UNIVERSITY OF SALZBURG

danube - companion channel - quarry ponds

the biodiversity of plankton communities in the light of a possible meta community

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2. Abstract german

In dieser Arbeit wurden die fünf Baggerseen in Feldkirchen an der Donau in Oberösterreich sowie das angrenzende Nebengerinne und die Donau selbst untersucht. Es wurde versucht festzustellen, ob es sich bei den Baggerseen um eine Meta-Gemeinschaft handelt oder nicht.
Zu diesem Zweck wurden die Planktongemeinschaften untersucht und chemisch-physikalische Parameter analysiert.
Die verschiedenen Wasserkörper wurden an fünf Beprobungsterminen über einen Zeitraum von einem Jahr beprobt und die darin vorkommenden Planktonarten wurden bestimmt.
Anschließend wurden die Wasserkörper miteinander verglichen.

Die Planktonarten *Microcystis aeruginosa, Merismopedia tenuissima, Dinobryon divergens, Asterionella formosa, Aulacoseira granulata, Melosira varians, Gyrosigma attenuatum, Navicula radiosa, Stauroneis anceps, Nitzschia acicularis, Nitzschia sigmoidea, Ceratium hirundinella, Peridinium willei, Scenedesmus ecornis, Desmodesmus armatus var. longispina, Tetradesmus obliquus, Tetraëdron minimum, Pelagostrombididae, Stentor amethystinus* und *Keratella cochlearis* wurden in mindestens 50 % der Proben gefunden und für die statistische Analyse ausgewählt.

Es wurde festgestellt, dass es signifikante Unterschiede in der Planktonzusammensetzung zwischen dem Begleitkanal, der Donau und den Baggerseen gibt, aber keine signifikanten Unterschiede zwischen dem Begleitkanal und der Donau. Es gibt auch keine statistisch signifikanten Unterschiede in der Planktonvielfalt der einzelnen Baggerseen.
Darüber hinaus wurde ein signifikanter Unterschied in den chemischen Parametern zwischen einem Baggersee, welcher für die Fischerei genutzt wird, und den übrigen Teichen festgestellt.
Die Ergebnisse der Studie lassen den Schluss zu, dass es sich bei den Baggerseen wahrscheinlich um eine Meta-Gemeinschaft handelt.

2.1. Abstract english

In this thesis, the five quarry ponds in Feldkirchen an der Donau in Upper Austria as well as the adjacent companion channel and the Danube itself were investigated. An attempt was made to determine whether the ponds are a metacommunity or not.
For this purpose, the plankton communities were examined and chemical / physical parameters were analysed.
The various water bodies were sampled on five sampling dates over a period of one year, and the plankton species present in them were determined.
The water bodies were then compared with each other.

The plankton species *Microcystis aeruginosa, Merismopedia tenuissima, Dinobryon divergens, Asterionella formosa, Aulacoseira granulata, Melosira varians, Gyrosigma attenuatum, Navicula radiosa, Stauroneis anceps, Nitzschia acicularis, Nitzschia sigmoidea, Ceratium hirundinella, Peridinium willei, Scenedesmus ecornis, Desmodesmus armatus var. longispina, Tetradesmus obliquus, Tetraëdron minimum, Pelagostrombididae, Stentor amethystinus* and *Keratella cochlearis* were encountered in at least 50% of the samples and were selected for statistical analysis.

It was found that there are significant differences between companion channel, danube and the quarry ponds in their plankton composition, but no significant differences between between companion channel & Danube. There are also no statistically significant differences in the plankton diversity of the individual quarry ponds.
Furthermore, a significant difference in the chemical parameters was found between one quarry pond which is used for fishing and the remaining ponds.
The results of the study lead to the conclusion that the quarry ponds are probably a metacommunity.

3. Introduction

The investigated quarry ponds in Feldkirchen an der Donau (Upper Austria) were formed in the course of the past decades by the extraction of gravel. Fed by groundwater, they filled up relatively quickly. As the lakes are very close to each other, the question arises whether each pond should be regarded as a separate habitat or whether they form a large metacommunity.

Based on preliminary studies from 2019, the aim of this thesis is to determine a possible metacommunity within the five investigated quarry ponds on the basis of the present meso- and microplankton diversity (Starmayr, Berninger, and Blatterer 2019).
Since the investigated ponds are located near the Danube, which also floods the ponds during high water events (Floods affecting the lakes were recorded in 2013, 2002, 1981, 1965 and 1954. (Personal communication with Markus Berger, BA, head of the building department of the municipality of Feldkirchen an der Donau.)), both the Danube and the companion channel between the ponds and the Danube were additionally investigated.
In addition, chemical parameters were investigated and compared.

The central question of this thesis is whether the plankton communities of the quarry ponds are a metacommunity or not.

> Hypothesis 1: The plankton composition of the quarry ponds differs only slightly from each other and the quarry ponds therefore form a metacommunity.
>
> > Alternative hypothesis 1: The quarry ponds do not form a metacommunity.

Another question is whether the last flood in 2013 caused a similarity between the plankton composition of the ponds and the plankton composition of the Danube.

> Hypothesis 2: The plankton composition of the quarry ponds and the adjacent flowing waters (companion channel and Danube) differ from each other only to a minor extent. This minor differentiation can be attributed to the high water event 2013.
>
> > Alternative hypothesis: The flood has no measurable effect on the plankton composition.

3.1. Plankton:

Plankton consists of microorganisms drifting in the waters, which are not able to change their horizontal position significantly in the bodies of water on their own. They can change their horizontal position on a small scale, but they have no chance against strong environmental influences such as currents or winds. However, many planktonspecies are usually able to change their position in a vertical direction (Sadava et al. 2019).
It is to be found almost everywhere, from seas, ponds and rivers to brackish water. For this reason, it serves as a food source for many species (Sadava et al. 2019).

Depending on their metabolic properties, plankton can be divided into bacterio-, phyto- or zooplankton:

- Bacterioplankton account for a large part of the energy flow in pelagic ecosystems. The bacteria belong to the microheterotrophs. They return a large part of dissolved organic matter (DOM) to the biotic circulation, instead of the DOM being mineralised and sinking to the bottom. This mechanism is called microbial loop (Vinogradov, Bogatova, and Synegub 2018).

- Phytoplankton consists of organisms that obtain their energy from sunlight through photosynthesis. This is done with the help of chloroplasts. They live in the euphotic zone and form the basis of the aquatic food web (Sardet 2016).
- Zooplankton consists of a large amount of different planktonic organisms, ranging from phagotrophic protists to large gelatinous invertebrates such as jellyfish. Eggs and larval stages of vertebrates are also included in zooplankton. These feed on phytoplankton and themselves form the food base for higher trophic levels (Teodósio and Barbosa 2021).

3.2. Food webs:

Plankton has a key position in the aquatic food web, as phytoplankton (primary producers) and zooplankton (secondary production) together form the basis of food webs.

Primary production here means the build-up of organic matter from inorganic material. This includes, for example, phytoplanktic algae, which build up dissolved organic carbon (DOC), by converting carbon dioxide, phosphates and nitrogen into biomass using photosynthesis (Güde 1997; Martin and Allgaier 2011).

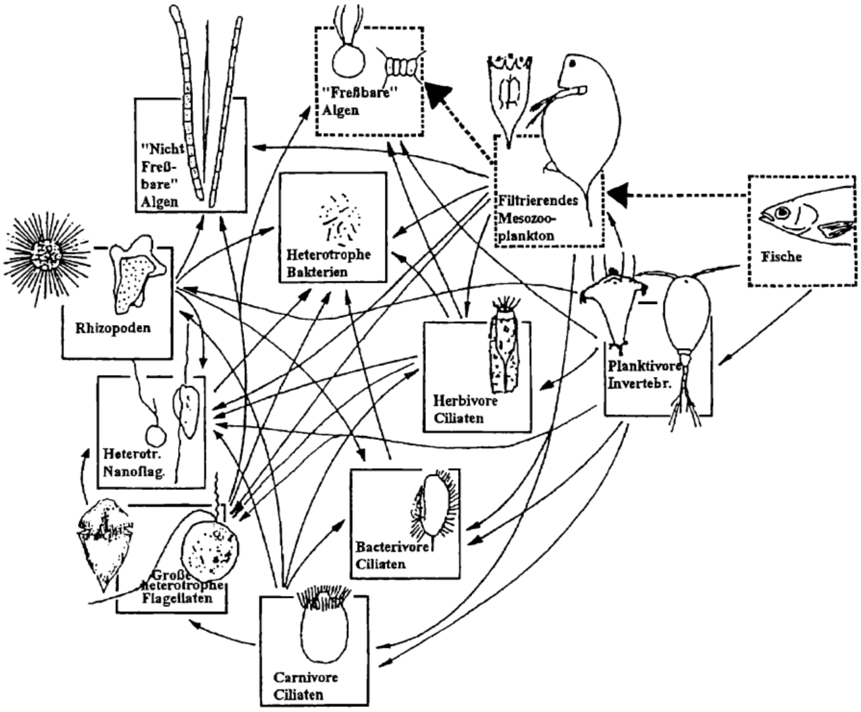


Figure 1: Example of a food web (Güde 1997).

They serve as a food source for larger zooplankton such as daphnia which build up more body mass; thus, they are considered secondary producers (Martin and Allgaier 2011; Güde 1997).

Daphnia, in turn, are the source of food for planktivorous organisms such as herring and sardines, as well as baleen whales and whale sharks. Herring and sardines, in turn, are eaten by smaller predatory fish such as mackerel and cod. These in turn are food for larger predators (Wickham 2019; Güde 1997; Martin and Allgaier 2011).

In addition to this classical food chain comes the microbial loop, which is a carbon transfer by bacteria. The bacteria take up dissolved organic carbon compounds and are then transferred along the classical food chain, i.e. from phytoplankton to zooplankton and from zooplankton to nekton. The DOC mostly originates from the microbial degradation of organic particles or as a waste product of plant and animal cells. The heterotrophic bacteria break down these particles and split large molecules into simple monomers. These are used to produce energy and to build up the bacteria's own biomass (Azam et al. 1983; Fenchel 2008).

This is particularly important because the DOC used cannot be utilised by most other organisms. The bacteria recycle organic carbon and other nutrients such as nitrogen and phosphorus, which would sink unused into the depths without the bacteria. In this way, the bacteria form the nutrient basis for many marine ecosystems (Azam et al. 1983; Fenchel 2008).

In addition to the microbial loop, the dissolved organic substances were found to aggregate into particles. These particles can be taken up by bacterivorous protists. This increases the efficiency of DOC recycling, as the bacteria consume about one third of the DOC for their own energy production, whereas no DOC is lost during the aggregation of particles (Kerner et al. 2003).

Plankton is furthermore divided into haliplankton, which occurs in the sea, hyphalmyroplankton in brackish water and the freshwater or limnoplankton studied here. A distinction is also made according to size: (Sieburth, Smetacek, and Lenz 1978)

Megaplankton	>200 mm
Macroplankton	200 mm - 20 mm
Mesoplankton	20 mm - 200 µm
Microplankton	200 µm - 20 µm
Nanoplankton	20 µm - 2.0 µm
Picoplankton	2.0 µm - 0.2 µm
Femtoplankton	0.2 µm - 0.02 µm

3.3. Interaction predator & prey

3.3.1. Bottom-up control

In the bottom-up concept, the primary producers, for example phytoplankton, play the main role in the food web. They are dependent on the amount of nutrients in the water body. The more nutrients are available for the primary producers, the larger their population becomes. As the population size of the primary producers increases, so does the population of primary consumers. When there are more primary consumers, the amount of top predators also increases.
The principle can also be applied in the other direction. If, for example, a water body has a high phosphorus content due to large fertiliser inputs, and is therefore eutrophic, a reduction in the phosphorus content can reduce the phytoplankton and improve the water quality (Benndorf et al. 2002; Hanley and La Pierre 2015; Townsend, Begon, and Harper 2009).

3.3.2. Top-down control

In the top-down concept, the predator at the top of the food web controls the population of the primary consumer (or secondary producer). The population of primary producers, on the other hand, grows because the feeding pressure exerted by the primary consumer is low.
If the top predator is removed, this can lead to a drastic change in the food web. The population of primary consumers increases strongly, the primary producers would be decimated. Eventually, the population of primary producers is so small that it is no longer able to sustain the population of primary consumers, and the population of primary consumers would be greatly reduced, and in the worst case even become extinct (Benndorf et al. 2002; Hanley and La Pierre 2015; Townsend, Begon, and Harper 2009).

In addition to the concepts of bottom-up and top-down control, a pond is subject to seasonal fluctuations in plankton abundance. In spring, rising temperatures and increased solar radiation cause algae growth and the pond begins to become turbid. This makes more food available for secondary producers such as daphnia, which begin to decimate the primary producers, and the water slowly clears up as the filter feeders are largely transparent; the clear water stage occurs. In this phase, the algae population declines due to feeding pressure, which also reduces the number of filter feeders. The decrease in predators causes the photosynthetic algae to increase again, and the water becomes turbid again (Ostendorp et al. 2007).

3.4. Meta Community

The island biogeography theory is based on an island and a continent. The continent serves as a source of species, while the aim is to predict how many species can settle on an island. This is defined by the variables of immigration and extinction of species on the island. These variables depend on the number of species already present on the island. The more species already present on the island, the fewer species can immigrate, since the resources that the immigrating species would need are already used by other species. However, if more species are present on the island, more of these species may become extinct. Using these two variables, an equilibrium can be calculated where the number of extinction species is equal to the number of immigration species. Therefore, the number of species remains constant.
As island size increases or distance from the mainland decreases, more species can settle on an island, so the number of species at equilibrium increases (MacArthur and Wilson 2016).

Based on the theory of island biogeography, the metapopulation theory was defined. It is stated that the landscape is a kind of patchwork of habitats habitable for one species and habitats not habitable for the same species. Whereby the habitats are different for different species. These habitable habitats are all the same distance apart and are identical. The metapopulation or metacommunity is then the number of all populations of the same species living in each habitat (Levins 1969).

To understand patterns of species distribution among habitats, metacommunity ecology examines local (e.g., predation) and regional factors (e.g., migration) together (Holyoak, Leibold, and Holt 2005; Altermatt 2016).
The effect of the driving factors needs to be investigated on different spatial scales. Therefore, it has to be considered that the presence of other species influences the natural selection of a species, e.g. by competition. It has been shown that competition between species can strongly influence the expression of the metacommunity. Also, high trait variation of a species can have a significant impact on these dynamics (Thompson et al. 2020).

Four patterns of species distribution are distinguished (Holyoak, Leibold, and Holt 2005):

- Levins metapopulation (Figure 2, A) describes multiple identical habitats that can be colonized by the same species. Species are able to survive because there is a stochastic equilibrium between the extinction of a species in one habitat and the colonization of another habitat by the same species.

- Source-sink metapopulations (Figure 2, B) differ from Levin's model by the fact that the species cannot survive in the smaller habitats (sinks) without a steady influx of individuals of a species from the larger habitat, the source.

- In the patchy population model (Figure 2, C), the individual habitats appear to be separated from each other and populated according to Levin's model, while in fact the individual habitats are in such active exchange with each other that they are to be regarded as one large habitat.

- There are also non-equilibrium metapopulations (Figure 2, D), which from the outside appear to be a metapopulation, but in reality are separate populations inhabited by the same species, without migration between them.

Then there are mixtures of various population patterns, such as Figure 2, E, where a patchy population is the source, surrounded by sink populations (Harrison 1991).

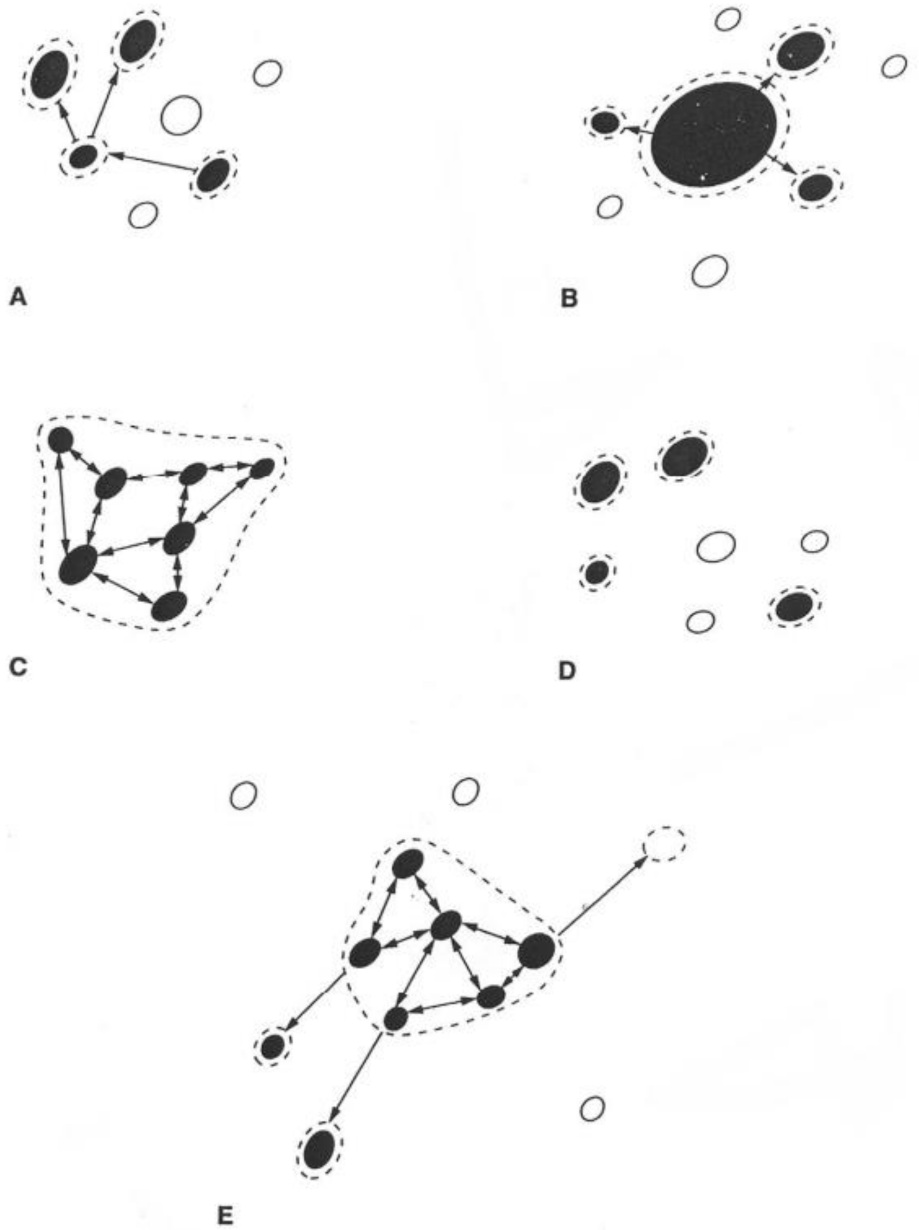


Figure 2: various metapopulation models; closed circles mark habitats, dashed circles mark population boundaries; filled circles are inhabited, empty ones are not; arrows mark migration or colonization (Harrison, 1991).

4. Material & methods

4.1. Sampling sites:

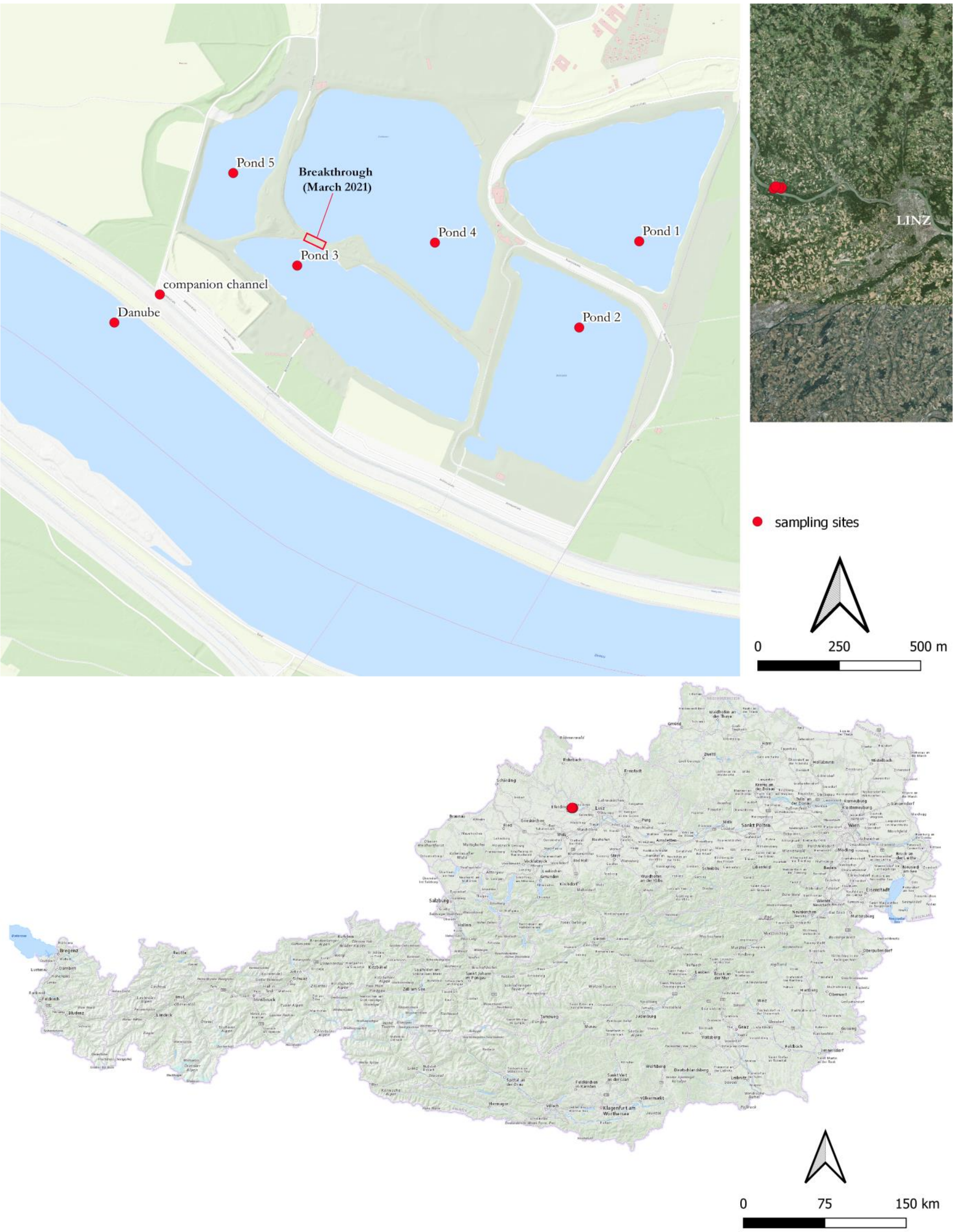


Figure 3: overview of the sampling sites.

The studied area consists of the Danube, a companion channel and five quarry ponds, four of which are used as bathing and recreation areas. The fifth pond is natural and reserved for fishermen. These quarry ponds are located in the village of Feldkirchen an der Donau, 18 kilometres upstream from Linz.

The ponds were created by quarrying the gravel body that makes up a good part of Feldkirchen's municipal area. The permeable gravel layer allows the ponds to be fed by groundwater. The mining of gravel began already in 1953. By 1964, some groundwater ponds could already be seen (Müller and Wimmer 1984). Since 1973, the ponds have been managed by the government of Upper Austria and are used as a recreational area. The government of Upper Austria regularly carries out water quality tests at the bathing ponds. The area covers a total of 630,000 m^2, of which 476,331 m^2 are currently allotted to the ponds.
Since 2005, the ponds have been repeatedly dredged with a dredging vessel, the "Andrea Doria". This ensures a maximum depth of 6 - 8.5 metres.
Various species of fish have been introduced into the ponds as a result of selective placement and various flooding events. It was not possible to find out which fish species were stocked and to what extent.

The recreational opportunities include swimming, diving, fishing, windsurfing, wakeboarding and water skiing. Furthermore, there are several restaurants and buffets, a water rescue base and a motion park on site (‘Land Oberösterreich - Badeseen Feldkirchen (mit Behindertenlift)’ n.d.; ‘DORIS Weboffice’ n.d.; Starmayr, Berninger, and Blatterer 2019).

Figure 4: From top to bottom: Pond I - V © Peneder 2019.

4.1.1. Pond I (plot no.: 754):

This is the northeasternmost of the ponds. It covers 106,202 m^2 of water surface. The pond was completed in 1963. As an EU bathing site, the water quality of the pond is tested five times a year. Since a diving school was located in the pond area, this pond as well as pond II is open for diving. To make the diving experience more interesting, vehicles, town signs, washing machines, toilet bowls and some platforms were sunk (Starmayr, Berninger, and Blatterer 2019; 'DORIS Weboffice' n.d.; Müller and Wimmer 1984).

4.1.2. Pond II (plot no.: 758/2):

It has 105,724 m^2 of water surface and was completed in 1970. This pond is sampled twice a year, each time in the summer months, as part of the federal government's programme. Furthermore, as with pond I, vehicles and similar items have been sunk, as diving is allowed in this pond; at the southern end of the pond there is a children's bathing area separated by a wooden fence (Starmayr, Berninger, and Blatterer 2019; 'DORIS Weboffice' n.d.; Müller and Wimmer 1984).

4.1.3. Pond III (plot no.: 724):

The "Jetlake" or pond III has a water ski and wakeboard lift. This pond is the most popular pond in the summer months; this is partly due to the artificial fine sand beaches that have been created in recent years. The pond itself was completed in 1969. Its water surface is 90,118 m^2. In mid-March of 2021, an artificial breakthrough was created which connects the pond with bathing pond IV (Starmayr, Berninger, and Blatterer 2019; 'DORIS Weboffice' n.d.; Müller and Wimmer 1984).

4.1.4. Pond IV (plot no.: 749/1 east):

The pond was completed in 1972. At the southern end of pond IV, a biotope called the "gravel pit habitat" was established in 2014. This pond is the only one in which wind and kite surfing is permitted. It is the largest pond and covers 136,680 m^2 of water surface. Like Pond II, it is also inspected twice a year by the government of Upper Austria during the summer months (Starmayr, Berninger, and Blatterer 2019; 'DORIS Weboffice' n.d.; Müller and Wimmer 1984).

4.1.5. Pond V (plot no.: 749/1 west):

The pond V is the smallest pond with 37,607 m^2. It is also the westernmost pond and bathing in it is strictly prohibited. It is not listed when the dredging of this pond was completed. The pond has been left as natural as possible, only fishermen are allowed to pursue their hobby here. Interviews with local fishermen revealed that fish are also stocked annually in this pond (Starmayr, Berninger, and Blatterer 2019; 'DORIS Weboffice' n.d.).

4.1.6. Companion channel:

The investigated companion channel, colloquially called Nebenfluter, is diverted from the Danube in Landshaag, about 5.2 kilometres upstream of the investigated area, then meanders for 1.4 kilometres through a meadow landscape and flows 3.4 kilometres downstream of the investigated area into the Pesenbach, which flows back into the Danube in Ottensheim (6.7 kilometres downstream).

This accompanying channel is intended to serve as additional retention space in case of floods and has been designated as a Natura 2000 site, thus serving as a refuge for several animal species ('DORIS Weboffice' n.d.).

4.1.7. Danube:

With a length of 2857 kilometres, the second largest river in Europe (after the Volga) begins in Germany and flows through Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, Romania, Ukraine and the Republic of Moldova and flows into the Black Sea.

It is an important trade route. Furthermore, the river and its catchment area are an important habitat for many animal species. For this reason, a large part of the Danube section running through Austria is designated as a Natura 2000 protected area, and there are several nature reserves along the Danube. ('DORIS Weboffice' n.d.; 'Land Oberösterreich - Ziele in der Untereinheit: Auwaldbereich und Donau' n.d.)

Table 1: coordinates of the sampling sites.

sampling site	north coordinate	east coordinate
Pond I	N48° 19,557'	E014° 04,448'
Pond II	N48° 19,449'	E014° 04,332'
Pond III	N48° 19,521'	E014° 03,857'
Pond IV	N48° 19,534'	E014° 04,141'
Pond V	N48° 19,602'	E014° 03,763'
Companion channel	N48° 19,483'	E014° 03,649'
Danube	N48° 19,461'	E014° 03,549'

4.2. Measurement of chemical-physical parameters

A vertical profile from 0 to 5 metres water depth (or in the case of the companion channel, down to the bottom) was carried out for each water body with the help of a two channel multi meter (Hach HQ40D) and the data was recorded in half-metre steps. Temperature, conductivity, pH and oxygen saturation were noted.

In the case of the accompanying channel, the vertical profile could only be carried out to 0.5 metres below the water surface, as the depth of the channel does not allow for more.

A similar situation applies to the Danube: due to the strong current, it was not possible to measure deeper than 0.5 metres, as the sensors began to drift at the same level from this depth onwards.

Furthermore, the weather, the depth of visibility (Secchi disk) and other special conditions (ice) were noted.

4.3. Plankton sampling:

Figure 5: taking water samples from the frozen pond II © Starmayr January 2021.

Figure 6: taking water samples from the Danube © Blatterer June 2021.

The ponds were sampled with the help of a canoe from the waterside. The companion channel was sampled in the middle of the channel, whereby it was waded out, as the water is only 75 cm deep at this point. Since the canoe would have tipped over in the current of the Danube, the sampling of the Danube had to be done with the help of a motorised dinghy. This was kindly provided by the Feldkirchen volunteer fire brigade

Per water body, a quantity of water defined as one litre was taken from a depth of one and a half metres using a Ruttner water sampler at the coordinates shown in Table 1 and filled into two sample vessels. For every water body, one sample vessel was filled with 50 ml of sample and 50 ml of formol-sucrose and another with 190 ml of sample and 10 ml of Bouin's solution. Bouin's solution is a mixture of 15 ml saturated solution of picric acid, 5 ml formalin (37%) and 1 ml galcial acetic acid. It is used to fix ciliates and serves as a basis for quantitative protargol staining (Montagnes and Lynn 1987).
Since handling such toxic substances in a tippy canoe would have been too dangerous, the fixation was done on land immediately after the sample was taken from the respective waterbody. This was done in the same way for each water body.
If the vertical profile showed an increase in oxygen content at a depth greater than 1.5 metres, another sample was taken at the point of highest oxygen content and this was designated as the deep chlorophyll maximum (DCM).

Furthermore, a live sample was taken to get an overview of the plankton organisms. This was observed under the microscope but not quantitatively evaluated. The only purpose was to get an approximate estimate of the organisms present.

The methods were repeated identically for each water body and at the same location, recorded by coordinates, for each sampling date. Furthermore, it was attempted to take the water samples on days with similar weather conditions. Sampling sites: Figure 3, Table 1

Table 2: sampling dates.

	1. Sampling	2. Sampling	3. Sampling	4. Sampling	5. Sampling
sampling date	27.09.2020	12.01.2021	17.03.2021	05.05.2021	29.06.2021

4.4. Chemical analysis:

The chemical analysis was carried out by the chemical-analytical laboratory of the Environmental Testing and Monitoring Agency of the State of Upper Austria. For this purpose, a water sample was taken from a water depth of 1.5 metres using a water sampler, which was transferred to a five-litre plastic canister for the analysis of the chlorophyll content and to a 200 ml glass sample vessel for the determination of the remaining parameters. To determine the total phosphorus, ammonium, nitrite and ortho-phosphate (o-P) content of the water sample, the collected sample was filtered through a cellulose acetate-based filter (filter size: 0.45 µm; background-free) and filled into a separate 200 ml glass flask.

The sample containers were transported to the laboratory the same day, cooled by cold packs in a cooling box. There the water samples were assessed under quality assured standards according to ÖNORM DIN 32645

The following test methods were applied (excerpt from test report 078128 of the chemical-analytical laboratory of the Environmental Testing and Monitoring Agency of the State of Upper Austria):

- Determination of total phosphorus in pure water (EN ISO 15681-2: digestion according to EN ISO 6878)
- Determination of ammonium by CFA in pure water (EN ISO 11732)
- Determination of nitrite by CFA in pure water (EN ISO 13395)
- Determination of ortho-phosphate by CFA in pure water (EN ISO 15681-2)
- Quantitative determination of chlorophyll-a concentration in surface water (DIN 38412-16)
- Determination of instantaneous oxygen and oxygen saturation index in waters, optical method (DIN ISO 17289)
- Determination of total organic carbon in waters by high temperature oxidation with oxygen or synthetic air to CO2 and NDIR detection (EN 1484)
- Determination of acid capacity, calculation of carbonate hardness and hydrogen carbonate in waters by acid titration (DIN 38409-7)
- Determination of F, Cl, NO3, SO4, oxalate by ion chromatography in pure waters in the laboratory (EN ISO 10304-1)
- Determination of Na, K, Mg, Ca by ion chromatography in pure waters in the laboratory (EN ISO 14911)
- Calculation of total hardness (DIN 38409-6)

4.5. Plankton analysis:

Both the sample fixed with formol-sucrose (FS) and the sample fixed in Bouin's were placed in 50ml Utermöhl chambers and allowed to sediment overnight for at least 20 hours.
Subsequently, the Utermöhl chambers were analysed the next day using a Carl-Zeiss inverted microscope with Reichert 6.3x m n. eyepieces. Here, the taxa were evaluated within the field of view, and measured using rasters to facilitate identification, respectively.

First, the sample fixed with formol-sucrose was viewed at a magnification of 19.68x and the contents of the entire sample were examined. All individuals that could be clearly assigned to a species at this magnification were noted.

The same procedure was followed for the Bouin's fixed sample. However, the Bouin's fixed sample was additionally examined with a magnification of 126x. Here, the field of view was placed at a hundred random locations, the total number of species present and their numbers of individuals were noted. Due to the uniformity of the samples examined, a sample size of 100 proved to be sufficient. The diameter of the field of view at this magnification is 0.82 mm, resulting in an examined area of 0.5281 mm^2 each.

If individuals were mistakenly counted twice in the two magnification levels, this was subsequently taken into account in the evaluation to avoid double counting.
The data obtained in this way were then extrapolated to individuals restrictive colonies per litre. The species list (see Table 7 - Table 11) indicates exactly which species were counted as colonies.

4.6. Quantitative analysis:

The diameter of the Utermöhl chamber is 26 mm. This results in an area of 530.9 mm^2 from the calculation below. It was assumed that after 20 hours the entire content of the Utermöhl chamber has sunk to the bottom and is therefore on this surface. Since the water sample was mixed with a non-negligible amount of fixative during fixation, this must also be taken into account in the calculation of the density of individuals, see the following formulae:

Area A: $$A = (\frac{26}{2})^2 * \pi = 530.9\, mm^2$$

4.6.1. Magnification 19.68:

Concentration FS c_{FS}: $$50ml : 50ml \triangleq 50\% \triangleq c_{FS} = 25ml/50ml$$

Concentration Bouin's $c_{B:}$ $$190ml : 10ml \triangleq 95\% \triangleq c_B = 47.5ml/50ml$$

Individuals(Colonies) I_{19} [I/liter]: $$I_{19} = (\frac{I_{FS,19}}{c_{FS}} + \frac{I_{B,19}}{c_B}) * 1000$$

$I_{FS,19}$ … Individuals counted at magnification 19.68 in Formol-Sucrose

$I_{B,19}$ … Individuals counted at magnification 19.68 in Bouin's

4.6.2. Magnification 126:

Area x [mm^2]: $$x = \left(\frac{0{,}82}{2}\right)^2 * \pi = 0.5281\, mm^2$$

Calculation factor f_{126}: $$f_{126} = \frac{A}{100*x} = 10.05353$$

Individuals(Colonies) I_{126} [I/liter] $$I_{126} = \frac{I_{B,126} * f_{126}}{c_B} * 1000$$

$I_{B,126}$ … Individuals counted at magnification 126 in Bouin's

4.7. Quantitative protargol staining (QPS)

In addition to the analysis in Utermöhl chambers, the samples were randomly fixed using QPS to verify the species list and identify the ciliates present. This was done at the Limnological Institute of the University of Innsbruck in Mondsee. The staining was carried out according to the QPS paper by Skibbe (Skibbe 1994; Montagnes and Lynn 1987).

Subsequently, the fixed specimens were viewed under the microscope and determined as far as possible to species level. The individuals contained in the grids of the sample were counted and extrapolated to individuals / litre using the following formula.

$$N_I = \frac{N_Z * df * A_{Filter}}{A_F * N_F * V} * 1000$$

N_I … Individuals per liter
N_Z … number of ciliates counted
df … dilution factor = 1.05
A_{Filter} … filtered area = 363.05 * 10^6 µm^2
A_F ... area per field = 10562500 µm^2
N_F … number of counted fields
V … filtered volume

4.8. Literature used / determination:

The individuals studied in this paper were, as far as possible, identified down to the species level. If this was not possible, they were at least determined down to the genus level. In the following, the totality of all determined individuals is referred to as species in order to improve the flow of reading. Specialised literature was used (Streble, Krauter, and Bäuerle 2020; Popovský 1990; Brauer and Lieder 1999; Klotter 1957; Rieth 1961; Kiefer 1960; Hustedt 1973; Foissner et al. 1991; Foissner, Berger, and Kohmann 1992; 1994; Foissner et al. 1993).

The species names taken from the literature were then checked for validity using the World Register of Marine Species (WORMS), GBIF and Algaebase, and were updated where necessary ('WoRMS - World Register of Marine Species' n.d.; 'GBIF' n.d.; 'Algaebase :: Listing the World's Algae' n.d.).

4.9. Statistical analysis:

The statistical analysis is carried out using SPSS Statistics.
Since many of the species found were only found once or realtively rarely, however, this is probably not due to the actual number, and instead were simply not collected during the sampling process, only the species that occurred in 50% of the running water samples or in 50% of the pond samples were used for the analysis.
Here, the data was first checked for normal distribution using the Kolmogorov-Smirnov test with Lillefors significance correction and the Shapiro-Wilk test (Kolmogoroff 1933; Smirnov 1939; Shapiro and Wilk 1965). Furthermore, the non-normally distributed species data were compared with each other using the Kruskal-Wallis test and correlated to the abiotic factors using the Spearman test (Kruskal and Wallis 1952; Mohr, Wilson, and Freund 2022).

5. Results:

5.1. Obtained data:

Each water body, i.e. quarry ponds, accompanying channels and the Danube, was sampled five times with a water sampler over the course of a year, and the prevailing weather conditions were noted, see Table 3. The collected water samples were then fixed with Formol-Sucrose and Bouins Solution and counted in the laboratory in Utermöhl chambers.

Table 3: sampling dates and current weather conditions

	1. Sampling	2. Sampling	3. Sampling	4. Sampling	5. Sampling
sampling date	27.09.2020	12.01.2021	17.03.2021	05.05.2021	29.06.2021
weather condition	partly cloudy, slightly windy	snowfall, 3 cm ice layer	overcast, light snowfall, light wind	Cloudy, light rain, windy	cloudy, light wind

In total, 107 different species were observed in the Utermöhl chambers. In addition to the species observed in the Utermöhl chambers, 13 ciliate species could be determined by Quantitative Protargol Staining (QPS), which were not detected in the Utermöhl chambers. For the QPS, 12 randomly selected water samples were stained and then counted under the microscope (appendix, Table 12).
A complete list of the species including the number of individuals or colonies per litre can be found in the appendix, Table 7 - Table 11.

From these 107 species, as already described, the species were selected which occurred with a frequency of 50% or more in the ponds or with ≥50% in the flowing waters.

After narrowing down the species list for statistical analysis, the following 20 plankton species remained:

Cyanobacteria:
- *Microcystis aeruginosa*
- *Merismopedia tenuissima*

Chrysophyceae
- *Dinobryon divergens*

Bacillariophyceae
- *Asterionella formosa*
- *Aulacoseira granulata*
- *Melosira varians*
- *Gyrosigma attenuatum*
- *Navicula radiosa*
- *Stauroneis anceps*
- *Nitzschia acicularis*
- *Nitzschia sigmoidea*

Dinophyceae
- *Ceratium hirundinella*

- *Peridinium willei*

Chlorophyceae

- *Scenedesmus ecornis*
- *Desmodesmus armatus var. longispina*
- *Tetradesmus obliquus*
- *Tetraëdron minimum*

Ciliata

- *Pelagostrombididae*
- *Stentor amethystinus*

Rotifera

- *Keratella cochlearis*

The data of all species and the abiotic factors, except for DOC and conductivity, are not normally distributed, see appendix, Table 23 & Table 24. For this reason, parameter-free test procedures were used for the statistical analysis.

5.2. Analysis:

5.2.1. *Microcystis aeruginosa*

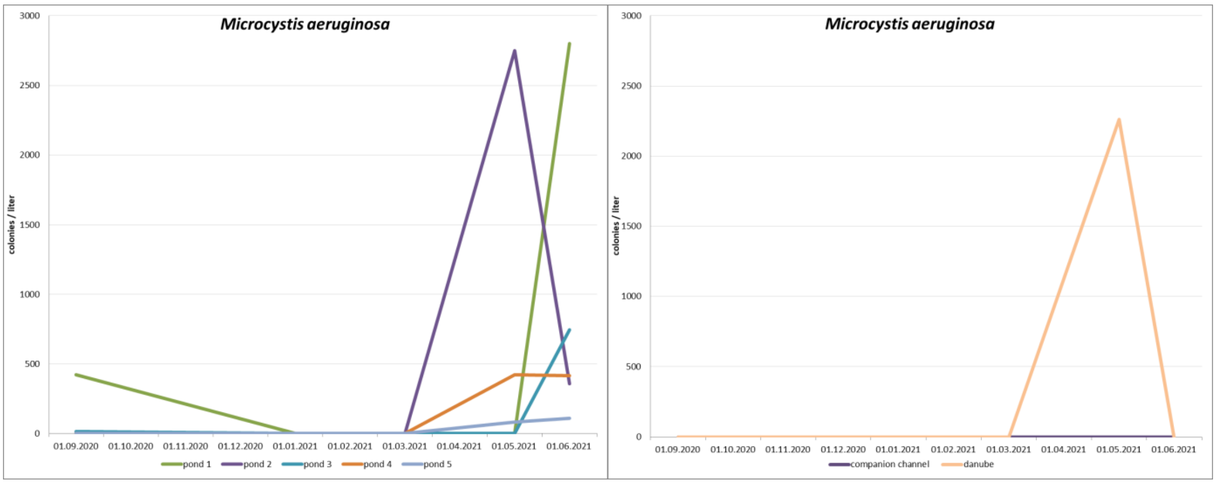


Figure 7: graphical representation of the *Microcystis aeruginosa* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Microcystis aeruginosa is a bloom-forming cyanobacterial species common in eutrophic to hypertrophic lakes (Wolfram, Donabaum, and Dokulil 2015) and reservoirs around the world. The algae reproduce especially well in hot weather; when they die they form a blue-green foam on the water surface and the toxic substance microcystin is released (Vincent 2009).

