Anthropogenic impacts on the ostracod fauna of Lake Stechlin, north-eastern Germany

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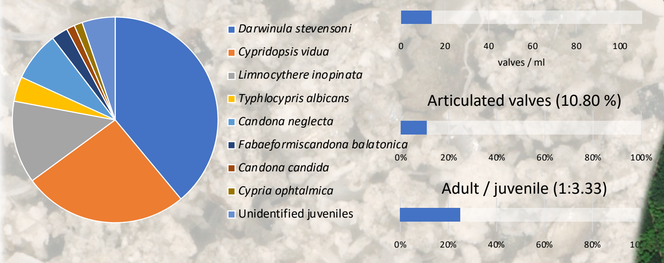
1. Introduction

Lake Stechlin, in north-eastern Germany, has a long history of environmental monitoring for physical, chemical, and biological changes, but the ostracod fauna has only been investigated in the 1960's by Flößner (1985).
During 1966–1990 a nuclear power plant operated near the north-western shore. The cooling water, discharged into the former oligotrophic lake, led to higher water temperatures even in the profundal zone and rose the trophic state. Eutrophication processes and an increase of biomass of planktic algae are still continuing today.
We study the ostracod assemblages in benthic surface samples in different areas of the lake, to analyse changes in the fauna, environments and possible human impacts. At each locality, three surface samples were taken with an UWITEC gravity corer.

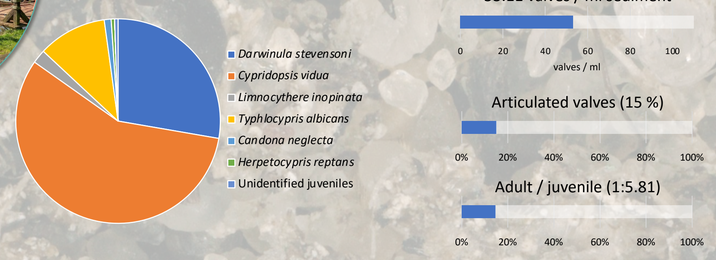
2. The undisturbed fauna?

