

DISTRIBUTION OF CRAYFISH (CRUSTACEA, DECAPODA) IN KARSTIC REGIONS INVOLVED INTO THE ATBI+M GEMER RESEARCH

EDUARD STLOUKAL & BARBORA VITÁZKOVÁ

Department of Zoology, Comenius University, Mlynská dolina B1,
842 15 Bratislava, Slovakia [stloukal@fns.uniba.sk; vitazkova@fns.uniba.sk]

Abstract

Altogether 86 localities in the area of the ATBI Gemer research programme and some adjacent regions in Slovakia were investigated for the presence of freshwater crayfish (Decapoda, Astacidae) during years 2004 – 2011. There were found three new sites of noble crayfish, *Astacus astacus* (Linnaeus, 1758), 4 sites known from the past were confirmed, but most sites were found without presence of crayfish. Noble crayfish, *Astacus astacus* is the only species reported from the area of ATBI Gemer. No indigenous crayfish species (NICS) is known from the region.

Key words

Decapoda, *Astacus astacus*, karstic fauna, ATBI+M Gemer, Slovakia.

INTRODUCTION

The Noble Crayfish (*Astacus astacus* Linnaeus, 1758) is a widespread species occurring in stagnant and running water bodies of the moderate climatic zone of Europe. Its populations have undergone significant declines in numbers due to anthropogenic changes of water quality, introduction of invasive non-indigenous species, crayfish plague, habitat loss and over-harvesting in many regions. Estimates of the rate of decline in most countries are very high during last decades (global decline rate of 50 - 70%). Successful re-stocking programs in some countries reduced the decline, but the species is still considered as Vulnerable under criterion A2ad of IUCN (see JEDLIČKA et al. 2008).

While records on the crayfish distribution in Western and Eastern Slovakia are more abundant, there are large gaps in recent data from Central

Slovakia. There are only several records on the crayfish occurrence on websites of municipalities from the region or at websites on nature compiled by amateurs, where is very reliability and lack of supporting information (exact place and date of observation, sex or size of reported crayfish etc.). Among unique records of the crayfish are records of the State Nature Protection staff, fishermen and student theses. Among records on crayfish occurrence in adjacent areas, URBAN et al. (2008) found remains of crayfish in otter excrements near the Málinec water dam and at some other sites of Poľana Mts (westward from our ATBI area). HUDEC (1994) published information on distribution of crayfish in Eastern Slovakia.

In Hungary, there are several records on distribution of *Astacus astacus* in the catchment of Sajó (Slaná), Bodva and Hernád (Hornád) rivers southward

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form the Slovenský kras NP (THURÁNSZKY & FORRÓ 1987, KOVÁCS et al. 2005).

A large scale inventory of species within the AT-BI+M Gemer (All Taxa Biodiversity Inventory and Monitoring) activities supported by the EDIT (European Distributed Institute of Taxonomy) network allowed us to make also inventory of recent distribution of freshwater crayfish in the region of three karstic national park situated in Central and Eastern Slovakia, in Slovenský raj, Muránska planina and Slovenský kras.

MATERIAL AND METHODS

In order to make inventory and verify older information on the occurrence of crayfish presence in the area of ATBI Gemer region, baited traps and manual collection of crayfish were used. Traps were placed in stagnant waters of ponds and dams at a depth of 1 – 2 m with bait. Traps were exposed for one or two days. We monitored also the stay tracks of crayfish, like faeces of predators (otter mostly), tracks on the unveiled bottom of lakes and presence of carapaces and chaelae on the banks of water bodies.

List of sites with geographic coordinates and altitudes is presented in the Table 1.

One leg of each specimen was removed and preserved in 96% etylalcohol for further analyses in laboratory.

Specimens were identified according to manuals and keys of FUEREDER & MACHINO (2002) and SOUTY-GROSSET et al. (2006).

Area description

All three ATBI Gemer core areas, NP Muránska planina, NP Slovenský raj a NP Slovenský kras, are mountains of typical karstic character – calcareous blocs – mountain plateaus surrounded by steep slopes with rich spring underhill. All tree mountain areas are broken by deep gorges with typical climatic inversion and separated by mountains and lowlands of another geological structure and origine (mostly of volcanic, metamorphed or sedimentary character).

Whole the studied area belongs to the main catchment of the Danube river, but river network belong to three independent tributaries of the Danube, Hron river, Slaná river and Hornád river (last two flow into Tisa river first).

RESULTS AND DISCUSSION

Noble crayfish, *Astacus astacus* (Linnaeus, 1758) was found at 5 sites from altogether 86 sites. Yje overview of all sampling sites is presented in the Table 1, positive sites with details in sampled crayfish is summarized in Table 2 and shown on the map in Figure 1.

