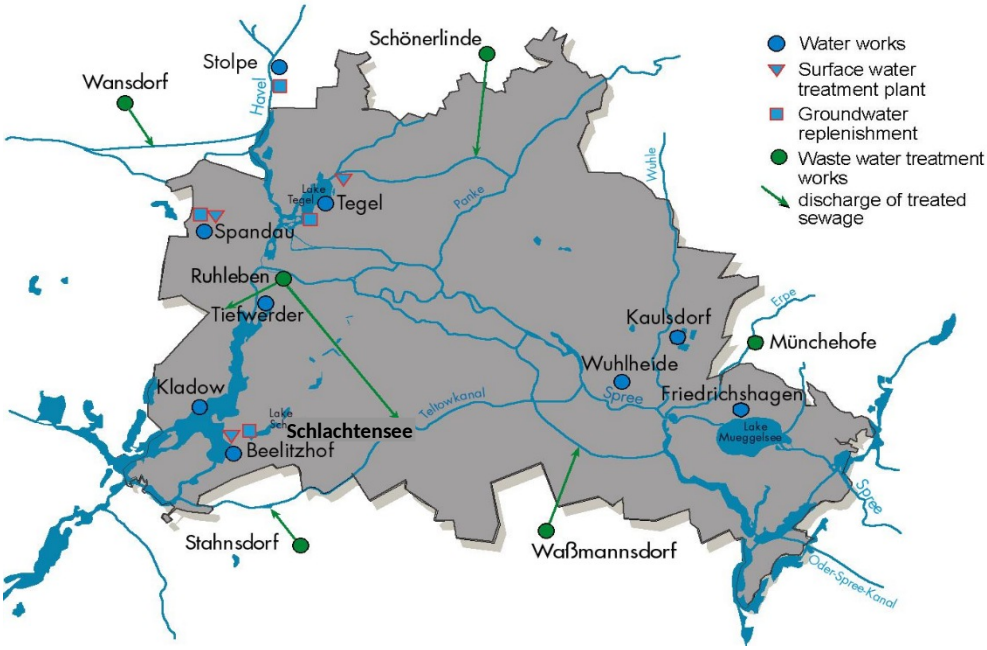
Features of Schlachtensee and background to the data

Ingrid Chorus, 7. June, 2020

Schlachtensee

Schlachtensee is one of a chain of glacial trough lakes in the southwest of Berlin, with wooded land along its north-western shore and lawns with villas along most of its south-eastern shore. It is fed by water from Wannsee, a lake of the Havel River System, and thus followed this river's eutrophication history since the 1960's.

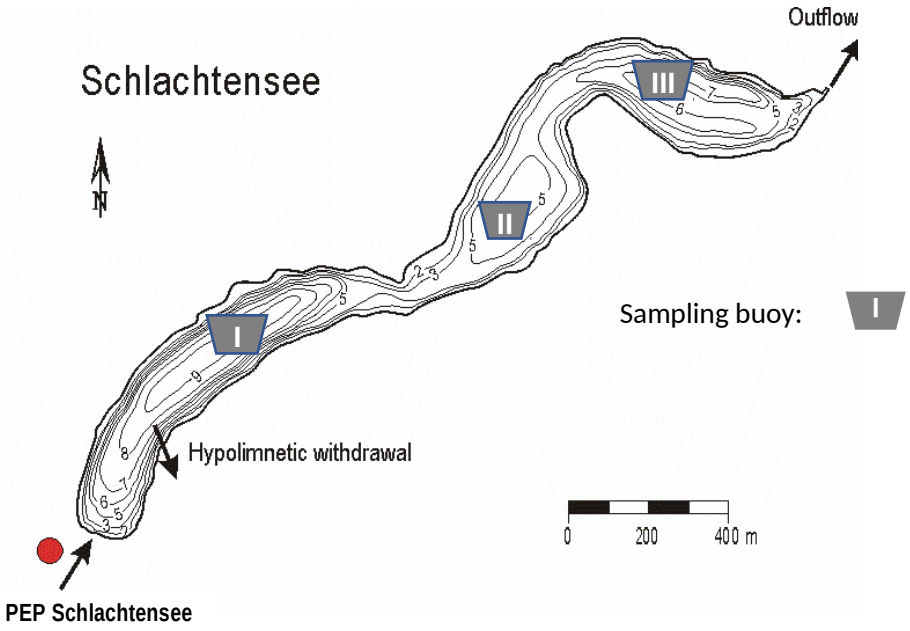


Location of Schlachtensee in Berlin, water works and treatment plants in the Berlin region (from Schauser & Chorus, 2011). Note the location of Müggelsee in the south-east and Lake Tegel in the north-west, further lakes with Data in LakeBase.

