

# Lake Werbellin – case study

## **Biosphere Reserves Management**

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Quelle (alle Bilder): Wikinger Reisen 2017

EU FFH Werbellinkanal within BR Schorfheide-Chorin, comprising three waterbodies: Grimnitzsee, Werbellinsee, Werbellinkanal

https://www.natura2000brandenburg.de/projektgebiete/b arnim/werbellinkanal





https://www.natura2000brandenburg.de/projektgebiete/b arnim/werbellinkanal "The FFH area (Special area of conservation) represents a section of the young moraine landscape with the Grimnitzsee, a shallow, mesotrophic-alkaline tongue basin lake in the hinterland of the Pomeranian terminal moraine arc, and the Werbellinsee, a very deep, oligotrophic-alkaline channel lake in the foreland of the terminal moraine. The two lakes are among the largest lakes in the biosphere reserve. Lake Werbellin is the second deepest lake in Brandenburg. The Lubowseemoor with the two Lubowseen lakes is located on the terminal moraine between the two lakes. In the marshy meltwater channel below Lake Werbellin there are further lakes and small peat bogs.

https://lfu.brandenburg.de/daten/n /natura2000/managementplanung/ 347/FFH-MP-347.pdf

https://www.natura2000brandenburg.de/projektgebiete/b arnim/werbellinkanal





... For centuries, the waters in the area served as waterways for the transport of goods and as water reservoirs, first for the Finow Canal and later for the Oder-Havel Canal. The water balance of the area is therefore strongly influenced by channel development, punctured watersheds and damming. The Werbellin Canal and Lake Werbellin have the status of a federal waterway, the main purpose of which today is to make the Werbellin Canal navigable for sports and excursion boats".

## **Trophic state index**

Trophic State Index	Chlorophyll (µg/L)	Phosphorus (µg/L)	Secchi depth (m)	Trophic Class	
< 30—40	0—2.6	0—12	>8—4	Oligotrophic or hipotrophic	
40—50	2.6—7.3	12—24	4—2	Mesotrophic	
50—70	7.3—56	24—96	2—0.5	Eutrophic	
70—100+	56—155+	96—384+	0.5— < 0.25	Hypertrophic	

https://en.wikipedia.org/wiki/Trophic\_state\_index

#### clear-water, macrophyte-dominated state



### turbid, phytoplankton-dominated state

Dieison et al. (2021): Regime shifts in a shallow lake over 12 years: Consequences for taxonomic and functional diversities, and ecosystem multifunctionality. Journal of Animal Ecology. <a href="https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2656.13658">https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2656.13658</a>



The FFH area was designated to protect the habitat types of the lakes, the nutrient-poor peatlands, such as the Lubowseemoor, as well as the near-natural forests of the Altenhofsche Eichheide with habitats for numerous FFH species; in particular, however, to protect the nutrient-poor Werbellinsee with its steeply sloping shores. The Grimnitzsee is also of outstanding importance as a resting place for migratory birds. The FFH area represents an important element in the network of the Oder, Haveland the neighbouring lake area to the north.

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The drainage channel of Lake Werbellin is deeply cut into the surrounding ground moraines. The Werbellinsee is up to 50 metres deep and its banks are very steep and gorge-like in places (see depth map in the appendix). Only on the western shore are there some areas with shallower banks.

- Grimmnitzsee, Großer and Kleiner Lubowsee used to be inland catchment areas.
- They were connected to Lake Werbellin when the original watershed was cut through. (Probably in connection with the construction of the first Finow Canal from 1603)
- Lubowseegraben was created in 1604 as an artificial connection between the Grimnitzsee and the Werbellinsee. It flows through the Großer Lubowsee.



## https://www.openstr eetmap.org/#map=1 2/52.8698/13.6766

lorf

Eichhorst

Werbellinkanal

Werbellinsee

Catchment area of lake Werbellin was successively enlarged.

Altenhof

• The water level in the entire catchment area of Lake Werbellinsee has been regulated by the Eichhorst lock since 1766.

A 11

- → the lake initially had the function of a significant water reservoir for the Finow Canal.
- → Since the construction of the Oder-Havel Canal in 1906-1914, the Werbellin Canal is no longer connected to the Finowcanal, but to the Oder-Havel Canal.
- → Werbellinsee only lost its function as a water reservoir in 1933 with the construction of the Niederfinow ship lift, as the loss of water from the canal could be significantly reduced.







**Thirty Years' War** 1618 – 1648  $\rightarrow$  complete destruction of the whole region, finow canal could not be maintained, was forgotten.

From 1730 onwards: economic recovery of the region.

Werbellin- and Finow canals recovered and built for the transport of wood and mineral resources.

