA bin min (km^2)	SA bin max (km^2)	Number of systems	Total SA (km^2)	Total lake and impoundment surface area according to global chla distribution (km^2)																			
0.001	0.01	2.8E+08	692600	197033	96725	76664	63289	53259	42750	34630	29376	22211	17912	13136	9314	8359	5971	5015	3344	2149	2388	1911	239
0.01	0.1	2.5E+07	614140	174712	85768	67979	56120	47225	37907	30707	26048	19695	15883	11648	8259	7412	5294	4447	2965	1906	2118	1694	212
0.1	1	2.2E+06	539830	153572	75390	59754	49329	41511	33321	26991	22896	17312	13961	10238	7260	6515	4654	3909	2606	1675	1861	1489	186
1	10	1.9E+05	477540	135852	66691	52859	43637	36721	29476	23877	20254	15314	12350	9057	6422	5763	4117	3458	2305	1482	1647	1317	165
10	100	1.7E+04	423002	120337	59074	46822	38654	32527	26109	21150	17941	13565	10940	8022	5689	5105	3647	3063	2042	1313	1459	1167	146
100	1000	1487	371666	105733	51905	41140	33963	28580	22941	18583	15764	11919	9612	7049	4998	4486	3204	2691	1794	1153	1282	1025	128
1000	10000	126	314996	89611	43991	34867	28784	24222	19443	15750	13360	10102	8146	5974	4236	3802	2716	2281	1521	978	1086	869	109
1E+04	1E+05	17	639650	392974	74257	42587	0	0	13010	48362	0	0	0	68460	0	0	0	0	0	0	0	0	0
1E+05	1E+06	1	378119	378119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table S3. Chlorophyll a (chla) distribution according to Sayer et al. 2015 propagated across Verpoorter et al. 2014 surface area (SA) distribution

Verpoorter et al. 2014		Chla fraction distribution (%)		28.45	13.97	11.07	9.14	7.69	6.17	5.00	4.24	3.21	2.59	1.90	1.34	1.21	0.86	0.72	0.48	0.31	0.34	0.28	0.03
		Chla (μg L^{-1})		2.5	7.5	12.5	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.5	57.5	62.5	67.5	72.5	77.5	82.5	87.5	92.5	97.5
		TP (μg L^{-1})		13	32	48	63	77	90	102	115	127	138	150	161	172	183	193	204	214	224	234	244
SA bin min (km^2)	SA bin max (km^2)	Number of systems	Total SA (km^2)	Total lake and impoundment surface area according to global chla distribution (km^2)																			
0.001	0.01	2.8E+08	367277	104484	51292	40654	33562	28242	22670	18364	15578	11778	9499	6966	4939	4433	3166	2660	1773	1140	1266	1013	127
0.01	0.1	2.4E+07	673437	191581	94049	74542	61538	51785	41567	33672	28563	21596	17416	12772	9057	8128	5806	4877	3251	2090	2322	1858	232
0.1	1	2.1E+06	985939	280483	137691	109133	90094	75815	60856	49297	41817	31618	25498	18699	13259	11899	8500	7140	4760	3060	3400	2720	340
1	10	1.8E+05	779444	221738	108853	86276	71225	59937	48111	38972	33059	24996	20158	14783	10482	9407	6719	5644	3763	2419	2688	2150	269
10	100	1.6E+04	598285	170202	83554	66224	54671	46006	36929	29914	25376	19186	15473	11347	8046	7221	5158	4332	2888	1857	2063	1650	206
100	1000	1330	482520	137269	67386	53410	44092	37104	29783	24126	20465	15474	12479	9151	6489	5824	4160	3494	2329	1497	1664	1331	166
1000	10000	105	535504	152342	74786	59275	48934	41178	33054	26775	22713	17173	13849	10156	7202	6463	4616	3878	2585	1662	1847	1477	185
1E+04	1E+05	16	607650	392974	42257	42587	0	0	13010	48362	0	0	0	68460	0	0	0	0	0	0	0	0	0
1E+05	1E+06	1	378119	378119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table S4. Chlorophyll a (chla) distribution according to Sayer et al. 2015 propagated across Messager et al. 2016 surface area (SA) distribution

