

Diet study of introduced whitefish, *Coregonus peled* (GMELIN), in two reservoir lakes with a view to improve their fishing value

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Introduction

Non-indigenous fish species may have a potentially high impact on native biota. This fact suggests that a scientific follow-up of this introduction proves to be very important.

Even if the diet of *Coregonus peled* seems to be well known in their natural repartition area, few data about the local diet of this introduced fish are available. The aim of this study is to help fill this gap.

Studied reservoir lakes

Located in the eastern part of the province of Liège (Belgium), the man-made lakes of Robertville and Bütgenbach, where this study was conducted, were respectively constructed in 1929 and 1932 on the upper reaches of the Warche (fig. 1). Property of the s.a. Electrabel, the reservoirs are used to produce electricity. Moreover, many nautical activities take place in both lakes. The fishing activities are managed by the "Ligue Royale de Propagande des

Pêcheurs de l'Est". Due to important supply of phosphorus by the Warche, both reservoirs are subject to eutrophication.

Coregonus peled (GMELIN, 1788)

Despite the acknowledgment of their membership to the order "Salmoniformes", the taxonomy of *Coregonus peled* is very debated. According to the authors, they are placed inside or outside the Salmonidae family (fig. 2). The natural repartition of this fish includes the major part of the catchment area of the Glacial Arctic Ocean in the north of Russia. However, they have been often introduced in the rivers and lakes of the east of Europe.

Since 1978, both lakes have been repeatedly stocked with peleds coming from Bohemia with the purpose of improving the fishing value of the lakes and of reducing algal blooms through the food web manipulation. Unfortunately, the peleds don't reproduce in the lakes.

Materials and methods

Both reservoirs were successively sampled by netting during one year. Between one and four sets (50 m long) of vertical gillnets of different mesh sizes, ranging from 40 to 60 mm, were used. The nets were tightened between two ropes and their lower leaded parts maintained them vertically. The nets were placed for three hours at several locations in both reservoirs.

Each captured fish was identified, measured and weighted. The sex was also determined. Scales for aging and stomach contents were taken. A stomach contents analysis was then made with a microscope in order to calculate four different prey indices: occurrence (I_o), abundance (I_a), biomass (I_b) and selectivity (I_s).

Phyto- and zooplankton sampling campaigns, as well as water quality measures, were also realised by other laboratories of Namur and Liège universities.

Results

The same seven main categories of food are found in both lakes in more than half of the stomachs. There isn't any

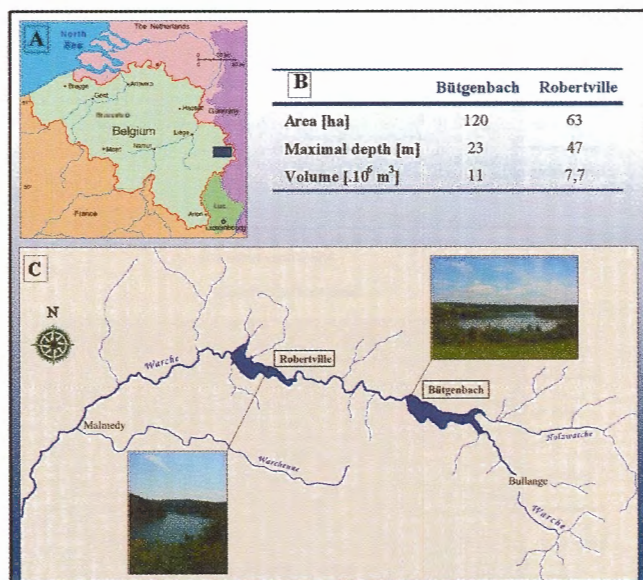


Fig. 1 — (A), (C): location maps of the reservoirs; (B): hydrological features of the lakes.