Rare occurrence of crayfish in the studied area can reflect the historical events of last centuries (largescale mining areas as well as local middle-age ore excavatian and metal production, large

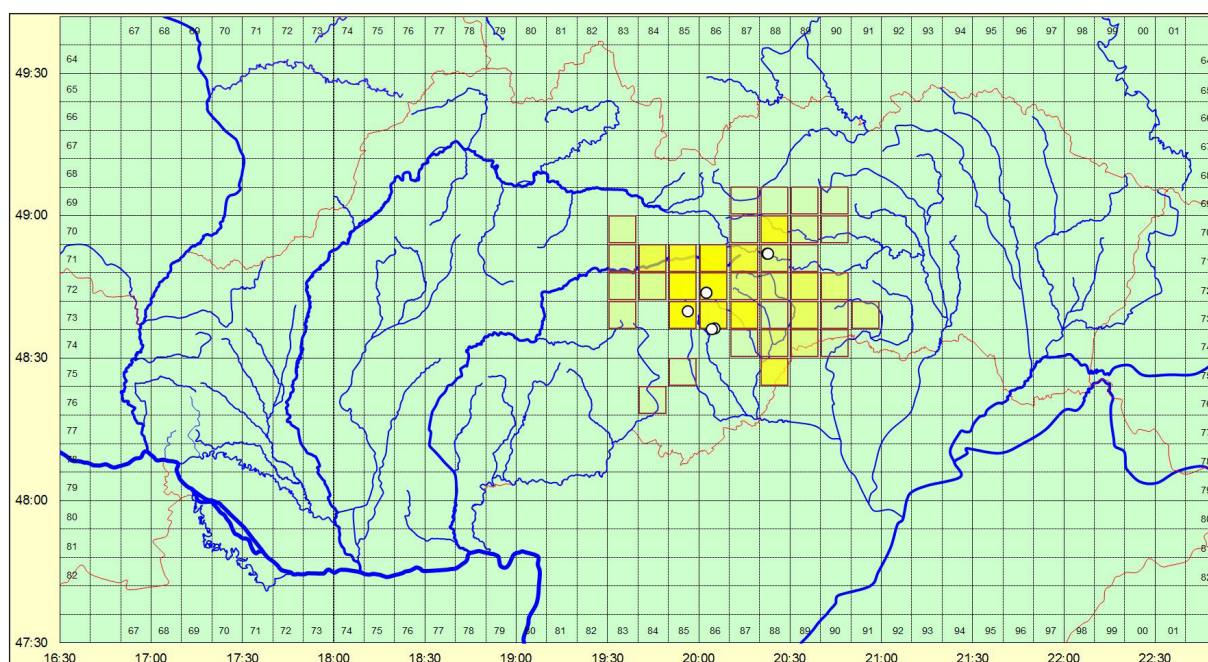


Figure 1. Map of the occurrence of noble crayfish, *Astacus astacus* (Linnaeus, 1758) in the region of the ATBI+M Gemer project.

Yellow squares – grid square of DFS, where samples were taken, the density of colour indicates number of visits or number of sites. White ring – place of recent occurrence of crayfish.

Table 1. List of sites involved into the crayfish inventory.

Repeatedly visited sites with distance 500 metres were removed from the list. Coordinates were recorded in WGS84.