Figure 8: *Microcystis aeruginosa*, individual cells, BF image. Stanwick Lakes Northamptonshire, UK. (c) C.F. Carter

The statistical analysis revealed no significant differences of *Microcystis aeruginosa* in the individual ponds ($p_{MC.}$ = 1.000; Table 25), as well as no significant differences in the watercourses (p_{MC} = 1.000; Table 32). Furthermore, there are no significant differences between the ponds and the watercourses (p_{MC} = 0.622; Table 26).

However, significant differences in *Microcystis aeruginosa* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.000; Table 27).

5.2.2. *Merismopedia tenuissima*

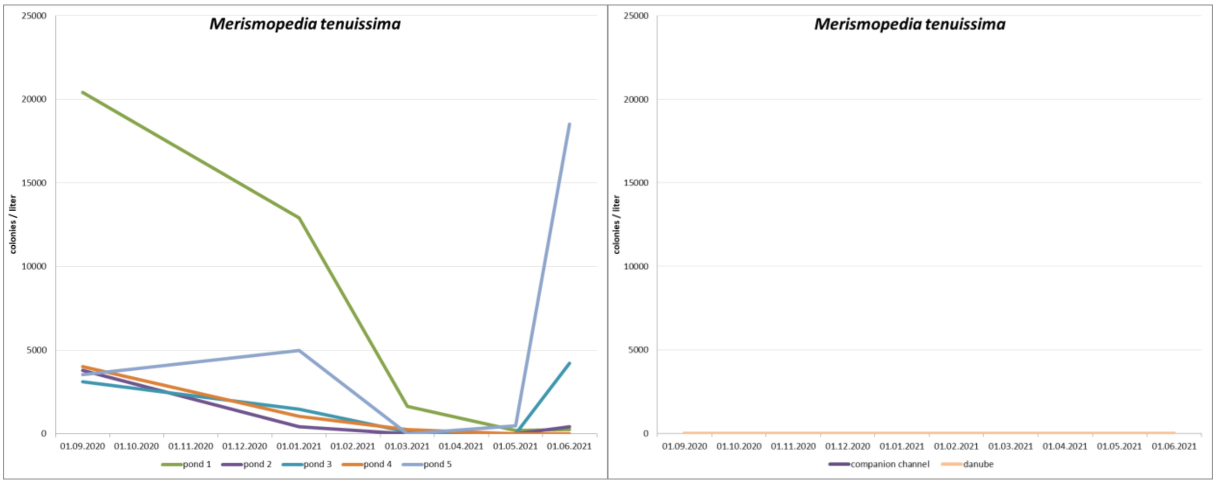


Figure 9: graphical representation of the *Merismopedia tenuissima* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Merismopedia tenuissima belongs to the cyanobacteria and is found in standing waters (Komárek 2003).

The statistical analysis revealed no significant differences of *Merismopedia tenuissima* in the individual ponds (p_{MC} = 0.281; Table 25), as well as no significant differences in the watercourses (p_{MC} = 1.000; Table 32). Though, significant differences between the ponds and the watercourses (p_{MC} = 0.002; Table 26) could be found.

Furthermore, significant differences in *Merismopedia tenuissima* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.020; Table 27).

5.2.3. *Dinobryon divergens*

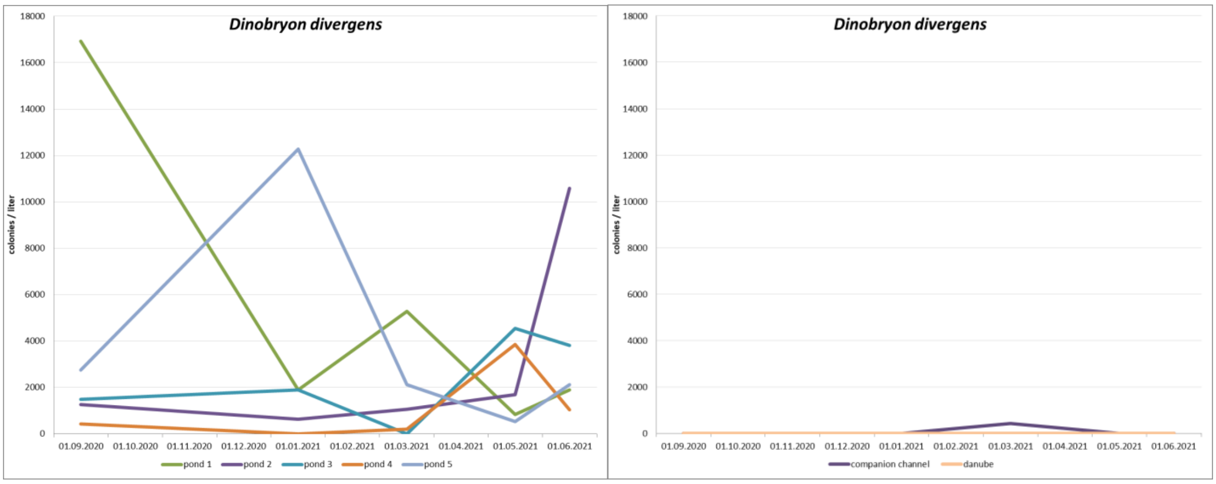


Figure 10: graphical representation of the *Dinobryon divergens* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Dinobryon divergens belongs to the chrysophyceae, and inhabits mostly base-poor, mesotrophic to slightly eutrophic lakes (Wolfram, Donabaum, and Dokulil 2015); but it can also be found in flowing waters such as the Danube (Nicholls and Wujek 2003). It is mainly represented in Europe ('GBIF' n.d.).

Figure 11: *Dinobryon divergens*, Yardley Chase, Northamptonshire, UK. BF image. © C.F. Carter

The statistical analysis revealed no significant differences of *Dinobryon divergens* in the individual ponds ($p_{MC} = 0.592$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 1.000$; Table 32). Though, significant differences between the ponds and the watercourses ($p_{MC} = 0.000$; Table 26) could be found.

However, no significant differences in *Dinobryon divergens* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.175$; Table 27).

5.2.4. *Asterionella formosa*

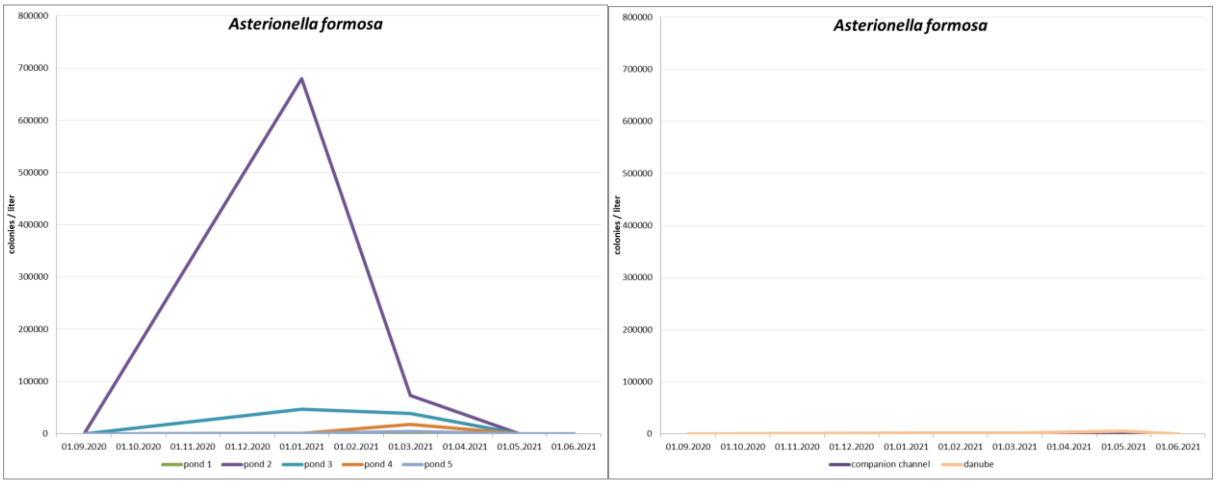


Figure 12: graphical representation of the *Asterionella formosa* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Asterionella formosa consists of star-shaped colonies of diatoms. It is widespread throughout the world, with the most frequent occurrences in Europe. It is a part of the phytoplankton of freshwater and seawater, where it often occurs in large quantities, especially in spring (Hustedt and Pascher 1930).

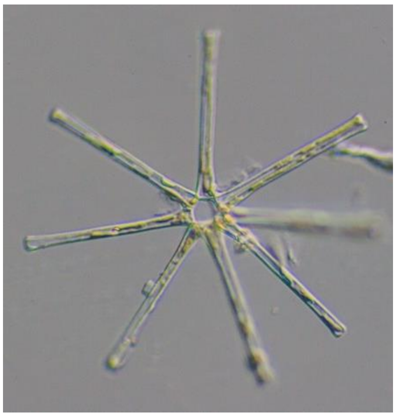


Figure 13: *Asterionella formosa* © Starmayr

The statistical analysis revealed no significant differences of *Asterionella formosa* in the individual ponds ($p_{MC} = 0.138$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 0.088$; Table 32). Furthermore, there were no significant differences between the ponds and the watercourses ($p_{MC} = 0.070$; Table 26) to be found.

However, significant differences in *Asterionella formosa* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.001$; Table 27).

5.2.5. *Aulacoseira granulata*

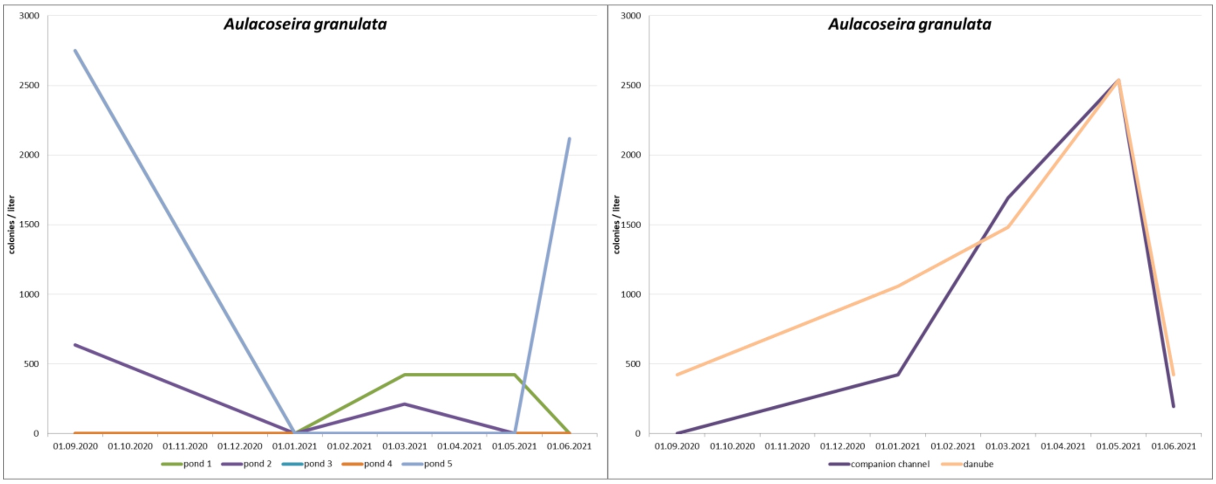


Figure 14: graphical representation of the *Aulacoseira granulata* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Aulacoseira granulata is a diatom that lives in the plankton of eutrophic to hypertropic waters (Wolfram, Donabaum, and Dokulil 2015). It has been described in North America, Europe, South Africa and Australia (Kilham and Kilham 1975).

The statistical analysis revealed no significant differences of *Aulacoseira granulata* in the individual ponds ($p_{MC} = 0.142$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 0.597$; Table 32). Though, significant differences between the ponds and the watercourses ($p_{MC} = 0.002$; Table 26) could be found.

Furthermore no significant differences in *Aulacoseira granulata* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.403$; Table 27).

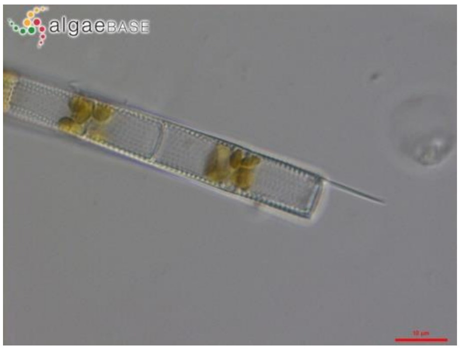


Figure 15: *Aulacoseira granulata*, Manitoba, Canada; Lugol's, 1000x, DIC, Hedy Kling Algal Taxonomy and Ecology Inc. © Karl Bruun

5.2.6. *Melosira varians*

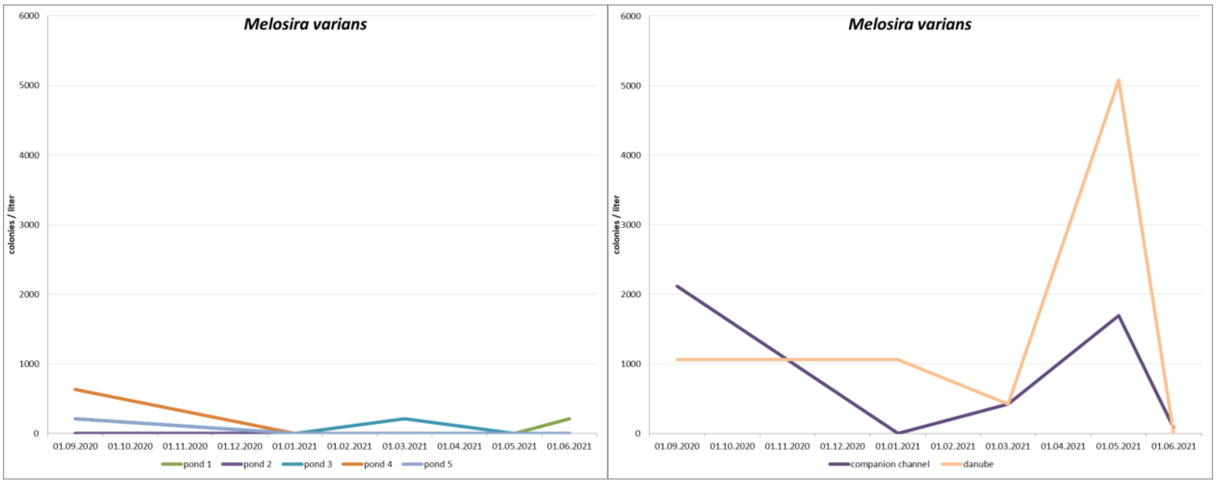


Figure 16: graphical representation of the *Melosira varians* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Melosira varians is a widespread diatom species that occurs in Europe, Asia, Africa and North America. It lives in flowing waters as well as in lakes and ponds. It prefers slightly alkaline environments (pH 7-8.5) and moderate oxygen (Bilous et al. 2021).

Figure 17: Melosira varians, Kingston, Washington, USA; Carpenter Creek watershed, Site A, estuary, 400x, DIC, © Karl Bruun

The statistical analysis revealed no significant differences of *Melosira varians* in the individual ponds (p_{MC} = 0.370; Table 25), as well as no significant differences in the watercourses (p_{MC} = 0.815; Table 32). Though, significant differences between the ponds and the watercourses (p_{MC} = 0.003; Table 26) could be found.

Furthermore no significant differences in *Melosira varians* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.105; Table 27).

5.2.7. Gyrosigma attenuatum

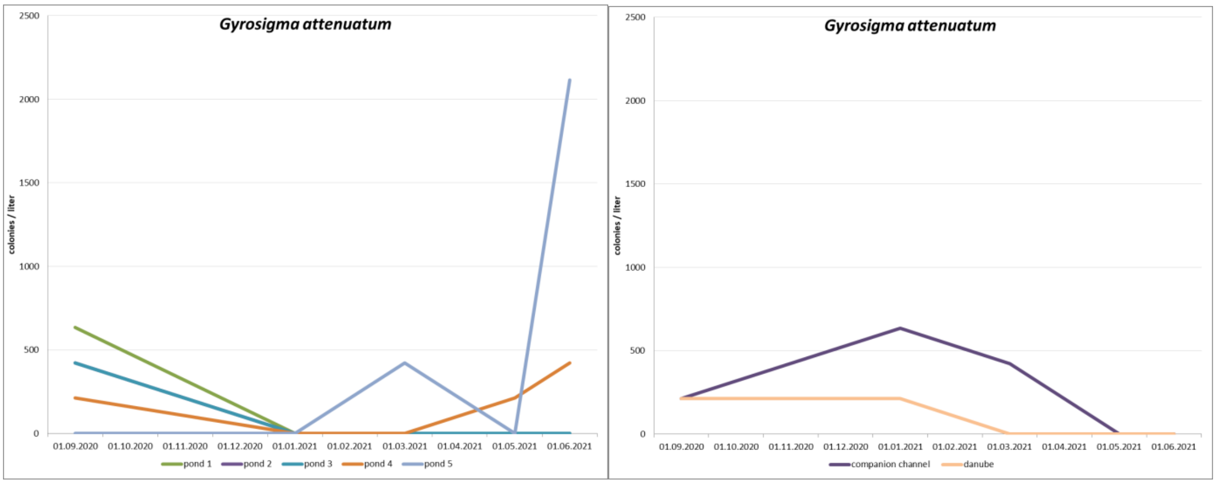


Figure 18: graphical representation of the *Gyrosigma attenuatum* findings in the waterbodies. The numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals /litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Figure 19: *Gyrosigma attenuatum*, 250x, Length 180 µm, © Robert Lavigne

Gyrosigma attenuatum is a diatom widely distributed in Europe and North America. This species prefers alkaline water environments and is relatively sensitive to organic pollution from sewage in its environment (Lange-Bertalot et al. 2017).

The statistical analysis revealed no significant differences of *Gyrosigma attenuatum* in the individual ponds ($p_{MC} = 0.410$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 0.448$; Table 32). Furthermore, there were no significant differences between the ponds and the watercourses ($p_{MC} = 0.503$; Table 26) to be found.

And no significant differences in *Gyrosigma attenuatum* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.111$; Table 27).

5.2.8. *Navicula radiosa*

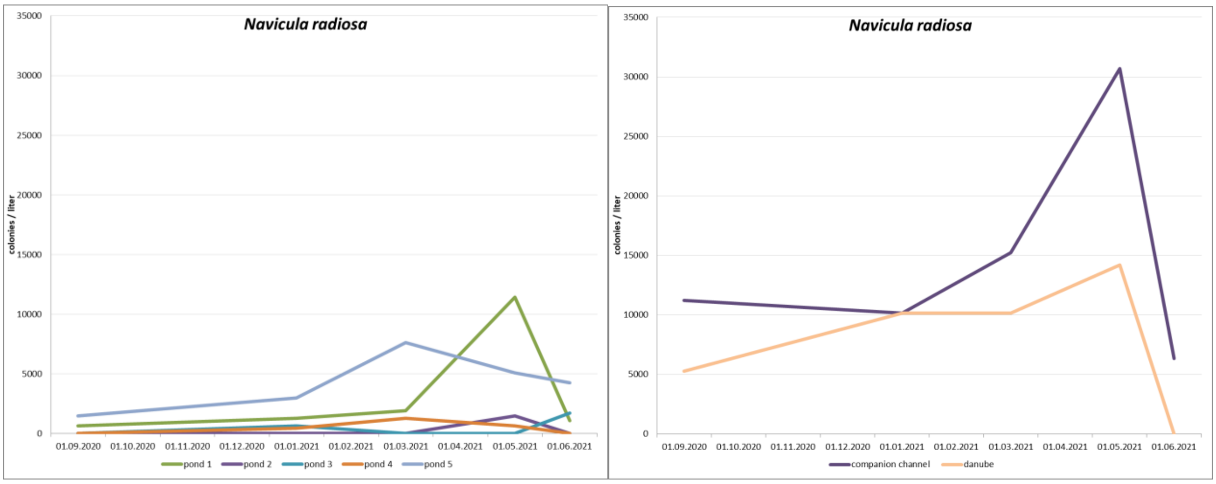


Figure 20: graphical representation of the *Navicula radiosa* findings in the waterbodies. The numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals /litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

The diatom *Naviula radiosa* is widespread in rivers and lakes. It is very tolerant and has no problems with high conductivity and high nutrient concentration. It is capable of living in rivers with embedded benthic substrates and in turbid waters (Stoermer and Julius 2003).

The statistical analysis revealed significant differences of *Navicula radiosa* in the individual ponds ($p_{MC} = 0.001$; Table 25), but no significant differences in the watercourses ($p_{MC} = 0.226$; Table 32). Though, significant differences between the ponds and the watercourses ($p_{MC} = 0.000$; Table 26) could be found.

Furthermore no significant differences in *Navicula radiosa* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.266$; Table 27).

5.2.9. Stauroneis anceps

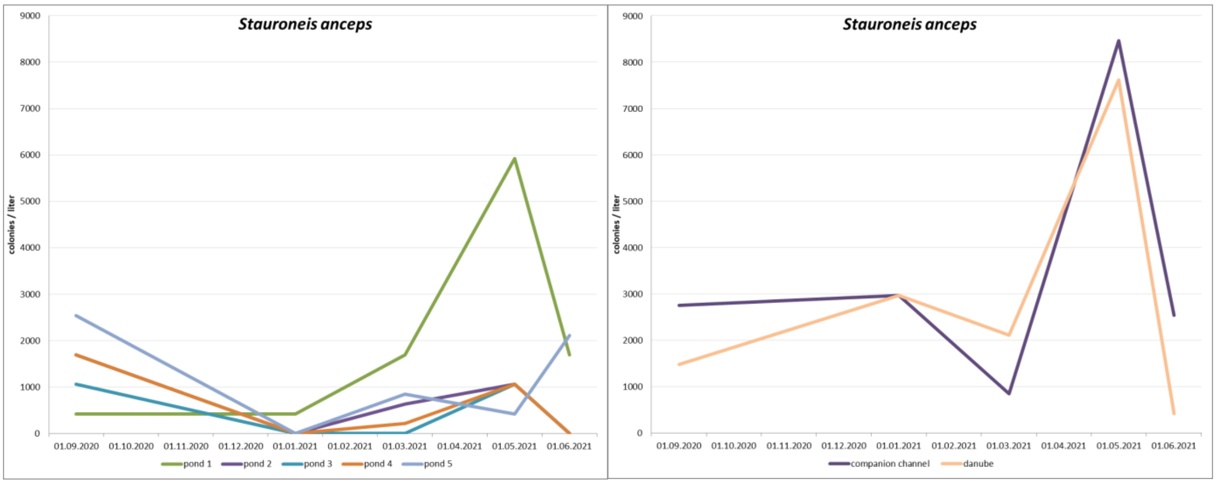


Figure 21: graphical representation of the *Stauroneis anceps* findings in the waterbodies. The numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Stauroneis anceps is a diatom that frequently occurs in the littoral of all types of water bodies (Lange-Bertalot et al. 2017).

The statistical analysis revealed no significant differences of *Stauroneis anceps* in the individual ponds (p_{MC} = 0.133; Table 25), as well as no significant differences in the watercourses (p_{MC} = 0.581; Table 32). But, significant differences between the ponds and the watercourses (p_{MC} = 0.004; Table 26) could be found.

However, no significant differences in *Stauroneis anceps* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.309; Table 27).

5.2.10. *Nitzschia acicularis*

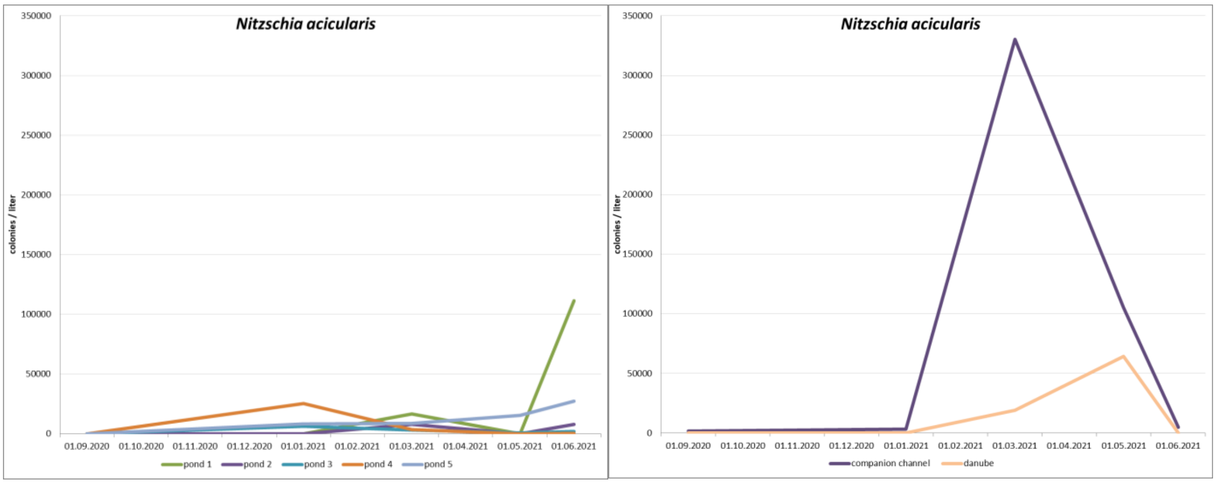


Figure 22: graphical representation of the *Nitzschia acicularis* findings in the waterbodies. The numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

The diatom *Nitzschia acicularis* lives in the plankton of slightly polluted waters. In spring, mass algal blooms can form on the surface of eutrophic to hypertropic ponds (Rheinheimer 1977; Wolfram, Donabaum, and Dokulil 2015).

The statistical analysis revealed no significant differences of *Nitzschia acicularis* in the individual ponds (p_{MC} = 0.230; Table 25), as well as no significant differences in the watercourses (p_{MC} = 0.217; Table 32). Furthermore, no significant differences between the ponds and the watercourses (p_{MC} = 0.287; Table 26) could be found.

However, significant differences in *Nitzschia acicularis* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.009; Table 27).

5.2.11. *Nitzschia sigmoidea*

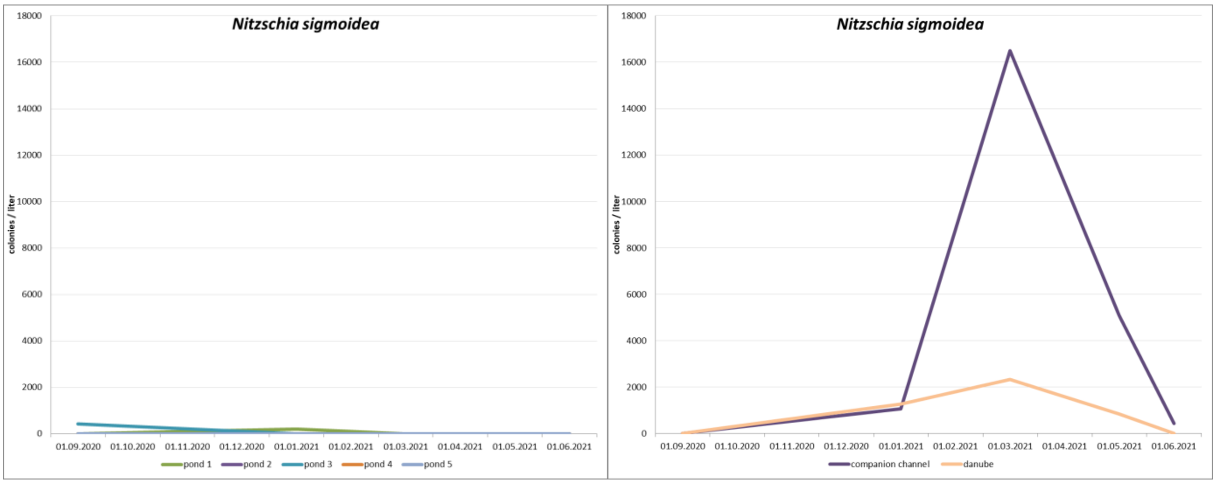


Figure 23: graphical representation of the *Nitzschia sigmoidea* findings in the waterbodies. The numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

Nitzschia sigmoidea is a diatom with a worldwide distribution and is typically found in brackish and freshwater. It is tolerant of a medium to high trophic range (Lange-Bertalot et al. 2017).

The statistical analysis revealed no significant differences of *Nitzschia sigmoidea* in the individual ponds (p_{MC} = 0.535; Table 25), as well as no significant differences in the watercourses (p_{MC} = 0.541; Table 32). But, significant differences between the ponds and the watercourses (p_{MC} = 0.002; Table 26) could be found.

However, no significant differences in *Nitzschia sigmoidea* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.777; Table 27).

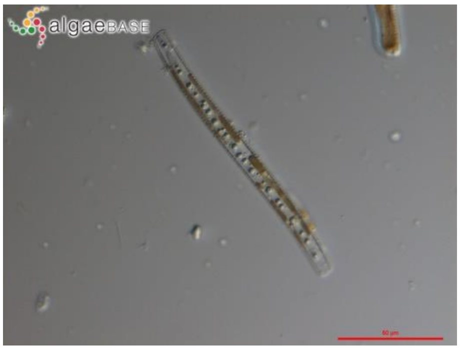


Figure 24: *Nitzschia sigmoidea*, Yakima, Washington, USA; golf course, 400x, DIC, © Karl Bruun

5.2.12. Ceratium hirundinella

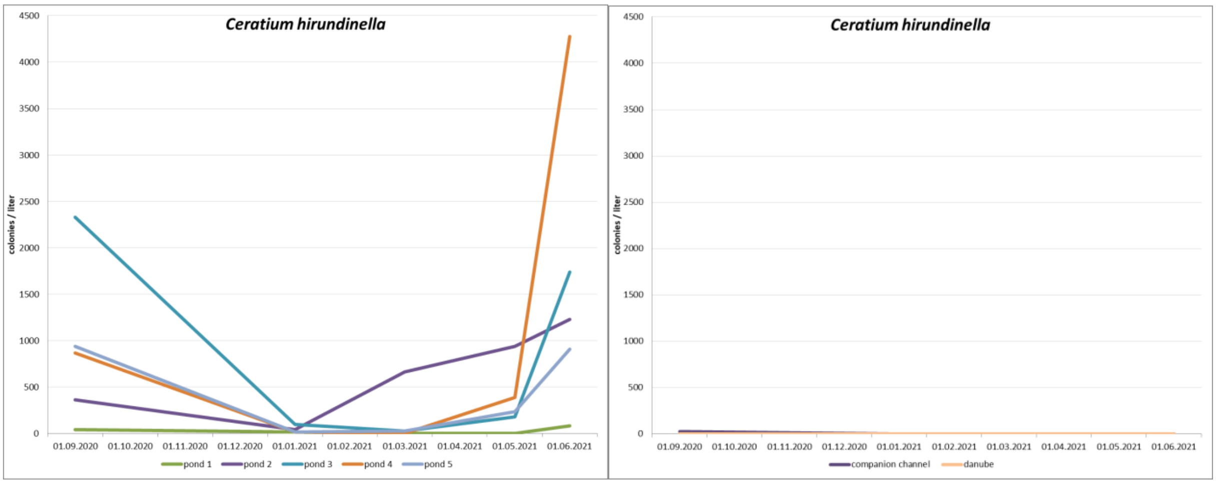


Figure 25: graphical representation of the *Ceratium hirundinella* findings in the waterbodies. The individual numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

The dinoflagellate *Ceratium hirundinella* is often found in lakes of temperate latitudes, where it makes up a large proportion of the phytoplankton. The highest density of the species occurs in August and September. It is mainly observed near the surface, as its mobility allows it to actively influence the position in the water and thus prevent it from sinking into the sediment (Heaney and Talling 1980).

The statistical analysis revealed no significant differences of *Ceratium hirundinella* in the individual ponds (p_{MC} = 0.097; Table 25), as well as no significant differences in the watercourses (p_{MC} = 1.000; Table 32). However, significant differences between the ponds and the watercourses (p_{MC} = 0.000; Table 26) could be found.

Furthermore, significant differences in *Ceratium hirundinella* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.008; Table 27).

Figure 26: *Ceratium hirundinella* © Starmayr

5.2.13. Peridinium willei

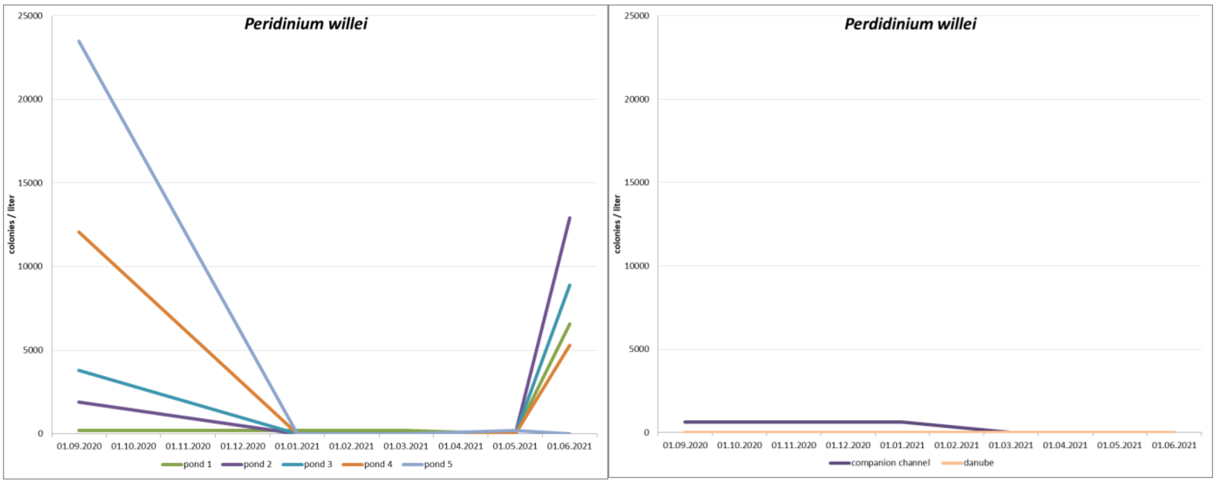


Figure 27: graphical representation of the *Peridinium willei* findings in the waterbodies. The individual numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

The dinoflagellate *Peridinium willei* is very adaptable and is therefore found in oligo- to hypertrophic (Wolfram, Donabaum, and Dokulil 2015), large to very large lakes. It is very rarely found in flowing waters (Olrik 1992).

The statistical analysis revealed no significant differences of *Peridinium willei* in the individual ponds ($p_{MC} = 0.974$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 0.446$; Table 32). Furthermore, no significant differences between the ponds and the watercourses ($p_{MC} = 0.480$; Table 26) could be found.

However, significant differences in *Peridinium willei* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.000$; Table 27).

5.2.14. *Scenedesmus ecornis*

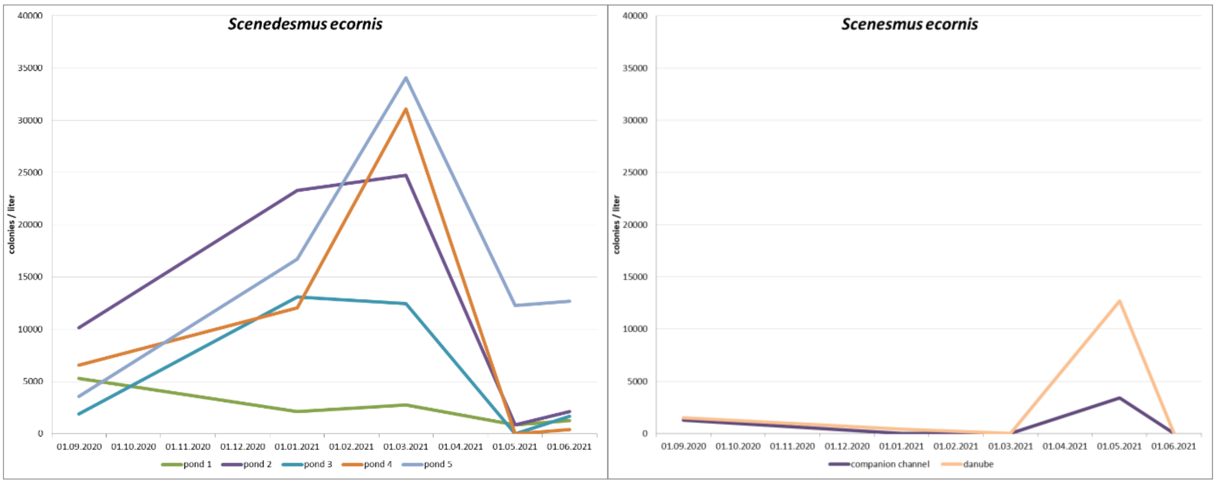


Figure 28: graphical representation of the *Scenedesmus ecornis* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow).

The green alga *Scenedesmus ecornis* is mainly found in Europe in the plankton of eutrophic to hypertropic lakes and rivers (Wolfram, Donabaum, and Dokulil 2015). They form a characteristic four-celled aggregation (Dodds and Whiles 2010).

The statistical analysis revealed no significant differences of *Scenedesmus ecornis* in the individual ponds ($p_{MC} = 0.092$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 0.684$; Table 32). However, significant differences between the ponds and the watercourses ($p_{MC} = 0.013$; Table 26) could be found.

But no significant differences in *Scenedesmus ecornis* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.388$; Table 27).

5.2.15. Desmodesmus armatus var. longispina

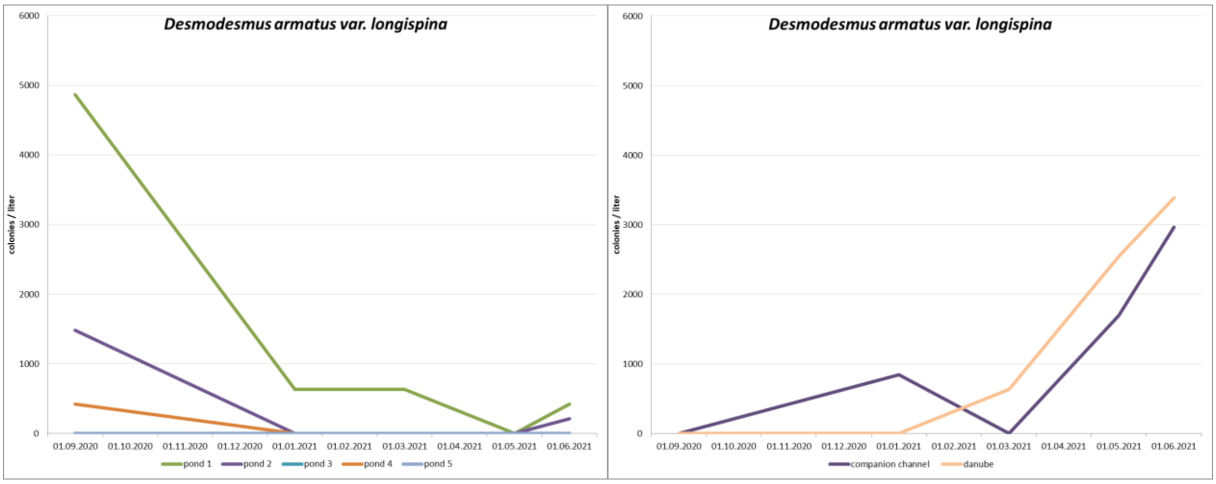


Figure 29: graphical representation of the *Desmodesmus armatus longispina* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow)

The green alga *Desmodesmus armatus longispina* is mainly found in Europe in the plankton of eutrophic lakes and rivers. They form four-celled colonies with long spines at their ends (Streble, Krauter, and Bäuerle 2020).

The statistical analysis revealed significant differences of *Desmodesmus armatus longispina* in the individual ponds (p_{MC} = 0.000; Table 25), but no significant differences in the watercourses (p_{MC} = 1.000; Table 32). However, significant differences between the ponds and the watercourses (p_{MC} = 0.003; Table 26) could be found.

But no significant differences in *Desmodesmus armatus longispina* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.745; Table 27).

5.2.16. *Tetradesmus obliquus*

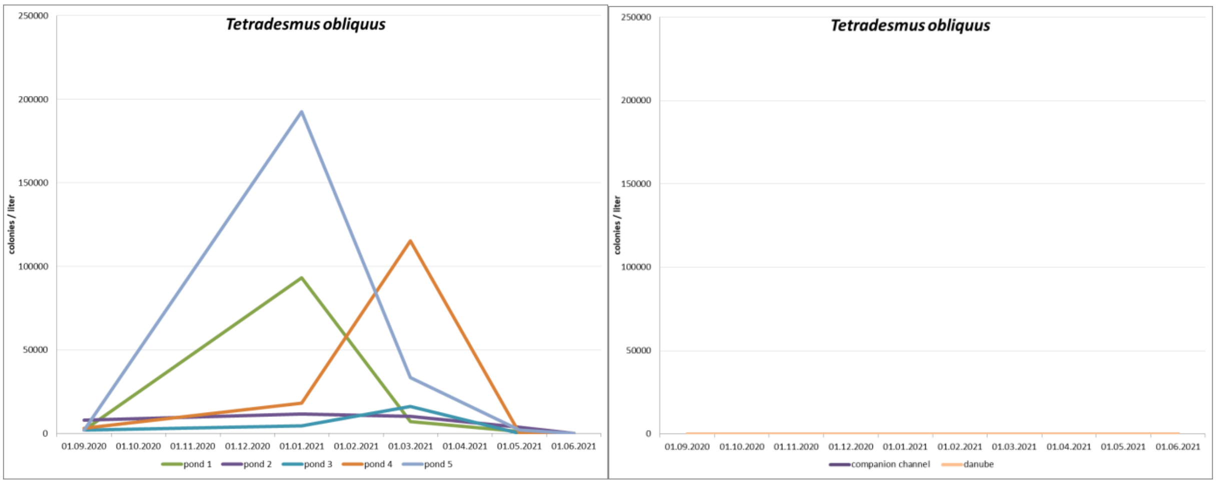


Figure 30: graphical representation of the *Tetradesmus obliquus* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow)

Tetradesmus obliquus is a green alga that is widespread in beta-mesosaprobic waters and occurs frequently, sometimes in masses (Streble, Krauter, and Bäuerle 2020).