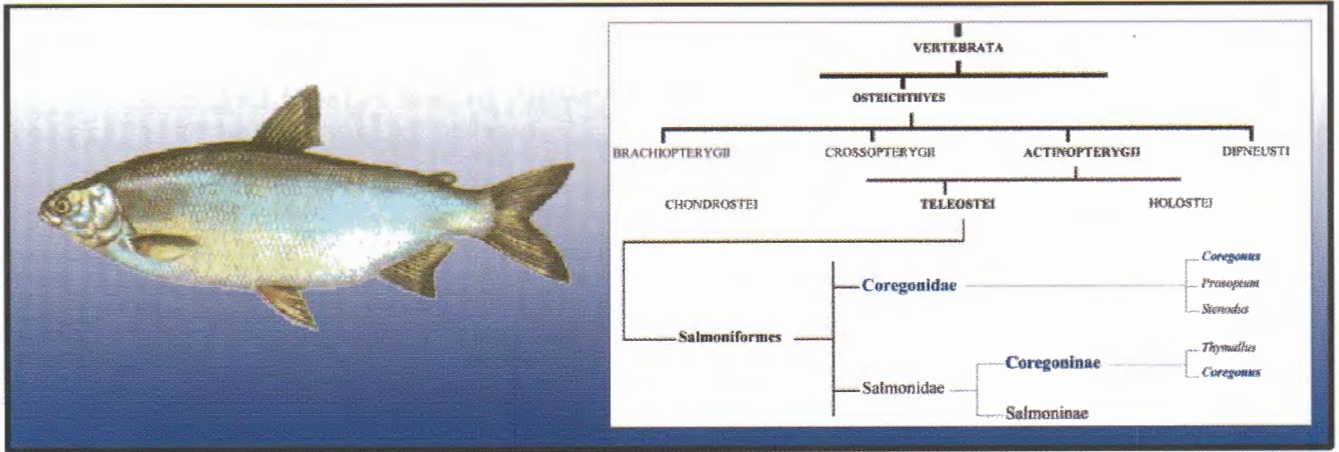


Fig. 2 — Taxonomy of the genus *Coregonus*.

significant difference between both reservoirs in the occurrence index (fig. 3, A).

Although they ingest the same food, the peleds of Bütgenbach eat more *Bosmina coregoni* ($I_a = 52,39\%$) whereas the peleds of Robertville eat a little more copepod eggs ($I_a = 31,09\%$) than *Bosmina* ($I_a = 30,67\%$) (fig. 3, A). The four most consumed categories in both lakes are *Bosmina*, *Daphnia*, the cyclopoïd copepods and the copepod eggs. This latter category is probably not voluntarily ingested and come, in our opinion, from the scattering that occurs in the stomach.

In the biomass index graphics (fig. 3, A), we found that the order between the different categories is overall respected but the significant contribution of the *Microcystis* colony in biomass in Robertville ($I_b = 28,44\%$) appears to be an important revelation. However, this fact must be moderated by the importance of the *Microcystis* in the I_o ($33,87\%$) (fig. 3, A).

Lastly, according to the Chesson criterion ($I_s > 0,25$), only *Bosmina*, *Daphnia* and the cyclopoïd copepods are actively selected by the peleds in Bütgenbach at one point whereas only *Bosmina*, the cyclopoïd copepods and *Diaphanosoma* are actively selected by the peleds in Robertville at one point (fig. 3, B). Nevertheless, these results are found on an index here calculated with a little number of fishes (between 5 and 15) and must be carefully interpreted.

(A) Bütgenbach reservoir (07/99-10/99 & 03/00-06/00)