Messager et al. 2016		Chla fraction distribution (%)		28.45	13.97	11.07	9.14	7.69	6.17	5.00	4.24	3.21	2.59	1.90	1.34	1.21	0.86	0.72	0.48	0.31	0.34	0.28	0.03
		Chla (µg L^{-1})		2.5	7.5	12.5	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.5	57.5	62.5	67.5	72.5	77.5	82.5	87.5	92.5	97.5
		TP (µg L^{-1})		13	32	48	63	77	90	102	115	127	138	150	161	172	183	193	204	214	224	234	244
SA bin min (km^2)	SA bin max (km^2)	Number of systems	Total SA (km^2)	Total lake and impoundment surface area according to global chla distribution (km^2)																			
0.001	0.1	?	557100[a]	158485	77802	61665	50907	42839	34387	27855	23629	17866	14408	10566	7492	6724	4803	4034	2689	1729	1921	1537	192
0.1	1	2.1E+06	344400	97976	48097	38122	31471	26483	21258	17220	14607	11045	8907	6532	4632	4157	2969	2494	1663	1069	1188	950	119
1	10	1.8E+05	411000	116922	57398	45493	37557	31605	25369	20550	17432	13180	10629	7795	5527	4960	3543	2976	1984	1276	1417	1134	142
10	100	1.6E+04	331600	94334	46310	36705	30301	25499	20468	16580	14064	10634	8576	6289	4459	4002	2859	2401	1601	1029	1143	915	114
100	1000	1330	313500	89185	43782	34701	28647	24107	19351	15675	13297	10054	8108	5946	4216	3784	2703	2270	1513	973	1081	865	108
1E+03	1E+04	105	313300	89128	43754	34679	28629	24092	19338	15665	13288	10047	8103	5942	4213	3781	2701	2269	1512	972	1080	864	108
1E+04	1E+06	17	985769[b]	771093	42257	42587	0	0	13010	48362	0	0	0	68460	0	0	0	0	0	0	0	0	0

Table S5. Univariate and multivariate models used to explain variation in areal emission rates of methane (CH4) diffusion, CH4 ebullition, total CH4 emission (diffusion + ebullition), carbon dioxide (CO2) diffusion, and nitrous oxide (N2O) diffusion. Candidate predictor variables are total phosphorus (TP), total nitrogen (TN), chlorophyll a (chl a), and surface area (SA). Multivariate models included SA, one other variable, and their interaction as possible main effects. Statistically significant effects (at p<0.05) are reported in 'Significant Effects" column. Coefficient of determination (r2), p-value (p), mean absolute error (mae), root mean squared error (rmse), and number of observations (n) are reported for each model. The best model for each gas and emission pathway is highlighted in bold font.

			Final Model				
Dependent Variable	Candidate Predictor Variables	Significant Effects	r^2	p	mae	rmse	n
	log10(TP)	log10(TP)	0.021	0.00	0.463	0.544	463
	log10(TN)	log10(TN)	0.087	0.00	0.444	0.527	380
	log10(Chl *a*)	log10(Chl *a*)	0.203	0.00	0.413	0.508	424
log10(CH_4 diffusion + 1)	log10(SA)	log10(SA)	0.050	0.00	0.494	0.614	602
	log10(SA) * log10(TP)	log10(SA) + log10(TP)	0.088	0.00	0.449	0.525	463
	log10(SA) * log10(TN)	log10(SA) + log10(TN)	0.166	0.00	0.419	0.504	380
	log10(SA) * log10(Chl *a*)	**log10(SA) * log10(Chl *a*)**	**0.290**	**0.00**	**0.395**	**0.480**	**423**
	log10(TP)	log10(TP)	0.292	0.00	0.543	0.648	101
	log10(TN)	log10(TN)	0.311	0.00	0.519	0.647	47
	log10(Chl *a*)	**log10(Chl *a*)**	**0.317**	**0.00**	**0.522**	**0.630**	**65**
log10(CH_4 ebullition + 1)	log10(SA)	-	0.013	0.19	0.669	0.775	137
	log10(SA) * log10(TP)	log10(TP)	0.292	0.00	0.543	0.648	101
	†log10(SA) * log10(TN)	†log10(SA) + log10(TN)	†0.387	†0.00	†0.486	†0.610	†47
	log10(SA) * log10(Chl *a*)	log10(Chl *a*)	0.280	0.00	0.526	0.634	64
	log10(TP)	log10(TP)	0.221	0.00	0.469	0.572	99
log10(CH_4 total + 1)	log10(TN)	log10(TN)	0.211	0.00	0.481	0.587	47
	log10(Chl *a*)	**log10(Chl *a*)**	**0.376**	**0.00**	**0.453**	**0.553**	**74**

