

Uniform temperature dependency in the phenology of a keystone herbivore in lakes of the Northern Hemisphere

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Table S1 Information on lakes in the Northern Hemisphere data set

This table provides latitudes, altitudes and water layers depths of temperatures reported in the individual publications, and sources of the data. Note that the water layer depth reported varies strongly between studies and that this will contribute to the unexplained variability of the phenology model.

Lake	latitude [°N]	elevation [m]	water layer of reported temperatures	Source
Ardleigh Reservoir	5	20	0 - 4 m	Abdul-Hussein & Mason 1987
Artificial Pond	36.02	25	0 - 1.4 m	Shei et al. 1988
Aziscoos Lake	45	460	surface	Tappa 1965
Bantam Lake	41.42	272	surface	Brooks 1946
Base Line Lake	42.26	259	surface	Hall 1964
Eglwys Nynydd	51.32	10	surface	George & Edwards 1974
Fort Whyte Lakes (II,III,IV)	49.49	230	surface	Depuis & Hann 2009
Großer Vätersee	53	60	2 m	Steiner 2002
Greifensee	47.33	435	0 - 5m	Mittelholzer 1970
Gronne	48.44	478	surface	Maier 1996
Groß-Glienicker See	52.28	31	surface	Deneke 2001
Hangdog Pond	45.37	190	0 - 1.7 m	Kwik & Carter 1975
Keuple Lake	47.26	700	0.5 m	Hazelwood & Parker 1961
Klostersee	47.58	533	surface	Seitz 1980
Lago Paione Superiore	46.1	2269	1 m	Callieri et al, 2006
Lago Trasimeno	43.08	259	0-5	Taticchi et al. 1991
Lago di Arancio	37.38	180	surface	Naselli-Flores & Barone 1997
Lake Buttermere	54.32	100	3 m	Smyly 1979
Lake Czarny	49.11	1583	0-5	Gliwicz et al. 2001
Lake Erken	59.5	11	0-epilimnion	Nauwerck 1963
Lake Esrom	56	17	surface	Petersen 1983
Lake Imikpuk	71.2	1	surface	Edmondson 1955
Lake Kvernavatnet	60.6	37	surface	Borsheim et al. 1988
Lake Lacawac	41.23	438	surface	Tessier 1986
Lake Lombola	69.07	214	0-epilimnion	Primicerio & Klemetsen, 1999
Lake Mekkojärvi	61.13	130	surface	Ojala & Salonen 2001
Lake Mitchell	43.47	449	0 - 3 m	DeMott 1983
Lake Morskie Oko	49.11	1395	0 - 5 m	Gliwicz et al. 2001
Lake Myvatn	63.35	278	1 m	Adalsteinsson 1979
Lake Oglethorpe	33.52	182	surface	Saunders et al. 1999
Lake Reading	38.24	350	0 - 2 m	Brunner 1984
Lake Sobygard	56.25	49	0 - 1 m	Jeppesen et al. 1990
Lake Thingvallatan	64.1	101	0-2m	Antonsson 1992
Lake Vechten	52.04	4	surface	Hovenkamp 1990

Lake Vela	40.16	45	0 - 1 m	Castro & Goncalves 2007
Lake Vesijärvi	61.01	81	surface	Nykänen et al. 2009
Lake Volkerak	51.38	-1	0 - 5 m	Mooji et al. 2003
Oberer Arosasee	46	1800	surface	Winder et al. 2003
Oneida Lake	43.2	34	2 m	Mills et al. 1978
Professoren Weiher	48.44	478	surface	Maier 1996
Richter Lake	45.12	438	0 m	Gannon et al 1984
Rio Seco Lake	37	3040	0 - 2.9 m	Perez-Martinez et al. 2007
Saidenbach Reservoir	50.44	439	mixed layer	Horn & Benndorf 1980
Saidenbach Reservoir	50.44	439	0 - 5 m	Pinkhaus et al. 2007
Stockton Lake	37.41	264	0 - 5 m	Havel & Graham 2006
Tjeukemeer	52.5	-1	0 -1.5 m	Vijverberg 1974
Waldsea Lake	52.17	550	surface	Swift & Hammer 1979
Weidsee	47.58	533	0 - 7 m	Jacobs 1977