The statistical analysis revealed no significant differences of *Tetradesmus obliquus* in the individual ponds ($p_{MC} = 0.858$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 1.000$; Table 32). Furthermore, no significant differences between the ponds and the watercourses ($p_{MC} = 0.055$; Table 26) could be found.

However, significant differences in *Tetradesmus obliquus* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.000$; Table 27).

5.2.17. Tetraëdron minimum

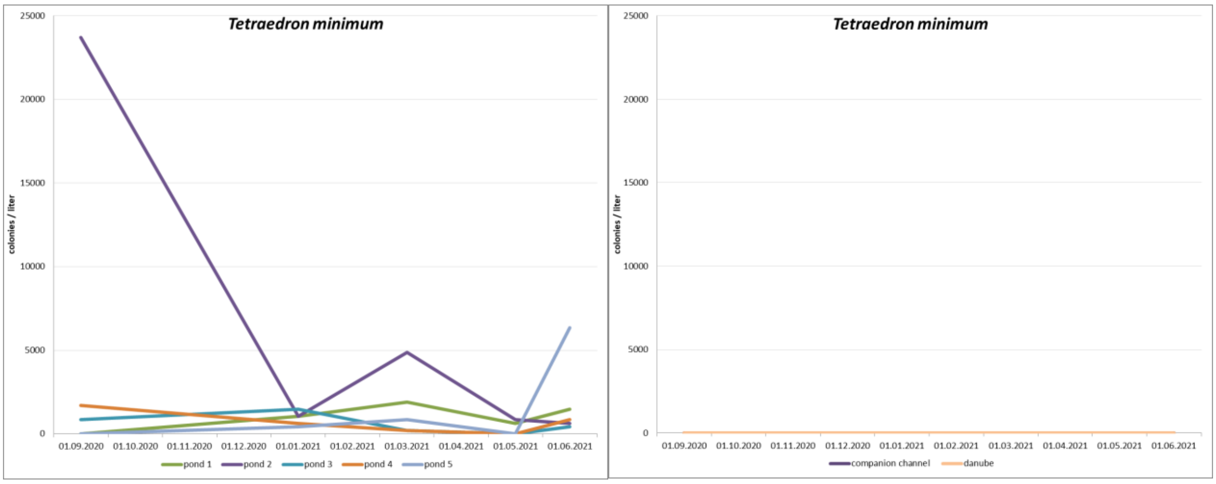


Figure 31: graphical representation of the *Tetraëdron minimum* findings in the waterbodies. The colony numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in colonies/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow)

The small green alga *Tetraëdron minimum* is common in the shore regions of ponds and lakes. It is often found in northern and central Europe (Streble, Krauter, and Bäuerle 2020). It is generalistic, but prefers eutropic waters (Wolfram, Donabaum, and Dokulil 2015).

The statistical analysis revealed no significant differences of *Tetraëdron minimum* in the individual ponds ($p_{MC} = 0.075$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 1.000$; Table 32). However, significant differences between the ponds and the watercourses ($p_{MC} = 0.000$; Table 26) could be found.

But, no significant differences in *Tetraëdron minimum* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.264$; Table 27).

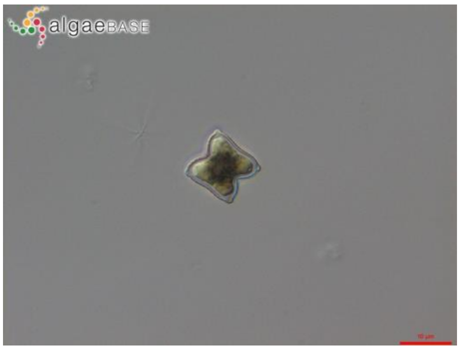


Figure 32: *Tetraëdron minimum*, Wyoming, USA: 1000x, DIC, (c) Karl Bruun

5.2.18. Pelagostrombididae

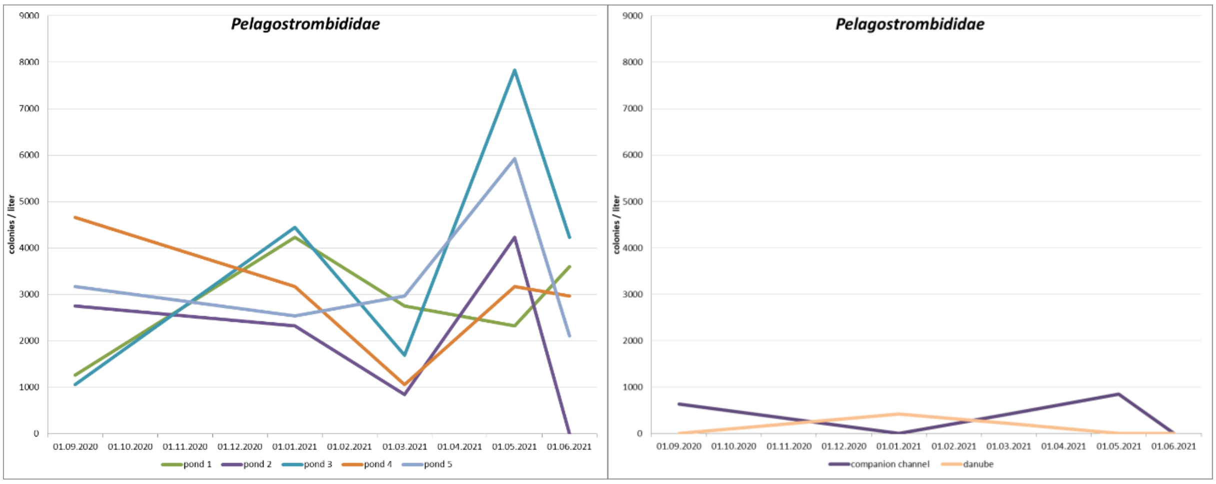


Figure 33: graphical representation of the *Pelagostrombididae* findings in the waterbodies. The individual numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow)

The ciliates of *Pelagostrombididae* are native to freshwater plankton. Habitat recordings from brackish and marine waters proved to be misidentifications. The *Pelagostrombididae* include the two genera *Limnostrombidium* and *Pelagostrombidium*. They are considered non-constitutional mixotrophs because they store chloroplasts from preyed algae and use them for food production (Agatha 2011).

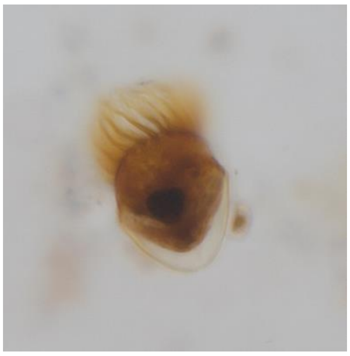


Figure 34: *Limnostrombidium pelagicum* © Starmayr

The statistical analysis revealed no significant differences of the *Pelagostrombididae* in the individual ponds ($p_{MC} = 0.259$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 0.367$; Table 32). However, significant differences between the ponds and the watercourses ($p_{MC} = 0.000$; Table 26) could be found.

But, no significant differences in *Pelagostrombididae* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.564$; Table 27).

5.2.19. Stentor amethystinus

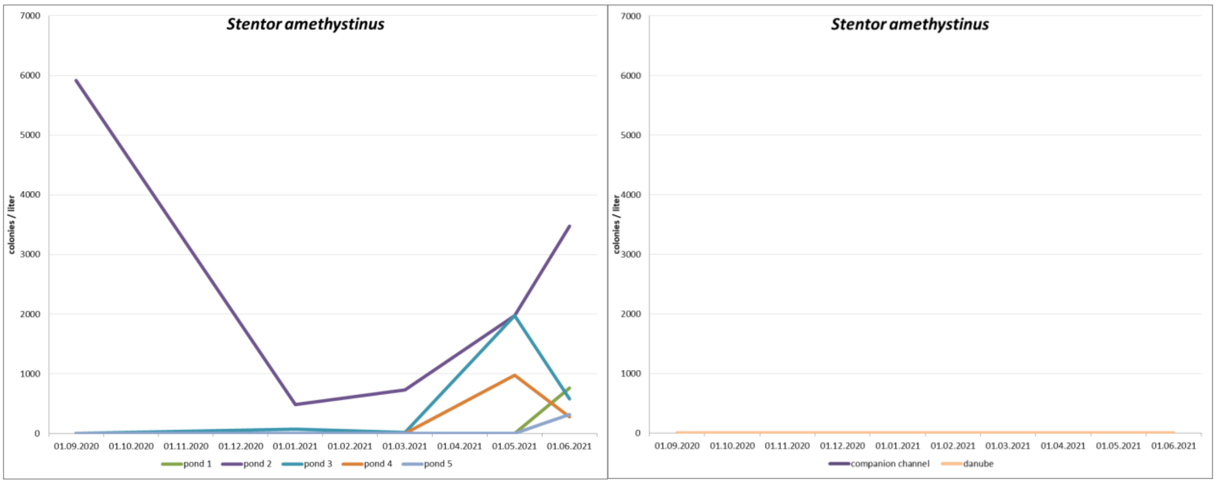


Figure 35: graphical representation of the *Stentor amethystinus* findings in the waterbodies. The individual numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow)

The ciliate *Stentor amethystinus* is very common in the plankton of oligotrophic to hypertrophic waters. The chloroplasts and dark granules inside them make them appear purple. It is phototactic, therefore it swims towards the light or bright surfaces and attaches itself there (Blatterer 2020).

The statistical analysis revealed no significant differences of *Stentor amethystinus* in the individual ponds ($p_{MC} = 0.068$; Table 25), as well as no significant differences in the watercourses ($p_{MC} = 1.000$; Table 32). However, significant differences between the ponds and the watercourses ($p_{MC} = 0.005$; Table 26) could be found.

Figure 36: *Stentor amethystinus*, © Barbara Kammerlander

But, no significant differences in *Stentor amethystinus* were found over the duration of the survey period in all waterbodies ($p_{MC} = 0.063$; Table 27).

5.2.20. Keratella cochlearis

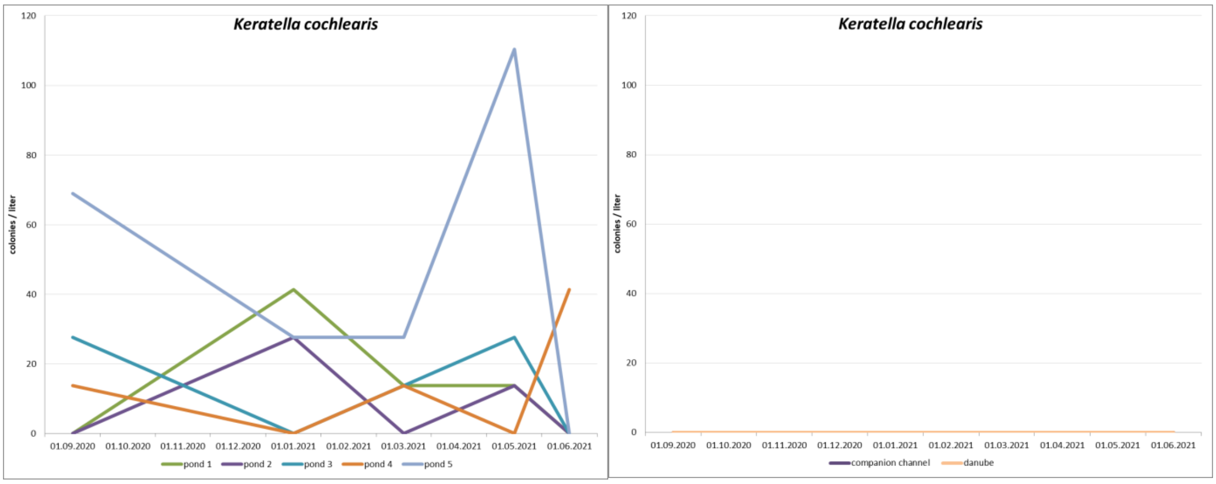


Figure 37: graphical representation of the *Keratella cochlearis* findings in the waterbodies. The individual numbers of the individual ponds are shown distributed over the year with a coloured line; the values are in individuals/litre. Graphic on the left: Ponds (pond 1 - green, pond 2 - purple, pond 3 - turquoise, pond 4 - orange, pond 5 - grey), graphic on the right: flowing waters (companion channel - purple, Danube - yellow)

The rotifer *Keratella cochlearis* is found worldwide in planktonic marine, brackish and fresh water. It is probably the most common and widespread species of rotifers. They undergo a cyclomorphosis: in summer in lakes the rotifer is spineless and in autumn and spring it develops spiny forms (Segers and De Smet 2008).

The statistical analysis revealed no significant differences of *Keratella cochlearis* in the individual ponds (p_{MC} = 0.249; Table 25), as well as no significant differences in the watercourses (p_{MC} = 1.000; Table 32). However, significant differences between the ponds and the watercourses (p_{MC} = 0.006; Table 26) could be found.

But, no significant differences in *Keratella cochlearis* were found over the duration of the survey period in all waterbodies (p_{MC} = 0.744; Table 27).

Figure 38: *Keratella cochlearis* © Starmayr

Only two of the 20 statistically studied species (the diatom *Navicula radiosa* and the green algae *Desmodesmus armatus longispina*) differ significantly within the ponds, with *Desmodesmus armatus longispina* being found mainly in ponds 1 & 2, but not in the rest of the ponds (Figure 29), and *Navicula radiosa* being found mainly in ponds 1 & 5, but also in the other ponds, albeit in smaller numbers (Figure 20).

In contrast, 14 of the 20 species studied showed significant differences between the watercourse and the ponds. The 14 species are as follows:

- *Merismopedia tenuissima* - This species was only observed in the ponds (Figure 9).
- *Dinobryon divergens* - This species was only found in the ponds and in small numbers in the companion channel (Figure 10).
- *Aulacoseira granulata* - This species was observed in all of the water bodies, but had significant temporal differences (Figure 14).
- *Melosira varians* - This species was caught everywhere, but showed significantly higher abundances in the watercourses (Figure 16).
- *Navicula radiosa* - This species was caught everywhere, but showed significantly higher abundances in the watercourses (Figure 20).
- *Nitzschia sigmoidea* - With few exceptions, this species was only observed in watercourses (Figure 23).
- *Stauroneis anceps* - This species was caught everywhere, but showed significantly higher abundances in the watercourse (Figure 21).
- *Ceratium hirundinella* - This species was only found in the ponds and in small numbers in the companion channel (Figure 25).
- *Scenedesmus ecornis* - This species was found in all watercourses, but the abundances in the watercourses were significantly lower than in the ponds (Figure 28).
- *Desmodesmus armatus longispina* - This species was observed in all waters, but had significant temporal differences (Figure 29).
- *Tetraëdron minimum* - This species was only observed in the ponds (Figure 31).
- *Pelagostrombididae* - This species was found in all waters, but the a-bundances in the watercourses were significantly lower than in the ponds (Figure 33).
- *Stentor amethystinus* - This species was only observed in the ponds (Figure 35).
- *Keratella cochlearis* - This species could only be observed in the ponds (Figure 37).

There are no statistically significant differences between the species in watercourses.

The analysis of time reveals significant differences in 7 out of 20 species over the duration of the study period. This significant differences are as follows:

- *Microcystis aeruginosa* showed an algal bloom in the Danube and in pond 2 in May and in pond 1 in June.
- *Merismopedia tenuissima* had an algal bloom in September in pond 1 and in June in pond 5. ,
- *Asterionella formosa* had an algal bloom in pond 2 in January.
- *Nitzschia acicularis* had an algal bloom in the companion channel in March.
- *Ceratium hirundinella* and *Peridinium willei* showed strong expressions in the summer months of September and June, while they were absent or only present in small numbers in the winter months.
- *Tetradesmus obliquus* showed an algal bloom in ponds 1 & 5 in January and in pond 4 in March.

5.3. Correlation of species to abiotic factors

Using the data obtained in this study, the relationships of the individual species to the given abiotic factors were calculated. These calculations can be found in the appendix, Table 34 & Table 35.

5.4. Abiotic factors

As shown in Table 4, 13 of 22 (more precisely conductivity, DOC, acidcapacity, carbonate hardness, hydrogencarbonate, total hardness, calcium, potassium, total P filtered, Cl, SO_4, NO_3-N & NO_2-N) abiotic factors show statistically significant differences in the ponds.
In the watercourses there is only one statistically significant difference (DOC).
All the water bodies together show 16 out of 22 statistically significant differences (conductivity, DOC, acidcapacity, carbonate hardness, hydrogencarbonate, total hardness, magnesium, calcium, potassium, sodium, total P filtered & unfiltered, Cl, SO_4 NO_3-N & NO_2-N).

Over the study period, 11 out of 22 factors show statistically significant differences (pH, temperature, O_2 dissolved, O_2 saturation, DOC, acidcapacity, carbonate hardness, total hardness, magnesium & NH_4-N).

Table 4: Summary of the statistical results from Table 28, Table 29, Table 30 and Table 33.

Monte Carlo significance	pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Chlorophyll A	DOC	Acid capacity Ks4,3	Carbonate hardness	Hydrogen carbonate	Total hardness
ponds	0.944	**0.000**	0.998	0.912	0.944	0.591	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**
watercourses	0.221	0.694	0.846	0.418	0.101	1.000	**0.007**	0.195	0.164	0.164	0.337
waterbodies	0.924	**0.000**	0.964	0.735	0.196	0.776	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

time	**0.000**	0.062	**0.000**	**0.001**	**0.000**	0.780	**0.050**	**0.025**	**0.020**	**0.020**	**0.028**

Monte Carlo significance	Magnesium	Calcium	Potassium	Sodium	Total P filtered	Total P unfiltered	Cl	SO4	NO3-N	NO2-N	NH4-N
ponds	0.352	**0.000**	**0.001**	0.095	**0.016**	0.207	**0.000**	**0.000**	**0.000**	**0.000**	0.322
watercourses	0.693	0.202	0.367	0.732	0.306	0.188	0.720	0.740	1.000	0.109	0.322
waterbodies	**0.000**	**0.000**	**0.000**	**0.002**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**	0.185

time	**0.010**	0.062	0.182	0.093	0.574	0.090	0.165	0.461	0.572	0.736	**0.005**

5.5. pH

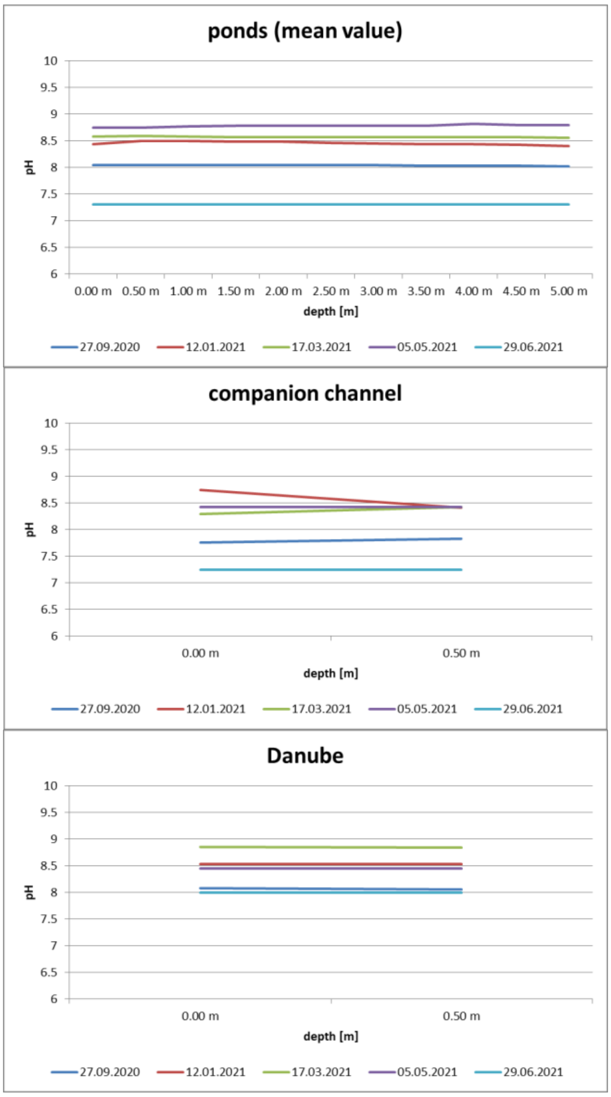


Figure 39: Graphic representation of the pH in the individual depth layers.

Since the five investigated quarry ponds did not show any remarkable differences in their pH within the individual sampling data, the mean values were taken in order to enable a better graphical representation

As can be seen in Figure 39, the ponds, the companion channel and the Danube do not show any major fluctuations in pH, either over depth or over time.

The lowest pH value for the ponds is recorded in June (mean: 7.31) and the highest in May with 8.78. The mean value for the ponds is 8.23 over the entire study period. The lowest value was 6.95 in pond 2 (29.6.21, entire depth) and the highest value was 8.97 on 05.05.21 in pond 4 starting at a depth of 4 metres downwards.

The Danube shows a maximum value of 8.85 in March and a minimum value of 8.00 in June. The mean here is 8.37.

The companion channel has its highest value in January (8.58) and its lowest in June (7.25). The average is 8.08.

5.6. Conductivity

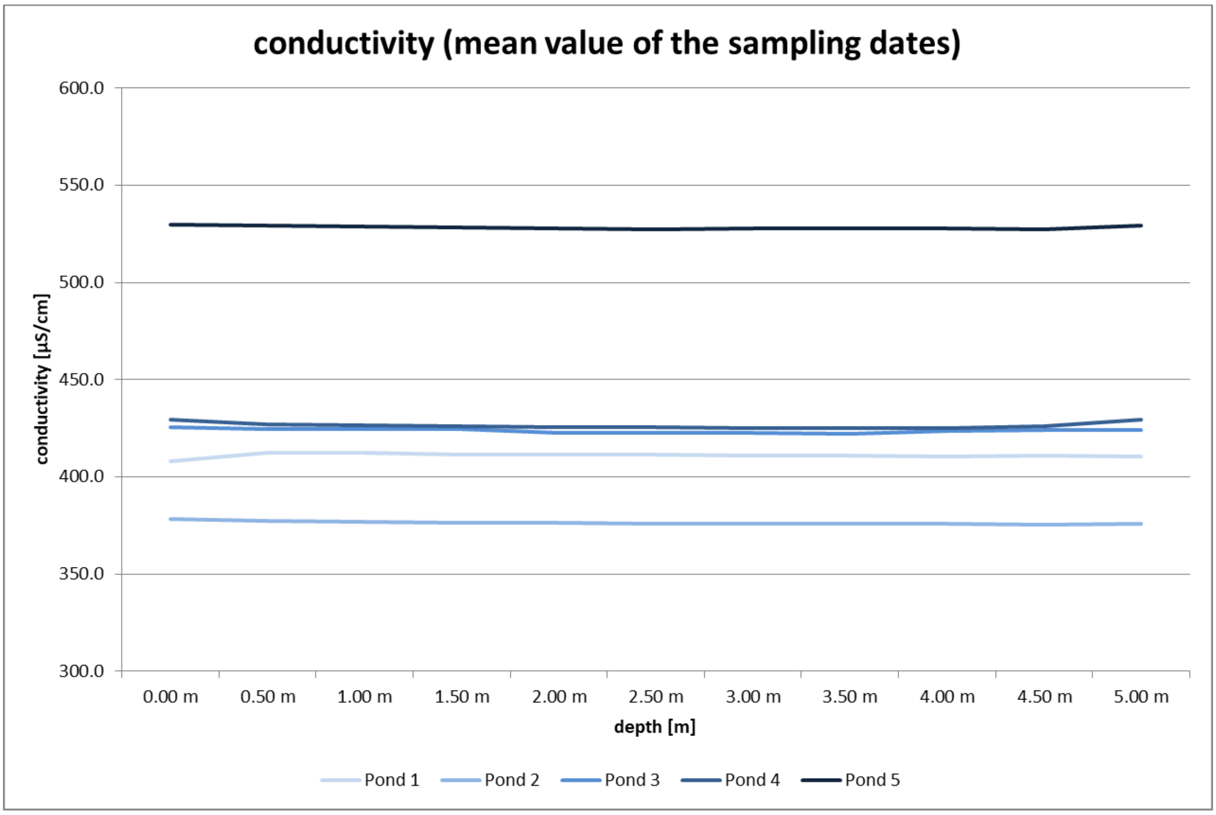


Figure 40: Mean values of the sampling dates inconductivity of the individual ponds over depth.

Since the conductivity of the ponds on the individual sampling dates did not vary considerably from one another, the mean value of the five sampling dates was taken to enable a better graphical representation.

The conductivity changes only slightly over the depth of the individual ponds. Ponds 1 to 4 all have a relatively similar conductivity of around 409 µS/cm, while pond 5 has a mean value of 528 µS/cm.

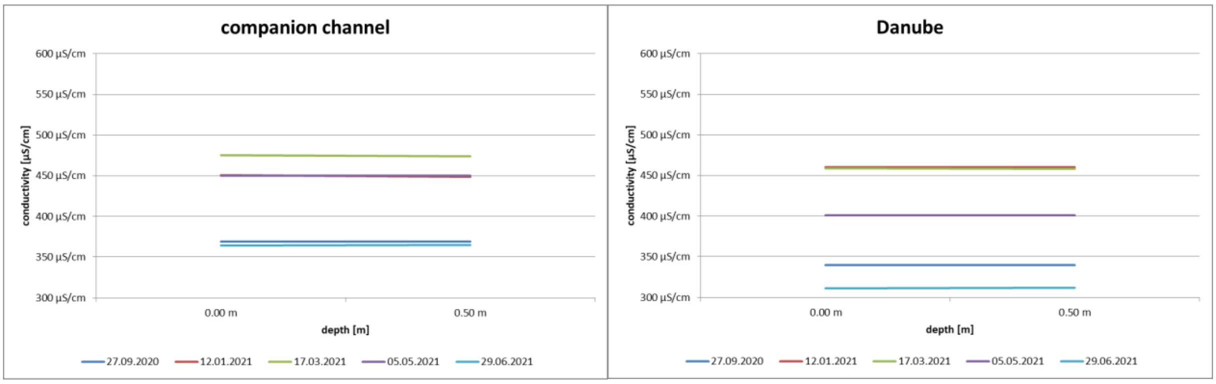


Figure 41: values of the conductivity of the watercourses over time and depth.

The conductivity of the watercourses, on the other hand, changes over time: the companion channel has the lowest conductivity in June at 364 µS/cm and the highest conductivity in March at 475 µS/cm (Figure 41). The situation is similar for the Danube, which has the lowest conductivity in June at 311 µS/cm and the highest in January at 460 µS/cm.

5.7. Temperature:

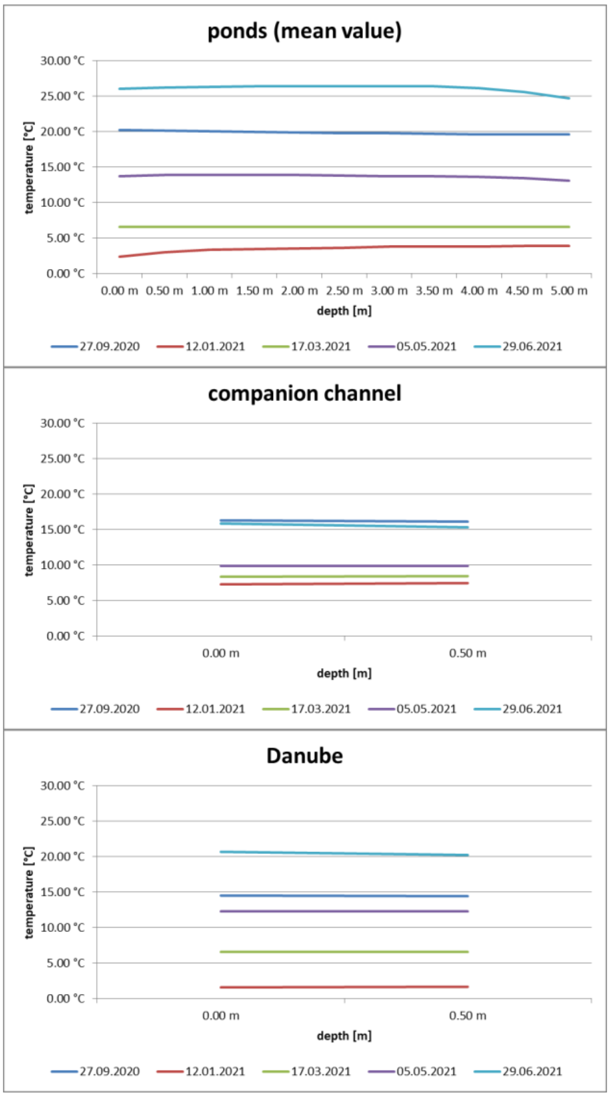


Figure 42: Graphic representation of the temperatures in the individual depth layers.

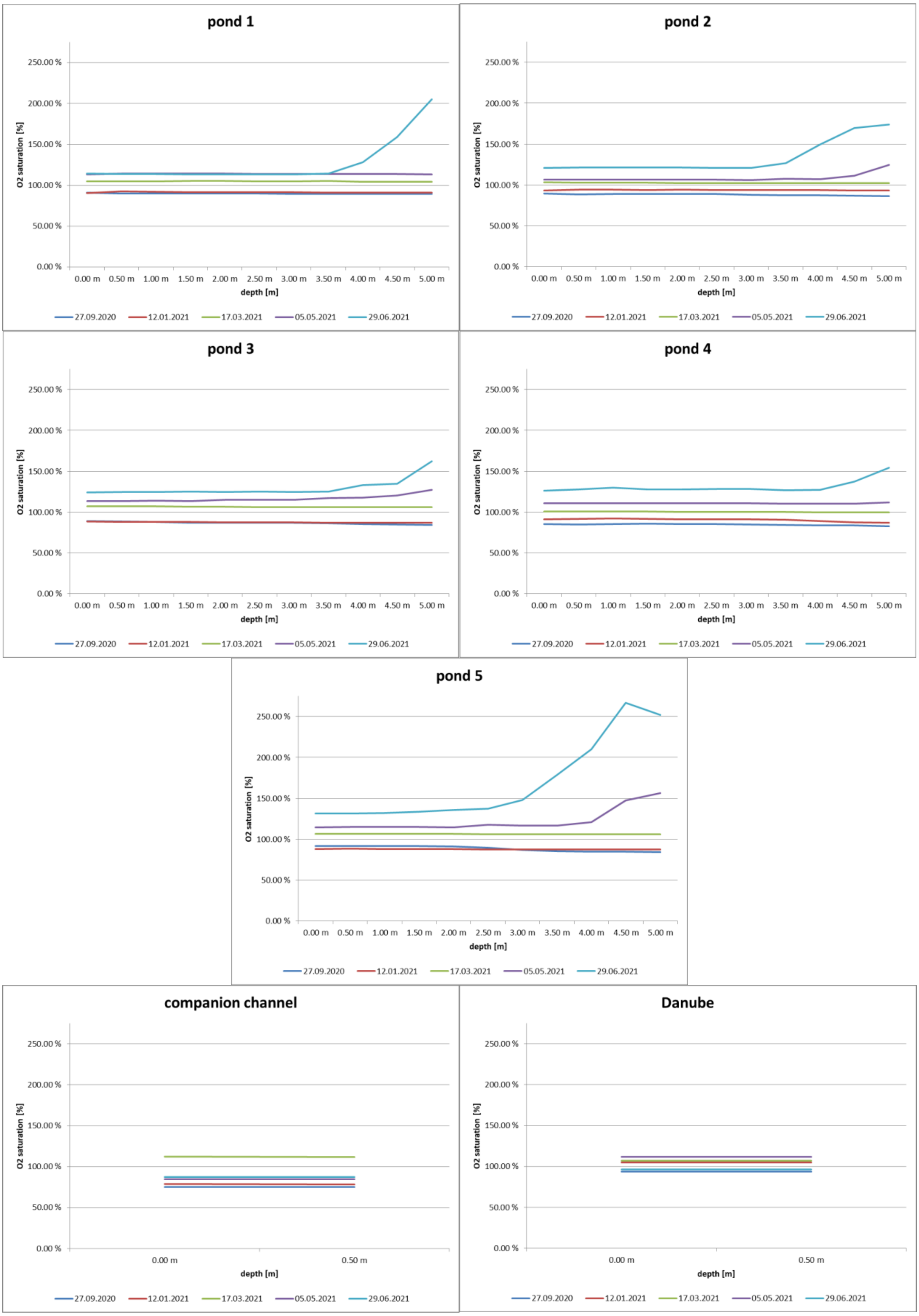
As with pH, the quarry ponds did not show significant temperature differences within the individual sampling data, so the mean values were taken for better graphical representation

As can be seen in Figure 42, the ponds, which do not have a current, show the greatest range in temperature. A maximum of 26.07 °C on average was measured in June, which only begins to decrease at a depth of 4.00 meters. In January the lowest temperatures were measured with an average of 3.51 °C.

The slow-flowing Danube shows a medium temperature dispersion, with highest values of 20.45 °C in June and lowest values of 1.65 °C in January.

The companion channel, which is very fast flowing due to its shallow depth, has the lowest temperature dispersion with an average of 16.20 °C in September and 15.60 °C in June and a lowest temperature of 7.40 °C in January.

5.8. Oxygen


pond 1

pond 2

pond 3

pond 4

pond 5

companion channel

Danube

Figure 43: graph of oxygen saturation over the depth of the individual water bodies per sampling date.

As can be seen from Figure 43, in June 2021 there was an increase in oxygen saturation in every pond from a depth of around four metres to the maximum sampled depth of five metres (detailed information in the appendix, Table 13 - Table 17).

The oxygen saturation of the flowing waters remained largely constant over the study period, with only the Companion channel showing a value above the average (81.50 %) in March with 112.00 % saturation. The Danube has an average saturation of 102.86 %.

5.9. Secchi depth

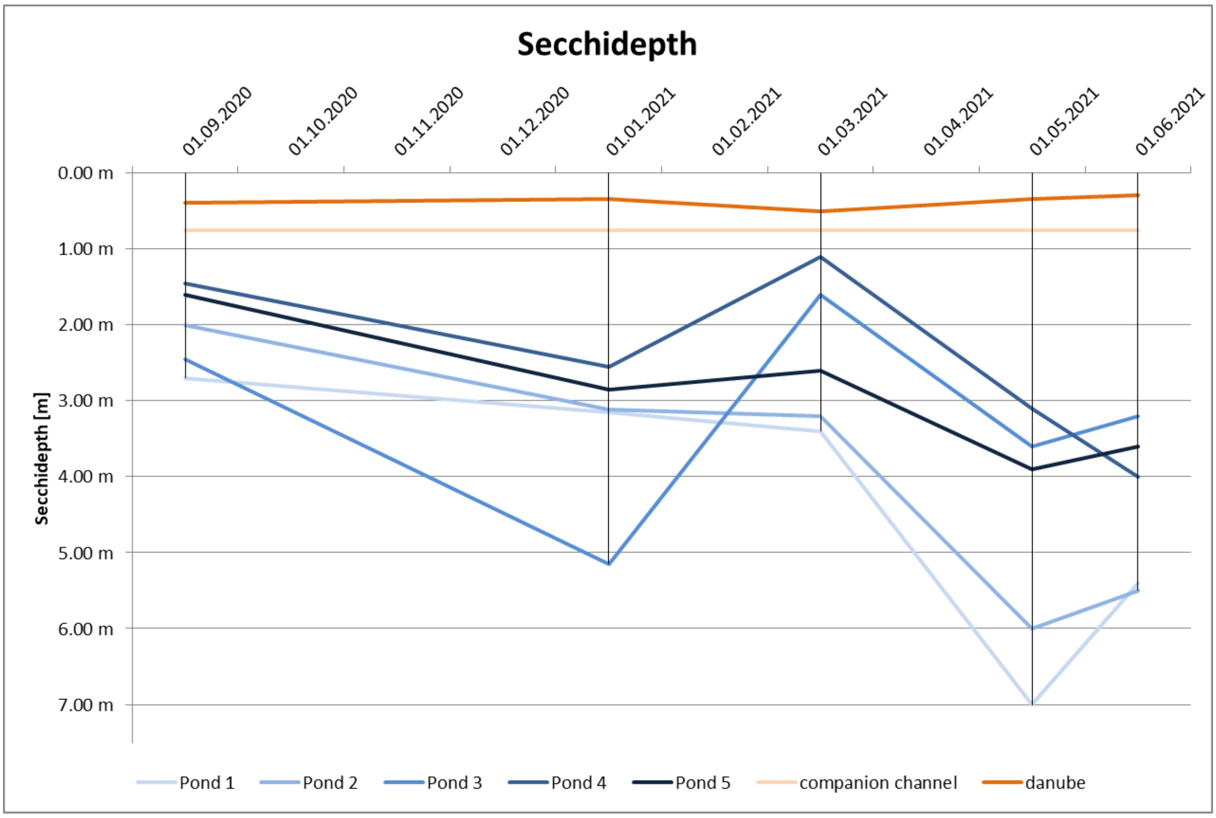


Figure 44: Development of the Secchi depth over the study period, Secchi depth in the companion channel to maximum depth, the ground has always been visible.

Figure 44 shows the development of the Secchi depth, and thus of the water turbidity over the year (detailed data in the appendix, Table 13- Table 17). The lines of the flowing waters are almost straight, but the ponds show characteristic patterns. The water is very turbid at the beginning of the study in autumn, becomes clearer over the winter, becomes turbid again in spring, then very clear at the end of spring and beginning of summer, and begins to become turbid again towards the end of summer.

5.10. Number of identical species per water body

In addition to the statistical analysis of the 20 selected species, all observed species were compiled in tables, which were used to examine the similarity of the species distribution in the individual ponds. For this purpose, only presence/absence data were evaluated. The cross-tabulations for the individual sampling dates can be found in the Appendix, Table 36 - Table 40.

Table 5: Cross-tabulation for the mean values; exemplary reading note: the distribution of Pond 1 and Pond 2 shows 13 identical species, which account for an average of 56,40% of the species encountered in both ponds.

	Mean						
	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
No. Species	26	21	21	20	25	17	16
No. of identical species							
Pond 1		13	11	11	14	7	7
Pond 2	56.40 %		14	12	14	6	6
Pond 3	47.09 %	64.37 %		14	15	5	5
Pond 4	48.50 %	61.02 %	67.63 %		15	6	5
Pond 5	55.99 %	63.28 %	67.05 %	67.03 %		7	7
companion channel	33.83 %	27.95 %	27.06 %	30.58 %	34.24 %		9
danube	32.55 %	30.97 %	25.36 %	27.16 %	34.53 %	52.90 %	

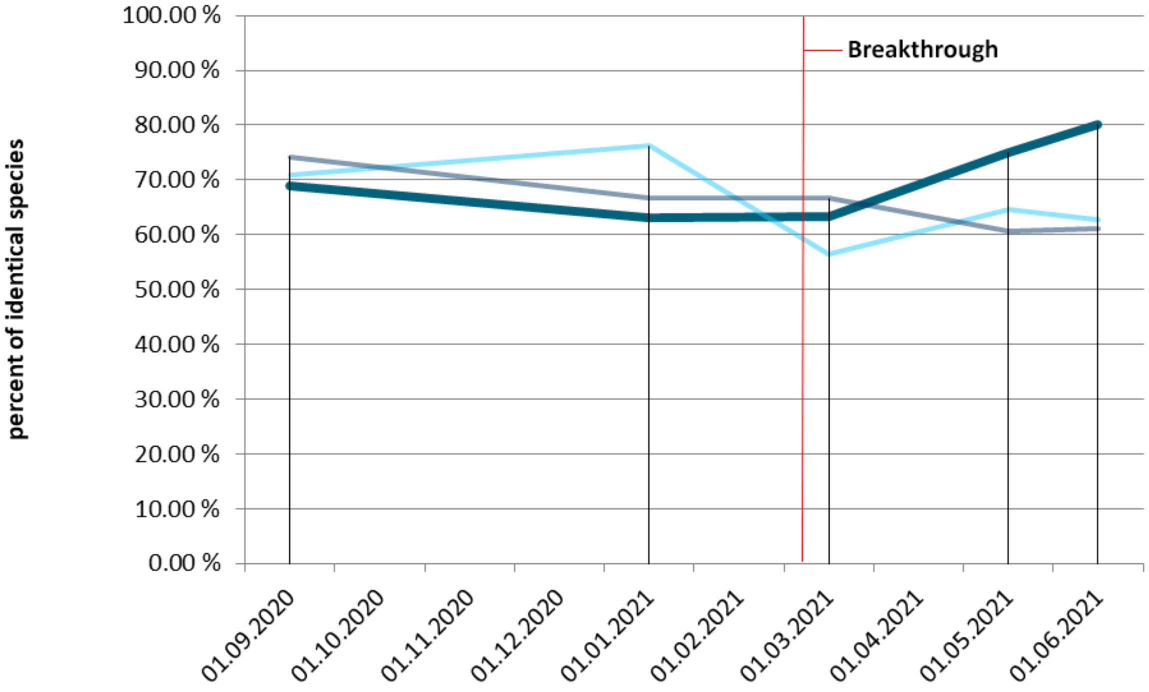
As shown in Table 5, the ponds have an average similarity of 59.83 % or 13.3 species to each other and the watercourses show a similarity of 52.90 % or 9 species.
However, the average similarity of ponds and watercourses to each other is only 30.42 % or 6.1 species.

5.11. Breakthrough pond 3 and pond 4

The artificial breakthrough created in mid-March 2021 provided a good opportunity to study the mixing of the two ponds in more detail. As this thesis deals with the question of a possible meta-community in the ponds, it is interesting to look at the effects of a breakthrough of about 30 metres in length. The exact depth of the breakthrough is not known, but is assumed to be about 2 metres.

The statistical analysis showed that there are no significant differences between the species in Pond 3 and Pond 4, see Appendix, Table 31.