	log10(SA)	-	0.000	0.94	0.587	0.700	159
	log10(SA) * log10(TP)	log10(TP)	0.221	0.00	0.469	0.572	99
	log10(SA) * log10(TN)	log10(SA) + log10(TN)	0.292	0.00	0.455	0.556	47
	log10(SA) * log10(Chl *a*)	log10(Chl *a*)	0.342	0.00	0.457	0.556	73
	log10(TP)	log10(TP)	0.008	0.00	0.257	0.347	6907
	log10(TN)	-	0.000	0.33	0.345	0.446	1932
	log10(Chl *a*)	log10(Chl *a*)	0.002	0.04	0.347	0.446	1812
log10(CO_2 diffusion+ 42.5)	log10(SA)	log10(SA)	0.087	0.00	0.250	0.335	6899
	log10(SA) * log10(TP)	**log10(SA) * log10(TP)**	**0.114**	**0.00**	**0.239**	**0.326**	**6716**
	log10(SA) * log10(TN)	log10(SA) + log10(TN)	0.014	0.00	0.343	0.444	1762
	log10(SA) * log10(Chl *a*)	log10(SA) + log10(Chl *a*)	0.008	0.00	0.346	0.442	1577
	log10(TP)	-	0.000	0.87	0.143	0.205	262
	log10(TN)	log10(TN)	0.016	0.05	0.139	0.202	246
	log10(Chl *a*)	log10(Chl *a*)	0.062	0.00	0.138	0.201	268
log10(N_2O diffusion + 0.25)	log10(SA)	log10(SA)	0.041	0.00	0.151	0.231	330
	log10(SA) * log10(TP)	log10(SA)	0.057	0.00	0.135	0.199	262
	log10(SA) * log10(TN)	log10(SA) + log10(TN)	0.066	0.00	0.132	0.196	246
	log10(SA) * log10(Chl *a*)	**log10(SA) + log10(Chl *a*)**	**0.090**	**0.00**	**0.135**	**0.198**	**268**

[†]Although the log10(SA) * log10(TN) model best explained variation in the ebullitive CH_4 flux, it was not chosen as the best model because all observations came from a single study (Rinta et al. 2017).

Table S6. Term coefficients, standard errors (SE) and p values for the best size-productivity weighted (SPW) models for carbon dioxide (CO_2; mg C m^{-2} d^{-1}), methane (CH_4; mg C m^{-2} d^{-1}), and nitrous oxide (N_2O; mg N m^{-2} d^{-1}) emission rates. Model terms include total phosphorus (TP; µg L^{-1}), chlorophyll a (chla; µg L^{-1}), and surface area (SA; km^2).

Dependent Variable	Model Term	Coefficient	SE	p
log10(CO_2 + 43)	Intercept	2.447	0.011	< 2.00E-16
	log10(SA)	-0.034	0.011	1.32E-03
	log10(TP)	0.080	0.009	2.32E-17
	log10(SA):log10(TP)	-0.072	0.009	4.51E-16
log10(diffusive CH_4 + 1)	Intercept	0.705	0.029	1.27E-80
	log10(SA)	-0.167	0.024	7.39E-12
	log10(chla)	0.530	0.047	1.57E-25
	log10(SA): log10(chla)	0.098	0.042	1.93E-02
log10(ebullitive CH_4 + 1)	Intercept	0.758	0.150	3.82E-06
	log10(chla)	0.752	0.139	1.06E-06
log10(total CH_4 + 1)	Intercept	0.940	0.122	5.87E-11
	log10(chla)	0.778	0.118	6.50E-09
log10(N_2O + 0.25)	Intercept	-0.505	0.014	5.59E-104
	log10(SA)	0.030	0.011	5.23E-03
	log10(chla)	0.104	0.030	5.88E-04

Table S7. Global carbon emissions in CO_2 equivalents (Pg C-CO_2eq/yr for each GHG) from lakes and impoundments and individual contributions to total radiative forcing from aquatic water bodies. Calculations are shown for the current global chla distribution as well as scenarios of generalized increases in 1, 5, and 10 µg/L. These represent small-moderate increases in global eutrophication.

