Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice
Czech Republic

Review of USB FFPW PhD thesis

First name(s), surname, titles of the PhD student: Sara Roje, M.Sc	**First name(s), surname, titles of supervisor:** Assoc. Prof. Dipl.-Ing. Miloš Buřič, Ph.D.
Title of PhD thesis: Cocktail of invaders in European inland waters – ecological characteristics, interactions and consequences	

REVIEWER:

Surname: Tricarico	**Institution**: University of Florence, Sesto Fiorentino, Italy
Name: Elena	
Titles: Assoc. Prof.	**E-mail**: elena.tricarico@unifi.it
Please describe your professional relationship to the PhD student: I have never met the student	**Please describe your field of expertise:** Biological invasions, behavioural ecology of crayfish, management of crayfish and other aquatic alien species

QUESTIONNAIRE

Originality, scientific importance, perspectives and impacts of results presented in the PhD thesis for basic and/or applied research

Evaluate competitiveness of the PhD thesis in the international context and compare its level with the current state of the art in the field **(extent ¼ – ½ page)**:

In invasion biology, the study of interactions among alien species is a relevant topic to be investigated because invaders can facilitate or limit each other, thus increasing or decreasing negative impacts on native species and ecosystems. Despite its importance, there are still many knowledge gaps about this issue, while the situation in aquatic ecosystems, invaded by multiple species, would require a better understanding of these interactions also under a management perspective. Moreover, the study of these interactions usually involves species of the same group (e.g. fish vs fish, crayfish vs crayfish), and less species of different groups. The thesis addresses some of these gaps and also evaluates the spatial behaviour of alien and native species (round goby vs native bullhead) that could come in contact. The results are noteworthy and important, improving the knowledge on interactions among invaders, particularly between invasive crustaceans (amphipod vs crayfish), and between invasive crayfish and invasive fish already present and co-occurring in Europe. The level and quality of the thesis are good, as also testified by the two already published articles in high impact factor journals. The work is very interesting and timely for the scientific pertinent field, and is relevant for pure and applied research: the interactions among invaders are indeed an

important research area of ecology and applied ethology to better assess the impacts of multiple coexistent invaders on native species and ecosystems, and to provide useful management indications. Even if the candidate was not able to carry out all the planned experiments for Sars cov2 restrictions, the results of the present thesis are still important to understand the dynamics between different invaders and the consequence on management. Particularly relevant are the results on interactions between killer shrimp and marbled and signal crayfish, all notable invaders in Europe, and on the spatial behaviour of round goby and native bullhead, resulting for the first time to be more similar than expected.

Elaboration of the PhD thesis, objectives of the work and deliverables

Evaluate the overall level of elaboration of the PhD thesis (structuring of the main text, comprehensibility, logicality of the chapters and their ordering) and the originality of the selected approaches to solve the objectives; evaluate publications and whether the results described correspond to objectives of the PhD thesis **(extent ¼ – ½ page)**:

The thesis has three main aims, reported at the end of Chapter 1, for whose achievement the candidate conducted several laboratory experiments. Overall, the thesis is a solid work, well and clearly structured, even if some corrections are suggested in the pdf of the thesis. The methods are appropriate, clearly illustrated and explained. The results are well presented, discussed with a good critical ability, accomplished the thesis objectives, and are already partially published (except Chapter 4) in relevant journals. They are all novel and provide a relevant contribution to interactions between invaders and between native and alien species, particularly Chapters 2-4. Chapter 2 shows important interactions between amphipod and invasive crayfish, particularly the predation of the first on the early stages of the latter. Chapter 3 reveals the aggressive interaction of round goby towards invasive crayfish, while Chapter 4 evidences that, contrary to the hypothesis, spatial behaviour of round goby and native bullhead is not so different, offering interesting starting points for future research on these species.

OVERALL COMMENTARY ON THE PhD THESIS

Please write in the box specific comments concerning the PhD thesis in extent of 1-2 pages:

The thesis is composed by three main articles, two already published (in high impact factor journals) and one ready for the submission. I don‘t have any particular comments to be addressed for Chapters 2 and 3 that are already published. Introduction (Chapter 1) and discussion (Chapter 5) are overall comprehensive, but I recommend to carefully revise the introduction in particular (please see the comments in the pdf), adding also some more recente literature. Chapter 4 (not yet published) provides new interesting results on the spatial behaviour of round goby and native bullhead and needs some revisions too. I have directly provided my comments and suggestions in the pdf of the thesis.

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FINAL RECOMMENDATION

X PhD thesis can be recommended for defence

☐ **PhD thesis can be recommended for defence with reservations**

☐ **PhD thesis cannot be recommended for defence**

Florence, 2021, July 5th.....

Date and place

Name and signature