Furthermore, Figure 45, which was created from the cross-tabulations Table 36 - Table 40, suggests a slight trend. Here, pond 5, which is adjacent to ponds 3 and 4, was used as a comparison. Looking at the similarity of the species of pond 3 and 4 in comparison to the similarities of pond 3 to pond 5 and pond 4 to pond 5, it seems that from the time of the breakthrough in mid-March onwards, a trend begins that leads to a higher number of identical species. Thus, at the end of June, the number of identical species between ponds 3 and 4 is 80%, between ponds 3 and 5 only 62.86% and between ponds 4 and 5 only 61.11%.



	27.09.2020	12.01.2021	17.03.2021	05.05.2021	29.06.2021
pond 3 / pond 4	68.97 %	63.16 %	63.41 %	75.00 %	80.00 %
pond 3 / pond 5	70.97 %	76.19 %	56.52 %	64.52 %	62.86 %
pond 4 / pond 5	74.19 %	66.67 %	66.67 %	60.61 %	61.11 %

Figure 45: Percent of identical species in pond 3 / 4, pond 3 / 5 & pond 4 / 5 over the period of time.

6. Discussion:

The central question of this thesis is whether the plankton communities of the five quarry ponds are a metacommunity or not. In addition, there is the question if the last flood in 2013 caused a similarity between the plankton composition of the ponds and the plankton composition of the Danube.

In order to determine this, the plankton of the quarry ponds, the companion channel and the Danube were sampled and analysed five times during the period of one year. Subsequently, the 20 plankton species that were present in >50% of the samples were statistically analysed for differences.

The plankton of the ponds differ significantly from each other only in two species (*Navicula radiosa* and *Desmodesmus armatus longispina*), the plankton of the companion channel and the Danube do not differ significantly from each other at all.

In comparison, the flowing waters, that is, the companion channel and the Danube, differ significantly from the ponds in 14 out of 20 species (*Merismopedia tenuissima, Dinobryon divergens, Aulacoseira granulata, Melosira varians, Navicula radiosa, Nitzschia sigmoidea, Stauroneis anceps, Ceratium hirundinella, Scenedesmus ecornis, Desmodesmus armatus longispina, Tetraëdron minimum, Pelagostrombididae, Stentor amethystinus* and *Keratella cochlearis*).

Over the duration of the study, of the 20 species studied, 7 showed statistically significant differences (*Microcystis aeruginosa, Merismopedia tenuissima, Asterionella formosa, Nitzschia acicularis, Ceratium hirundinella, Peridinium willei* and *Tetradesmus obliquus*).

The following sections will attempt to highlight commonalities and differences between the individual water bodies from the perspective of plankton, but also from the perspective of abiotic parameters. Finally, an attempt will be made to bring these individual factors together in relation to the research questions formulated at the beginning.

The selection of plankton organisms that were present in at least 50% of the pond samples or at least 50% of the watercourse samples, was carried out because the water sampler used for sampling can never reflect the totality of the water body; it would be possible for the same species to be present a few metres away but not at the sampling site. For this reason, the totality of all species found should be understood to mean that these species are common enough in the water bodies to be sampled.

However, it is quite likely that further species are present that could not be sampled. Furthermore, it must be taken into account that only plankton of a certain size can be sampled by the water sampler.

For example, the jellyfish *Craspedacusta sowerbii* has been observed repeatedly during various dives in the investigated quarry ponds over many years, but could not be sampled by the water sampler due to two factors:

- Firstly, the medusa always appears unpredictably, some years the animals are not found, but other years they are. Although with a water temperature of over 22°C the main basic requirement of the jellyfish in the quarry ponds is met almost every year (Aescht 2006; 2003). During the study period, the jellyfish could not be observed during dives. However, *Craspedacusta sowerbii* was already documented in Feldkirchen in 1971 (Grohs 1971; Gusenleitner 1991).
- Secondly, the Ruttner sampler displaces water when it is lowered, pushing the jellyfish and probably also copepods and daphnia to the side.

This species was probably introduced into Austria with tropical aquarium stock and was subsequently able to assert itself in the local ponds and lakes due to the low demands of the medusa (Aescht 2006).

6.1. Statistical analysis

However, as shown in Figure 30, *Tetradesmus obliquus* was clearly only found in the ponds, but the species could not be observed in June, which is why no significance was achieved using the Kruskal-Wallis test. This example clearly shows that it made sense to use only those species for statistical analysis that were found in at least 50 % of the cases. This allowed for a better and clearer calculation, as many zero values could have distorted the result. It is highly likely that some significant results will be neglected because of this, but this was accepted in view of the gain in clarity and precision of the calculation.

The results of the statistical analysis of the selected plankton species in combination with the graphical representation of the number of individuals (Figure 7 - Figure 37) suggest that the ponds are very similar habitats, which probably form a metacommunity as they differ significantly only in the species *Navicula radiosa* and *Desmodesmus armatus longispina* (Holyoak, Leibold, and Holt 2005; Altermatt 2016). This significant difference is probably due to an algal bloom. However, it is not certain what triggered the algal bloom of the respective species.

Since the Danube and the companion channel do not show statistically significant differences in their plankton composition, they are to be regarded as a single habitat, as the companion channel is diverted from the Danube only a few kilometres upstream.

6.2. Correlation of species to abiotic factors

The diatoms *Aulacoseira granulata*, *Melosira varians*, *Navicula radiosa*, *Nitzschia acicularis* and *Nitzschia sigmoidea* show significant correlations with potassium and sodium. Potassium has been shown to promote diatom development by reducing the induction phase (Zheng et al. 2005). Sodium is needed for the cell division of the diatoms (Masmoudi et al. 2013).

Potassium also correlates with the dinoflagellate *Peridinium willei*, as well as the green algae *Tetradesmus obliquus* and *Tetraëdron minimum* and the ciliates of the *Pelagostrombididae* and *Stentor amethystinus*.

Contrary to expectations, hydrogen carbonate shows significant correlations only in the diatoms *Navicula radiosa* and *Nitzschia acicularis*. It would have been expected that there would also be dependencies in the other diatoms, because hydrogen carbonate is absorbed by diatoms, who use it as a source of DIC (dissolved inorganic carbon), which is needed for growth. However, it is possible that the other diatoms studied are tolerant enough to tolerate the measured variations without significant density changes (Tortell, Reinfelder, and Morel 1997).
The same is true for acid capacity, carbonate hardness and total hardness, as these correlate with pH and hydrogen carbonate. However, pH has no significant effect on the diatoms. But this is not because the diatoms are not affected by pH, but because pH has hardly changed during the study period.

Temperature has a strong significant effect on *Microcystis aeruginosa* (Yang et al. 2018), *Dinobryon divergens* (Wirth, Limberger, and Weisse 2019), *Asterionella formosa* (Grimaud et al. 2017), *Ceratium* *hirundinella* (Kawabata and Banba 1993), *Peridinium willei* (Chapman and Pfester 1995), *Tetradesmus obliquus* (Yang et al. 2018) and *Stentor amethystinus*.

The high water temperatures in May and June favour an algal bloom of *Microcystis aeruginosa* (Yang et al. 2018). The same applies to *Dinobryon divergens* (Wirth, Limberger, and Weisse 2019), but conditions in January also seem to have been favourable for this species, so that they were able to multiply despite low temperatures.

Asterionella formosa, whose optimal temperature is around 20°C (Grimaud et al. 2017), also seems to have found good living conditions under the ice cover at around 4°C in January, which favoured an increase in population numbers.

Ceratium hirundinella and *Peridinium willei* showed strong expressions in the summer months of September and June, while they were absent or only present in small numbers in the winter months (Kawabata and Banba 1993; Chapman and Pfester 1995).

The high water temperatures in September, May and June seem to promote the growth of *Microcystis aruginosa*, enabling it to suppress *Tetradesmus obliquus*. This would also be consistent with the increased population densities of *Tetradesmus obliquus* in January and March, when there would be less competition (Yang et al. 2018).

6.3. Fish Species living in the investigated waters

The fish species present in the waters are not entirely known; interviews with local fishermen have shown that the following fish can be found in the ponds:

- Common bleak (*Alburnus alburnus*)
- Common bream (*Abramis brama*)
- Common carp (*Cyprinus carpio*)
- Common roach (*Rutilus rutilus*)
- Common rudd (*Scardinius erythrophthalmus*)
- Crucian carp (*Carassius carassius*)
- European perch (*Perca fluviatilis*)
- Goby (Gobiidae)
- Grass carp (*Ctenopharyngodon idella*)
- Pond trout (*Salmo trutta lacustris*)
- Northern pike (*Esox lucius*)
- Silver carp (*Hypophthalmichthys molitrix*)
- Tench (*Tinca tinca*)
- Wels (*Silurus glanis*)
- Zander (*Sander lucioperca*)

In addition to those already listed for the ponds, the following fish species have already been caught in the Danube by local fishermen:

- Burbot (*Lota lota*)
- Common barbell (*Barbus barbus*)
- European eel (*Anguilla anguilla*)
- Zingel (*Zingel zingel*)

6.4. Abiotic factors

As Table 4 shows, the two watercourses in which the companion channel originates from the Danube do not differ significantly from each other, only in the DOC content. It can be assumed that this difference is on the one hand due to the fact that the water of the companion channel meanders through a meadow forest area directly after its outflowing, where the particles can settle and not much energy is available for green algae due to the shading.

On the other hand, the companion channel lies in the downstream direction of the groundwater body to the north of the study area. It can be assumed that the cold, oxygen-poor groundwater enters the companion channel, where it mixes with the Danube water and causes the latter to become colder, as well as lowering its oxygen concentration. This dilution would also explain the clarity of the water in the companion channel.

Most of the 13 significant differences between the ponds can be traced back to pond 5 and the fish in it. Compared to the other ponds, pond 5 has higher values for acid capacity, carbonate hardness, hydrogen carbonate, total hardness, Calcium, NO_3^-N and NO_2^-N than the other ponds (see appendix, Table 18 - Table 22). This, as well as the increased conductivity (Figure 40), is due to the increased number of fish and their increased amount of excreta, which leads to a higher amount of dissolved ions (Boyd 2020). In addition, feeding of the fish and thus nutrient input by fishermen can be assumed.

In contrast, DOC and potassium are highest in pond 1. It is assumed that this is a consequence of the nearby agricultural land (Ferstl et al. 2011). While the other ponds are located behind the adjacent golf course from the perspective of groundwater flow. The input from the golf course can not be estimated by now, due to lack of data. Upstream of pond 1 there are several conventionally cultivated farmlands.

The values of total P filtered, Chlorine and SO_4 do not show any trends and are therefore probably subject to a general fluctuation (appendix, Table 18 - Table 22).

Considering all water bodies together, 16 significant differences in abiotic factors were observed (Table 4).

- The values for magnesium and potassium of the Danube and the accompanying channel are lower than those of the ponds, while the values for total P filtered & unfiltered are higher in the watercourses than in the ponds (appendix, Table 18 - Table 22).
- DOC is lowest in the companion channel and in all other cases relatively similar, except for pond 1; the value for sodium, on the other hand, is highest in the Danube. Chlorine appears to be relatively constant in the ponds, but fluctuates in the rivers (appendix, Table 18 - Table 22).
- The values for acid capacity, carbonate hardness, hydrogen carbonate, total hardness, NO_3^-N, NO_2^-N and calcium are highest in pond 5, as already mentioned (appendix, Table 18 - Table 22).
- SO_4 again shows a general fluctuation but no obvious trend (appendix, Table 18 - Table 22).

Conductivity will be discussed in more detail in one of the following chapters.

If the different values of pond 5, which are presumably due to the high number of fish, are excluded in the statistics, the remaining ponds differ significantly in only 5 out of 22 values. The same applies to the evaluation of all water bodies together: If the values of pond 5 are excluded, the remaining waters differ significantly in only 9 of 22 values.

These relatively small differences suggest that, since the individual water bodies are all connected via the groundwater system, abiotic factors should not have a significant influence on the distribution of plankton.

6.5. pH

The similar, slightly alkaline pH value and the water hardness of the individual water bodies is presumably due to the subsoil which the water flows through. The locally prevailing gravel sands of the Lower Terrace, the lower flood level and the youngest meadow stage partly consist of calcareous boulders, as can be seen in the extract from the geological base-map of the Province of Upper Austria, Figure 46.
This leads to more calcareous water and thus to a slightly higher, in other words slightly alkaline, pH value.

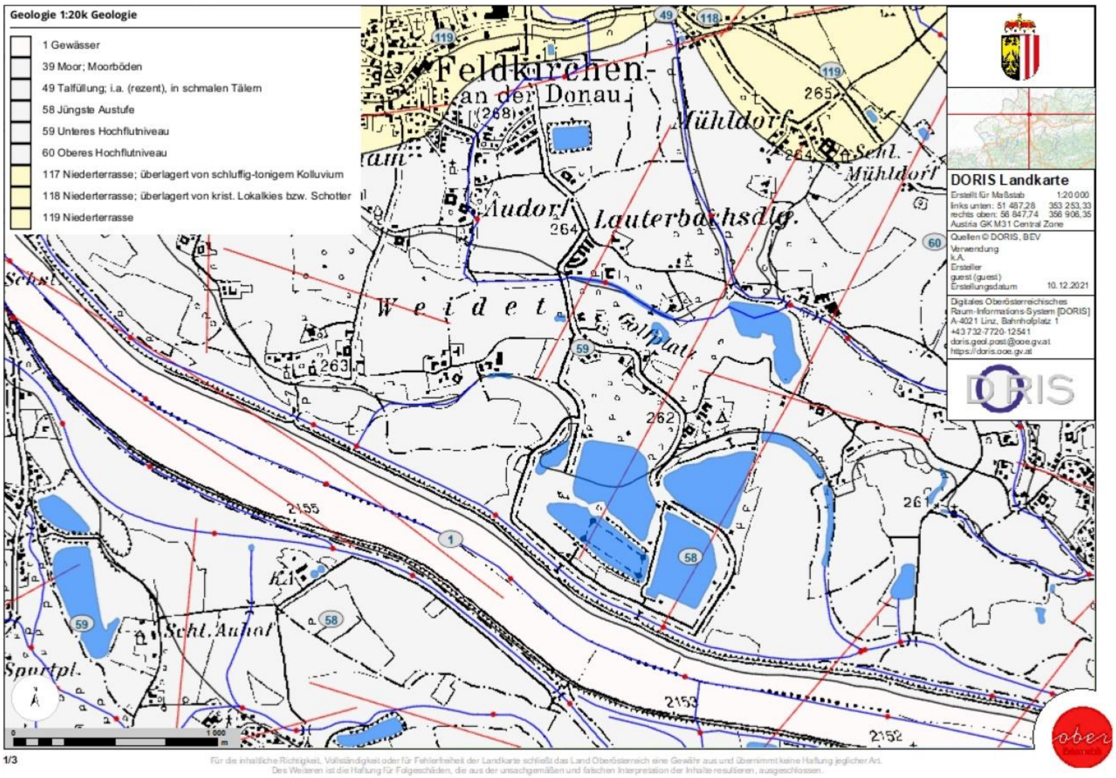


Figure 46: geological base-map of the Province of Upper Austria ('DORIS Weboffice' n.d.).

In addition to calcareous boulders, biogenic decalcification also has an influence on the pH value. Here, the CO2 present in the water is absorbed from the water by primary producers with the help of photosynthesis which causes the pH value to rise. In addition, calcium carbonate precipitates when the solution equilibrium in the water is exceeded (Ferstl et al. 2011).

6.6. Conductivity

The higher conductivity value in Pond 5 compared to Ponds 1 to 4 can be explained by the fact that this pond is actively and more frequently stocked with fish by the local fishing club than the other four ponds. This is based on the fact that the higher number of fish also results in a higher amount of their excreta and thus a greater amount of dissolved ions (Boyd 2020). In addition to the excreta of the fish, it can be assumed that some fishermen, despite the explicit forbiddance by the provincial government, attract the fish with angling feed and thus additionally increase the ion content. As an example, the angling feed of the brand Ecofut is mentioned here. This consists of 100% gammarus crayfish. The manufacturer's analyses have shown that the feed contains approximately 7.5% calcium ('Angelfutter' n.d.).
Although the calcium content varies depending on the feed used, it seems reasonable to conclude that a good part of the calcium content in pond 5 could be due to the attracting of the fish to the fishermen. The other elevated factors such as nitrate and nitrite are therefore probably also due to fishing activity.

Fluctuations in the conductivity of the watercourses are due to rainwater inputs. In addition, the high conductivity values in winter are very likely to be due to wash-off of the applied road salt into the watercourses (Boyd 2020). For example, a bridge crosses the Danube only six kilometres upstream of the study area, and the water from this bridge that accumulates during precipitation drains directly into the Danube.

6.7. Temperature

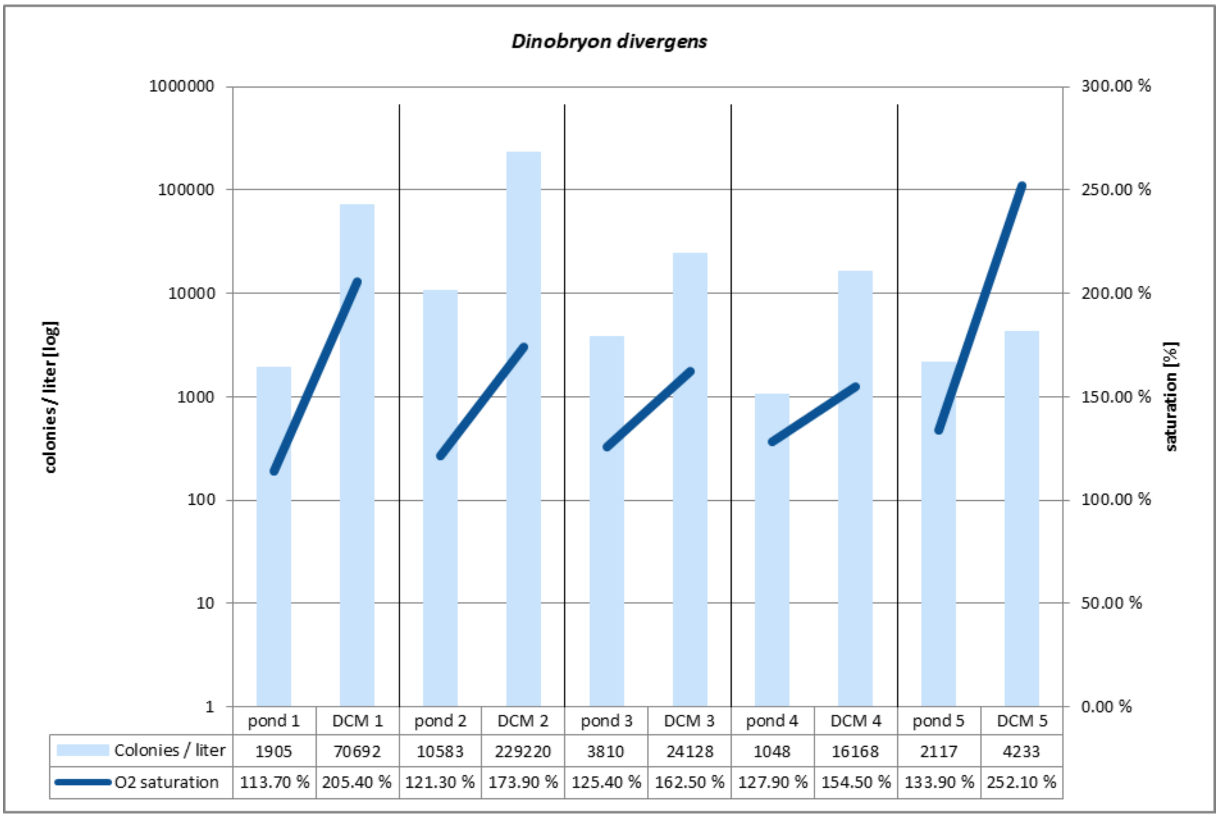
Figure 42 shows very clearly how, in winter, the water temperature of the frozen ponds rises from almost zero °C under the ice layer with increasing depth and water density until, at a depth of one metre, the temperature begins to remain constant at 4 °C.
In summer, on the other hand, you can see from the graph that the ponds have constant temperatures of around 26 °C down to a depth of about four metres, and from then on the solar radiation does not reach deep enough to warm the water layers. Since the two channel multi meter only reaches down to a depth of 5 metres, no exact data could be determined from beyond, but a drop in temperature to about 18.5°C at a depth of 6.5 metres is known from numerous dives.

Furthermore, the data in Figure 42 clearly show the connection between water flow velocity and temperature. For example, the maximum temperature is highest in the ponds which have no current and lowest in the relatively fast-flowing companion channel. The temperature range between summer and winter is also highest in the ponds and lowest in the companion channel, so the water temperature in the companion channel is relatively constant, while the ponds are subject to strong seasonal fluctuations (Boyd 2020).
It should be mentioned here that the constant temperature in the companion channel, in addition to the flow velocity, is largely due to the inflow of groundwater.
Furthermore, Hubert Blatterer (pers. comm.) was able to detect groundwater inflows in the shallows of the northern lakeside of pond 4 20 years ago, but it is not clear whether and to what extent the groundwater inflows still exist today, as the ponds became silted up as a result of the floods in 2002 and 2013, for example.

6.8. Oxygen saturation

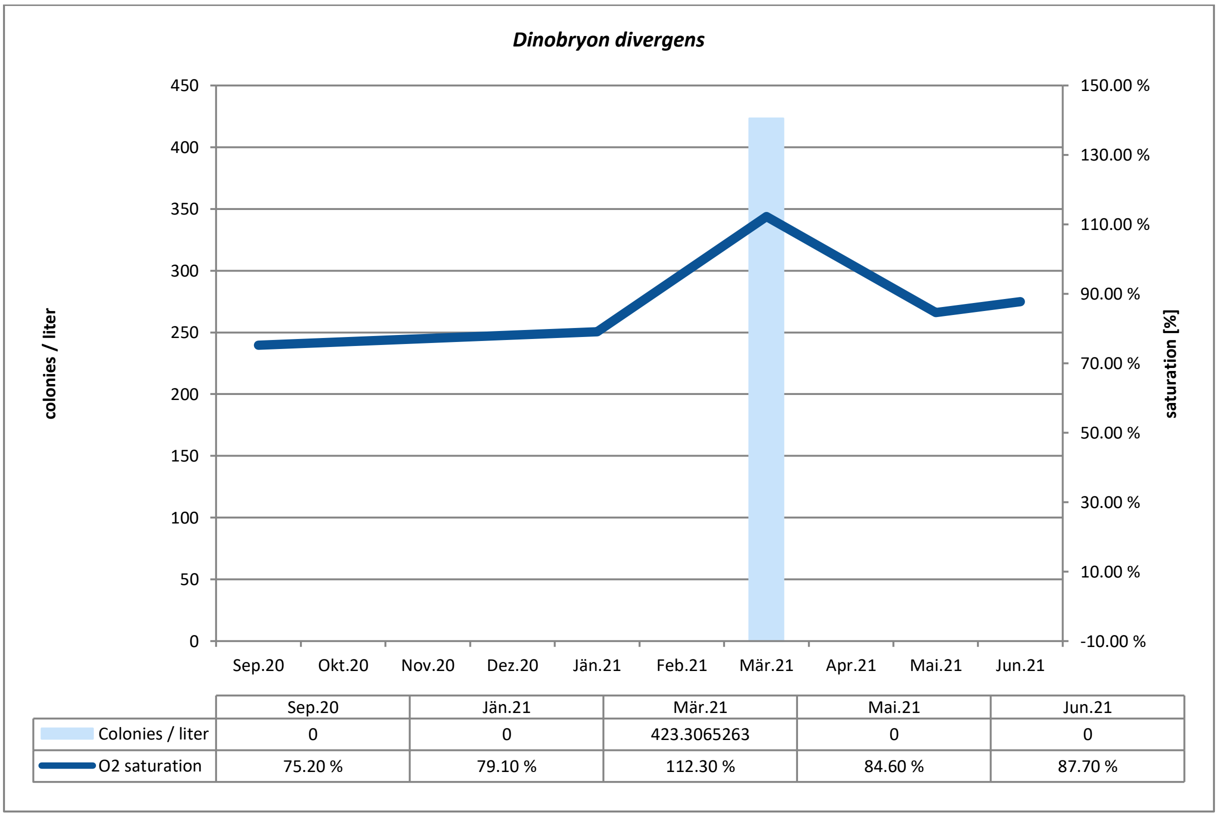
In June 2021 the increase in oxygen in a depth of five meters (Figure 43) indicates deep chlorophyll and is due to an algal bloom. As described in materials and methods, if the oxygen content in the deeper water was higher than the oxygen content at a sampling depth of 1.5 metres, a sample was also taken from this deeper water and the plankton was analysed. This sample was called the depth chlorophyll maximum (DCM). In June 2021, due to the high oxygen saturation, a DCM sample was taken in each water body at a depth of five metres.
After comparing all species to the obtained oxygen levels, it is assumed that the main cause of this increase in oxygen is mainly due to *Dinobryon divergens* in combination with other algae, as this occurs most frequently at this time, which is shown in Figure 47.

The oxygen increase in the accompanying channel in March could also be due to *Dinobryon divergens*, as it was not found in the other four samples (Figure 48). Since *Dinobryon divergens* is not actually a flowing water species, it seems reasonable to assume that the species was washed out of an upstream water body, such as the biotope in the Wögerergraben, due to rain shortly before the study date on 17 March. The averaged weather data in Figure 49 prove this, as there was a lot of precipitation between 14 and 16 March.
Furthermore, the same sample was fixed using QPS and the ciliate *Pelagothrix plancticola* (Table 12) could be observed in it. However, this is a purely standing water species that occurs primarily in small basins and does not develop in flowing waters (Foissner, Berger, and Kohmann 1994). This confirms the assumption that the rain that preceded the sampling date led to leaching from a pond or basin, which washed into the companion channel.



	pond 1	DCM 1	pond 2	DCM 2	pond 3	DCM 3	pond 4	DCM 4	pond 5	DCM 5
Colonies / liter	1905	70692	10583	229220	3810	24128	1048	16168	2117	4233
O2 saturation	113.70 %	205.40 %	121.30 %	173.90 %	125.40 %	162.50 %	127.90 %	154.50 %	133.90 %	252.10 %

Figure 47: graphical representation of *Dinobryon divergens* colonies to oxygen saturation in the ponds at 29.06.2021; here the bar in sample pond 1 represents the amount of *Dinobryon divergens* in pond 1 at a depth of 1.5 metres, the line represents the corresponding oxygen saturation (scale to the right); the bar in sample DCM 1 represents the amount of *Dinobryon divergens* in pond 1 at a depth of 5 metres, the line represents the corresponding oxygen saturation; the axis of colonies per litre is logarithmic, the percentage axis linear.



	Sep.20	Jän.21	Mär.21	Mai.21	Jun.21
Colonies / liter	0	0	423.3065263	0	0
O2 saturation	75.20 %	79.10 %	112.30 %	84.60 %	87.70 %

Figure 48: graphical representation of *Dinobryon divergens* colonies to oxygen saturation in the companion channel over year.

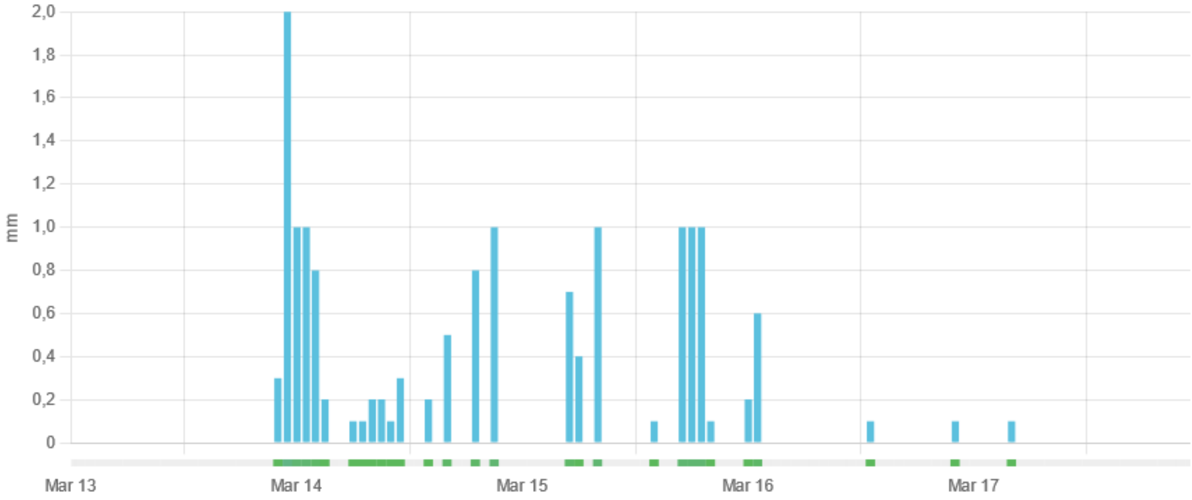


Figure 49: Total precipitation in Feldkirchen an der Donau from 13 - 17 March; calculated from the closest weather stations in Linz / Hörsching (AUT), Kremsmünster (AUT), Pocking (GER) and Aldersbach-Kriestorf (GER) © Meteostat.

6.9. Secchi depth

The seasonal fluctuations in the Secchi depth and thus the water turbidity are due to the annual algae cycles. In winter, when ice covers the ponds and the sun hits the earth at a flat angle, not much solar energy reaches the water layers, so the photsynthetic primary producers do not have much energy available to build up biomass and therefore hardly reproduce (Benndorf et al. 2002; Mougi and Kondoh 2016; Geller and Hupfer 2015).

When the ice has melted in spring and the solar energy can reach the water layers unhindered, these primary producers can reproduce undisturbed, especially since there are still no or only a few predators, in this case mostly ciliates (*Pelagostrombididae*), rotatoria (*Keratella cochlearis*), cladocera (*Bosmina coregoni* & *Daphnia longispina*) and copepods (e.g. *Eurytemora velox*), present, due to the lack of food. The green primary producers therefore multiply, the depth of visibility decreases (Benndorf et al. 2002; Mougi and Kondoh 2016; Geller and Hupfer 2015).

If more food is available for the mostly transparent predators, their number increases and the number of individuals of the primary producers decreases. As the transparent predators increase and the green primary producers decrease, the water appears very clear at the end of spring/beginning of summer (Benndorf et al. 2002; Mougi and Kondoh 2016; Geller and Hupfer 2015).

Soon, however, the predators have decimated the primary producers to the point where they are no longer present in sufficient quantity and the predators starve. This decrease in feeding pressure allows the primary producers to multiply again, and the water becomes turbid again. However, as there are still some predators present, the number does not increase excessively, which is why a kind of equilibrium is established in mid-summer, so that from this point on the ponds remain roughly equally turbid (Geller and Hupfer 2015; Benndorf et al. 2002; Mougi and Kondoh 2016).

This equilibrium remains until the solar radiation decreases again in mid/late autumn and the primary producers no longer have any food and the number of individuals is reduced. This also results in a decrease in predator density, the water clears up until the run begins anew the following spring (Benndorf et al. 2002; Mougi and Kondoh 2016; Geller and Hupfer 2015).

This contrasts with the Danube, which carries a constant number of suspended particles throughout the year and thus has a constantly low visibility depth.

The companion channel also has a constant Secchi depth, but here this is due to the shallow depth of the watercourse, which is only 75 centimetres deep at the point studied. Since there was always visibility down to the bottom, it can be assumed that the particles of the Danube sediment on their way through the meadow forest and are additionally diluted by the inflowing groundwater in such a way that the bottom of the companion channel remains visible at all times.

6.10. Number of identical species per water body

As can be seen in Table 5, the ponds are very similar to each other, with an average species identity of around 60%. This is not too surprising, as the ponds are connected to each other with a few tubes and via the gravel ground body. Unfortunately the exact dimensions and numbers of tubes could not be determined.

Since the companion channel is diverted from the Danube a few kilometres upstream, the similarity of about 53% of the species is also not surprising.

The average similarity of about 30% between ponds and watercourses is probably due to several factors: on the one hand, the distance between the companion channel and the ponds is greater than between the individual ponds, on the other hand, there are no connecting tubes between the companion channel and the ponds, and the only possibility for Danube plankton to enter the ponds would be during a flood event. In addition, the habitat of a watercourse differs from that of standing water (Glandt 2006; Risse-Buhl and Schönborn 2013).

The 30% species uniformity is therefore probably due to species that are native to watercourses and standing waters and were washed into the Danube from oxbow lakes. These oxbow lakes are standing waters that are half connected to the Danube (e.g. only on the downstream side of the oxbow lake), but which can also turn into flowing waters during floods (Risse-Buhl and Schönborn 2013).

In addition to this, it can be transmitted by living organisms such as aquatic birds and mammals or water sports equipment such as fishing tackle and kayaks (Essl and Rabitsch 2002).

6.11. Breakthrough pond 3 and pond 4

Since the statistical analysis showed no significant differences in the 20 selected species between ponds 3 & 4 and the percentage of species equality, which was calculated across all observed species, suggests a high degree of species equality, it is reasonable to conclude that ponds 3 and 4 must be regarded as one large pond after the breakthrough. However, in this case, further monitoring would be appropriate to observe whether the trend shown in Figure 45 continues.

Since the five ponds are probably one large metapopulation in general, it can be said that the breakthrough has turned two patches into one larger patch.

6.12. Comparison of the data

Some abiotic parameters of the lakes were already investigated in 1981; Table 6 compares the results of the investigations in 1981, 2019 and 2021. Since Lake 5 was not yet existent at that time, only 2019 and 2021 are listed here.

At the time of sampling in 1981, dredging was ongoing in Lake 4, which is why the visibility is so low and the total P value is so high. The nitrate content is also probably due to the dredging, as the oldest pond 1 has the lowest nitrate content in 1981, while the youngest pond 4, which was dredged at the time, had the highest nitrate content (Müller and Wimmer 1984, 78–84).

Otherwise, it can be seen in the table that the ponds have remained relatively constant and fluctuations are by and large due to seasonal weather conditions.

However, the large drop in pH between the 2019 and 2021 values in this table is somewhat misleading. The ponds had a mean pH of about 8.4 on the remaining four sampling dates of this work (mean values: September 2020: 8.03; January 2021: 8.45; March 2021: 8.56; May 2021: 8.78). Only when sampled in June was the pH lower in all ponds (mean value June 2021: 7.31). Whether this drop is of natural origin or a measurement error is not certain.

Table 6: comparison of abiotic data from 1981, 2019 & 2021.

	pond 1			pond 2			pond 3			pond 4			pond 5	
	06.07.1981	12.06.2019	29.06.2021	13.07.1981	12.06.2019	29.06.2021	06.07.1981	12.06.2019	29.06.2021	06.07.1981	12.06.2019	29.06.2021	12.06.2019	29.06.2021
temperature [°C]	21.6	17.2	26.2	22.6	16.9	26.6	20.8	16.6	26.1	20.3	16.8	26.4	17.0	26.5
pH	8.3	8.1	7.1	8.3	8.1	7.0	8.4	8.2	7.4	8.1	8.0	7.4	8.0	7.7
conductivity [yS/cm]	368.0	405.0	408.0	364.0	370.0	378.0	358.0	390.0	426.0	454.0	435.0	428.0	520.0	515.0
ammonium [mg/l]	0.03	0.03	0.05	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.03	0.02	0.03	0.03
nitrate [mg/l]	5.0	1.2	1.2	8.6	0.2	0.3	13.0	0.7	1.6	24.0	1.9	1.6	4.2	4.4
total hardness [°dH]	11.6	11.5	11.6	11.5	10.1	10.7	10.7	10.9	12.0	14.3	12.3	11.9	15.1	14.6
carbonate hardness [°dH]	9.0	NA	8.9	8.9	NA	8.3	8.3	NA	9.0	10.7	NA	9.1	NA	10.9
chloride [mg/l]	19.0	19.0	21.0	20.0	19.0	21.0	20.0	20.0	22.0	22.0	21.0	22.0	23.0	24.0
total phosphate [mg/l]	0.009	0.010	0.009	0.015	0.010	0.010	0.011	0.010	0.011	0.040	0.010	0.008	0.010	0.010
O2 dissolved [mg/l]	10.2	10.0	9.0	8.7	9.5	9.5	12.0	10.3	9.9	9.3	8.8	10.1	9.9	10.5
O2 saturation [%]	120.0	107.0	114.0	104.0	102.0	121.0	138.0	110.0	125.0	106.0	94.0	128.0	106.0	134.0
visibility	4.4	NA	5.4	4.1	NA	5.5	4.6	NA	3.2	0.6	NA	4.0	NA	3.6

As can be seen in Table 41 (see Appendix), there are strong differences between the quarry ponds and the tile lakes from Lower Austria and Vienna, which were used for comparison (Schagerl, Bloch, and Vietauer 2007).

Like the quarry ponds, these tile lakes are of human origin and were formed by excavation of the surrounding soil, in this case clay. Subsequently, they filled up with groundwater. They are about twice as deep as the quarry ponds, but have about the same surface area. The plankton samples were collected using a 20 micrometre plankton net in this paper.

Microcystis flos-aquae was found at least once in each quarry pond, but never in the tile lakes. The same applies to *Melosira sp.*, which frequently occurs in the quarry ponds, but only in one of the tile lakes, and to *Scenedesmus ecornis*; this species occurs in every quarry pond, but only in four tile lakes.

In a different direction, the species *Snowella lacustris*, *Cymatopleura solea*, *Diatoma tenuis*, *Diatoma vulgaris* and *Fragilaria capucina* are to be approached. These species occur frequently in the tile ponds but rather rarely in the quarry lakes.

In contrast, there are species that are common in both the quarry ponds and the tile lakes. These include *Asterionella formosa*, *Aulacoseira granulata*, *Navicula radiosa*, *Ceratium hirundinella* and *Tetraëdron minimum*. Here it is assumed that these species are generalists and have consequently found a suitable habitat in all the waters listed here.

In addition, a study of pond 1 was added to the comparison table by (Jersabek 2021; 2022). However, the methodology of Jersabek's study differs. Here, a sample was taken over the entire water depth with the help of a summative sampler and thus plankton from all depth levels was analyzed. In contrast, in the study at hand, only plankton from a water depth of 1.5 m was analyzed.

Furthermore, it has to be taken into account that although I tried to determine the species as precise as possible, errors in the determination may have occurred due to lack of experience on my part. An example is the genus *Cyclotella*, which was often not noticed due to its small size.

7. Conclusion:

The central question of this thesis is whether the plankton communities of the quarry ponds are a metacommunity. Furthermore, it should be investigated whether the last flood caused a similarity of the plankton communities of the quarry ponds and the Danube and if this can still be proven. For this purpose, two hypotheses and their alternative hypotheses were formulated.

> Hypothesis 1: The plankton composition of the quarry ponds differs only slightly from each other and the quarry ponds therefore form a metacommunity.
>
> > Alternative hypothesis 1: The quarry ponds do not form a metacommunity.
>
> Hypothesis 2: The plankton composition of the quarry ponds and the adjacent flowing waters (companion channel and Danube) differ from each other only to a minor extent. This minor differentiation can be attributed to the high water event 2013.
>
> > Alternative hypothesis: The flood had no measurable effect on the plankton composition.

7.1. Hypothesis 1

The obtained insights suggest that the quarry ponds are a metacommunity, as they do not show statistically significant differences in plankton abundance, but show clear deviations from the flowing waters 6.1, page 51).

Furthermore, the chemical composition of the waters does not show any significant differences, with the exception of pond 5, where the differences may be attributed to fish stocking (6.4 Abiotic factors, page 53).

The spatial proximity to each other and the connections between them (e.g. through pipes) would also favour a metacommunity (4.1 Sampling sites:, page 11).

The similarity of species composition is also very high. As can be seen in Table 5, as well as Table 36 - Table 40 (appendix), the ponds are very similar to each other; on average, 60% of the species found on one sampling date could also be observed in the other ponds on the same date (6.10 Number of identical species per water body, page 58).

As the recent connection of ponds 3 and 4 suggests, the question now arises how active the exchange between the ponds is, whether this is a metapopulation according to Levin's model, in which one pond is colonised by another, or whether it is a patchy population, in which it only appears to be separate populations, but there is so much exchange between the populations that they can be regarded as one large population (6.11 Breakthrough pond 3 and pond 4, page 59).

The comparison with tile lakes in Lower Austria and Vienna shows that they clearly differ from the quarry ponds in Upper Austria in terms of species composition (Appendix, Table 41). However, it must also be taken into account here that the sampling methodology used in the study by (Schagerl, Bloch, and Vietauer 2007) was different, as they used a plankton net for sampling, whereas in this thesis a water sampler was used to take a defined volume of one litre from a water depth of 1.5 metres (6.12 Comparison of the data, page 59).

Based on the data and impressions gathered, it can be assumed that the five quarry ponds are one metacommunity. For this reason, hypothesis 1: 'The plankton composition of the quarry ponds differs only slightly from each other and the quarry ponds therefore form a metacommunity' is to be accepted.

7.2. Hypothesis 2

The statistical analysis of the 20 selected plankton species shows significant differences in 14 plankton species between the ponds and the adjacent watercourses. With regard to the statistical analysis, it can be assumed that the 2013 flood no longer has any detectable effects on the plankton composition of the ponds (6.1 Statistical analysis, page 51).

Since the flowing waters and the quarry ponds differ from each other only to a relatively small extent in terms of abiotic factors, it is reasonable to assume that the individual water bodies are connected to each other via the groundwater system and that the abiotic factors therefore do not have a demonstrable influence on the distribution of plankton between flowing waters and ponds (6.4 Abiotic factors, page 53).

The spatial distance between watercourses and ponds is relatively small, so in the event of a flood, an exchange of plankton is favoured (4.1 Sampling sites:, page 11).

The similarity of plankton composition is on average 30%, which is relatively low. This similarity is due to several factors.
On the one hand, the habitat of flowing waters differs from the habitat of still waters (Risse-Buhl and Schönborn 2013; Glandt 2006).
On the other hand, there are species that are native to both types of water bodies. These species have presumably been washed into the Danube from oxbow lakes. These oxbow lakes are standing waters, half of which are connected to the Danube (e.g. only on the downstream side of the oxbow lakes), but which can also become flowing waters during floods (Risse-Buhl and Schönborn 2013).
In addition, as already described, the species can be carried from one water body to the next by living organisms such as water birds or water sports equipment such as kayaks (Essl and Rabitsch 2002)(6.12 Comparison of the data, page 59).