Lake Size Distribution	Chla Scenario	Size-Productivity Weighted	CO_2 (%)	CH_4 (%)	N_2O (%)
Downing et al. 2006	Current	1.9	26.1	71.8	2.0
	+ 1 µg L^{-1}	2.0	25.2	72.8	2.0
	+ 5 µg L^{-1}	2.4	22.4	75.7	1.9
	+ 10 µg L^{-1}	2.7	19.9	78.3	1.8
Verpoorter et al. 2014	Current	2.3	22.9	75.0	2.1
	+ 1 µg L^{-1}	2.4	22.0	75.9	2.1
	+ 5 µg L^{-1}	2.8	19.4	78.7	2.0
	+ 10 µg L^{-1}	3.2	17.1	81.1	1.8
Messager et al. 2016	Current	1.3	19.6	77.8	2.6
	+ 1 µg L^{-1}	1.3	18.7	78.8	2.6
	+ 5 µg L^{-1}	1.5	16.0	81.6	2.4
	+ 10 µg L^{-1}	1.8	13.8	84.0	2.2

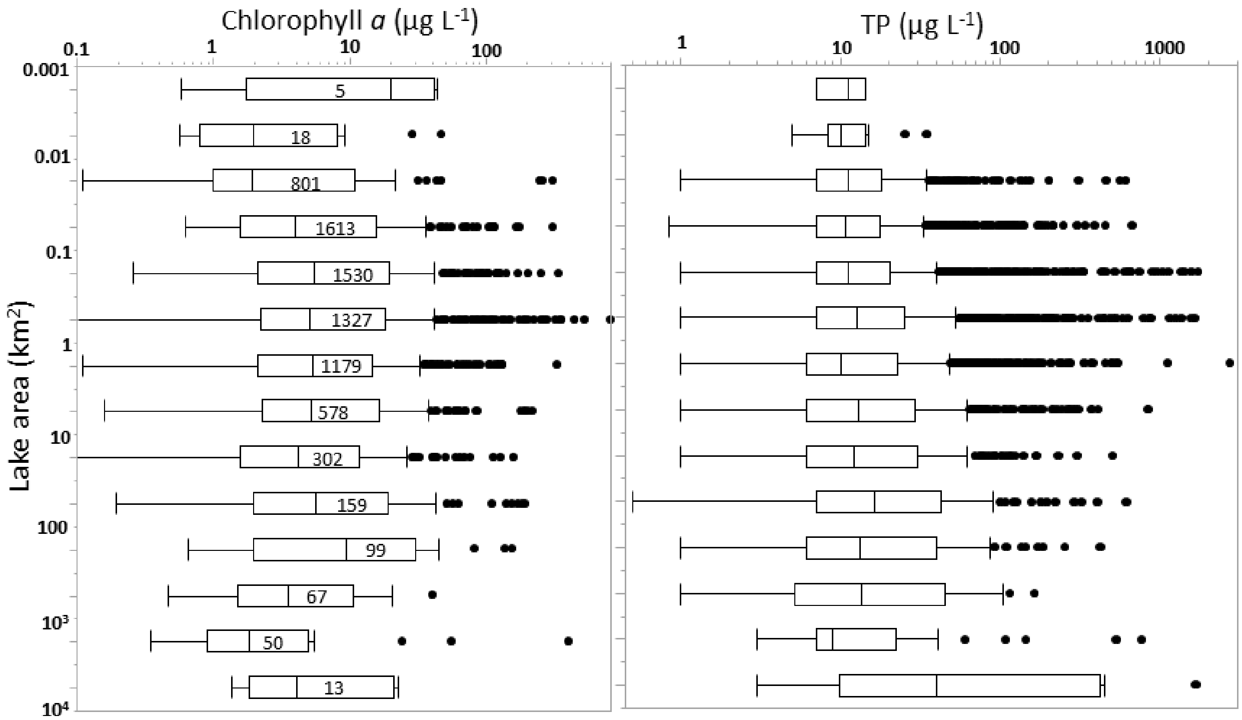

Figure S1. (Left) Boxplots of chla binned according to lake area, except for lakes of the two largest bin size classes. The box outlines the 1st and 3rd quartiles, the line within the box is the median, whiskers are maximum and minimum values and outliers are shown as black dots. Numbers in boxes are sample size. **(Right)** Boxplots of total phosphorus (TP) according to lake area, except for lakes of the two largest size classes. Sample sizes of chla