# Phytoplankton data at Lake Stechlin 1994-2020

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**Data origin** Data were generated by Judit Padisák and Monika Papke



## Data

### Sampling site

Lake Stechlin is a deep, dimictic, formerly oligotrophic clear-water lake that has been undergoing eutrophication since 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. Lake Stechlin 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 $10^6$ $m^3$ (Casper 1985). 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 (KKW Rheinsberg) and the small village of Neuglobsow with about 300 residents (up to 1000 during the tourist season in summer), whose wastewater is diverted to a different catchment. The shoreline is largely undeveloped with no notable infrastructure except on the small beach and the boat rental, 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 The cooling water was withdrawn from neighbouring Lake Nehmitz (North basin) and discharged into Lake Stechlin at an average temperature of approximately 10 °C above the ambient surface water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) and decreased the retention time of Lake Stechlin. 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**

Water samples for phytoplankton analyses were taken at the deepest point of Lake Stechlin (69.5 m) situated in the main basin (53°9‘19.5“N, 13°1‘52.9“E) in 5 m increments (0, 5, 10, 15, 20, 25 m) to obtain an integrated mixed sample (0-25 m) from the euphotic depth. The temporal resolution of sampling varied over time. Fortnightly samples have usually been taken from May to September. Outside the stratification period monthly sampling was performed even throughout winter (when possible). Phytoplankton species were identified using the most up-to date phycological manuals and literature (Freshwater Flora of Central Europe, book series, Springer). Phytoplankton samples were analyzed according to Utermöhl method (1958): a minimum of 400 settling units (cells, filaments or colonies) were counted in an inverted microscope of each Lugol-fixed sample giving a counting accuracy of around 10 % for total phytoplankton. Phytoplankton biomass was estimated by geometrical approximations (Hillebrand et al., 1999) using computerized plankton counters (Hamilton 1990; OPTICOUNT 2008). Autotrophic picoplankton (APP) was counted immediately after sampling in unpreserved samples by epifluorescence microscopy or if this was impossible, water samples were frozen within one hour after sampling and APP was counted in thawed samples within one month after sampling. APP cells from water samples were concentrated on black membrane filters and then embedded in ~30% glycerine solution (Padisák et al. 1997). APP were counted and analysed by means of epifluorescence microscopy using a Zeiss-Axiovert 35 inverted microscope equipped with an Osram HBO 5W/AC mercury short arc lamp. Blue excitation (Zeiss filter set 45 17 66, exciter filter 450-490 nm, FT 510, LP 520) was used for cyanobacteria picoplankton counting and green eukaryotic picoalgal cells, the latter occur occasionally in Lake Stechlin. Previous trials indicated no significant difference between counting with blue and green excitation and green eukaryotic picoalgal cells were easier to distinguish with blue excitation.

**Parameters**

- date – date of measurement [YYYY-MM-DD]

- columns 2-302 – Phytoplankton biomass of individual taxa [µg $L^{-1}$]
- comment – comments

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**Change log**

- 2022-02 Judit Padisák and Géza B. Selmeczy: the dataset has been curated and harmonized by Judit Padisák and Géza B. Selmeczy. Especially taxon names were updated and reflect the status as of February 2023.
- 2022-03 Sabine Wollrab: changed dataset to long format
- 2022-03 Sabine Wollrab, Judit Padisák, Géza B. Selmeczy and Stella A. Berger: updated the metadata