Taken together, these aspects lead to the conclusion that the 2013 flood did not cause any detectable similarities in the plankton composition of lakes and streams, or that these are no longer detectable. Hypothesis 2 must therefore be rejected and the corresponding alternative hypothesis: 'The flood had no measurable effect on the plankton composition.' accepted.

7.3. Improvements

In retrospect, however, some things would have to be taken into account to strengthen the validity of the study.
Firstly, a water sampler would have to be used which does not displace too much water when sinking, because in this setting it seems likely that some copepod and cladoceran individuals have been displaced by the water pressure caused by the sinking of the water sampler used.

Secondly, the individual water bodies would have to be sampled at least at three different locations on the same day and at least three samples would have to be taken at each sampling location on each sampling date. It would also be useful to reduce the interval between the sampling periods.
In this way, a more precise resolution of the individual water bodies could be achieved and the fluctuations of the individual species could be tracked better and more accurately.

In order to be able to draw a meaningful comparison, it would also be necessary to have one or more ponds with the same conditions (water depth, bedrock, distance to the watercourse, etc.) in order to be able to use this as a control for the results and thus enable a better statistical evaluation.

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9. Literature:

Aescht, E. 2003. 'Zur Geschichte der Sammlung „Wirbellose Tiere" (ohne Insekten) am Biologiezentrum Linz', 39.

Aescht, E. 2006. 'Die Süßwasserqualle *Craspedacusta Sowerbyi* LANKESTER 1880'.

Agatha, S. 2011. 'Global diversity of aloricate oligotrichea (*Protista, Ciliophora, Spirotricha*) in marine and brackish sea water'. *PLOS ONE* 6 (8): e22466. https://doi.org/10.1371/journal.pone.0022466.

'Algaebase :: Listing the world's algae'. n.d. Accessed 7 January 2022. https://www.algaebase.org/.

Altermatt, F. 2016. 'Metacommunity dynamics'. https://www.oxfordbibliographies.com/view/document/obo-9780199830060/obo-9780199830060-0021.xml.

'Angelfutter'. n.d. Ecofut - Tierfutter Manufaktur. Accessed 2 January 2022. https://www.ecofut.de/fische/angelfutter.

Azam, F., T. Fenchel, Jg. Field, Js. Gray, La. Meyer-Reil, and F. Thingstad. 1983. 'The ecological role of water-column microbes in the sea'. *Marine Ecology Progress Series* 10: 257–63. https://doi.org/10.3354/meps010257.

Benndorf, J., W. J. Böing, J. H. E. Koop, and I. F. Neubauer. 2002. 'Top-down control of phytoplankton: the role of time scale, lake depth and trophic state'. *Freshwater Biology* 47: 2282–95.

Bilous, O. P., S. I. Genkal, J. Zimmermann, W.-H. Kusber, and R. Jahn. 2021. 'Centric diatom diversity in the lower part of the southern bug river (Ukraine): The transitional zone at Mykolaiv City'. *PhytoKeys* 178 (May): 31–69. https://doi.org/10.3897/phytokeys.178.64426.

Blatterer, H. 2020. 'Land Oberösterreich - *Stentor amethystinus*: winzige Trompetentierchen in Badeseen'. Land Oberösterreich. 2020. https://www.land-oberoesterreich.gv.at/238771.htm.

Boyd, C. E. 2020. *Water quality: an introduction*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-23335-8.

Brauer, A., and U. Lieder. 1999. *Süßwasserfauna von Mitteleuropa Bd. 8. H. 2/3. Bd. 8. H. 2/3.*

Chapman, A. D., and L. A. Pfester. 1995. 'The effects of temperature, irradiance and nitrogen on the encystment and growth of the freshwater dinoflagellates *Peridinium cinctum* and *P. willei* in Culture (Dinophyceae)'. *Journal of Phycology* 31 (3): 355–59. https://doi.org/10.1111/j.0022-3646.1995.00355.x.

Dodds, W. K., and M. R. Whiles. 2010. 'Chapter 19 - Behavior and interactions among microorganisms and invertebrates'. In *Freshwater Ecology (Second Edition)*, edited by W. K. Dodds and M. R. Whiles, 509–44. London: Academic Press. https://doi.org/10.1016/B978-0-12-374724-2.00019-2.

'DORIS Weboffice'. n.d. Accessed 24 November 2021. https://wo.doris.at/weboffice/synserver?project=weboffice&client=core&user=guest&view=dkm.

Essl, F., and W. Rabitsch. 2002. *Neobiota in Österreich*. Wien: Umweltbundesamt.

Fenchel, T. 2008. 'The Microbial Loop – 25 Years Later'. *Journal of Experimental Marine Biology and Ecology* 366 (1–2): 99–103. https://doi.org/10.1016/j.jembe.2008.07.013.

Ferstl, M., R. Holnsteiner, U. Huber-Wilhelm, L. Lutz, W. Mörth, A. Nadlinger, M. Samek, et al. 2011. 'Abschlussbericht Einfluss von Nassbaggerungen auf die Oberflächen und Grundwasserqualität'.

Foissner, W., H. Berger, and F. Kohmann. 1992. *Taxonomische und ökologische Revision der Ciliaten des Saprobiensystems: Band II: Peritrichia, Heterotrichida, Odontostomatida.*

———. 1994. *Taxonomische und ökologische Revision der Ciliaten des Saprobiensystems: Band III: Hymenostomata, Prostomatida, Nassulida*. Informationsberichte des Bayerischen Landesamtes für Wasserwirtschaft. München: Bayerisches Landesamt für Wasserwirtschaft.

Foissner, W., H. Blatterer, H. Berger, and F. Kohmann. 1991. *Taxonomische Und Ökologische Revision Der Ciliaten Des Saprobiensystems: Band I: Cyrtophorida, Oligotrichida, Hypotrichea, Colpoea*.

———. 1993. *Taxonomische und okologische Revision der Ciliaten des Saprobiensystems: Band IV: Gymnostomatea, Loxodes, Suctoria*. Vol. 112. https://www.jstor.org/stable/3226683?origin=crossref.

'GBIF'. n.d. Accessed 7 January 2022. https://www.gbif.org/.

Geller, W., and M. Hupfer. 2015. 'Seeökosysteme II: Lebensräume, biologische Stoffumsatzprozesse und taxonomische Diversität der Organismen: Seeökosysteme II'. In *Handbuch Angewandte Limnologie: Grundlagen - Gewässerbelastung - Restaurierung - Aquatische Ökotoxikologie - Bewertung - Gewässerschutz*, edited by W. Calmano, M. Hupfer, H. Fischer, and H. Klapper, 1–43. Weinheim, Germany: Wiley-VCH Verlag GmbH & Co. KGaA. https://doi.org/10.1002/9783527678488.hbal2014001.

Glandt, D. 2006. *Praktische Kleingewässerkunde*. 1. Aufl. Zeitschrift für Feldherpetologie / Supplement 9. Laurenti. http://d-nb.info/992699436/04.

Grimaud, G. M., F. Mairet, A. Sciandra, and O. Bernard. 2017. 'Modeling the temperature effect on the specific growth rate of phytoplankton: A Review'. *Reviews in Environmental Science and Bio/Technology* 16 (4): 625–45. https://doi.org/10.1007/s11157-017-9443-0.

Grohs, H. 1971. 'Nachrichtenblatt der Naturkundlichen Station der Stadt Linz: 1971: Das Jahr der biologischen Besonderheiten'.

Güde, H. 1997. 'Biomanipulation und das mikrobielle Nahrungsnetz', 10.

Gusenleitner, F. 1991. 'Entomologische Arbeitsgemeinschaft: Jahresbericht 1991'.

Hanley, T. C., and K. J. La Pierre, eds. 2015. *Trophic Ecology: Bottom-Up and Top-Down Interactions across Aquatic and Terrestrial Systems*. Ecological Reviews. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139924856.

Harrison, S. 1991. 'Local Extinction in a metapopulation context: an empirical evaluation'. *Biological Journal of the Linnean Society* 42 (1–2): 73–88. https://doi.org/10.1111/j.1095-8312.1991.tb00552.x.

Heaney, S.I., and J.F. Talling. 1980. '*Ceratium hirundinella* - ecology of a complex, mobile, and successful plant'. Freshwater Biological Association. http://hdl.handle.net/1834/22703.

Holyoak, M., M. A. Leibold, and R. D. Holt. 2005. *Metacommunities: Spatial Dynamics and Ecological Communities*. Chicago: Univ. of Chicago Press.

Hustedt, F. 1973. *Kieselalgen (Diatomeen)*.

Hustedt, F., and A. Pascher. 1930. *Die Süsswasser-Flora Mitteleuropas : heft 10: Bacillariophyta (Diatomeae)*. Jena: Verlag Von Gustav Fischer.

Jersabek, C. D. 2021. 'Ökologischer Zustand der Seen im Land Oberösterreich. Amtliches Seen-Messnetz (ASM). Almsee, Vorderer Gosausee, Hinterer Und Vorderer Langbathsee, Offensee, Gleinkersee, Laudachsee, Nussensee, Schwarzensee, Höllerersee, Holzöstersee, Imsee, Heratinger See, Seeleitensee, Resilacke, Oedtsee, Wildenauer Badesee, Feldkirchner Badesee. Bewertungen Anhand Des Biologischen Qualitätselementes Phytoplankton, Gemäß EU-Wasserrahmenrichtlinie (GZÜV 2009). Das Jahr 2019, Mit Dreijahresmitteln Seit 2017. - Gutachten Im Auftrag Der Oberösterreichischen Landesregierung, 445 S.' https://www.land-oberoesterreich.gv.at/211482.htm.

———. 2022. 'Ökologischer Zustand der Seen im Land Oberösterreich. Amtliches Seen-Messnetz (ASM). Almsee, Vorderer Gosausee, Hinterer Und Vorderer Langbathsee, Offensee, Gleinkersee, Laudachsee, Nussensee, Schwarzensee, Höllerersee, Holzöstersee, Imsee, Heratinger See, Seeleitensee, Resilacke, Oedtsee, Wildenauer Badesee, Feldkirchner Badesee. Bewertungen Anhand Des Biologischen Qualitätselementes Phytoplankton, Gemäß EU-Wasserrahmenrichtlinie (GZÜV 2009). Das Jahr 2020, Mit Dreijahresmitteln Seit 2018. - Gutachten Im Auftrag Der Oberösterreichischen Landesregierung, in Press.'

Kawabata, Z., and D. Banba. 1993. 'Effect of water temperature on the excystment of the dinoflagellate *Ceratium hirundinella* (O. F. Müller) Bergh'. *Hydrobiologia* 257 (1): 17–20. https://doi.org/10.1007/BF00013992.

Kerner, M., H. Hohenberg, S. Ertl, M. Reckermann, and A. Spitzy. 2003. 'Self-organization of dissolved organic matter to micelle-like microparticles in river water'. *Nature* 422 (6928): 150–54. https://doi.org/10.1038/nature01469.

Kiefer, F. 1960. *Ruderfusskrebse*. Stuttgart: Franckh.

Kilham, S., and P. Kilham. 1975. '*Melosira granulata* (Ehr.) Ralfs: Morphology and ecology of a cosmopolitan freshwater diatom'. *SIL Proceedings, 1922-2010* 19 (4): 2716–21. https://doi.org/10.1080/03680770.1974.11896368.

Klotter, H.-E. 1957. *Grünalgen (Chlorophyceen).* Stuttgart: Kosmos, Gesellschaft der Naturfreunde; Franckh.

Kolmogoroff, A. 1933. 'Sulla determinazione empirica di una legge di distribuzione'. *Giornale dell'Istituto Italiano degli Attuari* 4: 83–91.

Komárek, J. 2003. '3 - Coccoid and colonial cyanobacteria'. In *Freshwater Algae of North America*, edited by J. D. Wehr and R. G. Sheath, 59–116. Aquatic Ecology. Burlington: Academic Press. https://doi.org/10.1016/B978-012741550-5/50004-0.

Kruskal, W. H., and A. Wallis. 1952. 'Use of ranks in one-criterion variance analysis'. *Journal of the American Statistical Association* 47 (260): 583–621. https://doi.org/10.1080/01621459.1952.10483441.

'Land Oberösterreich - Badeseen Feldkirchen (mit Behindertenlift)'. n.d. Land Oberösterreich. Accessed 8 February 2022. https://www.land-oberoesterreich.gv.at.

'Land Oberösterreich - Ziele in der Untereinheit: Auwaldbereich und Donau'. n.d. Land Oberösterreich. Accessed 24 November 2021. https://www.land-oberoesterreich.gv.at/68621.htm.

Lange-Bertalot, H., G. Hofmann, M. Werum, and M. Cantonati. 2017. *Freshwater Benthic Diatoms of Central Europe. Over 800 Common Species Used in Ecological Assessment. English Edition with Updated Taxonomy and Added Species.*

Levins, R. 1969. 'Some demographic and genetic consequences of environmental heterogeneity for biological control'. *Bulletin of the Entomological Society of America* 15 (3): 237–40. https://doi.org/10.1093/besa/15.3.237.

MacArthur, R. H., and E. O. Wilson. 2016. *The Theory of Island Biogeography*. Princeton University Press. https://doi.org/doi:10.1515/9781400881376.

Martin, K., and C. Allgaier. 2011. *Ökologie der Biozönosen*. Springer-Lehrbuch. Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-20628-3.

Masmoudi, S., N. Nguyen-Deroche, A. Caruso, H. Ayadi, A. Morant-Manceau, G. Tremblin, Martine, and B. Schoefs. 2013. 'cadmium, copper, sodium and zinc effects on diatoms: from heaven to hell — a Review'. *Cryptogamie, Algologie* 34 (2): 185–225. https://doi.org/10.7872/crya.v34.iss2.2013.185.

Mohr, D. L., W. J. Wilson, and R. J. Freund. 2022. 'Chapter 14 - Nonparametric Methods'. In *Statistical Methods (Fourth Edition)*, edited by D. L. Mohr, W. J. Wilson, and R. J. Freund, Fourth Edition, 651–83. Academic Press. https://doi.org/10.1016/B978-0-12-823043-5.00014-X.

Montagnes, D. H, and D. H. Lynn. 1987. 'A quantitative protargol stain (QPS) for ciliates: method description and test of its quantitative nature'.

Mougi, A., and M. Kondoh. 2016. 'Food-web complexity, meta-community complexity and community stability'. *Scientific Reports* 6 (1): 24478. https://doi.org/10.1038/srep24478.

Müller, G., and W. Wimmer. 1984. *Amtlicher Oberösterreichischer Wassergüteatlas*.

Nicholls, K. H., and D. E. Wujek. 2003. '12 - Chrysophycean algae'. In *Freshwater Algae of North America*, edited by J. D. Wehr and R. G. Sheath, 471–509. Aquatic Ecology. Burlington: Academic Press. https://doi.org/10.1016/B978-012741550-5/50013-1.

Olrik, K. 1992. 'Ecology of *Peridinium willei* and *P. volzii* (Dinophyceae) in danish lakes'. *Nordic Journal of Botany* 12 (5): 557–68. https://doi.org/10.1111/j.1756-1051.1992.tb01834.x.

Ostendorp, W., H. Brem, M. Dienst, K. D. Jöhnk, M. Mainberger, M. Peintinger, P. Rey, et al. 2007. 'Auswirkungen des globalen Klimawandels auf den Bodensee'.

Popovský, J. 1990. *Dinophyceae (Dinoflagellida)*. Edited by L. A. Pfiester, A. Pascher, H. Ettl, and B. Büdel. 1. Aufl. Süßwasserflora von Mitteleuropa Bd. 6. G. Fischer. http://d-nb.info/901103683/04.

Rheinheimer, G. 1977. 'H. Pankow, Algenflora der Ostsee II. Plankton (Einschl. Benthischer Kieselalgen). 493 S., 880 Abb., 26 Tafeln Mit 175 Fotos. Jena 1976: VEB Gustav Fischer Verlag. M 71,00'. *Journal of Basic Microbiology* 17: 416–416.

Rieth, A. 1961. *Jochalgen (Konjugaten) : Zieralgen und fädige Formen*. Stuttgart: Kosmos.

Risse-Buhl, W., and U. Schönborn. 2013. *Lehrbuch Der Limnologie*. Stuttgart, Germany: Schweizerbart Science Publishers. http://www.schweizerbart.de//publications/detail/isbn/9783510652754/Schonborn_Lehrbuch_der_Limnologie_2_Au.

Sadava, D., D. M. Hillis, H. C. Heller, and S. D: Hacker. 2019. *Purves Biologie*. Edited by J. Markl. Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-58172-8.

Sardet, C. 2016. *Plankton Der Erstaunliche Mikrokosmos Der Ozeane*.

Schagerl, M., I. Bloch, and A. Vietauer. 2007. *Naturinseln im Siedlungsgebiet: Ziegelteiche in Wien und Niederösterreich ; eine ökologische Studie zur Erfassung hydrochemischer Eigenschaften und deren Einfluss auf Algengemeinschaften*. Abhandlungen der Zoologisch-Botanischen Gesellschaft in Österreich 36. Wien: Verl. der Zoologisch-Botanischen Gesellschaft in Österreich.

Segers, H., and W. De Smet. 2008. 'Diversity and endemism in rotifera: a review, and *Keratella Bory de St Vincent*'. *Biodiversity and Conservation* 17 (February): 303–16. https://doi.org/10.1007/s10531-007-9262-7.

Shapiro, S. S., and M. B. Wilk. 1965. 'An analysis of variance test for normality (Complete samples)'. *Biometrika* 52 (3/4): 591–611. https://doi.org/10.2307/2333709.

Sieburth, J. McN., V. Smetacek, and J. Lenz. 1978. 'Pelagic ecosystem structure: Heterotrophic compartments of the plankton and their relationship to plankton size fractions '. *Limnology and Oceanography* 23 (6): 1256–63. https://doi.org/10.4319/lo.1978.23.6.1256.

Skibbe, O. 1994. 'An improved quantitative protargol stain for ciliates and other planktonic protists'.

Smirnov, N. V. 1939. 'On the estimation of the discrepancy between empirical curves of distribution for two independent samples'. *Moskov. Gos. Univ. Sect.*

Starmayr, L., U. Berninger, and H. Blatterer. 2019. 'Plankton species of the "Feldkirchner Badeseen" a study of freshwater plankton living in the five quarry ponds'.

Stoermer, E. F., and M. L. Julius. 2003. '15 - Centric Diatoms'. In *Freshwater Algae of North America*, edited by J. D. Wehr and R. G. Sheath, 559–94. Burlington: Academic Press. https://doi.org/10.1016/B978-012741550-5/50016-7.

Streble, H., D. Krauter, and A. Bäuerle. 2020. *Das Leben Im Wassertropfen*.

Teodósio, M. A., and A. B. Barbosa, eds. 2021. *Zooplankton Ecology*. Boca Raton London New York: CRC Press.

Thompson, P. L., L. M. Guzman, L. De Meester, Z. Horváth, R. Ptacnik, B. Vanschoenwinkel, D. S. Viana, and J. M. Chase. 2020. 'A process-based metacommunity framework linking local and regional scale community ecology'. *Ecology Letters* 23 (9): 1314–29. https://doi.org/10.1111/ele.13568.

Tortell, P. D., J. R. Reinfelder, and F. M. Morel. 1997. 'Active uptake of bicarbonate by diatoms'. *Nature* 390 (6657): 243–44. https://doi.org/10.1038/36765.

Townsend, C. R., M. Begon, and J. L. Harper. 2009. *Ökologie*. Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-44078-0.

Vincent, W.F. 2009. 'Cyanobacteria'. In *Encyclopedia of Inland Waters*, edited by G. E. Likens, 226–32. Oxford: Academic Press. https://doi.org/10.1016/B978-012370626-3.00127-7.

Vinogradov, A. K., Yu. I. Bogatova, and I. A. Synegub. 2018. *Ecology of marine ports of the black and azov sea basin*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-63062-5.

Wickham, S. 2019. 'Aquatische Ökologie – Meeresbiologie Vorlesung 5b mikrobielle Nahrungsnetze'.

Wirth, C., R. Limberger, and T. Weisse. 2019. 'Temperature × light interaction and tolerance of high water temperature in the planktonic freshwater flagellates *Cryptomonas* (Cryptophyceae) and *Dinobryon* (Chrysophyceae)'. *Journal of Phycology* 55 (2): 404–14. https://doi.org/10.1111/jpy.12826.

Wolfram, G., K. Donabaum, and M. T. Dokulil. 2015. 'Leitfaden zur Erhebung der biologischen Qualitätselemente, Teil B2 - Phytoplankton'.

'WoRMS - World Register of Marine Species'. n.d. Accessed 22 October 2021. http://www.marinespecies.org/index.php.

Yang, J., H. Tang, X. Zhang, X. Zhu, Y. Huang, and Z. Yang. 2018. 'High temperature and pH favor *Microcystis aeruginosa* to outcompete *Scenedesmus obliquus*.' *Environmental Science and Pollution Research International* 25 (5): 4794–4802. https://doi.org/10.1007/s11356-017-0887-0.

Zheng, W., C. Chen, Y. Wang, K. Bao, X. Wang, and C. Chu. 2005. 'Effects of potassium iodide on the growth and metabolite accumulation of two planktonic diatoms'. *Journal of Applied Phycology* 17 (4): 355–62. https://doi.org/10.1007/s10811-005-8005-y.

10. Appendix:

10.1. Plankton data:

Table 7: observed plankton at 27. September 2020, numbers are in individuals/liter or colonies/liter, whether it is individuals or colonies is indicated in the first column.

indv.(col.)/liter	species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
	Nauplius	0	40	138	179	41	0	0
	Cyanobacteria							
col.	*Anabaena spiroides*	0	0	0	0	0	0	0
col.	*Chroococcopsis gigantea*	0	0	0	0	0	0	0
col.	*Merismopedia tenuissima*	20425	3810	3122	4021	3545	0	0
col.	*Microcystis aeruginosa*	423	0	14	0	0	0	0
col.	*Microcystis flos-aquae*	2328	1058	1693	6561	2328	847	0
col.	*Phormidium inundatum*	0	0	0	0	0	0	0
col.	*Phormidium retzii*	0	0	0	0	0	0	0
col.	*Planktolyngbya limnetica*	0	0	28996	3175	7408	0	0
col.	*Snowella lacustris*	0	0	0	0	0	0	0
col.	*Woronichinia naegeliana*	0	0	0	5926	1270	0	0
	Chrysophyceae							
col.	*Dinobryon divergens*	16932	1270	1482	423	2751	0	0
indv.	*Mallomonas acaroides*	0	0	0	1693	1905	0	0
indv.	*Mallomonas caudata*	0	0	0	1482	0	0	0
col.	*Synura uvella*	0	0	0	0	0	0	0
	Diatoms							
indv.	*Amphora ovalis*	0	0	212	0	635	0	0
col.	*Asterionella formosa*	0	0	0	0	0	0	423
col.	*Aulacoseira granulata*	2751	635	0	0	2751	0	423
col.	*Bacillaria ulna*	0	0	0	0	0	0	0
indv.	*Cymatopleura solea*	0	0	0	0	0	0	0
indv.	*Cymbella helvetica*	0	0	0	0	0	0	0
col.	*Diatoma tenuis*	0	0	0	0	0	0	0
col.	*Diatoma vulgaris*	0	0	0	0	0	0	0
indv.	*Diploneis ovalis*	0	0	0	0	0	0	1058
indv.	*Eunotia arcus*	0	0	0	0	0	0	0
indv.	*Fragilaria acus*	0	0	0	0	0	0	0
col.	*Fragilaria capucina*	0	0	0	0	0	0	0
col.	*Fragilaria crotonensis*	0	0	0	0	0	0	0
indv.	*Gyrosigma attenuatum*	635	423	423	212	0	212	212
indv.	*Hannaea arcus*	0	0	0	0	0	0	0
col.	*Melosira varians*	0	0	212	635	212	2117	1058
col.	*Meridion circulare*	0	0	0	0	0	0	0
indv.	*Navicula lanceolata*	0	0	0	0	0	0	0
indv.	*Navicula pupula*	0	0	0	0	0	0	0
indv.	*Navicula radiosa*	635	0	0	0	1482	11218	5291
indv.	*Nitzschia acicularis*	0	0	0	0	0	1693	0
indv.	*Nitzschia linearis*	0	0	0	0	0	0	0
indv.	*Nitzschia sigmoidea*	0	0	423	0	0	0	0
indv.	*Pinnularia borealis*	0	0	0	0	0	0	0
indv.	*Sellaphora pupula*	0	0	0	0	0	0	0
indv.	*Stauroneis anceps*	423	1693	1058	1693	2540	2751	1482
indv.	*Stauroneis phoenicenteron*	0	0	0	0	0	212	0
indv.	*Surirella biseriata*	0	0	0	0	0	847	0
indv.	*Surirella ovata*	0	0	0	0	0	0	0
indv.	*Synedra ulna*	0	0	0	0	0	847	0
indv.	*Tryblionella angustata*	0	0	0	0	0	0	0
	Xanthophyceae							
col.	*Tribonema monochloron*	1693	1058	635	0	1693	0	1905
col.	*Tribonema vulgare*	0	0	0	0	0	0	0
	Euglenophyceae							
indv.	*Entosiphon sulcatum*	0	0	0	0	423	0	0
indv.	*Euglena arcus*	0	847	69	0	212	0	0
	Dinoflagellata							
indv.	*Ceratium hirundinella*	40	360	2331	869	938	28	0
indv.	*Peridinium willei*	212	1905	3810	12064	23494	635	0
	Chlorophyta							
col.	*Actinastrum hantzschii*	0	0	0	0	0	0	0

indv.(col.)/liter	species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
indv.	*Chlorococcum infusionum*	0	0	0	0	0	0	0
col.	*Coelastrum microporum*	1482	1270	2751	13757	76195	423	0
col.	*Comasiella arcuata*	0	0	0	0	0	0	0
col.	*Desmodesmus armatus var. longispina*	4868	1482	0	423	0	0	0
col.	*Hariotina reticulata*	0	0	0	0	0	0	0
col.	*Micractinium pusillum*	0	0	0	0	0	0	0
col.	*Monactinus simplex var. simplex*	0	0	0	0	0	0	0
col.	*Nephrochlamys subsolitaria*	0	0	0	0	0	0	0
col.	*Pediastrum angulosum*	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	635	3175	423	423	0	0	0
col.	*Pediastrum duplex*	212	423	212	212	0	0	0
col.	*Planktosphaeria gelatinosa*	0	0	0	0	635	0	0
col.	*Pseudopediastrum boryanum*	0	0	0	0	0	0	0
col.	*Scenedesmus acutus*	0	0	0	0	0	0	0
col.	*Scenedesmus ecornis*	5291	10159	1905	6561	3598	1270	1482
col.	*Scenedesmus ellipticus*	0	212	0	0	0	0	0
col.	*Scenedesmus obtusus*	0	0	0	0	0	0	0
indv.	*Siderocelis ornata*	0	0	0	0	0	0	0
col.	*Stauridium tetras*	0	0	0	0	0	0	0
col.	*Tetradesmus lagerheimii*	0	0	0	0	0	212	0
col.	*Tetradesmus obliquus*	2117	7831	1905	3175	1905	0	0
indv.	*Tetraëdron minimum*	0	23705	847	1693	0	0	0
col.	*Ulothrix tenuissima*	0	0	0	0	0	1058	0
col.	*Volvox aureus*	0	847	0	0	0	0	0
col.	*Willea apiculata*	0	0	0	0	0	0	0
Desmidiaceae								
indv.	*Closterium kutzingii*	635	0	0	31113	2751	0	0
indv.	*Closterium pronum*	1058	212	1270	0	3175	847	0
indv.	*Cosmarium regnellii*	0	0	0	0	0	1905	0
col.	*Spirogyra sp.*	1270	847	1058	0	423	0	423
col.	*Staurastrum gracile*	423	635	0	5926	423	0	212
col.	*Staurastrum pingue*	0	0	0	0	0	0	0
Ciliates								
indv.	*Pelagostrombididae*	1270	2751	1058	4656	3175	635	0
indv.	*Stentor amethystinus*	0	5920	0	0	0	0	0
Rotatoria								
indv.	*Asplanchna priodonta*	0	0	0	0	0	0	0
indv.	*Brachionus urceolaris*	0	0	0	0	0	0	0
indv.	*Conochilus unicornis*	0	0	0	0	0	0	0
indv.	*Filinia longiseta*	0	0	0	0	0	0	0
indv.	*Kellicottia longispina*	0	0	0	0	0	0	0
indv.	*Keratella cochlearis*	0	0	28	14	69	0	0
indv.	*Keratella ticinensis*	0	0	0	0	0	0	0
indv.	*Notholca foliacea*	0	0	0	0	0	0	0
indv.	*Polyarthra vulgaris*	0	240	14	124	193	0	0
indv.	*Trichocerca longiseta*	0	0	423	0	0	0	0
Cladocera								
indv.	*Alona quadrangularis*	0	0	0	0	0	0	0
indv.	*Bosmina coregoni*	0	40	55	0	0	0	0
indv.	*Daphnia longispina*	0	0	0	97	28	0	0
indv.	*Diaphanosoma brachyurum*	0	0	28	14	55	0	0
Copepoda								
indv.	*Eudiaptomus gracilis*	0	0	0	0	0	0	0
indv.	*Eurytemora velox*	0	0	14	14	14	0	0
indv.	*Macrocyclops albidus albidus*	0	0	0	0	0	0	0
indv.	*Macrocyclops fuscus*	0	0	0	0	0	0	0
indv.	*Megacyclops viridis*	0	0	0	0	0	0	0
indv.	*Paracyclops fimbriatus*	0	0	0	14	0	0	0
indv.	*Thermocyclops oithonoides*	0	0	0	0	0	0	0

Table 8: observed plankton at 12. January 2021, numbers are in individuals/liter or colonies/liter, whether it is individuals or colonies is indicated in the first column.

indv.(col.)/liter	species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
	Nauplius	0	0	0	0	14	0	0
Cyanobacteria								
col.	*Anabaena spiroides*	2540	423	212	0	847	0	0
col.	*Chroococcopsis gigantea*	0	0	0	0	0	0	0
col.	*Merismopedia tenuissima*	12911	423	1482	1058	4974	0	0
col.	*Microcystis aeruginosa*	0	0	0	0	0	0	0
col.	*Microcystis flos-aquae*	2328	1482	1270	212	2117	1058	635
col.	*Phormidium inundatum*	0	0	0	0	0	212	0
col.	*Phormidium retzii*	0	0	0	0	0	0	0
col.	*Planktolyngbya limnetica*	0	0	32171	0	3175	0	0
col.	*Snowella lacustris*	8043	0	0	0	0	0	0
col.	*Woronichinia naegeliana*	0	0	0	0	0	0	0
Chrysophyceae								
col.	*Dinobryon divergens*	1905	635	1905	0	12276	0	0
indv.	*Mallomonas acaroides*	847	0	0	0	0	0	0
indv.	*Mallomonas caudata*	0	0	0	0	0	0	0
col.	*Synura uvella*	0	0	0	0	0	0	0
Diatoms								
indv.	*Amphora ovalis*	0	0	0	0	0	1270	212
col.	*Asterionella formosa*	0	680042	46987	635	847	0	2117
col.	*Aulacoseira granulata*	0	0	0	0	0	423	1058
col.	*Bacillaria ulna*	0	0	0	0	0	0	0
indv.	*Cymatopleura solea*	0	0	0	0	0	0	0
indv.	*Cymbella helvetica*	0	0	212	0	0	0	0
col.	*Diatoma tenuis*	0	0	0	0	0	0	0
col.	*Diatoma vulgaris*	0	0	0	0	0	0	0
indv.	*Diploneis ovalis*	212	0	0	0	0	0	0
indv.	*Eunotia arcus*	0	0	0	0	0	0	0
indv.	*Fragilaria acus*	0	0	0	0	0	0	0
col.	*Fragilaria capucina*	0	0	0	0	0	0	0
col.	*Fragilaria crotonensis*	0	847	2117	0	0	0	0
indv.	*Gyrosigma attenuatum*	0	0	0	0	0	635	212
indv.	*Hannaea arcus*	0	0	0	0	0	0	423
col.	*Melosira varians*	0	0	0	0	0	0	1058
col.	*Meridion circulare*	0	0	0	0	0	423	0
indv.	*Navicula lanceolata*	0	0	0	0	0	0	0
indv.	*Navicula pupula*	0	0	0	0	0	1482	0
indv.	*Navicula radiosa*	1270	0	635	423	2963	10159	10159
indv.	*Nitzschia acicularis*	0	0	6350	25398	8254	3175	0
indv.	*Nitzschia linearis*	0	0	0	0	0	0	0
indv.	*Nitzschia sigmoidea*	212	0	0	0	0	1058	1270
indv.	*Pinnularia borealis*	0	0	0	0	0	0	0
indv.	*Sellaphora pupula*	0	0	0	0	0	0	0
indv.	*Stauroneis anceps*	423	0	0	0	0	2963	2963
indv.	*Stauroneis phoenicenteron*	0	0	0	0	0	0	0
indv.	*Surirella biseriata*	0	0	0	0	423	1270	1270
indv.	*Surirella ovata*	0	0	0	0	0	0	423
indv.	*Synedra ulna*	0	5926	2117	0	0	0	635
indv.	*Tryblionella angustata*	0	0	0	0	0	0	0
Xanthophyceae								
col.	*Tribonema monochloron*	0	0	0	0	0	0	423
col.	*Tribonema vulgare*	0	0	0	0	0	0	0
Euglenophyceae								
indv.	*Entosiphon sulcatum*	0	0	0	0	0	0	0
indv.	*Euglena arcus*	212	0	0	0	0	0	0
Dinoflagellata								
indv.	*Ceratium hirundinella*	14	41	97	14	14	0	0
indv.	*Peridinium willei*	212	0	0	0	0	635	0
Chlorophyta								
col.	*Actinastrum hantzschii*	0	0	0	0	0	0	0
indv.	*Chlorococcum infusionum*	0	0	0	0	0	0	0
col.	*Coelastrum microporum*	3175	212	0	1482	1905	0	0
col.	*Comasiella arcuata*	0	0	0	423	0	0	0
col.	*Desmodesmus armatus var. longispina*	635	0	0	0	0	847	0
col.	*Hariotina reticulata*	0	0	0	0	0	0	0
col.	*Micractinium pusillum*	0	0	0	0	0	0	0

indv.(col.)/liter	species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
col.	*Monactinus simplex var. simplex*	0	0	0	0	0	0	0
col.	*Nephrochlamys subsolitaria*	212	0	0	0	0	0	0
col.	*Pediastrum angulosum*	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	212	0	0	0	0	0
col.	*Pediastrum duplex*	0	0	0	212	0	0	0
col.	*Planktosphaeria gelatinosa*	0	0	0	0	0	0	0
col.	*Pseudopediastrum boryanum*	0	0	0	0	0	0	0
col.	*Scenedesmus acutus*	0	0	0	0	0	0	0
col.	*Scenedesmus ecornis*	2117	23282	13123	12064	16721	0	423
col.	*Scenedesmus ellipticus*	0	2963	8043	2117	0	0	0
col.	*Scenedesmus obtusus*	0	0	0	0	0	0	0
indv.	*Siderocelis ornata*	0	0	0	0	0	0	0
col.	*Stauridium tetras*	212	0	0	0	0	0	0
col.	*Tetradesmus lagerheimii*	0	0	0	0	0	0	0
col.	*Tetradesmus obliquus*	93127	11641	4445	18202	192604	0	0
indv.	*Tetraëdron minimum*	1058	1058	1482	635	423	0	0
col.	*Ulothrix tenuissima*	0	0	0	0	0	212	635
col.	*Volvox aureus*	0	0	0	0	0	0	0
col.	*Willea apiculata*	0	0	0	0	0	0	0
Desmidiaceae								
indv.	*Closterium kutzingii*	2117	0	847	1058	23070	0	0
indv.	*Closterium pronum*	4445	0	0	0	0	0	1905
indv.	*Cosmarium regnellii*	0	0	0	0	0	635	0
col.	*Spirogyra sp.*	0	0	0	0	0	0	635
col.	*Staurastrum gracile*	0	0	0	212	0	0	0
col.	*Staurastrum pingue*	0	0	0	0	0	0	0
Ciliates								
indv.	*Pelagostrombididae*	4233	2328	4445	3175	2540	0	423
indv.	*Stentor amethystinus*	0	483	69	0	0	0	0
Rotatoria								
indv.	*Asplanchna priodonta*	0	0	0	0	0	0	0
indv.	*Brachionus urceolaris*	0	0	0	0	0	0	0
indv.	*Conochilus unicornis*	0	0	0	0	0	0	0
indv.	*Filinia longiseta*	0	0	0	0	0	0	0
indv.	*Kellicottia longispina*	0	0	0	0	41	0	0
indv.	*Keratella cochlearis*	41	28	0	0	28	0	0
indv.	*Keratella ticinensis*	0	0	0	0	0	0	0
indv.	*Notholca foliacea*	0	0	0	0	0	0	0
indv.	*Polyarthra vulgaris*	14	0	28	0	0	0	0
indv.	*Trichocerca longiseta*	0	0	0	0	0	0	0
Cladocera								
indv.	*Alona quadrangularis*	0	0	0	0	0	0	0
indv.	*Bosmina coregoni*	0	0	0	0	0	0	0
indv.	*Daphnia longispina*	0	0	0	0	0	0	0
indv.	*Diaphanosoma brachyurum*	0	0	0	0	0	0	0
Copepoda								
indv.	*Eudiaptomus gracilis*	0	0	0	0	0	0	0
indv.	*Eurytemora velox*	0	0	0	0	0	0	0
indv.	*Macrocyclops albidus albidus*	0	0	0	0	0	0	0
indv.	*Macrocyclops fuscus*	0	0	0	0	0	0	0
indv.	*Megacyclops viridis*	0	0	0	0	0	0	0
indv.	*Paracyclops fimbriatus*	0	0	0	0	0	0	0
indv.	*Thermocyclops oithonoides*	0	0	0	0	0	0	0

Table 9: observed plankton at 17. March 2021, numbers are in individuals/liter or colonies/liter, whether it is individuals or colonies is indicated in the first column.

indv.(col.)/liter	species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
	Nauplius	0	166	55	41	14	0	0
Cyanobacteria								
col.	*Anabaena spiroides*	423	0	0	212	1693	0	0
col.	*Chroococcopsis gigantea*	423	0	0	0	0	0	0
col.	*Merismopedia tenuissima*	1640	0	106	265	0	0	0
col.	*Microcystis aeruginosa*	0	0	0	0	0	0	0
col.	*Microcystis flos-aquae*	635	0	0	0	0	0	0
col.	*Phormidium inundatum*	0	0	0	0	0	0	0
col.	*Phormidium retzii*	0	0	0	0	0	0	0
col.	*Planktolyngbya limnetica*	0	0	0	0	0	0	0
col.	*Snowella lacustris*	0	0	0	0	0	0	0
col.	*Woronichinia naegeliana*	0	0	0	0	0	0	0
Chrysophyceae								
col.	*Dinobryon divergens*	5291	1058	0	212	2117	423	0
indv.	*Mallomonas acaroides*	0	0	0	0	0	0	0
indv.	*Mallomonas caudata*	0	0	0	0	0	0	0
col.	*Synura uvella*	0	0	0	0	0	847	0
Diatoms								
indv.	*Amphora ovalis*	212	0	212	0	423	2540	0
col.	*Asterionella formosa*	0	73867	38733	18414	4233	0	2328
col.	*Aulacoseira granulata*	423	212	0	0	0	1693	1482
col.	*Bacillaria ulna*	423	212	0	0	1482	13546	2963
indv.	*Cymatopleura solea*	0	0	0	0	0	0	0
indv.	*Cymbella helvetica*	0	0	0	0	0	0	0
col.	*Diatoma tenuis*	0	0	0	0	423	0	423
col.	*Diatoma vulgaris*	0	0	0	0	0	0	1905
indv.	*Diploneis ovalis*	0	0	0	0	0	0	0
indv.	*Eunotia arcus*	423	0	0	0	0	0	0
indv.	*Fragilaria acus*	0	0	0	0	0	0	0
col.	*Fragilaria capucina*	0	0	0	0	0	847	212
col.	*Fragilaria crotonensis*	0	0	97	41	0	0	0
indv.	*Gyrosigma attenuatum*	0	0	0	0	423	423	0
indv.	*Hannaea arcus*	0	0	0	0	0	0	0
col.	*Melosira varians*	0	0	212	0	0	423	423
col.	*Meridion circulare*	0	0	0	0	0	847	212
indv.	*Navicula lanceolata*	0	0	0	0	0	3386	0
indv.	*Navicula pupula*	0	0	0	0	0	0	0
indv.	*Navicula radiosa*	1905	0	0	1270	7620	15239	10159
indv.	*Nitzschia acicularis*	16509	8043	3386	3598	8678	330179	19260
indv.	*Nitzschia linearis*	0	0	0	0	0	0	0
indv.	*Nitzschia sigmoidea*	0	0	0	0	0	16509	2328
indv.	*Pinnularia borealis*	0	0	0	0	0	0	0
indv.	*Sellaphora pupula*	0	635	0	0	0	0	1270
indv.	*Stauroneis anceps*	1693	635	0	212	847	847	2117
indv.	*Stauroneis phoenicenteron*	0	0	0	0	0	0	0
indv.	*Surirella biseriata*	0	0	0	0	0	0	0
indv.	*Surirella ovata*	0	0	0	0	0	0	0
indv.	*Synedra ulna*	0	0	0	0	0	0	0
indv.	*Tryblionella angustata*	423	212	0	0	0	0	0
Xanthophyceae								
col.	*Tribonema monochloron*	635	0	0	0	0	0	1905
col.	*Tribonema vulgare*	0	0	0	0	847	0	0
Euglenophyceae								
indv.	*Entosiphon sulcatum*	0	0	0	0	0	0	0
indv.	*Euglena arcus*	0	0	0	0	0	0	0
Dinoflagellata								
indv.	*Ceratium hirundinella*	0	662	28	0	28	0	0
indv.	*Peridinium willei*	212	0	0	0	0	0	0
Chlorophyta								
col.	*Actinastrum hantzschii*	0	0	0	0	0	0	0
indv.	*Chlorococcum infusionum*	0	0	0	0	0	0	0
col.	*Coelastrum microporum*	423	0	0	0	0	0	0
col.	*Comasiella arcuata*	0	0	0	0	0	0	0
col.	*Desmodesmus armatus var. longispina*	635	0	0	0	0	0	635
col.	*Hariotina reticulata*	0	0	0	0	0	0	0
col.	*Micractinium pusillum*	0	0	0	0	0	0	0

indv.(col.)/liter	species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
col.	*Monactinus simplex var. simplex*	212	423	0	0	0	0	0
col.	*Nephrochlamys subsolitaria*	0	0	0	0	0	0	0
col.	*Pediastrum angulosum*	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	0	0	0	0	0	0
col.	*Planktosphaeria gelatinosa*	0	0	0	0	0	0	0
col.	*Pseudopediastrum boryanum*	212	0	212	0	0	0	0
col.	*Scenedesmus acutus*	0	0	0	0	0	0	0
col.	*Scenedesmus ecornis*	2751	24763	12488	31113	34076	0	0
col.	*Scenedesmus ellipticus*	0	2328	635	3386	2117	0	0
col.	*Scenedesmus obtusus*	0	0	0	0	0	0	0
indv.	*Siderocelis ornata*	5291	1482	0	0	1270	0	0
col.	*Stauridium tetras*	635	0	0	0	0	0	0
col.	*Tetradesmus lagerheimii*	0	0	0	0	0	0	0
col.	*Tetradesmus obliquus*	7197	10159	16297	115351	33441	0	0
indv.	*Tetraëdron minimum*	1905	4868	212	212	847	0	0
col.	*Ulothrix tenuissima*	0	0	0	0	0	0	0
col.	*Volvox aureus*	0	212	538	1021	97	0	0
col.	*Willea apiculata*	0	0	0	0	0	0	0
Desmidiaceae								
indv.	*Closterium kutzingii*	0	0	0	635	1693	0	0
indv.	*Closterium pronum*	0	0	0	0	0	0	0
indv.	*Cosmarium regnellii*	0	0	0	0	0	0	0
col.	*Spirogyra sp.*	0	0	0	0	0	0	0
col.	*Staurastrum gracile*	212	0	0	0	1482	0	0
col.	*Staurastrum pingue*	0	0	0	0	0	0	0
Ciliates								
indv.	*Pelagostrombididae*	2751	847	1693	1058	2963	423	212
indv.	*Stentor amethystinus*	0	731	14	0	0	0	0
Rotatoria								
indv.	*Asplanchna priodonta*	14	0	0	0	0	0	0
indv.	*Brachionus urceolaris*	0	0	0	0	0	0	0
indv.	*Conochilus unicornis*	0	0	0	0	0	0	0
indv.	*Filinia longiseta*	0	28	41	14	0	0	0
indv.	*Kellicottia longispina*	0	0	14	41	14	0	0
indv.	*Keratella cochlearis*	14	0	14	14	28	0	0
indv.	*Keratella ticinensis*	0	0	0	0	0	0	0
indv.	*Notholca foliacea*	0	0	0	0	14	0	0
indv.	*Polyarthra vulgaris*	0	0	0	0	0	0	0
indv.	*Trichocerca longiseta*	0	0	0	0	0	0	0
Cladocera								
indv.	*Alona quadrangularis*	0	0	0	0	0	0	0
indv.	*Bosmina coregoni*	0	0	14	0	0	0	0
indv.	*Daphnia longispina*	0	0	0	0	0	0	0
indv.	*Diaphanosoma brachyurum*	0	0	0	0	0	0	0
Copepoda								
indv.	*Eudiaptomus gracilis*	0	0	0	0	0	0	0
indv.	*Eurytemora velox*	0	0	28	0	0	0	0
indv.	*Macrocyclops albidus albidus*	0	0	0	0	0	0	0
indv.	*Macrocyclops fuscus*	0	0	0	0	0	0	0
indv.	*Megacyclops viridis*	0	0	0	0	0	0	0
indv.	*Paracyclops fimbriatus*	0	0	0	0	0	0	0
indv.	*Thermocyclops oithonoides*	0	0	0	0	0	0	0