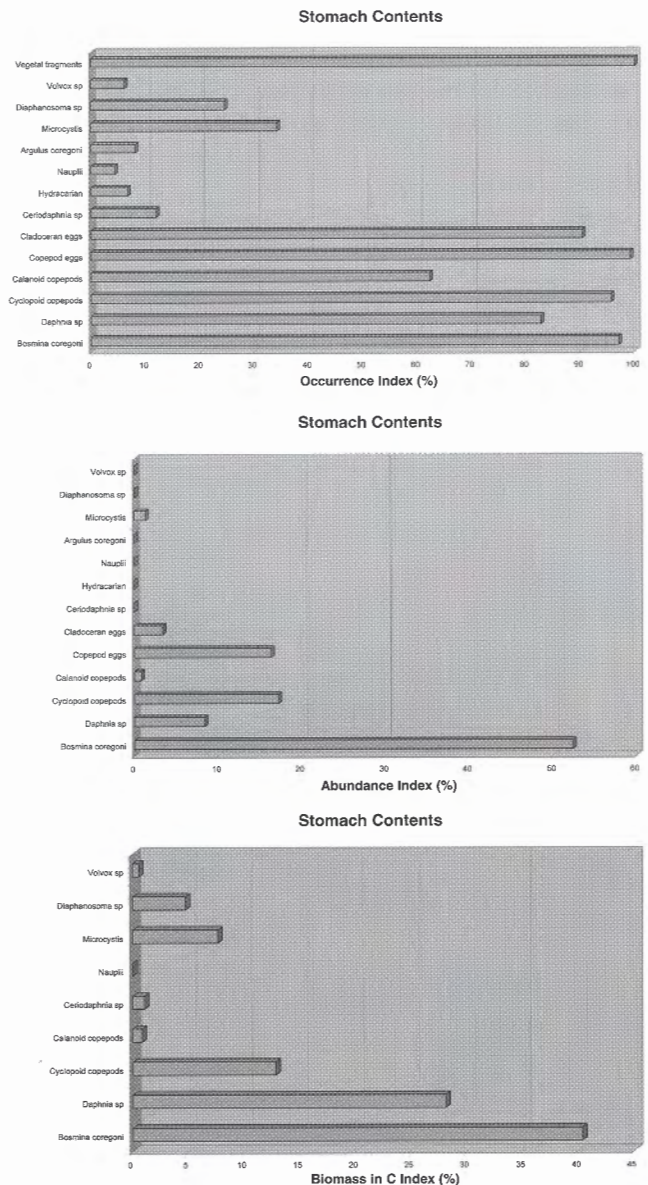
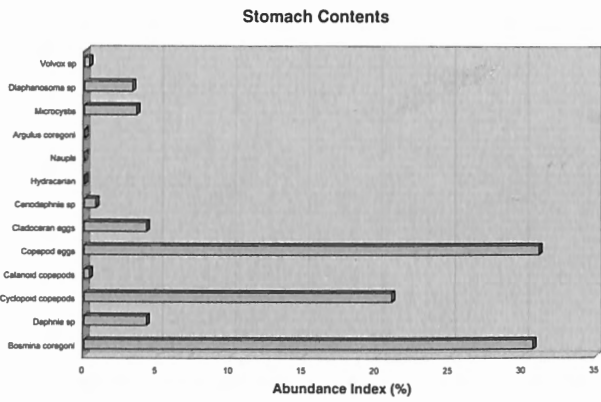
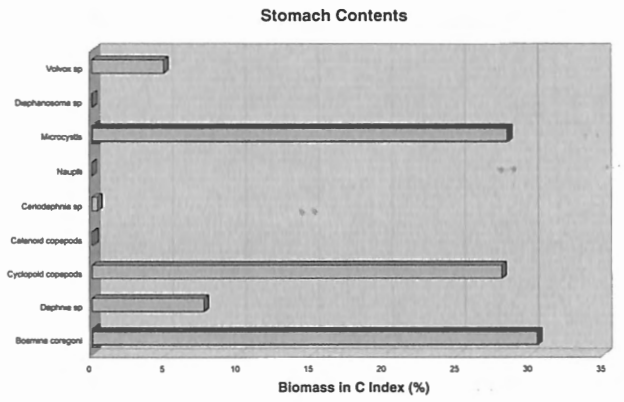
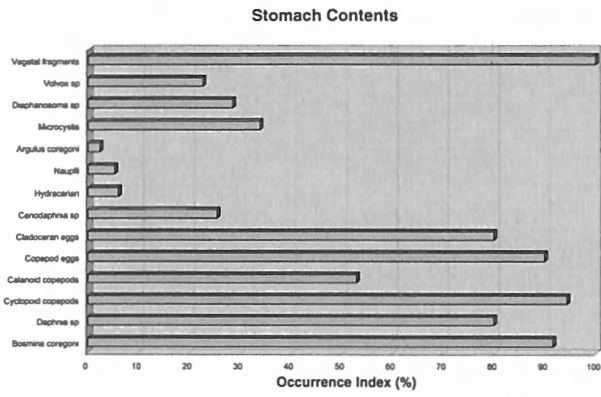


