

# Preliminary modification of the ESHIPPO crayfish model

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## Introduction

The extinction of species and the decline of biodiversity are the most severe global consequences of environmental threats. The decline of biodiversity is far greater in freshwater ecosystems than in the most threatened terrestrial ecosystems, and the most vulnerable are invertebrates, such as freshwater crayfish. Even one-third of freshwater crayfish worldwide are at risk of extinction. Natural subpopulations of the noble crayfish have been declining by 50-70%, and it is classified as a "vulnerable species" in the IUCN Red List of Threatened Species, with a decreasing trend of populations and subpopulations and decreasing distribution areas.

We used our published morphometric, phylogenetic, and population genetic data of the noble crayfish populations from aquatic ecosystems of Serbia, Slovenia, and Albania in order to upgrade the existing ESHIPPO crayfish model, and in this way to contribute to conservation plans, and management strategies for protection of this threatened species.



Figure 1. Noble crayfish

## Objectives:

The main objectives of this study were:

- 1) to modify the ESHIPPO crayfish model,
- 2) to assess the risk of extinction, and
- 3) to determine the priority of protection in the study area.

## Method/Desing:

In this study, we upgraded ESHIPPO crayfish model by adding population genetic component of the studied populations. This model is designed to assess the risk of extinction and define the priorities of species conservation in aquatic ecosystems at the local and national levels since frequent differences exists in the assessment of the risk of extinction at the local and global level.

Table 1. Overview of elements scoring for modified ESHIPPO crayfish model

	SLOVENIA		SERBIA					ALBANIA
	Kočevska River	Reservoir Bloke	Kačer River	Resnički Stream	Reservoir Korenica	Reservoir Gazivode	Reservoir Grlšte	Lake Prespa
<b>ES results</b>	21	21	23	23	23	23	23	21
<b>HIPPO results</b>	18	20	18	18	20	28	24	32
<b>ILAP results</b>	13	15	9	9	13	11	11	15
<b>ES + HIPPO + ILAP</b>	52	56	50	50	56	62	58	68
<b>The degree of protection priority</b>	2	2	3	3	2	1	2	1

## Results

According to the obtained results, the populations from Lake Prespa (68 points), and the Gazivode Reservoir (62 points) are defined as populations with a high level of extinction risk at the national level, i.e. the degree of protection priority 1. On the other hand, a moderate risk of extinction, i.e., the degree of protection priority 2, was determined for the populations from the reservoirs Grlšte (58 points), Korenica (56 points), and Bloke (56 points), and for the Kočevska River (52 points).

## Conclusion

We determined six populations as the priority of protection. This kind of model can help identify and preserve the diversity of the species and the integrity of local populations.

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