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Issue: **Review of Mgr thesis of Oldrich Jarolim**

Vienna, 26. January 2008

General comment:

The work of Oldrich Jarolim is a very valuable completion of the results of Cech & Kubecka (2002), who described mainly general issues regarding sinusoidal swimming pattern like range, peak-to-peak amplitude, target strength, cycling frequency etc. The scientific focus of this thesis was put on more specific issues like changes in sinusoidal swimming pattern throughout the season, the daily pattern of this behaviour and multidimensional analysis of nature of all basic pelagic swimming patterns. The influence of environmental factors was analysed as well.

The methodology, the structure of the sampling design and data evaluation as well as the tools for statistical analysis were well chosen and delivered detailed insights regarding differences in pelagic behaviour of reservoir fishes on a large seasonal and a fine diel scale. The literature was studied well and incorporated in the manuscript in the right proportion. The diction of the manuscript is well understandable and the work is presented in a way, which, after minor revision, could be potentially published in an impacted journal.

The results presented in this study reveal a better understanding of the ecological relevance of sinusoidal swimming pattern of reservoir fishes.

I recommend the Mgr thesis of Oldrich Jarolim with the title 'Pelagic behaviour of reservoir fishes: sinusoidal swimming and associated behaviour' to pass and select the grade 1 (=excellent).

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Detailed comment:

Page 1 line 17 in text (second paragraph):
Replace …most… by …majority…

Page 3 line 2 in text of 2.1 Study area
Add …an… before area and …of… before 210 ha.

Page 5 line 3 in text
Give the full text of the term before the shortcut; meaning:
A seasonal-trend decomposition procedure based on loess (STL, nonparametric analogy …

Page 5 line 4
Replace …trying… by …applied…

Page 5 line 10
Substitute … one another… by …each other…

Page 7 Fig. 3 a, b
Try to use uniform scaling of x-axis;
Try to put legend into the graph and delete the frame; don't add legend to the x-axis
Enlarge both axis titles and tick labels of both axes
Use uniform size of both axes titles and enlarge the size
Enlarge the heading (month) of each graph

Page 8 Fig. 3 c, d
Try to use uniform scaling of x-axis;
Try to put legend into the graph and delete the frame; don't add legend to the x-axis
Enlarge both axis titles and tick labels of both axes
Use uniform size of both axes titles and enlarge the size
Enlarge the heading (month) of each graph

Page 8 line 3 in text
Replace …nearly always… by …throughout…

Page 9 line 1 in text
Delete …It is clear…; Start with: The vast majority …

Page 9 Fig. 5 a, b
Put legend into the graph and delete the frame; don't add legend to the x-axis

Page 10 Fig. 5 c, d, e, f, g
Put legend into the graph and delete the frame; don't add legend to the x-axis

Page 10 line 2 in text

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Change words; ...both groups... the meaning is somehow confusing; because which groups do you mean? 0+, 1+, adults are mentioned in text and graphs as well. Better use ... both swimming types... or ...both types of swimming behaviour...

Page 11 Fig. 6
Change orientation of y-axis, so zero (=surface) will be on top of the graph.
Remove grid inside the graph

Page 11 line 5 in text
How did you define start and end of dusk? In Methods you only mention that the time interval when GR = 0 W m^{-2} was defined as night. Please add an explanation for the definition of dusk.

Page 12 whole paragraph and Fig. 9
I would suggest omitting the whole paragraph and Fig. 9. Both contain interesting additional information, but do not really contribute essentially to overall (seasonal) goal of the paper. Sample size is only one (n = 1). Important information is contained in the following figures.

Page 13 Fig. 10
The linear regression delivered solid coefficients of determination. But do you think linear regression provides best fit to the data?

Page 14 Fig. 11
The linear regression delivered weak coefficients of determination. Do you think linear regression provides best fit to the data and hence, gives the best explanation of the observed depth distribution pattern of the fish? Have you tried to apply a polynomial regression?
Change orientation of y-axis in all three graphs, so zero (=surface) will be on top of the graph.

Page 15 caption
You show residuals in the graph but do not explain them in the figure caption. Please complete.

Page 19 line 8 in references
Citation is missing in the text. Please complete in text or delete in references.

Page 20 line 20 in references
Citation is missing in the text. Please complete in text or delete in references.

Page 20 line 27 in references
Citation is listed twice. Please delete in references.

Page 20 line 29 in references
Citation is missing in the text. Please complete in text or delete in references.

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Page 21 line 3 in references
Citation is missing in the text. Please complete in text or delete in references.

Page 22 line 26 in references
Replace …and… by …&…

Sincerely
Georg Rakowitz

Referees´ evaluation of Mgr. thesis „Pelagic behavior of reservoir fishes: sinusoidal swimming and associated behavior" submitted by Bc. Oldřich Jarolím

Sinusoidal swimming of fish observed for the first time in late 80th by Haberlehner was described in detail by Čech and Kubečka in 2002 on the base of up-looking acoustic observations. Such swimming mode is mainly explained as feeding behavior of planktivorous fish enabling them visual detection of prey. Larger planktonic organisms, like e.g. *Daphnia* sp., are optically darker against the light sky and lighter against dark deepwater layers. Sinusoidal fish are so able to benefit from the contrast of the prey organisms against the background two times during the moving cycle.

The main aim of the thesis was to analyze the acoustical records from April – October 2005. In total, almost 6 thousands trajectories of individual fish were manually tracked. This represents a huge amount of work „per se". Results obtained substantially contribute to explanation of factors determining this behavior of fish in the pelagic zone of reservoirs. Sinusoidal swimming is restricted to larger fish and influenced mainly by light intensity during daytime. Moonlight has no influence. Supported by direct methods – gillnet catches and observations of underwater camera – it could be proven that most of the sinusoidal swimming fish were adult roach and common bream. Presented results bring new original findings substantially contributing to understanding of fish behavior in open water zone of reservoirs and lakes.

Formally the thesis is briefly and well written in a form close to be submitted to an impacted journal. It fulfills all criteria for a Mgr. thesis at the Faculty of Science, University of South Bohemia and I can recommend it for a successful defense.

I have only several remarks and questions:

- I do not understand the difference between factors "date" and "month" with respect to length of sinusoidal fish in ANOVA at p. 9. Please explain it.
- The formulation in conclusions on p. 18 "Average maximum proportions reached 78,2% of sinusoidal fish…" seems to be a bit strange to me. Moreover, it does not correspond with the highest proportion of sinusoidal fish in August – 63% (p. 16, Fig. 4a).
- Accepting that sinusoidal swimming is an adaptation for detection of planktonic prey (and we do not have better explanation so far), I miss an attempt to relate this behavior to actual food availability – eg. zooplankton biomass, or the density of large cladocerans – during particular observation periods except a general short notice on p. 16. Data about zooplankton are available in the database of HBI. I would strongly recommend to include this factor into prepared manuscript.

České Budějovice, January 26th 2009

Doc. RNDr. Josef Matěna, CSc.