Table 10: observed plankton at 05. May 2021, numbers are in individuals/liter or colonies/liter, whether it is individuals or colonies is indicated in the first column.

indv.(col.)/liter	species	pond 1	pond 2	DCM 2	pond 3	DCM3	pond 4	pond 5	DCM5	companion channel	danube
	Nauplius	0	14	28	14	0	14	69	41	0	0
Cyanobacteria											
col.	*Anabaena spiroides*	0	0	0	0	0	0	0	0	0	0
col.	*Chroococcopsis gigantea*	0	0	0	0	0	0	0	0	0	0
col.	*Merismopedia tenuissima*	212	0	0	0	0	0	476	1164	0	0
col.	*Microcystis aeruginosa*	0	2751	0	0	212	423	83	828	0	2262
col.	*Microcystis flos-aquae*	0	0	0	0	0	0	0	0	0	0
col.	*Phormidium inundatum*	0	0	0	0	0	0	0	0	0	0
col.	*Phormidium retzii*	0	0	0	0	0	0	0	0	423	0
col.	*Planktolyngbya limnetica*	17779	2751	0	0	0	0	0	0	0	0
col.	*Snowella lacustris*	0	0	0	0	0	0	0	0	0	0
col.	*Woronichinia naegeliana*	0	0	0	0	0	0	0	0	0	0
Chrysophyceae											
col.	*Dinobryon divergens*	847	1693	2011	4552	1905	3848	538	276	0	0
indv.	*Mallomonas acaroides*	212	0	0	0	0	212	0	0	0	0
indv.	*Mallomonas caudata*	0	0	0	0	0	0	0	0	0	0
col.	*Synura uvella*	1270	0	0	0	0	0	0	0	0	0
Diatoms											
indv.	*Amphora ovalis*	0	0	0	0	0	0	0	0	1693	0
col.	*Asterionella formosa*	0	212	402	212	1058	212	212	1058	423	5926
col.	*Aulacoseira granulata*	423	0	0	0	0	0	0	0	2540	2540
col.	*Bacillaria ulna*	0	0	0	0	0	0	0	0	33865	0
indv.	*Cymatopleura solea*	0	0	0	0	0	0	0	0	0	0
indv.	*Cymbella helvetica*	6773	0	0	0	0	0	0	0	0	0
col.	*Diatoma tenuis*	0	0	0	0	0	0	0	0	0	10159
col.	*Diatoma vulgaris*	0	0	0	0	0	0	0	0	2540	1693
indv.	*Diploneis ovalis*	0	0	0	0	0	0	0	0	0	0
indv.	*Eunotia arcus*	0	0	0	0	0	0	0	0	0	0
indv.	*Fragilaria acus*	212	0	0	0	0	0	0	0	0	847
col.	*Fragilaria capucina*	0	0	0	0	0	0	0	0	0	0
col.	*Fragilaria crotonensis*	0	212	0	0	14	0	0	0	0	0
indv.	*Gyrosigma attenuatum*	0	0	0	0	212	212	0	0	0	0
indv.	*Hannaea arcus*	0	0	0	0	0	0	0	0	0	0
col.	*Melosira varians*	0	0	0	0	2117	0	0	0	1693	5080
col.	*Meridion circulare*	0	0	0	0	0	0	0	0	0	0
indv.	*Navicula lanceolata*	1482	0	0	0	0	0	0	0	0	0
indv.	*Navicula pupula*	0	0	0	0	0	0	0	0	0	0
indv.	*Navicula radiosa*	11429	1482	7239	0	1482	635	5080	2117	30690	14181
indv.	*Nitzschia acicularis*	0	0	0	635	2540	212	15451	16932	104980	64343
indv.	*Nitzschia linearis*	0	0	0	0	0	0	0	0	0	0
indv.	*Nitzschia sigmoidea*	0	0	0	0	0	0	0	0	5080	847
indv.	*Pinnularia borealis*	0	0	0	0	0	0	0	0	0	0
indv.	*Sellaphora pupula*	0	0	0	0	0	0	0	0	0	0
indv.	*Stauroneis anceps*	5926	1058	0	1058	423	1058	423	1058	8466	7620
indv.	*Stauroneis phoenicenteron*	0	0	0	0	0	0	0	0	0	0
indv.	*Surirella biseriata*	0	0	0	0	0	0	0	0	0	0
indv.	*Surirella ovata*	0	0	0	0	0	0	0	0	0	0
indv.	*Synedra ulna*	0	0	0	0	0	0	0	0	0	0
indv.	*Tryblionella angustata*	0	0	0	0	0	0	0	0	0	0
Xanthophyceae											
col.	*Tribonema monochloron*	0	0	0	0	0	0	0	635	0	0
col.	*Tribonema vulgare*	0	0	0	0	0	0	0	0	0	0
Euglenophyceae											
indv.	*Entosiphon sulcatum*	0	0	0	0	0	0	0	0	0	0
indv.	*Euglena arcus*	0	0	0	0	0	0	0	0	0	0
Dinoflagellata											
indv.	*Ceratium hirundinella*	0	938	690	179	14	386	234	41	0	0
indv.	*Peridinium willei*	0	0	0	0	0	0	212	212	0	0
Chlorophyta											
col.	*Actinastrum hantzschii*	0	0	0	0	0	0	0	0	847	0
indv.	*Chlorococcum infusionum*	0	0	0	0	0	0	0	0	0	0
col.	*Coelastrum microporum*	0	0	0	0	0	0	0	0	0	0
col.	*Comasiella arcuata*	0	0	0	0	0	0	0	0	0	0
col.	*Desmodesmus armatus var. longispina*	0	0	804	0	0	0	0	0	1693	2540
col.	*Hariotina reticulata*	0	0	0	0	0	0	0	0	0	0

indv.(col.)/liter	species	pond 1	pond 2	DCM 2	pond 3	DCM3	pond 4	pond 5	DCM5	companion channel	danube
col.	*Micractinium pusillum*	0	0	0	0	0	0	0	0	0	0
col.	*Monactinus simplex var. simplex*	0	212	0	0	212	0	0	0	0	0
col.	*Nephrochlamys subsolitaria*	0	0	0	0	0	0	0	0	0	0
col.	*Pediastrum angulosum*	0	0	0	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	0	0	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	0	0	0	0	0	0	0	0	0
col.	*Planktosphaeria gelatinosa*	0	0	0	0	0	0	0	0	0	0
col.	*Pseudopediastrum boryanum*	0	0	0	0	0	0	0	0	0	0
col.	*Scenedesmus acutus*	847	0	0	0	0	0	0	0	0	0
col.	*Scenedesmus ecornis*	847	847	1206	0	635	0	12276	7196	3386	12699
col.	*Scenedesmus ellipticus*	0	0	0	0	0	0	2117	1058	0	1693
col.	*Scenedesmus obtusus*	0	0	0	0	0	0	0	0	0	0
indv.	*Siderocelis ornata*	0	0	0	0	0	0	0	0	0	0
col.	*Stauridium tetras*	0	0	0	0	0	0	0	0	0	0
col.	*Tetradesmus lagerheimii*	2328	0	0	0	0	0	0	0	0	0
col.	*Tetradesmus obliquus*	1058	3810	8043	0	635	0	1905	6350	0	0
indv.	*Tetraëdron minimum*	635	847	3619	0	0	0	0	0	0	0
col.	*Ulothrix tenuissima*	0	0	0	0	0	0	0	0	4233	0
col.	*Volvox aureus*	28	83	1503	4910	12083	579	69	7572	0	0
col.	*Willea apiculata*	0	0	0	0	0	0	0	0	0	0
Desmidiaceae											
indv.	*Closterium kutzingii*	0	0	0	0	0	0	0	0	0	0
indv.	*Closterium pronum*	0	0	0	0	0	0	0	0	0	0
indv.	*Cosmarium regnellii*	0	0	0	0	0	0	0	0	0	0
col.	*Spirogyra sp.*	0	0	0	0	0	0	0	0	0	0
col.	*Staurastrum gracile*	0	0	804	0	212	0	0	0	0	0
col.	*Staurastrum pingue*	0	0	0	0	0	0	0	0	0	0
Ciliates											
indv.	*Pelagostrombididae*	2328	4233	402	7831	2751	3175	5926	5926	847	0
indv.	*Stentor amethystinus*	0	1972	0	1972	0	979	0	0	0	0
Rotatoria											
indv.	*Asplanchna priodonta*	0	0	0	0	0	0	0	0	0	0
indv.	*Brachionus urceolaris*	0	0	0	0	0	0	0	0	14	14
indv.	*Conochilus unicornis*	0	0	0	0	0	0	0	14	0	0
indv.	*Filinia longiseta*	0	0	28	0	0	0	0	0	0	0
indv.	*Kellicottia longispina*	0	0	14	14	14	0	414	124	0	0
indv.	*Keratella cochlearis*	14	14	110	28	14	0	110	331	0	0
indv.	*Keratella ticinensis*	0	0	0	0	0	0	0	0	0	0
indv.	*Notholca foliacea*	0	0	0	0	0	0	0	0	0	0
indv.	*Polyarthra vulgaris*	0	14	0	0	0	0	69	0	0	0
indv.	*Trichocerca longiseta*	0	0	0	0	0	0	0	0	0	0
Cladocera											
indv.	*Alona quadrangularis*	14	0	0	0	0	0	0	0	0	0
indv.	*Bosmina coregoni*	14	0	0	0	14	0	0	14	0	0
indv.	*Daphnia longispina*	41	0	0	0	14	0	0	14	0	0
indv.	*Diaphanosoma brachyurum*	0	0	0	0	0	0	0	0	0	0
Copepoda											
indv.	*Eudiaptomus gracilis*	0	0	0	0	0	0	0	83	0	0
indv.	*Eurytemora velox*	0	0	14	0	14	0	0	0	0	0
indv.	*Macrocyclops albidus albidus*	0	0	0	0	0	0	0	0	0	0
indv.	*Macrocyclops fuscus*	0	14	0	0	0	0	0	0	0	0
indv.	*Megacyclops viridis*	0	0	0	0	14	0	0	0	0	0
indv.	*Paracyclops fimbriatus*	0	0	0	0	0	0	0	0	0	0
indv.	*Thermocyclops oithonoides*	0	0	0	0	0	0	0	0	0	0

Table 11: observed plankton at 29. June 2021, numbers are in individuals/liter or colonies/liter, whether it is individuals or colonies is indicated in the first column.

indv.(col.)/liter	species	pond 1	DCM 1	pond 2	DCM 2	pond 3	DCM 3	pond 4	DCM 4	pond 5	DCM 5	companion channel	danube
	Nauplius	0	21	0	42	69	0	28	42	41	147	0	0
Cyanobacteria													
col.	*Anabaena spiroides*	0	0	0	0	2540	1058	1693	1270	0	8466	0	0
col.	*Chroococcopsis gigantea*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Merismopedia tenuissima*	265	1905	423	1270	4233	7408	0	2117	18520	15874	0	0
col.	*Microcystis aeruginosa*	2800	105	359	779	745	653	414	295	110	274	0	0
col.	*Microcystis flos-aquae*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Phormidium inundatum*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Phormidium retzii*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Planktolyngbya limnetica*	212	423	212	0	13123	10159	11006	6350	0	0	0	0
col.	*Snowella lacustris*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Woronichinia naegeliana*	0	0	0	0	0	0	0	0	0	0	0	0
Chrysophyceae													
col.	*Dinobryon divergens*	1905	70692	10583	229220	3810	24128	1048	16168	2117	4233	0	0
indv.	*Mallomonas acaroides*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Mallomonas caudata*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Synura uvella*	635	0	0	0	0	0	423	0	0	0	0	0
Diatoms													
indv.	*Amphora ovalis*	0	0	0	0	423	0	0	0	0	2117	0	0
col.	*Asterionella formosa*	0	0	0	0	0	635	0	423	0	0	0	0
col.	*Aulacoseira granulata*	0	0	0	0	0	0	0	0	2117	0	193	423
col.	*Bacillaria ulna*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Cymatopleura solea*	0	0	0	0	0	0	0	0	0	0	423	0
indv.	*Cymbella helvetica*	0	0	0	0	0	0	0	0	0	6350	423	0
col.	*Diatoma tenuis*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Diatoma vulgaris*	0	0	0	0	0	0	0	0	0	0	166	0
indv.	*Diploneis ovalis*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Eunotia arcus*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Fragilaria acus*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Fragilaria capucina*	0	0	0	0	0	0	0	0	0	0	2963	0
col.	*Fragilaria crotonensis*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Gyrosigma attenuatum*	0	0	0	0	0	0	423	423	2117	2117	0	0
indv.	*Hannaea arcus*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Melosira varians*	212	0	0	0	0	0	0	0	0	0	83	0
col.	*Meridion circulare*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Navicula lanceolata*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Navicula pupula*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Navicula radiosa*	1058	847	0	0	1693	423	0	847	4233	4233	6350	0
indv.	*Nitzschia acicularis*	111330	65613	7831	9736	2117	423	423	0	27515	23282	4656	0
indv.	*Nitzschia linearis*	0	0	0	0	423	0	0	0	0	0	0	0
indv.	*Nitzschia sigmoidea*	0	0	0	423	0	423	0	0	0	0	423	0
indv.	*Pinnularia borealis*	0	0	0	0	0	0	0	0	0	0	5503	847
indv.	*Sellaphora pupula*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Stauroneis anceps*	1693	847	0	423	0	0	0	1270	2117	6350	2540	423
indv.	*Stauroneis phoenicenteron*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Surirella biseriata*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Surirella ovata*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Synedra ulna*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Tryblionella angustata*	0	0	0	0	0	0	0	0	0	0	0	0
Xanthophyceae													
col.	*Tribonema monochloron*	0	0	0	0	0	0	0	0	2117	0	847	423
col.	*Tribonema vulgare*	0	0	0	0	0	0	0	0	0	0	0	0
Euglenophyceae													
indv.	*Entosiphon sulcatum*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Euglena arcus*	0	0	0	0	0	0	0	0	0	0	0	0
Dinoflagellata													
indv.	*Ceratium hirundinella*	83	63	1228	6295	1738	1811	4276	2253	910	2884	0	0
indv.	*Peridinium willei*	6561	5926	12911	7196	8889	6985	5291	8466	0	27326	0	0
Chlorophyta													
col.	*Actinastrum hantzschii*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Chlorococcum infusionum*	0	0	0	0	0	0	0	0	463521	2084785	0	0
col.	*Coelastrum microporum*	0	0	0	0	6350	5291	1270	4233	8466	10583	0	0
col.	*Comasiella arcuata*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Desmodesmus armatus var. longispina*	423	3386	212	1693	0	0	0	0	0	0	2963	3386
col.	*Hariotina reticulata*	0	0	0	0	423	0	0	847	0	0	0	0

indv.(col.)/liter	species	pond 1	DCM 1	pond 2	DCM 2	pond 3	DCM 3	pond 4	DCM 4	pond 5	DCM 5	companion channel	danube
col.	*Micractinium pusillum*	423	0	0	0	0	0	0	0	0	0	0	0
col.	*Monactinus simplex var. simplex*	0	0	0	0	423	212	0	423	0	2117	0	0
col.	*Nephrochlamys subsolitaria*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Pediastrum angulosum*	212	0	0	0	0	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Pediastrum duplex*	0	847	0	0	0	0	0	0	0	0	423	0
col.	*Planktosphaeria gelatinosa*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Pseudopediastrum boryanum*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Scenedesmus acutus*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Scenedesmus ecornis*	1270	1693	2117	1270	1693	2328	423	2117	12699	14816	0	0
col.	*Scenedesmus ellipticus*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Scenedesmus obtusus*	0	0	0	0	0	0	0	1270	0	0	0	0
indv.	*Siderocelis ornata*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Stauridium tetras*	212	0	0	0	0	0	0	0	0	2117	0	0
col.	*Tetradesmus lagerheimii*	635	2117	0	0	0	0	0	0	0	0	0	0
col.	*Tetradesmus obliquus*	0	423	0	0	1270	0	2540	2117	340762	162973	423	423
indv.	*Tetraëdron minimum*	1482	3386	635	2117	423	423	847	423	6350	10583	0	0
col.	*Ulothrix tenuissima*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Volvox aureus*	0	0	0	0	0	63	0	0	0	211	0	0
col.	*Willea apiculata*	0	0	0	0	0	0	0	0	7408	8466	0	0
Desmidiaceae													
indv.	*Closterium kutzingii*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Closterium pronum*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Cosmarium regnellii*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Spirogyra sp.*	0	0	0	0	0	0	0	21	0	0	55	0
col.	*Staurastrum gracile*	0	0	0	0	0	0	0	0	0	0	0	0
col.	*Staurastrum pingue*	0	423	0	0	0	0	0	0	0	0	0	0
Ciliates													
indv.	*Pelagostrombididae*	3598	6350	0	0	4233	2328	2963	2117	2117	2117	0	0
indv.	*Stentor amethystinus*	759	105	3476	147	579	42	276	147	317	189	0	0
Rotatoria													
indv.	*Asplanchna priodonta*	55	21	0	21	0	0	0	0	0	0	0	0
indv.	*Brachionus urceolaris*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Conochilus unicornis*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Filinia longiseta*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Kellicottia longispina*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Keratella cochlearis*	0	253	0	63	0	21	41	21	0	105	0	0
indv.	*Keratella ticinensis*	0	0	0	0	0	0	0	0	0	21	0	0
indv.	*Notholca foliacea*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Polyarthra vulgaris*	0	84	0	0	0	0	0	0	0	0	0	0
indv.	*Trichocerca longiseta*	0	0	41	189	0	0	0	0	14	0	0	0
Cladocera													
indv.	*Alona quadrangularis*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Bosmina coregoni*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Daphnia longispina*	0	0	0	0	0	0	0	0	0	21	0	0
indv.	*Diaphanosoma brachyurum*	0	0	0	21	0	0	14	0	0	63	0	0
Copepoda													
indv.	*Eudiaptomus gracilis*	0	0	0	0	0	0	0	21	0	0	0	0
indv.	*Eurytemora velox*	0	0	0	0	0	0	0	0	28	0	0	0
indv.	*Macrocyclops albidus albidus*	0	0	0	0	0	0	0	0	28	0	0	0
indv.	*Macrocyclops fuscus*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Megacyclops viridis*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Paracyclops fimbriatus*	0	0	0	0	0	0	0	0	0	0	0	0
indv.	*Thermocyclops oithonoides*	0	0	0	21	14	0	0	0	0	21	0	0

10.2. Ciliate data

Table 12: ciliate data (QPS was not performed for all ponds at all dates).

indv. / liter	27. September 2020			12. January 2021		17. March 2021		05. May 2021			29. June 2021	
Ciliates	pond 2	pond 4	pond 5	danube	pond 3	companion channel	pond 1	DCM 5	pond 2	pond 3	DCM 4	pond 1
Actinobolina smalli	0	0	0	0	0	0	0	0	0	52	0	0
Askenasia acrostomia	72	433	0	0	0	0	0	722	72	309	289	0
Codonella cratera	0	0	1444	0	0	0	0	0	0	0	48	0
Limnostrombidium pelagicum	577	2021	1444	0	289	0	433	2526	72	0	385	2743
Pelagohalteria viridis	0	289	5774	0	1227	0	0	2887	794	9177	385	0
Pelagostrombidium mirabile	361	72	0	0	1227	0	289	3032	1516	567	914	650
Pelagothrix plancticola	0	0	0	0	0	180	0	0	0	0	0	0
Rhimostrombidium humile	0	0	0	0	0	0	0	0	0	0	48	0
Rhimostrombidium lacustris	0	144	0	0	289	0	0	505	0	0	0	0
Stentor amethystinus	6496	144	0	0	0	0	0	0	1805	670	96	650
Tintinnopsis cylindrata	0	0	0	0	0	0	0	650	0	0	0	0
Trichodina pediculus	0	0	0	0	0	0	0	0	0	103	0	0
Urotricha globosa	0	0	0	0	0	0	0	5053	0	0	0	0
Vorticella aquadulcis	0	0	0	0	0	0	0	361	0	0	0	0

10.3. Data from the two channel multi meter:

Table 13: Data of the two channel multi meter at 27.09.2020.

27.09.2020

conductivity	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	378 µS/cm	364 µS/cm	396 µS/cm	378 µS/cm	501 µS/cm	369 µS/cm	340 µS/cm
0.50 m	395 µS/cm	363 µS/cm	394 µS/cm	377 µS/cm	501 µS/cm	369 µS/cm	340 µS/cm
1.00 m	395 µS/cm	363 µS/cm	394 µS/cm	377 µS/cm	501 µS/cm		
1.50 m	394 µS/cm	362 µS/cm	395 µS/cm	377 µS/cm	500 µS/cm		
2.00 m	394 µS/cm	362 µS/cm	394 µS/cm	377 µS/cm	500 µS/cm		
2.50 m	394 µS/cm	362 µS/cm	395 µS/cm	377 µS/cm	500 µS/cm		
3.00 m	394 µS/cm	363 µS/cm	394 µS/cm	376 µS/cm	500 µS/cm		
3.50 m	394 µS/cm	363 µS/cm	394 µS/cm	376 µS/cm	500 µS/cm		
4.00 m	393 µS/cm	362 µS/cm	395 µS/cm	376 µS/cm	500 µS/cm		
4.50 m	393 µS/cm	363 µS/cm	395 µS/cm	376 µS/cm	500 µS/cm		
5.00 m	393 µS/cm	363 µS/cm	395 µS/cm	376 µS/cm	500 µS/cm		

pH	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	7.95	8.18	8.22	7.9	7.95	7.76	8.08
0.50 m	8	8.21	8.22	7.89	7.93	7.83	8.06
1.00 m	8	8.21	8.21	7.9	7.91		
1.50 m	8.01	8.21	8.18	7.91	7.91		
2.00 m	8.03	8.21	8.18	7.91	7.9		
2.50 m	8.04	8.2	8.17	7.91	7.89		
3.00 m	8.05	8.19	8.17	7.91	7.88		
3.50 m	8.07	8.19	8.16	7.91	7.86		
4.00 m	8.06	8.19	8.15	7.91	7.85		
4.50 m	8.06	8.19	8.14	7.91	7.85		
5.00 m	8.06	8.18	8.13	7.92	7.84		

temperature	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	20.70 °C	20.00 °C	20.60 °C	20.10 °C	19.70 °C	16.30 °C	14.50 °C
0.50 m	20.30 °C	20.10 °C	20.30 °C	20.10 °C	19.80 °C	16.10 °C	14.40 °C
1.00 m	20.20 °C	20.00 °C	20.20 °C	20.00 °C	19.70 °C		
1.50 m	20.20 °C	19.90 °C	20.10 °C	20.00 °C	19.60 °C		
2.00 m	20.00 °C	19.90 °C	20.10 °C	19.90 °C	19.50 °C		
2.50 m	20.00 °C	19.80 °C	20.00 °C	19.90 °C	19.30 °C		
3.00 m	20.00 °C	19.80 °C	20.00 °C	19.80 °C	19.20 °C		
3.50 m	19.90 °C	19.80 °C	19.90 °C	19.70 °C	19.10 °C		
4.00 m	19.90 °C	19.70 °C	19.90 °C	19.60 °C	19.00 °C		
4.50 m	19.90 °C	19.70 °C	19.90 °C	19.60 °C	19.00 °C		
5.00 m	19.90 °C	19.70 °C	19.90 °C	19.60 °C	19.00 °C		

O2 dissolved	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	7.90 mg/l	7.88 mg/l	7.75 mg/l	7.48 mg/l	8.09 mg/l	7.14 mg/l	9.23 mg/l
0.50 m	7.88 mg/l	7.79 mg/l	7.72 mg/l	7.46 mg/l	8.08 mg/l	7.19 mg/l	9.25 mg/l
1.00 m	7.91 mg/l	7.82 mg/l	7.72 mg/l	7.50 mg/l	8.12 mg/l		
1.50 m	7.92 mg/l	7.86 mg/l	7.63 mg/l	7.55 mg/l	8.14 mg/l		
2.00 m	7.92 mg/l	7.87 mg/l	7.66 mg/l	7.55 mg/l	8.12 mg/l		
2.50 m	7.93 mg/l	7.86 mg/l	7.63 mg/l	7.53 mg/l	8.00 mg/l		
3.00 m	7.91 mg/l	7.79 mg/l	7.64 mg/l	7.49 mg/l	7.78 mg/l		
3.50 m	7.91 mg/l	7.75 mg/l	7.59 mg/l	7.47 mg/l	7.64 mg/l		
4.00 m	7.89 mg/l	7.73 mg/l	7.53 mg/l	7.45 mg/l	7.61 mg/l		
4.50 m	7.89 mg/l	7.68 mg/l	7.50 mg/l	7.41 mg/l	7.61 mg/l		
5.00 m	7.89 mg/l	7.64 mg/l	7.43 mg/l	7.37 mg/l	7.54 mg/l		

O2 saturation	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	91.10 %	89.40 %	89.10 %	85.30 %	91.50 %	75.20 %	93.70 %
0.50 m	90.20 %	88.70 %	88.40 %	85.00 %	91.50 %	75.50 %	93.60 %
1.00 m	90.20 %	88.90 %	88.20 %	85.30 %	91.80 %		
1.50 m	90.20 %	89.10 %	86.90 %	85.80 %	91.80 %		
2.00 m	90.10 %	89.20 %	87.20 %	85.60 %	91.30 %		
2.50 m	90.00 %	89.00 %	86.70 %	85.30 %	89.60 %		
3.00 m	89.80 %	88.20 %	86.80 %	84.70 %	87.10 %		
3.50 m	89.80 %	87.60 %	86.20 %	84.40 %	85.30 %		
4.00 m	89.50 %	87.40 %	85.40 %	84.00 %	84.80 %		
4.50 m	89.50 %	86.80 %	85.00 %	83.60 %	84.90 %		
5.00 m	89.50 %	86.30 %	84.30 %	82.90 %	84.10 %		

Secchi depth	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
	2.70 m	2.00 m	2.45 m	1.45 m	1.60 m	max.	0.40 m

Table 14: Data of the two channel multi meter at 12.01.2021.

12.01.2021

conductivity	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	409 µS/cm	380 µS/cm	419 µS/cm	439 µS/cm	538 µS/cm	451 µS/cm	460 µS/cm
0.50 m	413 µS/cm	376 µS/cm	419 µS/cm	431 µS/cm	538 µS/cm	449 µS/cm	460 µS/cm
1.00 m	413 µS/cm	376 µS/cm	418 µS/cm	427 µS/cm	537 µS/cm		
1.50 m	412 µS/cm	376 µS/cm	415 µS/cm	426 µS/cm	537 µS/cm		
2.00 m	412 µS/cm	375 µS/cm	414 µS/cm	425 µS/cm	536 µS/cm		
2.50 m	411 µS/cm	374 µS/cm	414 µS/cm	425 µS/cm	535 µS/cm		
3.00 m	411 µS/cm	374 µS/cm	413 µS/cm	424 µS/cm	535 µS/cm		
3.50 m	410 µS/cm	374 µS/cm	413 µS/cm	424 µS/cm	535 µS/cm		
4.00 m	410 µS/cm	374 µS/cm	413 µS/cm	426 µS/cm	536 µS/cm		
4.50 m	409 µS/cm	374 µS/cm	413 µS/cm	425 µS/cm	536 µS/cm		
5.00 m	409 µS/cm	374 µS/cm	413 µS/cm	427 µS/cm	536 µS/cm		

pH	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	8.45	8.78	8.33	8.27	8.36	8.75	8.53
0.50 m	8.52	8.8	8.39	8.45	8.33	8.41	8.53
1.00 m	8.5	8.79	8.39	8.45	8.33		
1.50 m	8.51	8.76	8.39	8.45	8.32		
2.00 m	8.5	8.77	8.39	8.45	8.29		
2.50 m	8.49	8.76	8.38	8.4	8.26		
3.00 m	8.5	8.74	8.38	8.38	8.25		
3.50 m	8.49	8.73	8.38	8.35	8.25		
4.00 m	8.48	8.72	8.39	8.33	8.24		
4.50 m	8.48	8.72	8.38	8.29	8.23		
5.00 m	8.46	8.71	8.37	8.24	8.22		

temperature	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	2.80 °C	1.90 °C	1.80 °C	1.70 °C	3.60 °C	7.30 °C	1.60 °C
0.50 m	3.10 °C	3.10 °C	2.40 °C	2.50 °C	3.80 °C	7.50 °C	1.70 °C
1.00 m	3.40 °C	3.30 °C	3.20 °C	2.90 °C	3.90 °C		
1.50 m	3.40 °C	3.50 °C	3.50 °C	3.00 °C	4.00 °C		
2.00 m	3.40 °C	3.60 °C	3.60 °C	3.10 °C	4.00 °C		
2.50 m	3.50 °C	3.60 °C	3.60 °C	3.40 °C	4.00 °C		
3.00 m	3.80 °C	3.70 °C	3.70 °C	3.60 °C	4.10 °C		
3.50 m	3.90 °C	3.70 °C	3.80 °C	3.80 °C	4.00 °C		
4.00 m	3.90 °C	3.70 °C	3.80 °C	3.90 °C	4.00 °C		
4.50 m	3.90 °C	3.70 °C	3.80 °C	4.00 °C	4.00 °C		
5.00 m	4.00 °C	3.70 °C	3.80 °C	4.20 °C	4.00 °C		

O2 dissolved	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	12.03 mg/l	12.57 mg/l	11.84 mg/l	12.76 mg/l	11.70 mg/l	9.53 mg/l	14.15 mg/l
0.50 m	12.18 mg/l	12.43 mg/l	11.65 mg/l	12.36 mg/l	11.56 mg/l	9.21 mg/l	14.32 mg/l
1.00 m	12.00 mg/l	12.38 mg/l	11.45 mg/l	12.21 mg/l	11.29 mg/l		
1.50 m	11.45 mg/l	12.30 mg/l	11.36 mg/l	12.09 mg/l	11.27 mg/l		
2.00 m	11.95 mg/l	12.27 mg/l	11.28 mg/l	12.04 mg/l	11.24 mg/l		
2.50 m	11.89 mg/l	12.22 mg/l	11.24 mg/l	12.00 mg/l	11.19 mg/l		
3.00 m	11.85 mg/l	12.19 mg/l	11.23 mg/l	11.95 mg/l	11.19 mg/l		
3.50 m	11.79 mg/l	12.16 mg/l	11.22 mg/l	11.86 mg/l	11.18 mg/l		
4.00 m	11.74 mg/l	12.11 mg/l	11.22 mg/l	11.51 mg/l	11.18 mg/l		
4.50 m	11.69 mg/l	12.09 mg/l	11.22 mg/l	11.28 mg/l	11.17 mg/l		
5.00 m	11.65 mg/l	12.07 mg/l	11.22 mg/l	11.17 mg/l	11.70 mg/l		

O2 saturation	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	90.80 %	93.20 %	88.50 %	91.30 %	87.90 %	79.10 %	105.10 %
0.50 m	92.80 %	94.50 %	88.20 %	91.90 %	88.70 %	78.60 %	105.10 %
1.00 m	92.00 %	94.30 %	88.00 %	92.00 %	88.00 %		
1.50 m	91.80 %	94.10 %	87.80 %	91.60 %	88.00 %		
2.00 m	91.80 %	94.20 %	87.50 %	91.40 %	87.80 %		
2.50 m	91.60 %	94.10 %	87.30 %	91.20 %	87.60 %		
3.00 m	91.60 %	94.00 %	87.30 %	91.10 %	87.60 %		
3.50 m	91.40 %	93.90 %	87.20 %	90.80 %	87.50 %		
4.00 m	91.40 %	93.60 %	87.20 %	88.80 %	87.60 %		
4.50 m	91.20 %	93.50 %	87.20 %	87.30 %	87.60 %		
5.00 m	91.20 %	93.40 %	87.20 %	86.80 %	87.50 %		

Secchi depth	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
	3.15 m	3.11 m	5.15 m	2.55 m	2.85 m	max.	0.35 m

Table 15: Data of the two channel multi meter at 17.03.2021.

17.03.2021

conductivity	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	422 µS/cm	382 µS/cm	441 µS/cm	450 µS/cm	547 µS/cm	475 µS/cm	459 µS/cm
0.50 m	423 µS/cm	382 µS/cm	440 µS/cm	449 µS/cm	547 µS/cm	474 µS/cm	458 µS/cm
1.00 m	423 µS/cm	382 µS/cm	440 µS/cm	449 µS/cm	547 µS/cm		
1.50 m	423 µS/cm	382 µS/cm	440 µS/cm	449 µS/cm	547 µS/cm		
2.00 m	423 µS/cm	382 µS/cm	438 µS/cm	449 µS/cm	547 µS/cm		
2.50 m	423 µS/cm	382 µS/cm	438 µS/cm	449 µS/cm	546 µS/cm		
3.00 m	423 µS/cm	382 µS/cm	438 µS/cm	449 µS/cm	546 µS/cm		
3.50 m	423 µS/cm	382 µS/cm	438 µS/cm	449 µS/cm	546 µS/cm		
4.00 m	423 µS/cm	382 µS/cm	438 µS/cm	449 µS/cm	546 µS/cm		
4.50 m	423 µS/cm	381 µS/cm	437 µS/cm	449 µS/cm	546 µS/cm		
5.00 m	423 µS/cm	381 µS/cm	437 µS/cm	449 µS/cm	546 µS/cm		

pH	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	8.5	8.67	8.49	8.71	8.54	8.3	8.85
0.50 m	8.51	8.69	8.52	8.7	8.52	8.43	8.84
1.00 m	8.51	8.66	8.52	8.68	8.5		
1.50 m	8.51	8.67	8.52	8.67	8.49		
2.00 m	8.52	8.66	8.52	8.67	8.48		
2.50 m	8.52	8.65	8.52	8.65	8.48		
3.00 m	8.52	8.66	8.52	8.65	8.47		
3.50 m	8.53	8.66	8.52	8.64	8.47		
4.00 m	8.53	8.67	8.52	8.64	8.46		
4.50 m	8.53	8.66	8.52	8.64	8.46		
5.00 m	8.53	8.66	8.53	8.62	8.46		

temperature	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	6.70 °C	6.50 °C	6.20 °C	6.50 °C	7.00 °C	8.40 °C	6.60 °C
0.50 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C	8.50 °C	6.60 °C
1.00 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C		
1.50 m	6.60 °C	6.50 °C	6.30 °C	6.60 °C	7.00 °C		
2.00 m	6.60 °C	6.50 °C	6.30 °C	6.60 °C	7.00 °C		
2.50 m	6.60 °C	6.50 °C	6.30 °C	6.60 °C	7.00 °C		
3.00 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C		
3.50 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C		
4.00 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C		
4.50 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C		
5.00 m	6.60 °C	6.50 °C	6.30 °C	6.50 °C	7.00 °C		

O2 dissolved	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	12.73 mg/l	12.49 mg/l	13.06 mg/l	12.17 mg/l	12.75 mg/l	12.96 mg/l	12.60 mg/l
0.50 m	12.72 mg/l	12.46 mg/l	13.00 mg/l	12.15 mg/l	12.73 mg/l	12.90 mg/l	12.60 mg/l
1.00 m	12.71 mg/l	12.44 mg/l	12.98 mg/l	12.13 mg/l	12.73 mg/l		
1.50 m	12.74 mg/l	12.43 mg/l	1296.00 mg/l	12.12 mg/l	12.70 mg/l		
2.00 m	12.74 mg/l	12.41 mg/l	12.94 mg/l	12.10 mg/l	12.68 mg/l		
2.50 m	12.70 mg/l	12.40 mg/l	12.92 mg/l	12.09 mg/l	12.68 mg/l		
3.00 m	12.68 mg/l	12.39 mg/l	12.90 mg/l	12.08 mg/l	12.67 mg/l		
3.50 m	12.74 mg/l	12.37 mg/l	12.89 mg/l	12.06 mg/l	12.67 mg/l		
4.00 m	12.63 mg/l	12.36 mg/l	12.86 mg/l	12.04 mg/l	12.64 mg/l		
4.50 m	12.61 mg/l	12.35 mg/l	12.89 mg/l	12.04 mg/l	12.65 mg/l		
5.00 m	12.61 mg/l	12.34 mg/l	12.88 mg/l	12.01 mg/l	12.64 mg/l		

O2 saturation	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	105.10 %	103.30 %	107.30 %	100.80 %	106.80 %	112.30 %	107.20 %
0.50 m	105.10 %	103.10 %	107.00 %	100.70 %	106.70 %	112.00 %	107.10 %
1.00 m	105.10 %	102.90 %	106.90 %	100.60 %	106.70 %		
1.50 m	105.40 %	102.80 %	106.50 %	100.50 %	106.50 %		
2.00 m	105.40 %	102.50 %	106.50 %	100.40 %	106.40 %		
2.50 m	105.00 %	102.50 %	106.30 %	100.30 %	106.30 %		
3.00 m	104.90 %	102.40 %	106.20 %	100.10 %	106.30 %		
3.50 m	105.40 %	102.30 %	106.10 %	100.00 %	106.10 %		
4.00 m	104.50 %	102.20 %	105.80 %	99.80 %	105.90 %		
4.50 m	104.40 %	102.10 %	106.10 %	99.80 %	105.90 %		
5.00 m	104.40 %	102.10 %	106.00 %	99.60 %	105.90 %		

Secchi depth	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
	3.40 m	3.20 m	1.60 m	1.10 m	2.60 m	max.	0.50 m

Table 16: Data of the two channel multi meter at 05.05.2021.