From 1897 (train connection Berlin-Altenhof): **Tourism Commercial tourist boat trips on the lake from 1909** 

Tab. 2: Übersicht historischer Abbaustätten für Rohstoffe

Rohstoff	Ort	Abbau von	Abbau bis	Weiterverarbeitende Standorte	Zeugen im Gelän- de
Kalk	Stille Wiese	Spätestens 1734	Ende des 19. Jahrhunderts	Kalkofen, Zementfabriken, u. a. am heutigen Waldhof und in Elsenau	Lindensee (außer- halb des FFH- Gebiets)
Steine	Endmoränen- bogen	19. Jahrhun- dert	maximal Mitte 1960	u. a. Steinwerk Althüttendorf	Zahlreiche alte Steingruben
Ton	Voigtwiese	Mitte 19. Jahrhundert	1993	ZiegeleiDrainrohrwerke El- senau	Tonstich an der Straße Altenhof – Joachimsthal





### Water quality deteriorated 1950 - 1990

- unauthorised discharges of municipal wastewater
- overflow of highly eutrophic water from Lake Grimnitz
- the inflow of drainage ditches from peatland areas, e.g. from the Michenwiesen and the Stille Wiese
- Drainage ditches from arable land south of Altenhof and slurry irrigation on agricultural land to the east of Altenhof.
- manure irrigation on the agricultural land east of the lake

## **Description Lake Werbellin**

mesotrophic, very large and deep clear-water lake; channel lake on predominantly sandy substrate, with many typical underwater plants; extensive Characeae meadows down to a depth of 5.7 metres, with shallow to moderately sloping. Chara tomentosa, C. contraria and Nitellopsis obtusa dominate.

Only rarely do strictly mesotrophic species such as Chara filiformis occur; on steeper banks mainly pondweed (Potamogeton perfolatius), as well as other species of weakly eutrophic lakes such as crested pondweed (P. pectinatus), rough hornwort (Ceratophyllum demersum) and spiked milfoil (Myriophyllum spicatum).

Due to shading by riparian woodland, only small-scale reedbeds, mainly consisting of reeds (Phragmites australis), accompanied by narrow-leaved bulrush (Typha angustifolia), common pond sedge (Schoenoplectus lacustris) and needle marsh sedge (Eleocharis palustris); hardly any floating-leaf plants; banks are largely surrounded by forest, some neighbouring villages, 5 bathing areas with heavy recreational use

### Threats:

- Eutrophication due to agriculture and wastewater discharges
- Destruction of habitat structures through intensive recreational use (boat traffic, fishing, bathers)
- Low water levels in summer due to lock operation



Kaffenkahn (typical 19th century wooden barge) with its cargo (bricks), on its way to Berlin, sunk in Lake Werbellin in the 19th century.



Copyright Uwe Klimek (2023): https://www.kaffenkahn-ev.de/

The detection of **Chara filiformis** is of supraregional importance. The species threatened with extinction throughout Germany and Brandenburg and is the only plant in the FFH area for which there is a particularly high level of responsibility (!!). In Germany, the species occurs only occurs in waters of the Mecklenburg-Brandenburg Lake District, with one exception. Less than a dozen colonized bodies of water are known. especially bound to nutrient-poor lakes and occurs in the FFH area in the mesotrophic Werbellinsee with a low cover

Faden-Armleuchteralge. © 2010, A.Schwarzer – Herbier étendu et dense, typiquement dominé par Chara filiformis. Beine lacustre du Lac des Quatre-Cantons, baie de Vitznau <u>https://www.infoflora.ch/de/flora/chara-filiformis.html</u>





Abb. 13: Fischotternachweise aus dem FFH-Gebiet und dessen Umfeld



Abb. 12: Bekannte Biberreviere und weitere Nachweise aus dem FFH-Gebiet und dessen Umfeld

The overarching, fundamental objective for the FFH area is the improvement of the water management for the conservation and development of the lake habitats, bogs and wetlands in the area, which are habitats for valuable species of fish, amphibians, molluscs, dragonflies and birds.

### to continue the measures to restore the original catchment areas by:

- Further development of measures to minimise the amount of water from the Grimnitzsee overflow into Werbellinsee.
- Closure or further minimisation of the inflows from the extended catchment areas, such asfrom the Joachimsthaler Hauptgraben, the Michenwiesen, the Stille Wiese and the Fliegeponds, from peatland areas along the Werbellin Canal and from the Lubowseethrough

To improve water quality, but also to minimize disturbance to the shoreline zones, **muscle, wind or solar-powered boats should be promoted over motorboats**. In addition, a sufficient **supply of sewage disposal facilities** should be provided to prevent the direct disposal of faeces and sewage into the lake. The existing network of information on the disposal of waste, faeces and sewage for visitors should be further developed.



Biofilm on the surface of water. Consisting of microorganisms (mostly yeast related fungus species)

Tears apart on contact and the resulting gap no longer closes (unlike oil)

Kahmhaut in einem natürlichen Gewässer. <u>https://de.wikipedia.org/wiki/Kahmhaut#</u> /media/Datei:Kahmhaut.jpg