Morphometric and hydrological characteristics of Schlachtensee

Surface area [km²]	0.42
Lake volume [10^6 m^3]	1.97
Maximum lake depth [m]	9
Mean lake depth [m]	4.7
Water retention time [d]	210

Schlachtensee is a popular recreational area for rowing, swimming, fishing and recently als for stand-up paddling. Motorboats are banned. Until well into the 1990's it was also a relevant source for drinking water gained from bank filtrate production wells located between the lake and the next downstream lake in the chain, i.e. Krumme Lanke. These abstract a mixture of groundwater and lake water, the latter filtered in the course of several weeks of travel time in the underground before it reaches the well. Treatment is limited to aeration and rapid sand filtration, and microbiological quality test results show no need for disinfection of the drinking water.



In the 1960's, the lake became as eutrophic as Wannsee and the Havel River. As trough lake, it stratifies stably during summer, and oxygen depletion in the hypolimnion was pronounced. Massive cyanobacterial blooms caused summer Secchi disc readings of often less than 0.5 m. Due to the specific situation of West Berlin during the times of the "iron curtain", the city government aimed for a solution and constructed a phosphorus elimination plant (PEP) between Wannsee and Schlachtensee. This went into operation in autumn of 1981. Treatment at the PEP involves precipitation, coagulation, flocculation, and in particular

filtration, thus achieving effluent concentrations of 8 - 10 µg/L P, exchanging the volume of Schlachtensee about 1.5 times per year and thus gradually “flushing” P out of the lake.

Other inflows to Schlachtensee are relatively minor. They are limited to run-off from paved and built-up surfaces and from the rather steep, largely wooded terrain around much of the lake. A further measure was withdrawal of the P-rich hypolimnion during a few weeks in late summer to export phosphorus. In spite of the sapropelic sediments it took only 5 years for the summer epilimnetic TP-concentrations to decline from around 600-700 µg/l to summer means of less than 30 µg/L, at which concentration phytoplankton biomass and species composition shifted from dominance of cyanobacteria to a mixed composition and much lower levels of biomass. Trophic recovery continued into the early 2000 years, with summer epilimnion TP concentrations occasionally even below 10 µg/L for the first time in 2004, and with return of the reed belt. Since 2008, Schlachtensee is no longer monitored for trophic state and phytoplankton, but for bathing water quality, focusing on microbial indicators. This shows that the lake has remained a very clear and highly attractive recreational site..

Background to 25 years of data acquisition

To study the success of the measure, in 1979 the Berlin government contracted the Institute for Water-, Air- and Soil Hygiene” (in 1994 transferred to the German Environment Agency – Umweltbundesamt, UBA). This programme did not cover phytoplankton biovolume determination, but in 1981 a diploma thesis generated quantitative biovolume data, and from 1982 until 1990, these were generated in the context of three research programmes (1984-1986 by the Technical University Berlin). UBA then continued the programme until the end of 2007, sometimes intensified by further research projects and with gaps in the phytoplankton data in 1993/1994 as well as in 2000/2001. Details are given in Chorus & Schauser, 2011, including references to publications about aspects of the lake’s trophic recovery.

Sampling was begun in 1979 with 3 sampling points in Schlachtensee and 2 in the next downstream lake of the chain, i.e. Krumme Lanke (shown for Schlachtensee as stations I – III in the map above), and the data for all 5 are in LakeBase. However, by the end of 1985 it was clear that the data for stations I – III in Schlachtensee and those for stations IV and V in Krumme Lanke are very similar, and sampling of stations II, III and IV was discontinued. Station V in Krumme Lanke continued to be sampled for physico-chemical parameters until December 1998, and Station I at the deepest site of Schlachtensee was sampled until December 2007, with phytoplankton biovolume determined until the end of 2006.

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