05.05.2021

conductivity	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	422 µS/cm	386 µS/cm	445 µS/cm	451 µS/cm	544 µS/cm	450 µS/cm	401 µS/cm
0.50 m	422 µS/cm	386 µS/cm	444 µS/cm	450 µS/cm	544 µS/cm	450 µS/cm	401 µS/cm
1.00 m	422 µS/cm	385 µS/cm	444 µS/cm	450 µS/cm	543 µS/cm		
1.50 m	420 µS/cm	384 µS/cm	447 µS/cm	449 µS/cm	543 µS/cm		
2.00 m	420 µS/cm	384 µS/cm	443 µS/cm	449 µS/cm	543 µS/cm		
2.50 m	420 µS/cm	384 µS/cm	442 µS/cm	449 µS/cm	542 µS/cm		
3.00 m	419 µS/cm	384 µS/cm	443 µS/cm	448 µS/cm	541 µS/cm		
3.50 m	419 µS/cm	383 µS/cm	442 µS/cm	448 µS/cm	541 µS/cm		
4.00 m	418 µS/cm	384 µS/cm	442 µS/cm	448 µS/cm	541 µS/cm		
4.50 m	419 µS/cm	383 µS/cm	444 µS/cm	448 µS/cm	538 µS/cm		
5.00 m	418 µS/cm	387 µS/cm	443 µS/cm	448 µS/cm	537 µS/cm		

pH	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	8.75	8.74	8.88	8.85	8.5	8.42	8.45
0.50 m	8.75	8.74	8.9	8.82	8.51	8.42	8.45
1.00 m	8.82	8.81	8.9	8.81	8.51		
1.50 m	8.85	8.84	8.9	8.81	8.5		
2.00 m	8.89	8.85	8.9	8.8	8.5		
2.50 m	8.89	8.85	8.88	8.79	8.51		
3.00 m	8.9	8.86	8.87	8.79	8.51		
3.50 m	8.9	8.86	8.87	8.79	8.5		
4.00 m	8.9	8.86	8.83	8.97	8.5		
4.50 m	8.9	8.86	8.75	8.97	8.5		
5.00 m	8.9	8.86	8.75	8.97	8.5		

temperature	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	13.90 °C	13.70 °C	13.10 °C	13.60 °C	14.20 °C	9.90 °C	12.30 °C
0.50 m	13.90 °C	14.00 °C	13.50 °C	13.60 °C	14.30 °C	9.90 °C	12.30 °C
1.00 m	13.80 °C	14.00 °C	13.60 °C	13.90 °C	14.30 °C		
1.50 m	13.70 °C	13.90 °C	13.50 °C	14.00 °C	14.30 °C		
2.00 m	13.60 °C	13.80 °C	13.50 °C	14.10 °C	14.30 °C		
2.50 m	13.60 °C	13.70 °C	13.40 °C	14.10 °C	14.20 °C		
3.00 m	13.40 °C	13.60 °C	13.40 °C	14.10 °C	14.20 °C		
3.50 m	13.40 °C	13.60 °C	13.30 °C	14.20 °C	14.10 °C		
4.00 m	13.20 °C	13.50 °C	13.20 °C	14.20 °C	14.00 °C		
4.50 m	13.00 °C	13.20 °C	13.00 °C	14.20 °C	13.80 °C		
5.00 m	12.80 °C	12.60 °C	12.90 °C	13.90 °C	13.50 °C		

O2 dissolved	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	11.37 mg/l	10.89 mg/l	11.56 mg/l	11.17 mg/l	11.40 mg/l	9.30 mg/l	11.67 mg/l
0.50 m	11.44 mg/l	10.84 mg/l	11.46 mg/l	11.13 mg/l	11.43 mg/l	9.31 mg/l	11.67 mg/l
1.00 m	11.43 mg/l	10.82 mg/l	11.48 mg/l	11.10 mg/l	11.44 mg/l		
1.50 m	11.42 mg/l	10.85 mg/l	11.48 mg/l	11.07 mg/l	11.40 mg/l		
2.00 m	11.41 mg/l	10.89 mg/l	11.63 mg/l	11.05 mg/l	11.36 mg/l		
2.50 m	11.30 mg/l	10.91 mg/l	11.63 mg/l	11.03 mg/l	11.69 mg/l		
3.00 m	11.39 mg/l	10.87 mg/l	11.64 mg/l	11.01 mg/l	11.59 mg/l		
3.50 m	11.38 mg/l	10.84 mg/l	11.90 mg/l	10.99 mg/l	11.62 mg/l		
4.00 m	11.37 mg/l	10.80 mg/l	11.99 mg/l	10.99 mg/l	12.08 mg/l		
4.50 m	11.36 mg/l	11.31 mg/l	12.27 mg/l	11.02 mg/l	14.82 mg/l		
5.00 m	11.35 mg/l	12.81 mg/l	13.05 mg/l	11.20 mg/l	15.80 mg/l		

O2 saturation	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	113.70 %	106.50 %	113.40 %	111.00 %	114.50 %	84.60 %	112.00 %
0.50 m	114.60 %	106.50 %	113.60 %	111.00 %	115.20 %	84.60 %	112.00 %
1.00 m	114.50 %	106.60 %	113.90 %	111.00 %	115.20 %		
1.50 m	114.40 %	106.60 %	113.70 %	110.90 %	115.00 %		
2.00 m	114.30 %	106.60 %	115.10 %	110.90 %	114.60 %		
2.50 m	113.90 %	106.60 %	115.10 %	110.70 %	117.70 %		
3.00 m	114.10 %	106.10 %	115.00 %	110.60 %	116.50 %		
3.50 m	114.00 %	107.60 %	117.30 %	110.50 %	116.70 %		
4.00 m	113.90 %	107.10 %	117.90 %	110.50 %	121.00 %		
4.50 m	113.80 %	111.40 %	120.20 %	110.50 %	147.60 %		
5.00 m	113.70 %	124.40 %	127.50 %	112.00 %	156.50 %		

Secchi depth	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
	7.00 m	6.00 m	3.60 m	3.10 m	3.90 m	max.	0.35 m

Table 17: Data of the two channel multi meter at 29.06.2021.

29.06.2021

conductivity	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	409 µS/cm	379 µS/cm	427 µS/cm	429 µS/cm	518 µS/cm	364 µS/cm	311 µS/cm
0.50 m	408 µS/cm	379 µS/cm	426 µS/cm	429 µS/cm	517 µS/cm	365 µS/cm	312 µS/cm
1.00 m	408 µS/cm	378 µS/cm	426 µS/cm	429 µS/cm	516 µS/cm		
1.50 m	408 µS/cm	378 µS/cm	426 µS/cm	428 µS/cm	515 µS/cm		
2.00 m	408 µS/cm	378 µS/cm	425 µS/cm	428 µS/cm	514 µS/cm		
2.50 m	408 µS/cm	378 µS/cm	425 µS/cm	428 µS/cm	514 µS/cm		
3.00 m	408 µS/cm	377 µS/cm	425 µS/cm	427 µS/cm	516 µS/cm		
3.50 m	408 µS/cm	378 µS/cm	424 µS/cm	427 µS/cm	516 µS/cm		
4.00 m	409 µS/cm	377 µS/cm	430 µS/cm	427 µS/cm	515 µS/cm		
4.50 m	410 µS/cm	376 µS/cm	431 µS/cm	432 µS/cm	516 µS/cm		
5.00 m	409 µS/cm	374 µS/cm	431 µS/cm	447 µS/cm	527 µS/cm		

pH	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	7.1	6.95	7.4	7.4	7.7	7.25	8
0.50 m	7.1	6.95	7.4	7.4	7.7	7.25	8
1.00 m	7.1	6.95	7.4	7.4	7.7		
1.50 m	7.1	6.95	7.4	7.4	7.7		
2.00 m	7.1	6.95	7.4	7.4	7.7		
2.50 m	7.1	6.95	7.4	7.4	7.7		
3.00 m	7.1	6.95	7.4	7.4	7.7		
3.50 m	7.1	6.95	7.4	7.4	7.7		
4.00 m	7.1	6.95	7.4	7.4	7.7		
4.50 m	7.1	6.95	7.4	7.4	7.7		
5.00 m	7.1	6.95	7.4	7.4	7.7		

temperature	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	26.10 °C	26.20 °C	25.90 °C	26.00 °C	25.90 °C	15.90 °C	20.70 °C
0.50 m	26.20 °C	26.40 °C	26.00 °C	26.30 °C	26.00 °C	15.30 °C	20.20 °C
1.00 m	26.20 °C	26.50 °C	26.10 °C	26.30 °C	26.30 °C		
1.50 m	26.20 °C	26.60 °C	26.10 °C	26.40 °C	26.50 °C		
2.00 m	26.20 °C	26.60 °C	26.20 °C	26.40 °C	26.50 °C		
2.50 m	26.20 °C	26.70 °C	26.20 °C	26.40 °C	26.50 °C		
3.00 m	26.20 °C	26.70 °C	26.30 °C	26.40 °C	26.50 °C		
3.50 m	26.20 °C	26.60 °C	26.30 °C	26.50 °C	26.30 °C		
4.00 m	26.00 °C	25.90 °C	26.10 °C	26.50 °C	26.10 °C		
4.50 m	25.60 °C	25.00 °C	26.00 °C	26.40 °C	25.00 °C		
5.00 m	25.00 °C	24.30 °C	25.00 °C	26.00 °C	23.10 °C		

O2 dissolved	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	9.07 mg/l	9.58 mg/l	9.88 mg/l	10.03 mg/l	10.41 mg/l	8.48 mg/l	8.47 mg/l
0.50 m	9.01 mg/l	9.55 mg/l	9.88 mg/l	10.07 mg/l	10.36 mg/l	8.58 mg/l	8.52 mg/l
1.00 m	9.00 mg/l	9.53 mg/l	9.87 mg/l	10.22 mg/l	10.38 mg/l		
1.50 m	8.98 mg/l	9.51 mg/l	9.92 mg/l	10.07 mg/l	10.52 mg/l		
2.00 m	8.96 mg/l	9.52 mg/l	9.86 mg/l	10.05 mg/l	10.65 mg/l		
2.50 m	8.95 mg/l	9.47 mg/l	9.89 mg/l	10.10 mg/l	10.77 mg/l		
3.00 m	8.94 mg/l	9.48 mg/l	9.85 mg/l	10.07 mg/l	11.63 mg/l		
3.50 m	9.00 mg/l	9.97 mg/l	9.89 mg/l	9.96 mg/l	14.10 mg/l		
4.00 m	10.19 mg/l	11.88 mg/l	10.55 mg/l	10.01 mg/l	16.65 mg/l		
4.50 m	12.72 mg/l	13.73 mg/l	10.70 mg/l	10.82 mg/l	21.22 mg/l		
5.00 m	16.61 mg/l	14.26 mg/l	13.13 mg/l	12.26 mg/l	21.10 mg/l		

O2 saturation	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
0.00 m	114.50 %	121.10 %	124.30 %	126.40 %	131.30 %	87.70 %	96.40 %
0.50 m	114.00 %	121.40 %	124.60 %	127.60 %	131.30 %		
1.00 m	113.80 %	121.40 %	124.60 %	129.70 %	132.10 %		
1.50 m	113.70 %	121.30 %	125.40 %	127.90 %	133.90 %		
2.00 m	113.50 %	121.40 %	124.70 %	127.70 %	135.60 %		
2.50 m	113.40 %	120.90 %	125.30 %	128.40 %	137.30 %		
3.00 m	113.30 %	121.10 %	124.80 %	128.10 %	148.00 %		
3.50 m	114.60 %	127.00 %	125.40 %	126.70 %	178.80 %		
4.00 m	128.40 %	149.50 %	133.10 %	127.40 %	210.30 %		
4.50 m	159.10 %	169.90 %	134.90 %	137.30 %	267.00 %		
5.00 m	205.40 %	173.90 %	162.50 %	154.50 %	252.10 %		

Secchi depth	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
	5.40 m	5.50 m	3.20 m	4.00 m	3.60 m	max.	0.30 m

10.4. Chemical analysis:

Table 18: result of the chemical analysis in 1.5 metres depth of 27.09.2020.

	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
Chlorophyll A	7.50 µg/l	20.70 µg/l	3.50 µg/l	9.40 µg/l	8.40 µg/l	1.80 µg/l	2.30 µg/l
DOC	3.30 mg/l	2.60 mg/l	2.40 mg/l	3.00 mg/l	2.20 mg/l	1.20 mg/l	2.20 mg/l
Acid capacity Ks4,3	3.10 mmol/l	2.80 mmol/l	3.00 mmol/l	2.80 mmol/l	4.00 mmol/l	3.10 mmol/l	2.60 mmol/l
Carbonate hardness	8.60 ° dH	8.00 ° dH	8.50 ° dH	7.80 ° dH	11.20 ° dH	8.60 ° dH	7.30 ° dH
Hydrogen carbonate	188 mg/l	173 mg/l	185 mg/l	171 mg/l	245 mg/l	188 mg/l	159 mg/l
Total hardness	10.50 dH	9.70 dH	10.60 dH	9.90 dH	14.00 dH	10.00 dH	8.90 dH
Magnesium	18 mg/l	19 mg/l	19 mg/l	19 mg/l	19 mg/l	11 mg/l	11 mg/l
Calcium	45 mg/l	39 mg/l	44 mg/l	40 mg/l	68 mg/l	53 mg/l	46 mg/l
Potassium	3.40 mg/l	3.40 mg/l	3.40 mg/l	3.20 mg/l	3.00 mg/l	2.40 mg/l	2.30 mg/l
Sodium	9.20 mg/l	8.90 mg/l	9.40 mg/l	9.20 mg/l	9.20 mg/l	9.20 mg/l	9.80 mg/l
Total P filtered	0.006 mg/l	0.008 mg/l	0.004 mg/l	0.005 mg/l	0.004 mg/l	0.051 mg/l	0.030 mg/l
Total P unfiltered	0.013 mg/l	0.022 mg/l	0.016 mg/l	0.030 mg/l	0.025 mg/l	0.057 mg/l	0.098 mg/l
o-P	0.003 mg/l	0.003 mg/l	<0,002	<0,002	<0,002	0.048 mg/l	0.026 mg/l
Cl	20 mg/l	21 mg/l	22 mg/l	22 mg/l	23 mg/l	13 mg/l	14 mg/l
SO4	25 mg/l	22 mg/l	25 mg/l	25 mg/l	27 mg/l	22 mg/l	25 mg/l
NO3-N	0.700 mg/l	<0,03	0.500 mg/l	0.600 mg/l	2.700 mg/l	1.100 mg/l	1.200 mg/l
NO2-N	0.018 mg/l	0.002 mg/l	0.015 mg/l	0.024 mg/l	0.038 mg/l	0.010 mg/l	0.009 mg/l
NH4-N	0.16 mg/l	0.07 mg/l	0.15 mg/l	0.21 mg/l	0.22 mg/l	0.04 mg/l	0.04 mg/l
O2(dissolved)	7.90 mg/l	7.90 mg/l	7.60 mg/l	7.60 mg/l	8.10 mg/l	7.20 mg/l	9.20 mg/l
O2(saturation)	90 %	89 %	87 %	86 %	92 %	76 %	94 %
conductivity	394 µS/cm	362 µS/cm	395 µS/cm	377 µS/cm	500 µS/cm	369 µS/cm	341 µS/cm
pH	8	8.2	8.2	7.9	7.9	7.8	8
Temperature	20.20 ° C	19.90 ° C	20.10 ° C	20.00 ° C	19.60 ° C	16.10 ° C	14.40 ° C

Table 19: result of the chemical analysis in 1.5 metres depth of 12.01.2021.

	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
Chlorophyll A	5.66 µg/l	5.39 µg/l	2.46 µg/l	6.66 µg/l	6.20 µg/l	4.83 µg/l	2.90 µg/l
DOC	2.60 mg/l	2.00 mg/l	1.60 mg/l	1.90 mg/l	1.50 mg/l	0.94 mg/l	2.50 mg/l
Acid capacity Ks4,3	3.30 mmol/l	3.00 mmol/l	3.30 mmol/l	3.40 mmol/l	4.50 mmol/l	3.60 mmol/l	3.50 mmol/l
Carbonate hardness	9.40 ° dH	8.50 ° dH	9.30 ° dH	9.40 ° dH	12.50 ° dH	10.00 ° dH	9.80 ° dH
Hydrogen carbonate	204 mg/l	185 mg/l	203 mg/l	205 mg/l	272 mg/l	218 mg/l	214 mg/l
Total hardness	11.80 dH	10.70 dH	12.00 dH	12.10 dH	15.30 dH	12.50 dH	12.50 dH
Magnesium	20 mg/l	20 mg/l	21 mg/l	21 mg/l	21 mg/l	15 mg/l	16 mg/l
Calcium	52 mg/l	43 mg/l	51 mg/l	53 mg/l	75 mg/l	64 mg/l	63 mg/l
Potassium	3.80 mg/l	3.30 mg/l	3.10 mg/l	3.00 mg/l	2.90 mg/l	2.20 mg/l	2.50 mg/l
Sodium	9.30 mg/l	9.20 mg/l	9.30 mg/l	9.40 mg/l	9.40 mg/l	11.00 mg/l	17.00 mg/l
Total P filtered	0.006 mg/l	0.005 mg/l	0.003 mg/l	0.005 mg/l	0.004 mg/l	0.042 mg/l	0.031 mg/l
Total P unfiltered	0.010 mg/l	0.007 mg/l	0.007 mg/l	0.014 mg/l	0.014 mg/l	0.050 mg/l	0.076 mg/l
o-P	0.004 mg/l	<0,002	<0,002	<0,002	<0,002	0.040 mg/l	0.027 mg/l
Cl	22 mg/l	22 mg/l	23 mg/l	23 mg/l	23 mg/l	20 mg/l	26 mg/l
SO4	25 mg/l	23 mg/l	26 mg/l	27 mg/l	28 mg/l	26 mg/l	32 mg/l
NO3-N	1.000 mg/l	0.200 mg/l	0.800 mg/l	1.400 mg/l	4.000 mg/l	2.100 mg/l	2.200 mg/l
NO2-N	0.013 mg/l	0.006 mg/l	0.010 mg/l	0.020 mg/l	0.025 mg/l	0.008 mg/l	0.013 mg/l
NH4-N	0.04 mg/l	0.02 mg/l	0.06 mg/l	0.20 mg/l	0.04 mg/l	0.03 mg/l	0.04 mg/l
O2(dissolved)	11.50 mg/l	12.30 mg/l	11.40 mg/l	12.10 mg/l	11.30 mg/l	9.50 mg/l	14.30 mg/l
O2(saturation)	92 %	94 %	88 %	92 %	88 %	79 %	105 %
conductivity	412 µS/cm	375 µS/cm	415 µS/cm	426 µS/cm	537 µS/cm	451 µS/cm	460 µS/cm
pH	8.5	8.8	8.4	8.5	8.3	8.8	8.5
Temperature	3.40 ° C	3.50 ° C	3.50 ° C	3.00 ° C	3.90 ° C	7.30 ° C	1.70 ° C

Table 20: result of the chemical analysis in 1.5 metres depth of 17.03.2021.

	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
Chlorophyll A	1.53 µg/l	2.02 µg/l	4.71 µg/l	6.60 µg/l	2.68 µg/l	6.12 µg/l	13.70 µg/l
DOC	2.40 mg/l	2.00 mg/l	1.70 mg/l	1.90 mg/l	1.50 mg/l	1.30 mg/l	2.40 mg/l
Acid capacity Ks4,3	3.40 mmol/l	3.00 mmol/l	3.50 mmol/l	3.60 mmol/l	4.50 mmol/l	3.60 mmol/l	3.40 mmol/l
Carbonate hardness	9.50 ° dH	8.50 ° dH	9.70 ° dH	10.00 ° dH	12.50 ° dH	10.10 ° dH	9.60 ° dH
Hydrogen carbonate	208 mg/l	185 mg/l	211 mg/l	218 mg/l	273 mg/l	220 mg/l	210 mg/l
Total hardness	11.80 dH	10.50 dH	12.20 dH	12.60 dH	15.60 dH	12.70 dH	12.00 dH
Magnesium	18 mg/l	19 mg/l	19 mg/l	19 mg/l	19 mg/l	15 mg/l	14 mg/l
Calcium	54 mg/l	44 mg/l	56 mg/l	58 mg/l	80 mg/l	65 mg/l	62 mg/l
Potassium	3.10 mg/l	3.00 mg/l	2.90 mg/l	2.90 mg/l	2.80 mg/l	2.10 mg/l	2.40 mg/l
Sodium	9.10 mg/l	8.70 mg/l	8.90 mg/l	8.90 mg/l	9.10 mg/l	14.00 mg/l	15.00 mg/l
Total P filtered	0.006 mg/l	0.003 mg/l	0.003 mg/l	0.004 mg/l	0.004 mg/l	0.027 mg/l	0.014 mg/l
Total P unfiltered	0.008 mg/l	0.010 mg/l	0.016 mg/l	0.017 mg/l	0.010 mg/l	0.034 mg/l	0.038 mg/l
o-P	0.003 mg/l	<0,002	<0,002	<0,002	<0,002	0.024 mg/l	0.008 mg/l
Cl	21 mg/l	21 mg/l	22 mg/l	22 mg/l	23 mg/l	25 mg/l	25 mg/l
SO4	24 mg/l	22 mg/l	25 mg/l	25 mg/l	26 mg/l	26 mg/l	27 mg/l
NO3-N	1.200 mg/l	0.200 mg/l	1.500 mg/l	1.800 mg/l	4.300 mg/l	2.600 mg/l	2.300 mg/l
NO2-N	0.011 mg/l	0.004 mg/l	0.012 mg/l	0.014 mg/l	0.021 mg/l	0.010 mg/l	0.012 mg/l
NH4-N	0.04 mg/l	0.03 mg/l	0.05 mg/l	0.06 mg/l	0.02 mg/l	0.02 mg/l	0.03 mg/l
O2(dissolved)	12.70 mg/l	12.40 mg/l	13.00 mg/l	12.10 mg/l	12.70 mg/l	12.90 mg/l	12.60 mg/l
O2(saturation)	105 %	103 %	107 %	101 %	107 %	112 %	107 %
conductivity	423 µS/cm	382 µS/cm	440 µS/cm	449 µS/cm	547 µS/cm	474 µS/cm	458 µS/cm
pH	8.5	8.7	8.5	8.7	8.5	8.4	8.8
Temperature	6.60 ° C	6.50 ° C	6.40 ° C	6.60 ° C	7.00 ° C	8.50 ° C	6.60 ° C

Table 21: result of the chemical analysis in 1.5 metres depth of 05.05.2021.

	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
Chlorophyll A	<1.0	3.51 µg/l	6.76 µg/l	3.90 µg/l	1.78 µg/l	6.69 µg/l	19.10 µg/l
DOC	2.60 mg/l	2.10 mg/l	2.20 mg/l	2.20 mg/l	1.60 mg/l	1.40 mg/l	2.20 mg/l
Acid capacity Ks4,3	3.40 mmol/l	3.10 mmol/l	3.50 mmol/l	3.60 mmol/l	4.40 mmol/l	3.50 mmol/l	3.10 mmol/l
Carbonate hardness	9.40 ° dH	8.60 ° dH	9.90 ° dH	10.00 ° dH	12.20 ° dH	9.90 ° dH	8.60 ° dH
Hydrogen carbonate	205 mg/l	188 mg/l	216 mg/l	218 mg/l	266 mg/l	215 mg/l	188 mg/l
Total hardness	11.70 dH	10.60 dH	12.50 dH	12.60 dH	15.50 dH	12.20 dH	10.60 dH
Magnesium	18 mg/l	19 mg/l	19 mg/l	19 mg/l	20 mg/l	14 mg/l	13 mg/l
Calcium	53 mg/l	45 mg/l	58 mg/l	59 mg/l	78 mg/l	64 mg/l	54 mg/l
Potassium	3.10 mg/l	3.00 mg/l	2.90 mg/l	2.90 mg/l	2.80 mg/l	2.10 mg/l	2.20 mg/l
Sodium	8.90 mg/l	8.70 mg/l	9.10 mg/l	9.00 mg/l	9.20 mg/l	13.00 mg/l	13.00 mg/l
Total P filtered	0.004 mg/l	0.005 mg/l	0.009 mg/l	0.005 mg/l	0.003 mg/l	0.024 mg/l	0.009 mg/l
Total P unfiltered	0.009 mg/l	0.009 mg/l	0.012 mg/l	0.012 mg/l	0.013 mg/l	0.034 mg/l	0.036 mg/l
o-P	<0,002	<0,002	0.003 mg/l	0.002 mg/l	0.002 mg/l	0.020 mg/l	0.003 mg/l
Cl	20 mg/l	21 mg/l	22 mg/l	22 mg/l	23 mg/l	22 mg/l	21 mg/l
SO4	24 mg/l	22 mg/l	26 mg/l	26 mg/l	27 mg/l	26 mg/l	24 mg/l
NO3-N	1.20 mg/l	0.30 mg/l	1.70 mg/l	1.80 mg/l	4.40 mg/l	2.00 mg/l	1.50 mg/l
NO2-N	0.013 mg/l	0.004 mg/l	0.015 mg/l	0.017 mg/l	0.030 mg/l	0.009 mg/l	0.013 mg/l
NH4-N	0.055 mg/l	0.027 mg/l	0.055 mg/l	0.029 mg/l	0.041 mg/l	0.033 mg/l	0.021 mg/l
O2(dissolved)	11.40 mg/l	10.90 mg/l	11.50 mg/l	11.10 mg/l	11.40 mg/l	9.30 mg/l	11.70 mg/l
O2(saturation)	115 %	107 %	114 %	111 %	115 %	85 %	112 %
conductivity	422 µS/cm	384 µS/cm	447 µS/cm	449 µS/cm	543 µS/cm	450 µS/cm	401 µS/cm
pH	8.7	8.8	8.9	8.8	8.5	8.4	8.5
Temperature	13.90 ° C	14.00 ° C	13.50 ° C	14.00 ° C	14.30 ° C	9.90 ° C	12.30 ° C

Table 22: result of the chemical analysis in 1.5 metres depth of 29.06.2021.

	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube
Chlorophyll A	1.95 µg/l	4.88 µg/l	4.51 µg/l	3.63 µg/l	3.73 µg/l	5.71 µg/l	4.46 µg/l
DOC	3.20 mg/l	2.50 mg/l	2.30 mg/l	2.30 mg/l	2.10 mg/l	1.60 mg/l	2.50 mg/l
Acid capacity Ks4,3	3.20 mmol/l	3.00 mmol/l	3.20 mmol/l	3.30 mmol/l	3.90 mmol/l	3.00 mmol/l	2.40 mmol/l
Carbonate hardness	8.90 ° dH	8.30 ° dH	9.00 ° dH	9.10 ° dH	10.90 ° dH	8.40 ° dH	6.60 ° dH
Hydrogen carbonate	193 mg/l	180 mg/l	196 mg/l	199 mg/l	238 mg/l	184 mg/l	144 mg/l
Total hardness	11.60 dH	10.70 dH	12.00 dH	11.90 dH	14.60 dH	10.30 dH	8.30 dH
Magnesium	20 mg/l	20 mg/l	20 mg/l	20 mg/l	21 mg/l	12 mg/l	10 mg/l
Calcium	51 mg/l	44 mg/l	52 mg/l	52 mg/l	69 mg/l	53 mg/l	43 mg/l
Potassium	3.30 mg/l	3.20 mg/l	3.00 mg/l	3.10 mg/l	2.90 mg/l	2.20 mg/l	2.10 mg/l
Sodium	9.30 mg/l	9.20 mg/l	9.40 mg/l	9.20 mg/l	9.60 mg/l	10.00 mg/l	8.90 mg/l
Total P filtered	0.005 mg/l	0.005 mg/l	0.003 mg/l	0.004 mg/l	0.003 mg/l	0.035 mg/l	0.040 mg/l
Total P unfiltered	0.009 mg/l	0.010 mg/l	0.011 mg/l	0.008 mg/l	0.010 mg/l	0.057 mg/l	0.084 mg/l
o-P	<0,002	<0,002	<0,002	<0,002	<0,002	0.031 mg/l	0.035 mg/l
Cl	21 mg/l	21 mg/l	22 mg/l	22 mg/l	24 mg/l	15 mg/l	14 mg/l
SO4	25 mg/l	23 mg/l	26 mg/l	26 mg/l	28 mg/l	20 mg/l	20 mg/l
NO3-N	1.200 mg/l	0.300 mg/l	1.600 mg/l	1.600 mg/l	4.400 mg/l	1.300 mg/l	1.300 mg/l
NO2-N	0.014 mg/l	0.004 mg/l	0.017 mg/l	0.017 mg/l	0.037 mg/l	0.012 mg/l	0.015 mg/l
NH4-N	0.05 mg/l	0.02 mg/l	0.02 mg/l	0.02 mg/l	0.03 mg/l	0.03 mg/l	0.04 mg/l
O2(dissolved)	9.00 mg/l	9.50 mg/l	9.90 mg/l	10.10 mg/l	10.50 mg/l	8.60 mg/l	8.60 mg/l
O2(saturation)	114 %	121 %	125 %	128 %	134 %	88 %	97 %
conductivity	408 µS/cm	378 µS/cm	426 µS/cm	428 µS/cm	515 µS/cm	635 µS/cm	312 µS/cm
pH	7.1	7	7.4	7.4	7.7	7.3	8
Temperature	26.20 ° C	26.60 ° C	26.10 ° C	26.40 ° C	26.50 ° C	15.30 ° C	20.00 ° C

10.5. Statistics:

10.5.1. Normal distribution:

Table 23: Tests for normal distribution of the spezies, H0: There is a normal distribution.

Tests for normal distribution

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistics	df	Significance	Statistics	df	Significance
Microcystis aeruginosa	0.322	43	0.000	0.518	43	0.000
Merismopedia tenuissima	0.302	43	0.000	0.576	43	0.000
Dinobryon divergens	0.391	43	0.000	0.279	43	0.000
Asterionella formosa	0.439	43	0.000	0.195	43	0.000
Gyrosigma attenuatum	0.321	43	0.000	0.503	43	0.000
Aulacoseira granulata	0.336	43	0.000	0.604	43	0.000
Melosira varians	0.356	43	0.000	0.458	43	0.000
Navicula radiosa	0.255	43	0.000	0.695	43	0.000
Nitzschia acicularis	0.352	43	0.000	0.408	43	0.000
Nitzschia sigmoidea	0.399	43	0.000	0.276	43	0.000
Stauroneis anceps	0.220	43	0.000	0.725	43	0.000
Ceratium hirundinella	0.296	43	0.000	0.603	43	0.000
Peridinium willei	0.354	43	0.000	0.581	43	0.000
Scenedesmus ecornis	0.262	43	0.000	0.750	43	0.000
Desmodesmus armatus var. longispina	0.332	43	0.000	0.613	43	0.000
Tetradesmus obliquus	0.371	43	0.000	0.393	43	0.000
Tetraëdron minimum	0.340	43	0.000	0.436	43	0.000
Pelagostrombididae	0.120	43	0.132	0.922	43	0.006
Stentor amethystinus	0.349	43	0.000	0.447	43	0.000
Keratella cochlearis	0.321	43	0.000	0.538	43	0.000

a. Significance correction following Lilliefors

Table 24: Tests for normal distribution of the abiotic factors, H0: There is a normal distribution.

Tests for normal distribution

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistik	df	Signifikanz	Statistik	df	Signifikanz
pH	0.200	41	0.000	0.902	41	0.002
conductivity	0.127	41	0.092	0.954	41	0.100
temperature	0.121	41	0.139	0.919	41	0.007
O2 (sof)	0.144	41	0.032	0.924	41	0.009
O2 (saturation)	0.205	41	0.000	0.793	41	0.000
Secchi	0.128	41	0.089	0.932	41	0.017
Chlorophyll A	0.178	41	0.002	0.783	41	0.000
DOC	0.117	41	0.173	0.966	41	0.250
Acid capacity Ks4,3	0.159	41	0.010	0.925	41	0.010
Carbonate hardness	0.148	41	0.024	0.934	41	0.019
Hydrogen carbonate	0.149	41	0.023	0.935	41	0.021
Total hardness	0.168	41	0.005	0.935	41	0.022
Magnesium	0.328	41	0.000	0.776	41	0.000
Calcium	0.152	41	0.018	0.928	41	0.012
Potassium	0.214	41	0.000	0.919	41	0.007
Sodium	0.369	41	0.000	0.564	41	0.000
Total P filtered	0.355	41	0.000	0.641	41	0.000
Total P unfiltered	0.310	41	0.000	0.689	41	0.000
o-P	0.385	41	0.000	0.549	41	0.000
Cl	0.294	41	0.000	0.771	41	0.000
SO4	0.197	41	0.000	0.929	41	0.013
NO3-N	0.188	41	0.001	0.859	41	0.000
NO2-N	0.188	41	0.001	0.891	41	0.001
NH4-N	0.329	41	0.000	0.605	41	0.000

a. Significance correction following Lilliefors

10.5.2. Kruskal-Wallis-Test (Spezies / waterbodies):

Table 25: Analysis of the differences of the individual species in relation to the different ponds. H0: There is no significant difference.

Statistik für Test^{a,b}

			Microcystis aeruginosa	Merismopedia glauca	Dinobryon divergens	Asterionella formosa	Gyrosigma attenuatum	Aulacoseira granulata	Melosira varians	Navicula radiosa	Nitzschia acicularis	Nitzschia sigmoidea	Stauroneis anceps	Ceratium hirundinella	Peridinium willei	Scenedesmus ecornis	Desmodesmus armatus var. longispina	Scenedesmus securiformis	Tetraëdron minimum	Pelagostrombididae	Stentor amethystinus	Keratella cochlearis
Chi-Quadrat			,032	5,158	2,921	6,922	4,183	6,591	4,472	15,360	5,664	3,731	7,011	7,675	,516	7,797	16,914	1,402	8,319	5,619	8,449	5,487
df			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymptotische Signifikanz			1,000	,272	,571	,140	,382	,159	,346	,004	,226	,444	,135	,104	,972	,099	,002	,844	,081	,229	,076	,241
Monte-Carlo-Signifikanz	Signifikanz		1,000^{c}	,281^{c}	,592^{c}	,138^{c}	,410^{c}	,142^{c}	,370^{c}	,001^{c}	,230^{c}	,535^{c}	,133^{c}	,097^{c}	,974^{c}	,092^{c}	,000^{c}	,858^{c}	,075^{c}	,259^{c}	,068^{c}	,249^{c}
	99%-Konfidenzintervall	Untergrenze	1,000	,269	,579	,129	,398	,133	,357	,000	,219	,522	,124	,090	,970	,085	,000	,849	,068	,248	,062	,238
		Obergrenze	1,000	,292	,604	,147	,423	,151	,382	,002	,240	,548	,142	,105	,978	,099	,001	,867	,082	,270	,075	,260

a. Kruskal-Wallis-Test

b. Gruppenvariable: waterbody

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 2000000.

Table 26: Analysis of the differences of the individual species in relation to the different waterbodies. H0: There is no significant difference.

Statistik für Test^{a,b}

			Microcystis aeruginosa	Merismopedia glauca	Dinobryon divergens	Asterionella formosa	Gyrosigma attenuatum	Aulacoseira granulata	Melosira varians	Navicula radiosa	Nitzschia acicularis	Nitzschia sigmoidea	Stauroneis anceps	Ceratium hirundinella	Peridinium willei	Scenedesmus ecornis	Desmodesmus armatus var. longispina	Scenedesmus securiformis	Tetraëdron minimum	Pelagostrombididae	Stentor amethystinus	Keratella cochlearis
Chi-Quadrat			4,601	18,494	21,593	11,094	5,495	18,647	17,830	24,469	7,427	18,543	16,484	23,560	5,678	14,481	17,903	11,757	21,403	23,217	16,847	16,469
df			6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Asymptotische Signifikanz			,596	,005	,001	,086	,482	,005	,007	,000	,283	,005	,011	,001	,460	,025	,006	,068	,002	,001	,010	,011
Monte-Carlo-Signifikanz	Signifikanz		,622^{c}	,002^{c}	,000^{c}	,070^{c}	,503^{c}	,002^{c}	,003^{c}	,000^{c}	,287^{c}	,002^{c}	,004^{c}	,000^{c}	,480^{c}	,013^{c}	,003^{c}	,055^{c}	,000^{c}	,000^{c}	,005^{c}	,006^{c}
	99%-Konfidenzintervall	Untergrenze	,610	,001	,000	,064	,490	,001	,001	,000	,275	,001	,003	,000	,467	,010	,002	,049	,000	,000	,003	,004
		Obergrenze	,635	,003	,000	,077	,516	,003	,004	,000	,299	,004	,006	,000	,493	,016	,004	,060	,001	,000	,007	,008

a. Kruskal-Wallis-Test

b. Gruppenvariable: waterbody

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 79654295.

10.5.3. Kruskal-Wallis-Test (Spezies / time points)

Table 27: Analysis of the differences of the individual species with reference to the individual time points. H0: there is no significant difference.

Statistik für Test^{a,b}

			Microcystis aeruginosa	Merismopedia glauca	Dinobryon divergens	Asterionella formosa	Gyrosigma attenuatum	Aulacoseira granulata	Melosira varians	Navicula radiosa	Nitzschia acicularis	Nitzschia sigmoidea	Stauroneis anceps	Ceratium hirundinella	Peridinium willei	Scenedesmus ecornis	Desmodesmus armatus var. longispina	Scenedesmus securiformis	Tetraëdron minimum	Pelagostrombididae	Stentor amethystinus	Keratella cochlearis
Chi-Quadrat			18,974	11,110	6,361	17,012	7,375	4,073	7,478	5,273	12,512	1,858	4,851	12,706	19,795	4,185	2,089	17,133	5,299	2,971	8,628	1,995
df			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymptotische Signifikanz			,001	,025	,174	,002	,117	,396	,113	,260	,014	,762	,303	,013	,001	,382	,719	,002	,258	,563	,071	,737
Monte-Carlo-Signifikanz	Signifikanz		,000^{c}	,020^{c}	,175^{c}	,001^{c}	,111^{c}	,403^{c}	,105^{c}	,266^{c}	,009^{c}	,777^{c}	,309^{c}	,008^{c}	,000^{c}	,388^{c}	,745^{c}	,000^{c}	,264^{c}	,564^{c}	,063^{c}	,744^{c}
	99%-Konfidenzintervall	Untergrenze	,000	,016	,166	,000	,103	,391	,097	,254	,006	,766	,297	,006	,000	,376	,733	,000	,253	,551	,057	,733
		Obergrenze	,000	,024	,185	,001	,120	,416	,113	,277	,011	,787	,320	,011	,000	,401	,756	,001	,275	,577	,069	,756

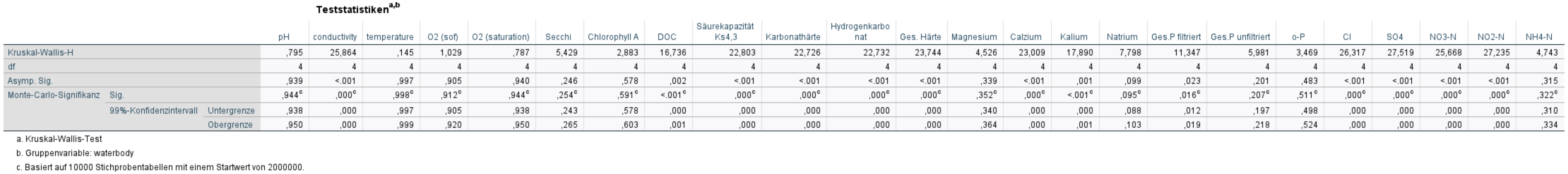
a. Kruskal-Wallis-Test

b. Gruppenvariable: datum

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 1861419652.

10.5.4. Kruskal-Wallis-Test (abiotic factors / waterbodies)

Table 28: Analysis of the differences in the individual abiotic factors in relation to the individual ponds. H0: there is no significant difference.



Teststatistiken^{a,b}

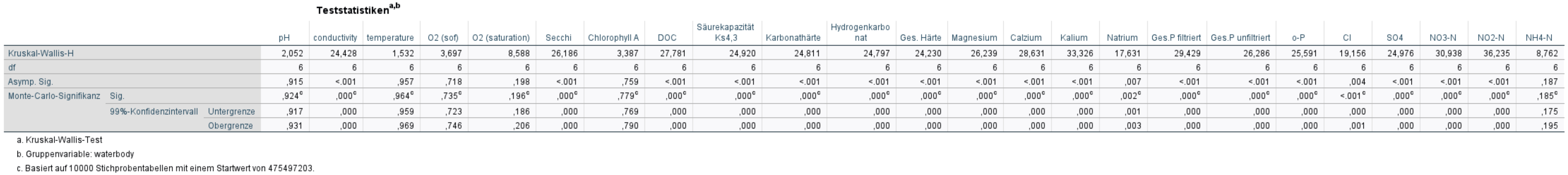
			pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Secchi	Chlorophyll A	DOC	Säurekapazität Ks4,3	Karbonathärte	Hydrogenkarbonat	Ges. Härte	Magnesium	Calzium	Kalium	Natrium	Ges.P filtriert	Ges.P unfiltriert	o-P	Cl	SO4	NO3-N	NO2-N	NH4-N
Kruskal-Wallis-H			,795	25,864	,145	1,029	,787	5,429	2,883	16,736	22,803	22,726	22,732	23,744	4,526	23,009	17,890	7,798	11,347	5,981	3,469	26,317	27,519	25,668	27,235	4,743
df			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.			,939	<.001	,997	,905	,940	,246	,578	,002	<.001	<.001	<.001	<.001	,339	<.001	,001	,099	,023	,201	,483	<.001	<.001	<.001	<.001	,315
Monte-Carlo-Signifikanz	Sig.		,944^{c}	,000^{c}	,998^{c}	,912^{c}	,944^{c}	,254^{c}	,591^{c}	<.001^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,352^{c}	,000^{c}	<.001^{c}	,095^{c}	,016^{c}	,207^{c}	,511^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,322^{c}
	99%-Konfidenzintervall	Untergrenze	,938	,000	,997	,905	,938	,243	,578	,000	,000	,000	,000	,000	,340	,000	,000	,088	,012	,197	,498	,000	,000	,000	,000	,310
		Obergrenze	,950	,000	,999	,920	,950	,265	,603	,001	,000	,000	,000	,000	,364	,000	,001	,103	,019	,218	,524	,000	,000	,000	,000	,334

a. Kruskal-Wallis-Test

b. Gruppenvariable: waterbody

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 2000000.

Table 29: Analysis of the differences in the individual abiotic factors in relation to the individual water bodies. H0: there is no significant difference.