References

- Adalsteinsson H. (1979) Zooplankton and Its Relation to Available Food in Lake Myvatn. *Oikos* 32, 162-194
- Antonsson U. (1992) The Structure and Function of Zooplankton in Thingvallavatn, Iceland. *Oikos* 64, 188-221
- Borsheim K.Y., Andersen S., Johnsen G.H., Kambestad E.O. & Norland S. (1988) Primary and bacterial production compared to growth and food requirements of *Daphnia longispina* in Lake Kvernvatnet, west Norway. *J.Plankt.Res.* 10, 921-939
- Bruner G.J. (1984) Coexistence strategies of *Daphnia* in Lake Reading Ks. *Emporia State Research Studies* 32, 5-21
- Callieri C., Corno G. & Bertoni R. (2006) Bacterial grazing by mixotrophic flagellates and *Daphnia longispina*: a comparison in a fishless alpine lake. *Aquatic Microbial Ecology* 42, 127-137
- Castro B.B. & Goncalves F. (2007) Seasonal dynamics of the crustacean zooplankton of a shallow eutrophic lake from the Mediterranean region. *Fundamental and Applied Limnology* 169, 189-202
- DeMott W.R. (1983) Seasonal succession in a natural *Daphnia* assemblage. *Ecol.Mon.* 53, 321-340
- Deneke R. (2002) Untersuchungen zum Einfluß des Schichtungsverhaltens (Mixis) auf die Trophie und Planktonsuccession in eutrophen Seen unter besonderer Berücksichtigung des Klarwasserstadiums im Frühjahr. PhD thesis, Brandenburgische Technische Universität Cottbus.
- Dupuis A.P. & Hann B.J. (2009) Warm spring and summer water temperatures in small eutrophic lakes of the Canadian prairies: potential implications for phytoplankton and zooplankton. *Journal of Plankton Research* 31, 489-502
- Edmondson W.T. (1955) The Seasonal Life History of *Daphnia* in An Arctic Lake. *Ecology* 36, 439-455

- Gannon J.E., Cap R.K., Stewart K.M. & Stewart W.A. (1984) Zooplankton community composition in Richter Lake, Wisconsin. *Verh.Internat.Verein.Limnol.* 22, 525-532
- George D.G. & Edwards R.W. (1974) Population dynamics and Production of *Daphnia hyalina* in A Eutrophic Reservoir. *Freshw.Biol.* 4, 445-465
- Gliwicz Z.M., Slusarczyk A. & Slusarczyk M. (2001) Life history synchronization in a long-lifespan single-cohort *Daphnia* population in a fishless alpine lake. *Oecologia* 128, 368-378
- Hall D.J. (1964) Experimental Approach to Dynamics of Natural-Population of *Daphnia galeata mendotae*. *Ecology* 45, 94-112
- Havel J.E. & Graham J.L. (2006) Complementary population dynamics of exotic and native *Daphnia* in North American reservoir communities. *Archiv fur Hydrobiologie* 167, 245-264
- Hazelwood D. & Parker R.A. (1961) Population-Dynamics of Some Fresh-Water Zooplankton. *Ecology* 42, 266-274
- Horn W. & Benndorf J. (1980) Field investigations and model simulation of the dynamics of zooplankton populations in fresh waters. *Int.Rev.ges.Hydrobiol.* 65, 209-222
- Hovenkamp W. (1990) Population dynamics of coexisting *Daphnia* species in Lake Vechten. 1-94. PhD thesis, University of Amsterdam.
- Jacobs J. (1977) Coexistence of similar zooplankton species by differential adaptation to reproduction and escape in an environment with fluctuating food and enemy densities. *Oecologia* 30, 313-329
- Jeppesen E., Sondergaard M., Sortkjaer O., Mortensen E. & Kristensen P. (1990) Interactions Between Phytoplankton, Zooplankton and Fish in A Shallow, Hypertrophic Lake - A Study of Phytoplankton Collapses in Lake Sobygard, Denmark. *Hydrobiologia* 191, 149-164
- Kwik J.K. & Carter J.C.H. (1975) Population-Dynamics of Limnetic Cladocera in A Beaver Pond. *Journal of the Fisheries Research Board of Canada* 32, 341-346
- Maier G. (1996) *Daphnia* invasion: Population dynamics of *Daphnia* assemblages in two eutrophic lakes with particular reference to the introduced alien *Daphnia ambigua*. *Journal of Plankton Research* 18, 2001-2015
- Mason C.F. & Abdulhusein M.M. (1991) Population dynamics and production of *Daphnia hyalina* and *Bosmina longirostris* in a shallow, eutrophic reservoir. *Freshwater Biology* 25, 243-260
- Mills E.L., Forney J.L., Clady M.D. & Schaffner W.R. (1978) Oneida Lake. In: *Lakes of New York state, Vol. 2: Ecology of the lakes of Western New York* (ed. Bloomfield J.A.), pp. 367-451. Academic Press, New York.
- Mittelholzer E. (1970) Populationsdynamik und produktion des Zooplanktons im Greifensee und im Vierwaldstättersee. *Schweizerische Zeitschrift für Hydrologie* 32, 91-148
- Mooij W.M., Hülsmann S., Vijverberg J., Veen A. & Lammens E.H.R.R. (2003) Modeling *Daphnia* population dynamics and demography under natural conditions. *Hydrobiologia* 491, 19-34
- Naselli-Flores L. & Barone R. (1997) Importance of water-level fluctuation on population dynamics of cladocerans in a hypertrophic reservoir (Lake Arancio, south-west Sicily, Italy). *Hydrobiologia* 360, 223-232
- Nykanen M., Vakkilainen K., Liukkonen M. & Kairesalo T. (2009) Cladoceran remains in lake sediments: a comparison between plankton counts and sediment records. *Journal of Paleolimnology* 42, 551-570

