Pyhtoplankton at Lake Stechlin 1994-2020

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Data origin Data were collected by Judit Padisák.

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Data

Sampling site

Lake Stechlin is a deep, dimictic, formerly oligotrophic clear-water lake that has been undergoing eutrophication since at least the early 2000s and especially since 2010. The lake is located in a nature reserve approximately 80 km north of Berlin, Germany (53°9‘5.6“N, 13°1‘34.2“E) at 59 m altitude. The lake has a maximum depth of 69.5 m, a mean depth of 23.3 m, a surface area of 4.3 km^2 and a volume of 96.9 x 10^6 m^3. The lake basin was formed during the last continental glaciation ca. 12,000 years ago and is today situated at the transition between temperate maritime and temperate continental climate (Fraedrich et al. 2001). The catchment has a size of 12.6 km^2 and is almost completely covered by managed forest (95%). The main species is Scots pine (*Pinus sylvestris*), although beech (*Fagus sylvatica*) is the dominant tree species along the shoreline. Non-forested areas are the site of a former nuclear power plant and a small village (Neuglobsow with about 300 residents but more during the summer tourist season), whose wastewater is diverted to a different catchment. The shoreline is largely undeveloped with no notable infrastructure except on the properties of a fisherman, the Federal German Environment Agency and the Leibniz Institute of Freshwater Ecology and Inland Fisheries. The seepage lake is mainly fed by precipitation and groundwater, resulting in a theoretical water retention time of more than 40 years (Koschel 1995, Holzbecher et al. 1999). There are no river inflows except for occasional discharge from a small stream channel that is dry in most years. The water level of Lake Stechlin is regulated. From 1966 to 1990, the lake received a total of about 300,000 m^3 d^{-1} of cooling water from the nearby nuclear power plant. The cooling water was withdrawn from neighbouring Lake Nehmitz (North basin) and discharged into Lake Stechlin at an average temperature of approximately 10 °C above the ambient surface water temperature. This resulted in an average increase in water temperature

by 1-2 °C during the power plant operation (1966-1990). For more information, see Casper (1985), Koschel and Casper (1986), Casper and Koschel (1995), Koschel and Adams (2003) and Kirillin et al. (2013).

Time span 1994-2020

Sampling method

Phytoplankton samples were taken at the deepest site of the lake (69.5 m) in the main basin (53°9‘19.5“N, 13°1‘52.9“E) in 5 m increments. The temporal resolution varied over time. Fortnightly samples have usually been taken from May to September. Outside this period monthly results are almost always available. After mixing the subsamples from 0-25 m layer (euphotic zone), an integral sample was got for counting. Phytoplankton species were identified using the most up-to date phycological manuals and literature. A minimum of 400 settling units (cells, filaments or colonies) were counted in an inverted microscope in each Lugol-fixed sample giving a counting accuracy of around 10 % for total phytoplankton. Phytoplankton biomass was estimated by geometrical approximations using OPTICOUNT (2008) computerized plankton counter. Autotrophic picoplankton (APP) was counted preferably immediately after sampling in unpreserved samples. If it was not possible, unpreserved samples were deep-frozen within one hour after sampling and APP was counted in melted samples no later than one month after sampling. APP cells were concentrated on black membranes and then embedded in ~30 % glycerine solution. Samples were analysed by means of epifluorescence microscopy using a Zeiss-Axiovert 35 inverted microscope equipped with an Osram HBO 5W/AC mercury short arc lamp. Only blue excitation (Zeiss filter set 45 17 66, exciter filter 450-490 nm, FT 510, LP 520) was used for picoplankton counting because in previous trials, no significant difference had been found between counting with blue and green excitation and green eukaryotic picoalgal cells that occasionally occur in Lake Stechlin were easier to distinguish with blue excitation.

Parameters

- `date` – date of measurement [`YYYY-MM-DD`]
- `columns 2-405` – Phytoplankton biomass of individual taxa [µg L^{-1}]
- `comment` – comment

References

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Casper P, Koschel R. 1995: Description of Lake Stechlin. Limnologica 25, 281–284.

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Holzbecher E, Nützmann G, Ginzel G. 1999: Water and component mass balances in the catchment of Lake Stechlin. Integrated Methods in Catchment Hydrology - Tracer, Remote Sensing and New Hydrometric Techniques, IAHS Publication 258, 37–44.

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Koschel R, Adams DD. 2003: An approach to understanding a temperate oligotrophic lowland lake. Archiv für Hydrobiologie Special Issues - Advances in Limnology 58, 1–9.