Teststatistiken^{a,b}

			pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Secchi	Chlorophyll A	DOC	Säurekapazität Ks4,3	Karbonathärte	Hydrogenkarbonat	Ges. Härte	Magnesium	Calzium	Kalium	Natrium	Ges.P filtriert	Ges.P unfiltriert	o-P	Cl	SO4	NO3-N	NO2-N	NH4-N
Kruskal-Wallis-H			2,052	24,428	1,532	3,697	8,588	26,186	3,387	27,781	24,920	24,811	24,797	24,230	26,239	28,631	33,326	17,631	29,429	26,286	25,591	19,156	24,976	30,938	36,235	8,762
df			6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Asymp. Sig.			,915	<.001	,957	,718	,198	<.001	,759	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	,007	<.001	<.001	<.001	,004	<.001	<.001	<.001	,187
Monte-Carlo-Signifikanz	Sig.		,924^{c}	,000^{c}	,964^{c}	,735^{c}	,196^{c}	,000^{c}	,779^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,000^{c}	,002^{c}	,000^{c}	,000^{c}	,000^{c}	<.001^{c}	,000^{c}	,000^{c}	,000^{c}	,185^{c}
	99%-Konfidenzintervall	Untergrenze	,917	,000	,959	,723	,186	,000	,769	,000	,000	,000	,000	,000	,000	,000	,000	,001	,000	,000	,000	,000	,000	,000	,000	,175
		Obergrenze	,931	,000	,969	,746	,206	,000	,790	,000	,000	,000	,000	,000	,000	,000	,000	,003	,000	,000	,000	,001	,000	,000	,000	,195

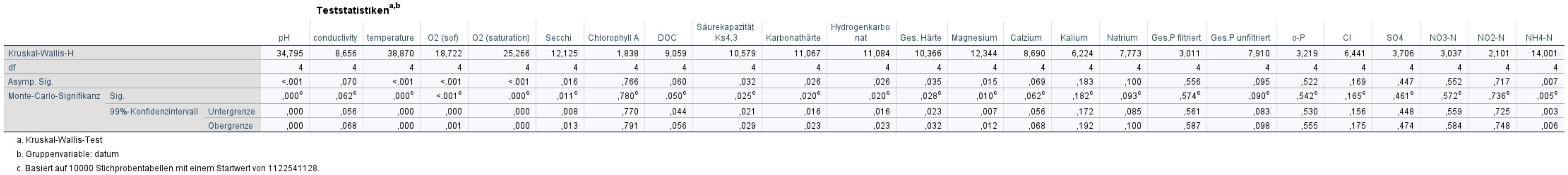
a. Kruskal-Wallis-Test

b. Gruppenvariable: waterbody

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 475497203.

10.5.5. Kruskal-Wallis-Test (abiotic factors / time points)

Table 30: Analysis of the differences of the individual abiotic factors in relation to the individual time points. H0: there is no significant difference.



Teststatistiken^{a,b}

			pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Secchi	Chlorophyll A	DOC	Säurekapazität Ks4,3	Karbonathärte	Hydrogenkarbonat	Ges. Härte	Magnesium	Calzium	Kalium	Natrium	Ges.P filtriert	Ges.P unfiltriert	o-P	Cl	SO4	NO3-N	NO2-N	NH4-N
Kruskal-Wallis-H			34,795	8,656	38,870	18,722	25,266	12,125	1,838	9,059	10,579	11,067	11,084	10,366	12,344	8,690	6,224	7,773	3,011	7,910	3,219	6,441	3,706	3,037	2,101	14,001
df			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.			<.001	,070	<.001	<.001	<.001	,016	,766	,060	,032	,026	,026	,035	,015	,069	,183	,100	,556	,095	,522	,169	,447	,552	,717	,007
Monte-Carlo-Signifikanz	Sig.		,000^{c}	,062^{c}	,000^{c}	<.001^{c}	,000^{c}	,011^{c}	,780^{c}	,050^{c}	,025^{c}	,020^{c}	,020^{c}	,028^{c}	,010^{c}	,062^{c}	,182^{c}	,093^{c}	,574^{c}	,090^{c}	,542^{c}	,165^{c}	,461^{c}	,572^{c}	,736^{c}	,005^{c}
	99%-Konfidenzintervall	Untergrenze	,000	,056	,000	,000	,000	,008	,770	,044	,021	,016	,016	,023	,007	,056	,172	,085	,561	,083	,530	,156	,448	,559	,725	,003
		Obergrenze	,000	,068	,000	,001	,000	,013	,791	,056	,029	,023	,023	,032	,012	,068	,192	,100	,587	,098	,555	,175	,474	,584	,748	,006

a. Kruskal-Wallis-Test

b. Gruppenvariable: datum

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 1122541128.

10.5.6. Kruskal-Wallis-Test (Spezies / pond 3&4)

Table 31: Analysis of the differences of the individual species in relation to the ponds 3 & 4. H0: there is no significant difference.

Statistik für Test[a]

			Microcystis aeruginosa	Merismopedia glauca	Dinobryon divergens	Asterionella formosa	Gyrosigma attenuatum	Aulacoseira granulata	Melosira varians	Navicula radiosa	Nitzschia acicularis	Nitzschia sigmoidea	Stauroneis anceps	Ceratium hirundinella	Peridinium willei	Scenedesmus ecornis	Desmodesmus armatus var. longispina	Scenedesmus securiformis	Tetraëdron minimum	Pelagostrombididae	Stentor amethystinus	Keratella cochlearis
Mann-Whitney-U			19,500	17,000	14,500	16,000	13,000	21,000	16,000	21,000	16,500	15,000	14,000	20,500	18,000	19,500	17,500	18,500	17,000	20,500	19,000	19,500
Wilcoxon-W			40,500	38,000	35,500	37,000	41,000	42,000	37,000	42,000	37,500	36,000	42,000	48,500	46,000	47,500	45,500	46,500	45,000	41,500	40,000	40,500
Z			-,225	-,579	-,931	-,726	-1,259	,000	-,874	,000	-,647	-1,368	-1,058	-,072	-,466	-,215	-1,080	-,376	-,579	-,072	-,294	-,221
Asymptotische Signifikanz (2-seitig)			,822	,562	,352	,468	,208	1,000	,382	1,000	,517	,171	,290	,943	,641	,830	,280	,707	,562	,943	,769	,825
Exakte Signifikanz [2*(1-seitig Sig.)]			,836[b]	,628[b]	,366[b]	,534[b]	,295[b]	1,000[b]	,534[b]	1,000[b]	,534[b]	,445[b]	,366[b]	,945[b]	,731[b]	,836[b]	,628[b]	,731[b]	,628[b]	,945[b]	,836[b]	,836[b]
Monte-Carlo-Signifikanz (2-seitig)	Signifikanz		,872[c]	,603[c]	,393[c]	,497[c]	,313[c]		,494[c]	1,000[c]	,556[c]	,467[c]	,324[c]	,976[c]	,712[c]	,871[c]	,467[c]	,753[c]	,621[c]	,969[c]	,834[c]	,852[c]
	99%-Konfidenzintervall	Untergrenze	,863	,591	,380	,484	,301		,482	1,000	,543	,454	,312	,972	,700	,862	,454	,742	,609	,964	,824	,843
		Obergrenze	,881	,616	,405	,510	,325		,507	1,000	,568	,480	,336	,980	,724	,879	,480	,764	,634	,973	,843	,861
Monte-Carlo-Signifikanz (1-seitig)	Signifikanz		,445[c]	,306[c]	,204[c]	,253[c]	,174[c]		,275[c]	,513[c]	,278[c]	,272[c]	,167[c]	,485[c]	,351[c]	,434[c]	,467[c]	,366[c]	,304[c]	,487[c]	,419[c]	,434[c]
	99%-Konfidenzintervall	Untergrenze	,432	,294	,193	,242	,165		,264	,500	,266	,260	,157	,472	,339	,422	,454	,353	,292	,474	,406	,421
		Obergrenze	,458	,317	,214	,264	,184		,287	,525	,289	,283	,177	,498	,363	,447	,480	,378	,315	,500	,431	,446
Exakte Signifikanz (2-seitig)								1,000[d]														
Exakte Signifikanz (1-seitig)								1,000[d]														
Punkt-Wahrscheinlichkeit								1,000[d]														

a. Gruppenvariable: waterbody

b. Nicht für Bindungen korrigiert.

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 2000000.

d. Für diesen Test werden anstelle von Monte-Carlo-Ergebnissen exakte Ergebnisse berechnet.

10.5.7. Kruskal-Wallis-Test (Spezies / watercourses)

Table 32: Analysis of the differences of the individual species in relation to the watercourses. H0: there is no significant difference.

Teststatistiken[a,b]

			Microcystis aeruginosa	Merismopedia glauca	Dinobryon divergens	Asterionella formosa	Gyrosigma attenuatum	Aulacoseira granulata	Melosira varians	Navicula radiosa	Nitzschia acicularis	Nitzschia sigmoidea	Stauroneis anceps	Ceratium hirundinella	Peridinium willei	Scenedesmus ecornis	Desmodesmus armatus var. longispina	Scenedesmus securiformis	Tetraëdron minimum	Pelagostrombididae	Stentor amethystinus	Keratella cochlearis
Kruskal-Wallis-H			1,000	,000	1,000	4,050	1,034	,405	,100	1,889	1,889	,548	,395	1,000	2,250	,310	,012	,000	,000	1,250	,000	,000
df			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Asymp. Sig.			,317	1,000	,317	,044	,309	,525	,752	,169	,169	,459	,530	,317	,134	,577	,914	1,000	1,000	,264	1,000	1,000
Monte-Carlo-Signifikanz	Sig.		1,000[c]		1,000[c]	,088[c]	,448[c]	,597[c]	,815[c]	,226[c]	,217[c]	,541[c]	,581[c]	1,000[c]	,446[c]	,684[c]	1,000[c]			,367[c]		
	99%-Konfidenzintervall	Untergrenze	1,000		1,000	,081	,435	,584	,805	,216	,206	,528	,568	1,000	,433	,672	1,000			,354		
		Obergrenze	1,000		1,000	,095	,460	,609	,825	,237	,227	,553	,593	1,000	,459	,696	1,000			,379		
Exakte Signifikanz				1,000[d]														1,000[d]	1,000[d]		1,000[d]	1,000[d]
Punkt-Wahrscheinlichkeit				1,000[d]														1,000[d]	1,000[d]		1,000[d]	1,000[d]

a. Kruskal-Wallis-Test

b. Gruppenvariable: waterbody

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 1573343031.

d. Für diesen Test werden anstelle von Monte-Carlo-Ergebnissen exakte Ergebnisse berechnet.

10.5.8. Kruskal-Wallis-Test (Abiotic factors / watercourses)

Table 33: Analysis of the differences of the abiotic factors in relation to the watercourses. H0: there is no significant difference.

Teststatistiken[a,b]

			pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Chlorophyll A	DOC	Säurekapazität Ks4,3	Karbonathärte	Hydrogenkarbonat	Ges. Härte	Magnesium	Calzium	Kalium	Natrium	Ges.P filtriert	Ges.P unfiltriert	Cl	SO4	NO3-N	NO2-N	NH4-N
Kruskal-Wallis-H			1,844	,273	,098	,884	2,810	,011	6,902	1,878	2,151	2,151	1,098	,278	1,866	1,154	,176	1,320	1,866	,177	,180	,000	3,231	1,104
df			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Asymp. Sig.			,175	,602	,754	,347	,094	,917	,009	,171	,142	,142	,295	,598	,172	,283	,675	,251	,172	,674	,671	1,000	,072	,293
Monte-Carlo-Signifikanz	Sig.		,221[c]	,694[c]	,846[c]	,418[c]	,101[c]	1,000[c]	,007[c]	,195[c]	,164[c]	,164[c]	,337[c]	,693[c]	,202[c]	,367[c]	,732[c]	,306[c]	,188[c]	,720[c]	,740[c]	1,000[c]	,109[c]	,322[c]
	99%-Konfidenzintervall	Untergrenze	,210	,682	,836	,405	,093	1,000	,005	,184	,155	,155	,325	,682	,192	,355	,721	,294	,178	,708	,729	1,000	,101	,310
		Obergrenze	,231	,706	,855	,431	,108	1,000	,009	,205	,174	,174	,349	,705	,213	,380	,744	,317	,198	,731	,752	1,000	,117	,334

a. Kruskal-Wallis-Test

b. Gruppenvariable: waterbody

c. Basiert auf 10000 Stichprobentabellen mit einem Startwert von 2000000.

10.5.9. Spearman-Rho-Correlation (Spezies / abiotic factors)

Table 34: Correlation of the individual species with the abiotic factors. H0: there are no significant correlations. corr.coeff… correlationcoefficient; Sig. (2-sided)… statistical significance (twosided); N=43; - Part 1.

		pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Chlorophyll A	DOC	Acid capacity Ks4.3	Carbonate hardness	Hydrogen carbonate	Total hardness	Magnesium
Microcystis aeruginosa	corr.-coeff.	**-0.366***	0.021	**0.611****	0.097	**0.619****	-0.170	0.292	-0.053	-0.070	-0.068	0.027	**0.364***
	Sig. (2-sided)	**0.016**	0.892	**0.000**	0.534	**0.000**	0.283	0.057	0.737	0.656	0.663	0.864	**0.017**
Merismopedia tenuissima	corr.-coeff.	**-0.423****	0.087	**0.304***	-0.043	0.107	0.081	**0.347***	0.043	0.047	0.042	0.096	**0.627****
	Sig. (2-sided)	**0.005**	0.581	**0.047**	0.783	0.495	0.610	**0.023**	0.784	0.767	0.791	0.540	**0.000**
Dinobryon divergens	corr.-coeff.	-0.287	0.098	**0.422****	0.202	**0.480****	-0.090	**0.363***	0.075	0.073	0.074	0.141	**0.556****
	Sig. (2-sided)	0.062	0.533	**0.005**	0.195	**0.001**	0.572	**0.017**	0.633	0.642	0.637	0.369	**0.000**
Asterionella formosa	corr.-coeff.	**0.540****	0.240	**-0.638****	**0.462****	-0.020	0.002	**-0.412****	0.203	0.214	0.216	0.254	0.053
	Sig. (2-sided)	**0.000**	0.121	**0.000**	**0.002**	0.897	0.992	**0.006**	0.191	0.169	0.165	0.101	0.738
Gyrosigma attenuatum	corr.-coeff.	-0.206	0.160	0.273	-0.185	-0.051	-0.008	-0.008	0.112	0.113	0.116	0.087	-0.080
	Sig. (2-sided)	0.185	0.305	0.077	0.235	0.744	0.959	0.958	0.473	0.472	0.458	0.578	0.610
Aulacoseira granulata	corr.-coeff.	0.048	0.020	-0.081	-0.227	-0.278	**.322***	0.070	-0.009	0.004	0.001	-0.110	**-0.595****
	Sig. (2-sided)	0.759	0.899	0.606	0.144	0.071	**0.037**	0.653	0.955	0.979	0.995	0.484	**0.000**
Melosira varians	corr.-coeff.	-0.007	-0.066	-0.109	-0.173	**-0.305***	0.212	-0.063	-0.101	-0.092	-0.094	-0.150	**-0.559****
	Sig. (2-sided)	0.963	0.676	0.488	0.267	**0.047**	0.177	0.690	0.521	0.557	0.547	0.338	**0.000**
Navicula radiosa	corr.-coeff.	0.189	**0.402****	-0.246	0.107	-0.046	-0.092	**-0.409****	**0.428****	**0.436****	**0.433****	**0.304***	**-0.402****
	Sig. (2-sided)	0.224	**0.008**	0.112	0.494	0.771	0.561	**0.006**	**0.004**	**0.003**	**0.004**	**0.048**	**0.008**
Nitzschia acicularis	corr.-coeff.	-0.171	**0.395****	-0.056	**0.352***	0.264	-0.097	**-0.342***	**0.399****	**0.392****	**0.391****	**0.417****	0.203
	Sig. (2-sided)	0.274	**0.009**	0.722	**0.021**	0.087	0.541	**0.025**	**0.008**	**0.009**	**0.010**	**0.005**	0.191
Nitzschia sigmoidea	corr.-coeff.	-0.016	0.098	-0.208	0.107	-0.162	0.281	-0.077	-0.005	0.017	0.008	0.024	**-0.383***
	Sig. (2-sided)	0.917	0.533	0.181	0.494	0.300	0.071	0.624	0.976	0.915	0.957	0.881	**0.011**
Stauroneis anceps	corr.-coeff.	-0.004	0.099	0.069	-0.198	-0.175	0.039	0.026	0.100	0.100	0.099	-0.033	**-0.502****
	Sig. (2-sided)	0.980	0.526	0.658	0.204	0.262	0.805	0.870	0.524	0.523	0.528	0.834	**0.001**
Ceratium hirundinella	corr.-coeff.	**-0.393****	-0.051	**0.606****	-0.029	**0.427****	-0.168	0.226	-0.145	-0.154	-0.152	-0.018	**0.623****
	Sig. (2-sided)	**0.009**	0.745	**0.000**	0.855	**0.004**	0.287	0.145	0.352	0.326	0.331	0.911	**0.000**

		pH	conductivity	temperature	O2 (sof)	O2 (saturation)	Chlorophyll A	DOC	Acid capacity Ks4.3	Carbonate hardness	Hydrogen carbonate	Total hardness	Magnesium
Peridinium willei	corr.-coeff.	**-0.688****	-0.076	**0.659****	-0.168	0.232	-0.083	**0.412****	-0.150	-0.165	-0.167	-0.093	**0.345***
	Sig. (2-sided)	**0.000**	0.629	**0.000**	0.281	0.134	0.599	**0.006**	0.335	0.291	0.284	0.552	**0.023**
Scenedesmus ecornis	corr.-coeff.	-0.022	0.177	-0.206	0.130	-0.086	-0.015	-0.229	0.171	0.175	0.172	0.203	**0.458****
	Sig. (2-sided)	0.891	0.257	0.184	0.407	0.585	0.926	0.140	0.272	0.262	0.270	0.192	**0.002**
Desmodesmus armatus var. longispina	corr.-coeff.	-0.251	**-0.441****	0.152	-0.200	-0.167	0.280	**0.386***	**-0.434****	**-0.439****	**-0.446****	**-0.498****	**-0.348***
	Sig. (2-sided)	0.105	**0.003**	0.329	0.199	0.283	0.072	**0.011**	**0.004**	**0.003**	**0.003**	**0.001**	**0.022**
Tetradesmus obliquus	corr.-coeff.	**0.464****	0.044	**-0.579****	0.102	**-0.323***	0.036	-0.185	0.134	0.146	0.145	0.094	0.247
	Sig. (2-sided)	**0.002**	0.779	**0.000**	0.516	**0.035**	0.823	0.235	0.391	0.349	0.352	0.548	0.110
Tetraëdron minimum	corr.-coeff.	-0.181	-0.242	0.162	0.152	0.212	-0.225	0.287	-0.248	-0.251	-0.251	-0.203	**0.562****
	Sig. (2-sided)	0.246	0.118	0.299	0.332	0.172	0.152	0.062	0.109	0.105	0.104	0.193	**0.000**
Pelagostrombididae	corr.-coeff.	0.126	0.286	0.002	0.064	0.162	-0.163	0.099	**0.318***	**0.328***	**0.330***	**0.334***	**0.548****
	Sig. (2-sided)	0.422	0.063	0.989	0.682	0.299	0.302	0.529	**0.037**	**0.032**	**0.031**	**0.029**	**0.000**
Stentor amethystinus	corr.-coeff.	-0.189	-0.184	**0.406****	0.014	**0.391****	-0.093	0.220	-0.212	-0.220	-0.218	-0.095	**0.464****
	Sig. (2-sided)	0.224	0.238	**0.007**	0.931	**0.010**	0.560	0.156	0.173	0.155	0.160	0.543	**0.002**
Keratella cochlearis	corr.-coeff.	0.062	0.271	0.065	**.421****	**0.417****	-0.202	0.027	0.272	0.271	0.270	0.297	**0.442****
	Sig. (2-sided)	0.695	0.079	0.680	**0.005**	**0.005**	0.201	0.862	0.078	0.079	0.079	0.053	**0.003**

*. The correlation is significant at the 0.05 level (two-sided).

**. The correlation is significant at the 0.01 level (two-sided).

Table 35: Correlation of the individual species with the abiotic factors. H0: there are no significant correlations. corr. coeff… correlationcoefficient; Sig. (2-sided)… statistical significance (twosided); N=43; - Part 2.

		Calcium	Potassium	Sodium	Total P filtered	Total P unfiltered	o-P	Cl	SO4	NO3-N	NO2-N	NH4-N
Microcystis aeruginosa	corr.-coeff.	-0.079	0.232	0.030	**-0.314***	**-0.339***	-0.279	-0.049	0.069	-0.012	0.239	-0.300
	Sig. (2-sided)	0.614	0.134	0.849	**0.041**	**0.026**	0.070	0.754	0.660	0.938	0.123	0.051
Merismopedia tenuissima	corr.-coeff.	-0.104	**0.607****	0.097	**-0.519****	-0.296	**-0.421****	0.230	0.237	0.002	**0.445****	0.244
	Sig. (2-sided)	0.507	**0.000**	0.537	**0.000**	0.054	**0.005**	0.138	0.125	0.989	**0.003**	0.115
Dinobryon divergens	corr.-coeff.	-0.108	**0.578****	-0.220	**-0.410****	**-0.643****	**-0.476****	0.056	0.089	-0.097	0.230	-0.105
	Sig. (2-sided)	0.489	**0.000**	0.157	**0.006**	**0.000**	**0.001**	0.722	0.569	0.541	0.138	0.505
Asterionella formosa	corr.-coeff.	0.190	-0.263	-0.073	-0.207	-0.015	-0.122	**0.335***	0.186	0.100	-0.083	-0.072
	Sig. (2-sided)	0.223	0.088	0.641	0.183	0.926	0.435	**0.028**	0.231	0.530	0.595	0.645
Gyrosigma attenuatum	corr.-coeff.	0.122	-0.039	0.185	0.108	0.133	0.151	0.114	0.251	0.266	0.217	-0.089
	Sig. (2-sided)	0.435	0.805	0.235	0.490	0.395	0.333	0.465	0.105	0.088	0.162	0.571
Aulacoseira granulata	corr.-coeff.	0.148	**-0.338***	**0.316***	**0.420****	**0.467****	**0.478****	-0.089	0.013	0.194	-0.137	0.073
	Sig. (2-sided)	0.344	**0.027**	**0.039**	**0.005**	**0.002**	**0.001**	0.570	0.932	0.218	0.382	0.642
Melosira varians	corr.-coeff.	0.115	**-0.394****	**0.414****	**0.470****	**0.602****	**0.411****	0.014	0.019	0.064	-0.111	0.121
	Sig. (2-sided)	0.464	**0.009**	**0.006**	**0.001**	**0.000**	**0.006**	0.929	0.905	0.685	0.479	0.439
Navicula radiosa	corr.-coeff.	**0.626****	**-0.628****	**0.452****	0.289	**0.311***	**0.392****	0.115	0.260	**0.471****	-0.007	-0.226
	Sig. (2-sided)	**0.000**	**0.000**	**0.002**	0.061	**0.042**	**0.009**	0.464	0.092	**0.002**	0.963	0.145
Nitzschia acicularis	corr.-coeff.	**0.472****	**-0.317***	**0.390****	-0.107	-0.029	-0.057	0.295	**0.303***	**0.381***	0.085	-0.223
	Sig. (2-sided)	**0.001**	**0.039**	**0.010**	0.496	0.856	0.718	0.055	**0.049**	**0.013**	0.587	0.150
Nitzschia sigmoidea	corr.-coeff.	0.164	**-0.340***	**0.660****	**0.428****	**0.441****	**0.408****	0.122	0.095	0.133	-0.276	-0.294
	Sig. (2-sided)	0.295	**0.026**	**0.000**	**0.004**	**0.003**	**0.007**	0.437	0.543	0.401	0.073	0.056
Stauroneis anceps	corr.-coeff.	0.294	**-0.340***	**0.321***	**0.391****	**0.376***	**0.399****	-0.100	0.060	0.271	-0.009	0.071
	Sig. (2-sided)	0.056	**0.026**	**0.036**	**0.010**	**0.013**	**0.008**	0.523	0.702	0.083	0.954	0.653
Ceratium hirundinella	corr.-coeff.	-0.297	**0.543****	-0.232	**-0.600****	**-0.511****	**-0.640****	0.132	0.053	-0.179	0.214	-0.176
	Sig. (2-sided)	0.053	**0.000**	0.135	**0.000**	**0.000**	**0.000**	0.399	0.737	0.256	0.169	0.258

		Calcium	Potassium	Sodium	Total P filtered	Total P unfiltered	o-P	Cl	SO4	NO3-N	NO2-N	NH4-N
Peridinium willei	corr.-coeff.	-0.214	**0.484****	0.077	-0.241	-0.184	-0.279	-0.072	0.044	-0.070	0.229	-0.010
	Sig. (2-sided)	0.169	**0.001**	0.622	0.119	0.236	0.070	0.645	0.779	0.659	0.139	0.947
Scenedesmus ecornis	corr.-coeff.	0.083	0.215	-0.104	**-0.595****	-0.223	**-0.497****	0.289	0.132	0.046	0.237	0.121
	Sig. (2-sided)	0.596	0.166	0.505	**0.000**	0.151	**0.001**	0.060	0.399	0.772	0.126	0.440
Desmodesmus armatus var. longispina	corr.-coeff.	**-0.343***	0.080	0.102	**0.523****	0.180	**0.333***	**-0.515****	**-0.459****	-0.302	**-0.324***	0.034
	Sig. (2-sided)	**0.024**	0.608	0.513	**0.000**	0.248	**0.029**	**0.000**	**0.002**	0.052	**0.034**	0.828
Tetradesmus obliquus	corr.-coeff.	-0.042	**0.322***	**-0.474****	**-0.343***	-0.215	**-0.317***	0.158	-0.093	-0.168	0.017	**0.378***
	Sig. (2-sided)	0.788	**0.035**	**0.001**	**0.024**	0.167	**0.038**	0.312	0.551	0.286	0.913	**0.012**
Tetraëdron minimum	corr.-coeff.	**-0.425****	**0.667****	-0.261	**-0.444****	**-0.666****	**-0.625****	-0.005	-0.228	**-0.415****	-0.142	-0.033
	Sig. (2-sided)	**0.004**	**0.000**	0.091	**0.003**	**0.000**	**0.000**	0.975	0.142	**0.006**	0.365	0.831
Pelagostrombididae	corr.-coeff.	0.120	**0.401****	-0.257	**-0.448****	**-0.456****	**-0.346***	**0.347***	**0.320***	0.134	**0.464****	**0.344***
	Sig. (2-sided)	0.444	**0.008**	0.096	**0.003**	**0.002**	**0.023**	**0.023**	**0.037**	0.399	**0.002**	**0.024**
Stentor amethystinus	corr.-coeff.	**-0.347***	**0.414****	-0.269	**-0.318***	**-0.525****	**-0.412****	-0.052	-0.138	-0.230	-0.186	-0.262
	Sig. (2-sided)	**0.023**	**0.006**	0.081	**0.038**	**0.000**	**0.006**	0.739	0.379	0.142	0.232	0.090
Keratella cochlearis	corr.-coeff.	0.139	0.298	-0.271	**-0.444****	**-0.421****	**-0.410****	0.235	0.155	0.096	**0.329***	-0.009
	Sig. (2-sided)	0.372	0.052	0.079	**0.003**	**0.005**	**0.006**	0.130	0.319	0.547	**0.031**	0.956

*. The correlation is significant at the 0.05 level (two-sided).

**. The correlation is significant at the 0.01 level (two-sided).

10.6. Cross-tabulations:

Table 36: Cross-tabulation for 27.09.2020; exemplary reading note: the distribution of Pond 1 and Pond 2 shows 18 identical species, which account for an average of 73.47% of the species encountered in both ponds.

	27.09.2020						
	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
No. Species	23	26	29	29	33	19	12
No. of identical species							
Pond 1		18	16	16	18	10	8
Pond 2	73.47 %		19	17	18	10	7
Pond 3	61.54 %	69.09 %		20	22	10	6
Pond 4	61.54 %	61.82 %	68.97 %		23	10	5
Pond 5	64.29 %	61.02 %	70.97 %	74.19 %		11	8
companion channel	47.62 %	44.44 %	41.67 %	41.67 %	42.31 %		5
danube	45.71 %	36.84 %	29.27 %	24.39 %	35.56 %	32.26 %	

Table 37: Cross-tabulation for 12.01.2021; exemplary reading note: the distribution of Pond 1 and Pond 2 shows 11 identical species, which account for an average of 50.00% of the species encountered in both ponds.

	12.01.2021						
	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
No. Species	27	17	22	16	20	16	20
No. of identical species							
Pond 1		11	13	10	14	6	6
Pond 2	50.00 %		14	11	12	1	4
Pond 3	53.06 %	71.79 %		12	16	3	6
Pond 4	46.51 %	66.67 %	63.16 %		12	3	4
Pond 5	59.57 %	64.86 %	76.19 %	66.67 %		4	6
companion channel	27.91 %	6.06 %	15.79 %	18.75 %	22.22 %		9
danube	25.53 %	21.62 %	28.57 %	22.22 %	30.00 %	50.00 %	

Table 38: Cross-tabulation for 17.03.2021; exemplary reading note: the distribution of Pond 1 and Pond 2 shows 13 identical species, which account for an average of 50.98% of the species encountered in both ponds.

	17.03.2021						
	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
No. Species	31	20	21	20	25	15	18
No. of identical species							
Pond 1		13	10	12	15	8	8
Pond 2	50.98 %		12	11	14	6	7
Pond 3	38.46 %	58.54 %		13	13	4	4
Pond 4	47.06 %	55.00 %	63.41 %		15	5	5
Pond 5	53.57 %	62.22 %	56.52 %	66.67 %		8	7
companion channel	34.78 %	34.29 %	22.22 %	28.57 %	40.00 %		10
danube	32.65 %	36.84 %	20.51 %	26.32 %	32.56 %	60.61 %	

Table 39: Cross-tabulation for 05.05.2021; exemplary reading note: the distribution of Pond 1 and Pond 2 shows 11 identical species, which account for an average of 51.16% of the species encountered in both ponds.

	05.05.2021						
	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
No. Species	23	20	11	13	20	17	15
No. of identical species							
Pond 1		11	6	7	10	5	5
Pond 2	51.16 %		9	10	13	5	5
Pond 3	35.29 %	58.06 %		9	10	4	3
Pond 4	38.89 %	60.61 %	75.00 %		10	5	5
Pond 5	46.51 %	65.00 %	64.52 %	60.61 %		6	7
companion channel	25.00 %	27.03 %	28.57 %	33.33 %	32.43 %		11
danube	26.32 %	28.57 %	23.08 %	35.71 %	40.00 %	68.75 %	

Table 40: Cross-tabulation for 29.06.2021; exemplary reading note: the distribution of Pond 1 and Pond 2 shows 10 identical species, which account for an average of 66.67% of the species encountered in both ponds.

	29.06.2021						
	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	companion channel	danube
No. Species	19	11	17	18	18	14	5
No. of identical species							
Pond 1		10	11	11	11	5	2
Pond 2	66.67 %		9	9	8	2	1
Pond 3	61.11 %	64.29 %		14	11	3	1
Pond 4	59.46 %	62.07 %	80.00 %		11	2	1
Pond 5	59.46 %	55.17 %	62.86 %	61.11 %		6	4
companion channel	30.30 %	16.00 %	19.35 %	12.50 %	37.50 %		5
danube	16.67 %	12.50 %	9.09 %	8.70 %	34.78 %	52.63 %	

10.7. Comparison of the data

Table 41: Percentage at which the species could be observed in the respective water bodies during sampling. This master thesis: 5 times equals 100%; Jersabek 2019: 3x = 100%; Jersabek 2020: 4x = 100%; Schagerl et al.: 15x = 100% (Jersabek 2021; 2022; Schagerl, Bloch, and Vietauer 2007).

species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube	pond 1 Jersabek 2019	pond 1 Jersabek 2020	Blaue Lagune	Adler-Teich	Rinke-Teich	Figur-Teich	Schwarze Lacken	Wienerberg Teich	Kastanienallee-Teich	Benda-Teich	Grüner See	Schwimmschulteich
Cyanobacteria																			
Anabaena spiroides	40%	20%	40%	40%	40%														
Aphanizomenon gracile								100%	25%										
Chroococcopsis gigantea	20%																		
Dolichospermum flosaquae									25%										
Merismopedia tenuissima	100%	60%	80%	60%	80%			33%				7%		20%					
Microcystis aeruginosa	40%	40%	40%	40%	40%		20%			7%		7%	13%	40%	7%			33%	20%
Microcystis flos-aquae	60%	40%	40%	40%	40%	40%	20%		50%										
Microcystis wesenbergii								100%	75%				7%	13%					
Phormidium inundatum						20%													
Phormidium retzii						20%													
Planktolyngbya limnetica	40%	40%	60%	40%	40%														
Planktothrix rubescens								67%	100%						27%	7%			
Snowella lacustris	20%									20%	20%	13%	20%	13%	47%	13%			
Woronichinia naegeliana				20%	20%														7%
Chrysophyceae																			
Bitrichia chodatii								33%											
Chrysidiastrum catenatum									25%										
Dinobryon crenulatum								67%											
Dinobryon divergens	100%	100%	80%	80%	100%	20%		100%	100%		20%	33%	67%	33%					
Dinobryon sertularia									25%			27%	7%	53%					
Dinobryon sociale								67%	50%										
Mallomonas caudata	40%			40%	20%			33%	25%										

species	pond 1	pond 2	pond 3	pond 4	pond 5	com-panion channel	danube	pond 1 Jersabek 2019	pond 1 Jersabek 2020	Blaue Lagune	Adler-Teich	Rinke-Teich	Figur-Teich	Schwar-ze Lacken	Wiener-berg Teich	Kasta-nienalle e-Teich	Benda-Teich	Grüner See	Schwim mschul-teich
Synura uvella	40%			20%		20%													
Pseudopedinella sp.								33%											
Haptophyceae																			
Chrysochromulina parva								67%	25%										
Diatoms																			
Amphora ovalis	20%		60%		40%	60%	20%	67%						87%		7%	67%		
Asterionella formosa		60%	60%	60%	60%	20%	80%	67%	25%	7%	13%	7%	20%	20%	13%	27%	40%	13%	27%
Aulacoseira sp.								100%								13%	7%		
Aulacoseira granulata	60%	40%			40%	80%	100%	100%	25%	27%	13%	13%	20%	7%	7%	7%			7%
Aulacoseira islandica								67%	75%										
Bacillaria ulna	20%	20%			20%	40%	20%												
Cyclotella comta radiosa								100%	25%	40%	20%	27%	33%	60%	53%	40%	13%		
Cyclotella sp.								100%	100%										
Cymatopleura solea						20%				20%	73%	47%	40%	27%	67%	67%	27%	53%	47%
Cymbella sp.								33%		20%		7%	7%		7%				
Cymbella ehrenbergii								33%		13%	53%	33%	7%	80%	33%	27%			
Cymbella helvetica	20%		20%			20%					7%								
Diatoma tenuis					20%		40%			40%	40%	67%	40%	60%	53%	53%	7%	40%	33%
Diatoma vulgaris						40%	40%			27%	27%	20%	40%	33%	33%	33%	27%	13%	7%
Diploneis ovalis	20%						20%	33%											
Epithemia sp.								33%			13%			13%					
Eunotia arcus	20%																		
Fragilaria acus	20%						20%												
Fragilaria capucina						40%	20%				27%	47%	47%	27%	33%	60%	27%	20%	47%
Fragilaria construens								67%				27%		93%					
Fragilaria crotonensis		40%	40%	20%							7%								
Gyrosigma sp.								100%		13%	13%						7%		

species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube	pond 1 Jersabek 2019	pond 1 Jersabek 2020	Blaue Lagune	Adler-Teich	Rinke-Teich	Figur-Teich	Schwarze Lacken	Wienerberg Teich	Kastanienallee-Teich	Benda-Teich	Grüner See	Schwimmschulteich
Gyrosigma attenuatum	20%	20%	20%	60%	40%	60%	40%						47%	100%					
Hannaea arcus							20%												
Melosira varians	20%		40%	20%	20%	80%	80%	67%	25%		7%	53%	53%	67%					
Meridion circulare						40%	20%												
Navicula lanceolata	20%					20%													
Navicula pupula						20%								40%					
Navicula radiosa	100%	20%	40%	60%	100%	100%	80%			73%	80%	87%	73%	93%	60%	60%	13%	7%	47%
Nitzschia acicularis	40%	40%	80%	80%	80%	100%	40%												
Nitzschia linearis			20%																
Nitzschia sigmoidea	20%		20%			80%	60%										27%		
Pantocsekiella ocellata								100%	25%										
Pinnularia borealis						20%	20%												
Sellaphora pupula		20%					20%												
Stauroneis anceps	100%	60%	40%	60%	80%	100%	100%												
Stauroneis phoenicenteron						20%													
Surirella biseriata					20%	40%	20%	100%											
Surirella ovata							20%												
Synedra ulna		20%	20%			20%	20%												
Tryblionella angustata	20%	20%																	
Xanthophyceae																			
Goniochloris smithii								33%											
Ophiocytium sp.								33%											
Tetraëdriella jovetii								33%											
Tribonema monochloron	40%	20%	20%		40%	20%	80%											7%	
Tribonema vulgare					20%											13%			
Euglenophyceae																			
Entosiphon sulcatum					20%														

species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube	pond 1 Jersabek 2019	pond 1 Jersabek 2020	Blaue Lagune	Adler-Teich	Rinke-Teich	Figur-Teich	Schwarze Lacken	Wienerberg Teich	Kastanienallee-Teich	Benda-Teich	Grüner See	Schwimmschulteich
Euglena sp.								67%		13%		13%	7%	13%	13%				7%
Euglena arcus	20%	20%	20%		20%									7%		13%			
Lepocinclis sp.								33%			7%								
Phacus sp.								67%											
Trachelomonas volvocina								33%											
Trachelomonas sp								33%											
Dinoflagellata																			
Ceratium hirundinella	60%	100%	100%	80%	100%	20%		100%	100%	73%	87%	60%	80%	47%	67%	7%	13%		
Glenodinium sp.								67%	25%										
Gymnodinium uberrimum									50%										
Gyrodinium helveticum									25%										
Peridiniopsis elpatiewskyi									25%										
Peridinium sp.								67%	50%										
Peridinium willei	80%	40%	40%	40%	40%	40%			25%	47%	53%	60%	33%	47%	7%				
Peridinium umbonatum								33%											
Chlorophyta																			
Actinastrum hantzschii						20%													
Ankistrodesmus sp.								33%	25%										
Ankistrodesmus arcuatus								33%											
Binuclearia lauterbornii								100%											
Botryococcus braunii									50%	27%	27%	27%	80%	47%	53%	13%	20%	47%	33%
Chlorococcum infusionum					20%														
Chlorotetraëdron incus								33%											
Coelastrum microporum	60%	40%	40%	60%	60%	20%				33%	20%	27%	60%	67%	67%	20%	47%	20%	20%
Comasiella arcuata				20%															
Crucigenia tetrapedia								100%											
Desmodesmus armatus var. longispina	80%	40%		20%		60%	60%							7%					

species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube	pond 1 Jersabek 2019	pond 1 Jersabek 2020	Blaue Lagune	Adler-Teich	Rinke-Teich	Figur-Teich	Schwarze Lacken	Wienerberg Teich	Kastanienallee-Teich	Benda-Teich	Grüner See	Schwimmschulteich
Desmodesmus brasiliensis								33%											
Desmodesmus subspicatus								33%											
Dictyosphaerium subsolitarium								100%	75%			7%							
Elakatothrix genevensis								100%											
Hariotina reticulata			20%					67%											
Lagerheimia genevensis								100%						13%	27%			20%	7%
Lemmermannia triangularis								100%	50%										
Micractinium pusillum	20%																		
Monactinus simplex var. simplex	20%	40%	20%					100%	25%	7%						13%	6%		
Monoraphidium contortum								100%								27%		13%	7%
Monoraphidium dybowskii									25%										
Nephrochlamys subsolitaria	20%							100%				7%		40%					
Oocystis sp.								100%	75%	7%	13%	0%	13%	7%	13%	13%	13%	7%	7%
Pediastrum angulosum	20%																		
Pediastrum duplex	20%	40%	20%	40%		20%		67%	25%			7%	27%		60%	13%	73%		7%
Phacotus lenticularis								33%											
Planktosphaeria gelatinosa					20%														
Pseudopediastrum boryanum	20%		20%					100%		27%	47%	87%	93%	100%	67%	20%	13%		33%
Raphidocelis sp.								33%											
Scenedesmus spp.								100%	50%										
Scenedesmus acutus	20%									7%				27%	27%	7%	27%	33%	13%
Scenedesmus ecornis	100%	100%	80%	80%	100%	40%	60%			7%	7%	27%	7%	60%					
Scenedesmus ellipticus		60%	40%	40%	40%		20%												
Selenastrum bibraianum									25%										
Siderocelis ornata	20%	20%			20%														
Stauridium tetras	60%							100%											
Tetrachlorella alternans									25%										
Tetrachlorella incerta									50%										

species	pond 1	pond 2	pond 3	pond 4	pond 5	companion channel	danube	pond 1 Jersabek 2019	pond 1 Jersabek 2020	Blaue Lagune	Adler-Teich	Rinke-Teich	Figur-Teich	Schwarze Lacken	Wienerberg Teich	Kastanienallee-Teich	Benda-Teich	Grüner See	Schwimmschulteich
Tetradesmus lagerheimii	40%					20%													
Tetradesmus obliquus	80%	80%	80%	80%	100%	20%	20%											20%	20%
Tetraëdron caudatum								100%		7%				20%					
Tetraëdron minimum	80%	100%	80%	80%	60%			100%	50%	13%	13%	33%	27%	20%	20%	13%	20%	40%	20%
Ulothrix tenuissima						60%	20%												
Volvox aureus	20%	60%	40%	40%	40%														
Willea apiculata					20%			100%	50%										
Desmidiaceae																			
Closterium acutum var. variabile								100%	75%		7%		7%						
Closterium incurvum								33%											
Closterium limneticum									25%					7%					
Closterium kutzingii	40%		20%	60%	60%					7%				47%					
Closterium pronum	40%	20%	20%		20%	20%	20%												
Cosmarium sp.								33%											
Cosmarium regnellii						40%													
Spirogyra sp.	20%	20%	20%		20%	20%	40%			33%	7%	13%	20%	7%	13%	7%	13%		7%
Staurastrum sp.								33%											
Staurastrum gracile	40%	20%		40%	40%		20%												
Cryptophyceae																			
Cryptomonas sp.								100%											
Cryptomonas erosa								100%	100%										
Cryptomonas marssonii									50%										
Plagioselmis nannoplanctica								100%	50%										