- Ojala A. & Salonen K. (2001) Productivity of *Daphnia longispina* in a highly humic boreal lake. *Journal of Plankton Research* 23, 1207-1215
- Perez-Martinez C., Barea-Arco J., Conde-Porcuna J.M. & Morales-Baquero R. (2007) Reproduction strategies of *Daphnia pulicaria* population in a high mountain lake of Southern Spain. *Hydrobiologia* 594, 75-82
- Petersen F. (1983) Population dynamics and production of *Daphnia galeata* (Crustacea, Cladocera) in Lake Esrom. *Hol.Ecol.* 6, 285-294
- Pinkhaus O., Schwerin S., Pirow R., Zeis B., Buchen I., Gigengack U., Koch M., Horn W. & Paul R.J. (2007) Temporal environmental change, clonal physiology and the genetic structure of a *Daphnia* assemblage (*D. galeata-hyalina* hybrid species complex). *Freshw.Biol.* 52, 1537-1554
- Primicerio R. & Klemetsen A. (1999) Zooplankton seasonal dynamics in the neighbouring lakes Takvatn and Lombola (Northern Norway). *Hydrobiologia* 411, 19-29
- Saunders P.A., Porter K.G. & Taylor B.E. (1999) Population dynamics of *Daphnia* spp. and implications for trophic interactions in a small, monomictic lake. *J.Plankt.Res.* 21, 1823-1845
- Seitz A. (1980) The coexistence of three species of *Daphnia* in the Klostersee 1. Field studies of three species of *Daphnia* in the Klostersee. *Oecologia* 45, 117-130
- Shei P., Iwakuma T. & Fujji K. (1988) Population dynamics of *Daphnia rosea* in a small eutrophic pond. *Ecol.Res.* 3, 291-304
- Smyly W.J.P. (1979) Population dynamics of *Daphnia hyalina* Leydig (Crustacea, Cladocera) in A Productive and An Unproductive Lake in the English Lake District. *Hydrobiologia* 64, 269-278
- Steiner S. (2002) Dynamik und Energietransfer einer planktischen Crustaceengemeinschaft in Abhängigkeit von der Nahrungsgrundlage und den Planktivoren. 1-145. PhD thesis, Technical University Dresden.
- Swift M.C. & Hammer U.T. (1979) Zooplankton Population-Dynamics and Diaptomus Production in Waldsea Lake, A Saline Meromictic Lake in Saskatchewan. *Journal of the Fisheries Research Board of Canada* 36, 1431-1438
- Tappa D.W. (1965) The dynamics of the association of six limnetic species of *Daphnia* in Aziscoos lake. Maine. *Ecol.Mon.* 35, 395-423
- Taticchi M.I., Artegiani I. & Isa C. (1991) Cladocera populations in Trasimeno Lake (Italy): 17/07/87 to 28/12/88. *Verh.Internat.Verein.Limnol.* 24, 1049-1057
- Tessier A.J. (1986) Comparative population regulation of two planktonic cladocera (*Holopedium gibberum* and *Daphnia catawba*). *Ecology* 67, 285-302
- Vijverberg J. & Richter A.F. (1982) Population-Dynamics and Production of *Daphnia-Hyalina* Leydig and *Daphnia-Cucullata* Sars in Tjeukemeer. *Hydrobiologia* 95, 235-259
- Winder M., Bürgi H.R. & Spaak P. (2003) Mechanisms regulating zooplankton populations in a high-mountain lake. *Freshwater Biology* 48, 795-809