Change log

- 2021-11-29 Silke R. Schmidt: In the original files (one per year), obvious typos in the date were corrected (wrong year). Duplicates (identical rows) were deleted. Species that never occured with a measured value were deleted. Names of taxa were changed that were obvious misspellings or slightly different in order to harmonize the dataset. There might still be taxa that describe the same species.
  In the following, all taxa that were changed are listed, there name they were changed to and the reason for the change are given in the form
  taxa that were changed <- new name # reason
  " 'Chlorella sp.' " <- "Chlorella sp." # quotes not needed and not always used
  "Achnanthidium minutissimum" <- "Achnanthes minutissima" # 21 occurences; synonym according to https://www.algaebase.org/search/species/detail/?tc=accept&species_id=33155
  "Anabarna macrospora" <- "Anabaena macrospora" # probably misspelling
  "Anabarna solitaria" <- "Anabaena solitaria" # probably misspelling
  "Aulacoseira granularta var. angustissima" <- "Aulacoseira granulata var. angustissima" # probably misspelling
  "unicellular blue-green" <- "blue-green picoalga, unicellular" # harmonization, probably the same
  "blue-green picoalga unicellular" <- "blue-green picoalga, unicellular" # harmonization, probably the same
  "blue-green picoalga" <- "blue-green picoalga, unicellular" # harmonization, probably the same
  "C. psudocomensis" <- "C. pseudocomensis" # probably misspelling
  "C. pseudocomensis ps." <- "C. pseudocomensis" # harmonization, probably the same
  "C. Rest" <- "C. spp - Rest" # harmonization, probably the same
  "Carteria sp. cf." <- "Carteria sp." # harmonization, probably the same
  "Centrales < 5, small" <- "Centrales < 5" # harmonization, probably the same
  "Centrales 30-35" <- "Centrales 30-" # harmonization, probably the same
  "Chlamydomonas sp. small" <- "Chlamydomonas sp., small" # harmonization, probably the same
  "Chlamydomonas" <- "Chlamydomonas sp." # harmonization, probably the same
  "Chloropgyta" <- "Chlorophyta" # probably misspelling
  "Chroococcus nagy, laza (distans)" <- "Chroococcus nagy, laza" # harmonization, probably the same
  "Chroococcus sp.kicsi, tömött (limneticus)" <- "Chroococcus sp.kicsi, tömött" # harmonization, probably the same
  "Chrysopora fenestrata" <- "Chrysospora fenestrata" # probably misspelling
  "Cnetrales" <- "Centrales" # probably misspelling
  "Coelospharium kuetzingianum" <- "Coelosphaerium kuetzingianum" # harmonization, probably the same
  "Cosmarium cf. botrytis" <- "Cosmarium botrytis" # harmonization, probably the same
  "Crucigeniella rectangularis" <- "Crucigenia rectangularis" # harmonization, probably the same

"Cymbella sp." <- "Cymbella spp." # harmonization, probably the same
"Dinobryion petiolatum" <- "Dinobryon petiolatum" # probably misspelling
"egyéb Phytomonadina" <- "other Phytomonadina" # harmonization, probably the same
"Kephyrion spp" <- "Kephyrion spp." # harmonization, probably the same
"Lepocynclis sp." <- "Lepocinclis sp." # harmonization, probably the same
"Microcystis cf. aeruginosa" <- "Microcystis aeruginosa" # harmonization, probably the same
"Mougeotia thick" <- "Mougeotia sp. thick" # harmonization, probably the same
"Navicula sp.." <- "Navicula sp." # probably misspelling
"Neocystis polycocca+ others" <- "Neocystis policocca+others" # harmonization, probably the same
"OTHER FILAMENTOUS" <- "other filamentous" # harmonization, probably the same
"Pinnulria sp." <- "Pinnularia sp." # probably misspelling
"Pseudokephyrion sp." <- "Pseudokephyrion spp." # harmonization, probably the same
"Quadrigula pfitzerii" <- "Quadrigula pfitzeri" # probably misspelling
"Rhoplaodia gibba" <- "Rhopalodia gibba" # probably misspelling
"Scenedesmus sp." <- "Scenedesmus spp." # harmonization, probably the same
"Spinoferomonas sp." <- "Spiniferomonas sp." # harmonization, probably the same
"tot. Phytoplenakton" <- "total phytoplankton biomass" # harmonization, probably the same
"tot. Phytoplankton" <- "total phytoplankton biomass" # harmonization, probably the same
"total biomass (ug/L)") <- "total phytoplankton biomass" # harmonization, probably the same
"total" <- "total phytoplankton biomass" # harmonization, probably the same