bins on left correspond to TP boxplots as well. No significant relationship was found between chlorophyll and surface area (r^2=0.0006, p=0.2503) and a significant but extremely weak positive relationship was found between TP and surface area (r^2=0.007, p<0.0001). Because lake size accounted for so little variation in chla or TP we felt justified in assigning chlorophyll frequency distributions over all but the largest two size categories of lakes, for which we entered true concentrations.

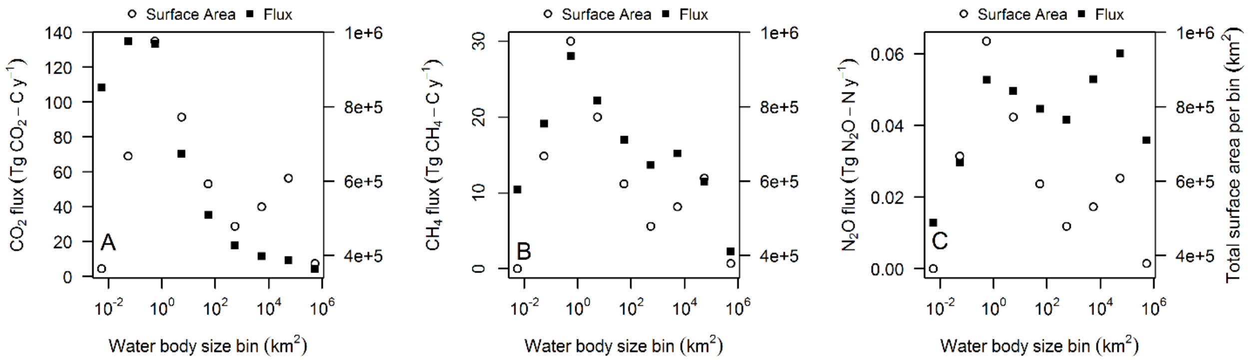

Figure S2 - Annual emissions (Tg Gas y^{-1}) per lake size bin according to the Verpoorter et al. (2014) distribution using the size-productivity weighted approach for A) the CO_2 data, B) the total CH_4 dataset, and C) N_2O.

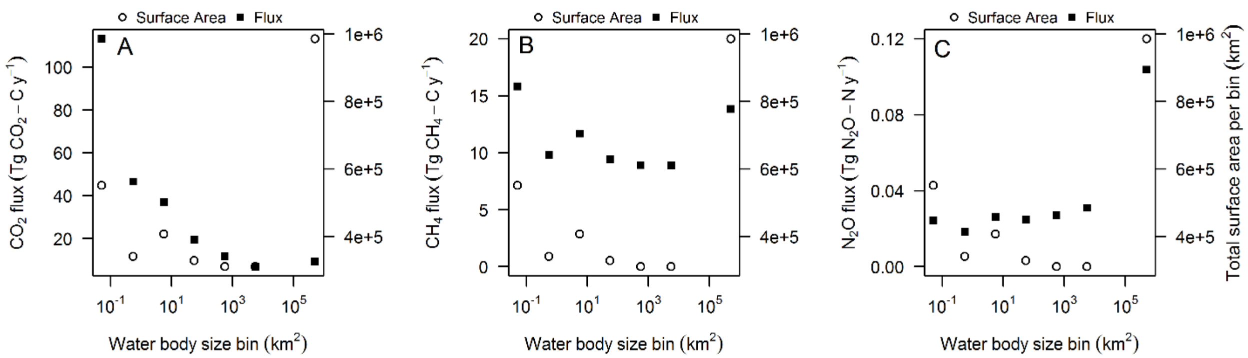

Figure S3 - Annual emissions (Tg Gas y^{-1}) per lake size bin according to the Messager et al. (2016) distribution using the size-productivity weighted approach for A) the CO_2 data, B) the total CH_4 dataset, and C) N_2O.