Water depth: 1 m



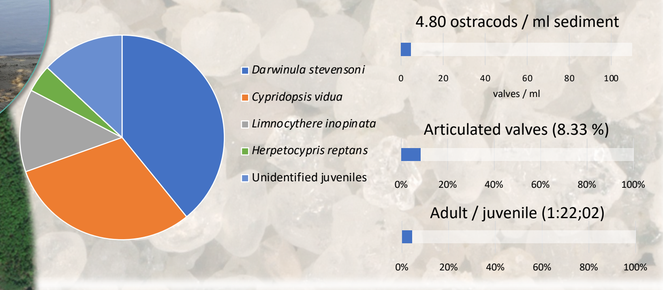
3.1. The fish farm

Water depth: 0.6 m



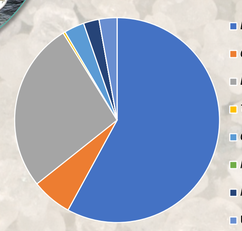
3.2. The beach

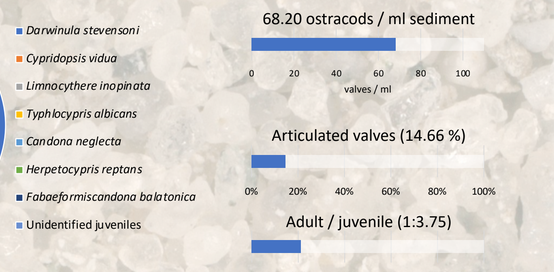
Water depth: 0.9 m



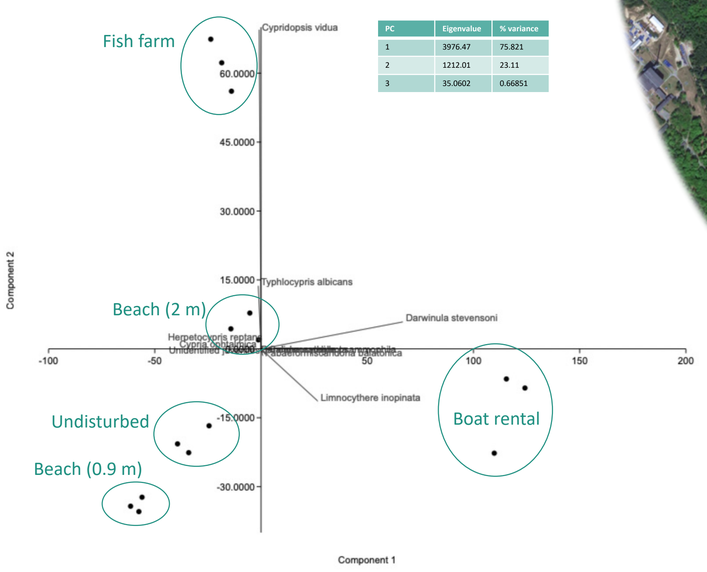
3.3. The boat rental

Water depth: 0.6 m





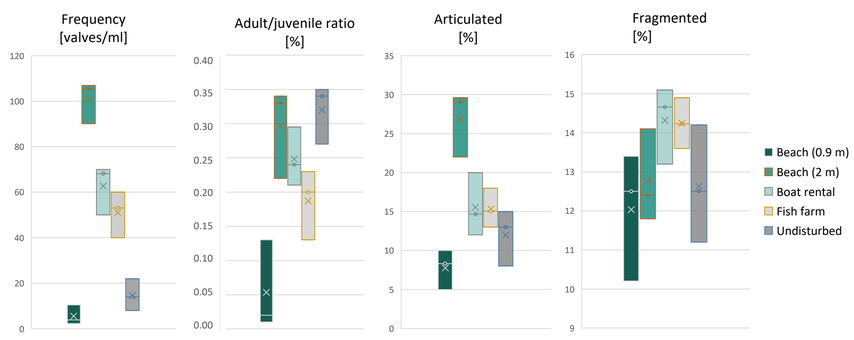
4. Comparison



PC	Eigenvalue	% variance
1	3976.47	75.821
2	1212.01	23.11
3	35.0602	0.66851

^ Principal component analysis showing the differences between the localities, and how the ostracod species are associated with them. The shallow beach data may be taken with care, due to generally low abundances. The boat rental locality differs especially with relatively high numbers of *D. stevensoni* and *L. inopinata* or relatively lower abundances of the other species. The difference of the fish farm locality, characterized by *C. vidua,* may be related to the high nutrient supply.

> Comparison of calculated ratios of the localities: The shallow beach locality is difficult to interpret because of the overall very low amount of valves in these samples.
The other ratios are relatively similar to each other, and variances could be explained by the depth differences of the sampled localities and to a lesser extent by anthropogenic impacts.



5. Outcomes

General outcomes

- Carbonate shells start to dissolve at ca. 10 m depth
- No ostracods found in the profundal zone due to dissolution of valves and anoxic conditions
- Diverse assemblages with high frequencies (more than 100 valves per ml sediment) in littoral and sublittoral zones (>2 m), implying generally favourable conditions
- *Cytherissa lacustris* is only present in deeper areas (>2 m), but relatively abundant there (5-10%)

Anthropogenic activities

- Very low frequencies and lower diversities at areas with trampling/ sand dumping
- Lower diversities, but relatively high frequencies at fish farm
- Higher frequencies and and slightly higher diversities at boat activity; no major anthropogenic impact

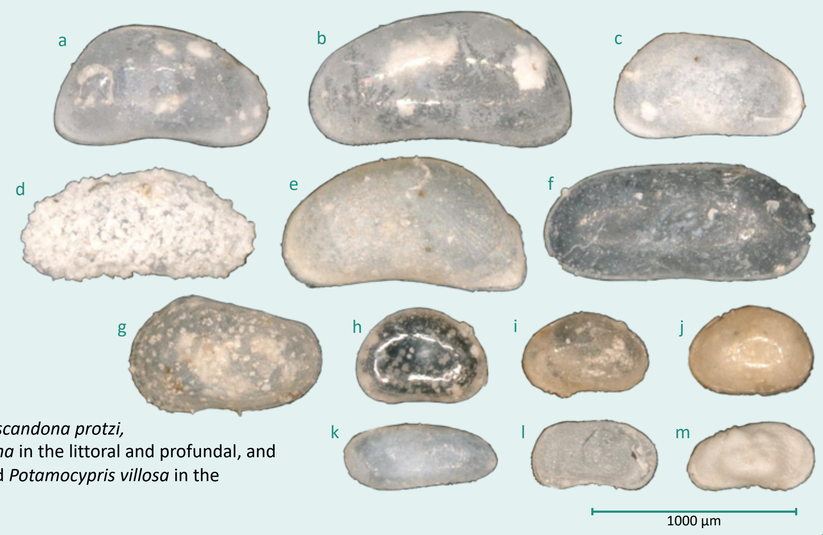
6. Future research questions

- Do different sampling methods (e.g. box corer, Van Veen-grab, etc.) have influence on the sampled abundances? (Samples taken in the south-eastern basin)
- Is the adult/juvenile ratio statistically conclusive in a depth transect? (Samples taken in the south-western basin)
- Further sampling in September 2022: Fauna and depth transect of the smaller Lake Dagow (west of Lake Stechlin on the map above), surface samples at boat landing stages of the Leibniz Institute for Freshwater Ecology and Inland Fisheries on the southernmost shore, and short core at former fish farm site in the northern basin.

The Lake Stechlin fauna

Species

Candona candida	(a; female, right valve)
Candona neglecta	(b; female, left valve)
Cyclocypris ovum	(j; left valve)
Cypria ophtalmica	(h; right valve)
Cypridopsis vidua	(i; left valve)
Cytherissa lacustris	(g; left valve)
Darwinula stevensoni	(k; right valve)
Fabaeformiscandona balatonica	(e; female, left valve)
Fabaeformiscandona hyalina	(d; juvenile, left valve, encrusted)
Herpetocypris reptans	(f; juvenile, left valve)
Limnocythere inopinata	(l; female, right valve)
Paralimnocythere psammophila	(m; female, right valve)
Typhlocypris albicans	(c; right valve)



In the 1960's, Flößner (1985) also found abundant *Fabaeformiscandona protzi, Cyclocypris laevis, Cyclocypris serena*, and *Notodromas monacha* in the littoral and profundal, and rare *Fabaeformiscandona acuminata*, *Cyclocypris exsculpta* and *Potamocypris villosa* in the littoral.

References:
Flößner, D. (1985). The meiozoobenthos. In Casper, S.J. (Ed.): Lake Stechlin – A temperate oligotrophic lake (pp. 219–230). Dr W. Junk Publishers, Dordrecht.
Photos: 3.1: reiseland-brandenburg.de: Fischimbiss „Fischerei Stechlinsee"
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3.3: reiseland-brandenburg.de: Bootsverleih Stechlin

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