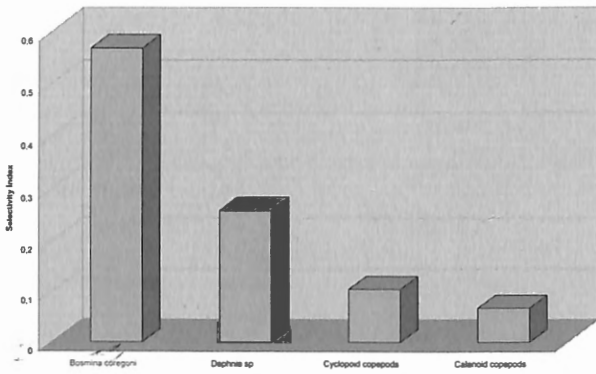
Fig. 3 — (A) Indexes of occurrence, abundance and biomass in C calculated with the results of the stomach contents analysis; (B): selectivity indexes for both reservoirs. →

(A) Robertville reservoir (07/99-10/99 & 03/00-06/00)

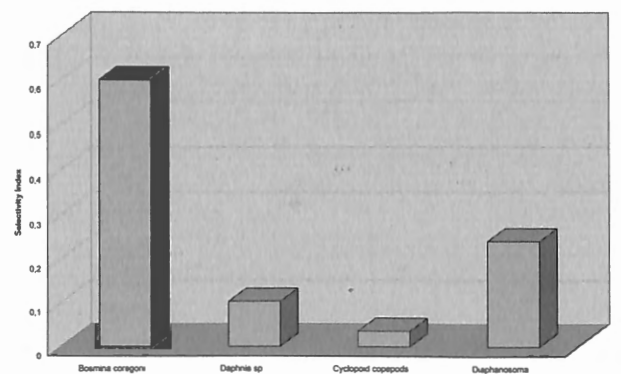


(B) Selectivity index

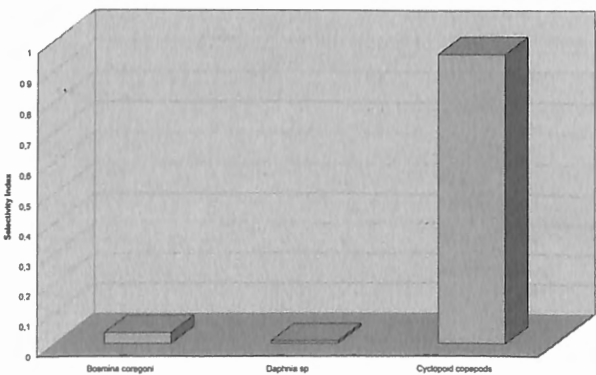
Bütgenbach 25/8/99



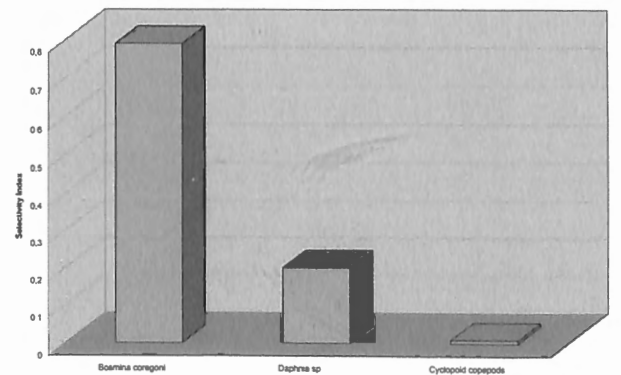
Bütgenbach 15/10/99



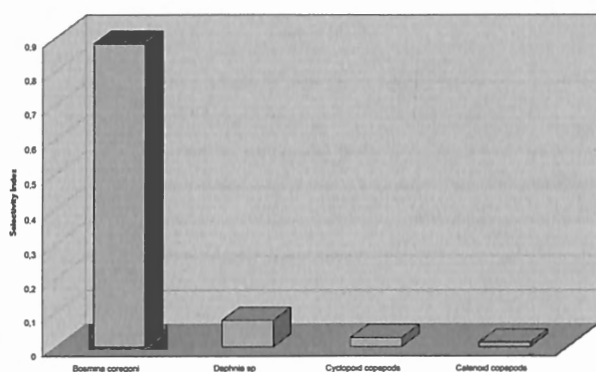
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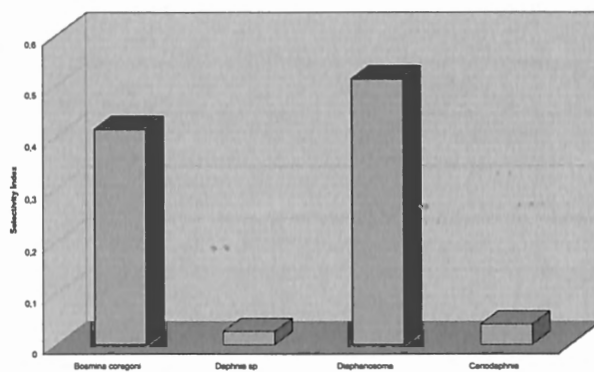
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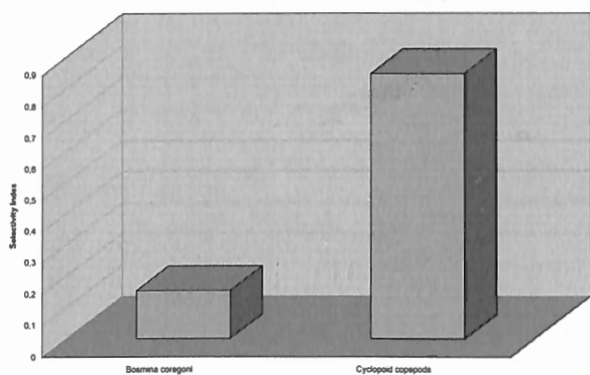
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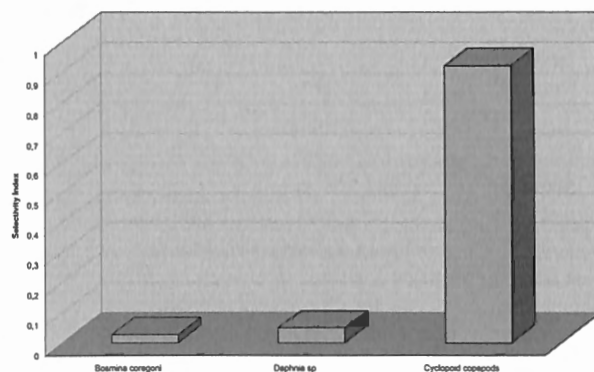
Robertville 06/10/99



Robertville 11/04/00



Robertville 08/06/00



Conclusion

A general conclusion can be drawn concerning the diet of these fishes. The peleds of these reservoirs prove to be mainly zooplanktivorous. They principally eat the cladocerans *Bosmina coregoni* and *Daphnia sp.*, and the cyclopoid copepods.

All the literature together with our results have brought us to the conclusion that *Coregonus peled* established in Robertville and Bütgenbach is not a good candidate for the application of the biomanipulation techniques in contrary to what people thought at the time it was introduced in the water bodies. Besides this fact, this species may have a bad influence via predation on herbivorous clado-

cerans. In addition, its fishing value seems to be weak because only boat owners have the ability to catch them. Finally, the water quality analyses have shown the unsuitability between the physico-chemical conditions of the lakes and the ecological needs of the peleds.

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