Site name	Latitude	Magnitude	Site name	Latitude	Magnitude
Ardovo	20.418938	48.532788	Krásnohorská vyvieračka – creek below spring	20.581304	48.619122
Biela Voda, Podlesok	20.385904	48.965353	Muránka	20.073222	48.756051
Bleislove jazero	20.325256	48.925289	Muránka	20.071663	48.728963
Chrasť nad Hornádom	20.582502	48.918227	Muránka – prielom	20.308888	48.525277
Čierna Lehota	20.226500	48.732341	Muránska Lehota – creek	20.027172	48.726429
Čierna Lehota	20.286388	48.782817	Muránska Lehota – creek	20.028300	48.725910
Čierny Hron	20.099613	48.620754	Muránska Lehota – pond	20.043391	48.729087
Čoltovo	20.397878	48.481047	Muránska Lehota – pond	20.043200	48.728320
Dedinky – Palcmanová Maša	20.376419	48.865002	Nový Sad	19.559972	48.291681
Detva	20.201250	48.807545	Ordzovany	20.765929	48.992471
Dobšiná – Medené Hámre	20.153008	48.514675	Pača	20.611573	48.695001
Dravecký potok	20.503037	49.025292	Ploské – hoist shaft	20.073847	48.602736
Drnava	20.643541	48.638771	Pohronská Polhora – creek above village	19.694722	48.803611
Držkovce	20.216721	48.533694	Prielom Hnilca	20.325408	48.875320
Gelnica	20.551242	48.787397	Prielom Muránky	20.306867	48.526175
Gemerská Panica	20.370617	48.456424	Primovce	20.378647	49.007639
Gemerská Poloma	20.493545	48.731946	Rakovnica	20.454147	48.656177
Gemerská Poloma – creek above village	20.657967	48.784656	Ratkovský potok	20.077828	48.623019
Gočaltovo	20.330472	48.631838	Ratkovský potok	20.081538	48.609257
Hans Jakubova dolina	20.316811	48.886193	Revúca	20.079503	48.675207
Hnilec	20.496938	48.844222	Rimava	19.927713	48.704446
Hnilecká jelšina	20.266349	48.873984	Rudňany	20.680801	48.876188
Hnilecká jelšina	20.256029	48.880205	Silica – pond	20.527777	48.548611
Hornád	20.321375	48.982902	Slaná	20.230171	48.805784
Hornád – Betlanovce	20.389646	48.984013	Slaná	20.245592	48.805886
Hornád – Čingov	20.490581	48.943309	Slavošovce	20.221388	48.732222
Hornád – near Hrabušice	20.397500	48.970277	Slovinky	20.811021	48.883839
Hornád – Podlesok	20.376848	48.963153	Smižanská Píla	20.544097	48.924455
Hornád – at Letanovský mlyn	20.441111	48.950398	Smolník	20.711558	48.718367
Hornád – above Spišská Nová Ves	20.506580	48.948293	Sokol – dammed creek	20.341967	48.925272
Hôrka	20.371793	49.009639	Stračaník	20.178767	48.821034
Hradová	20.073222	48.756051	Stratenská Píla	20.364847	48.868772
Hradová – creek below spring	19.911901	48.667187	Súľovský potok	20.475277	48.799166
Hrdzavý potok	20.029588	48.745705	Sviniarka	20.089089	48.827013
Hrhov – creek near village	20.764970	48.579133	Teplička	20.385904	48.965353
Hron	20.204038	48.854118	Tisovec – creek	19.915908	48.688695
Hron – above village Beňuš	20.007984	48.824413	Tisovec – pond	19.923687	48.673084
Hronec	19.942011	48.802206	Tomášov potok	20.102777	48.633611
Hronec – above Závadka	19.934985	48.836535	Uhorná	20.229969	48.732160
Jasov – creek below village	20.937582	48.671851	Zádielská dolina – creek	20.821752	48.636526
Jasov – pond	20.958160	48.679286	Zadný Hámor	20.591329	48.823230
Jašteričie jazierko	20.542212	48.568007	Závadka nad Hronom	19.911338	48.876429
			Zdychava	20.136601	48.679726
			Zlatno	20.089089	48.827013

Table 2. List of crayfish records.

code of the sample	date	site name	orographic unit	altitude	sex
stl_090715_02	15.7.2009	Turiec – near village Ploské	Revúcka vrchovina	365	male
stl_080702_04	2.7.2008	Tisovec – pond	Muránska planina	386	female
stl_090714_01	14.7.2009	Muránska Lehota – pond	Muránska planina	375	male
stl_090714_02	14.7.2009	Muránska Lehota – pond	Muránska planina	375	female
stl_100702_01	2.7.2010	Ploské – shaft	Stolické vrchy	385	female
stl_100702_02	2.7.2010	Ploské – shaft	Stolické vrchy	385	female
stl_100702_03	2.7.2010	Ploské – shaft	Stolické vrchy	385	female
	15.7.2009	Muránska Lehota – pond	Stolické vrchy	375	male
stl_100701_01	1.7.2010	Muránska Lehota – pond	Stolické vrchy	375	female
stl_100701_02	1.7.2010	Muránska Lehota – pond	Stolické vrchy	375	male
-	8.7.2010	Dedinky – Palcmanská Maša	Slovenský raj	788	unidentified, carapace
-	8.7.2010	Dedinky – Palcmanská Maša	Slovenský raj	788	unidentified, chelae
-	8.7.2010	Dedinky – Palcmanská Maša	Slovenský raj	788	unidentified, chelae

deforestation and extensive industrial development, intensive agricultural production and large population growth during last century).

Populations of crayfish are isolated and bound to several isolated stagnant water bodies or to upper sections of streams, where the water quality was not deteriorated by human influence.

Presence of crayfish in the large water dam the Palcmanská Maša is known for decades in the upper

part of the dam (near inlet of Hnilec river under village Stratená), however according to information of local people, they did not reported crayfish there for many years. Occurrence near the village Dedinky can results from higher level of available food from the breeding plant of salmonid fish and due available shelters between large rock at the bank of the water reservoir (Figure 4). In this water reservoir, crayfish were traditionally mentioned in the inlet of Hnilec river near Stratenská Píla, however



Figure 2. Female of noble crayfish *Astacus astacus* from fishponds near Tisovec city.

according to information from local people, no crayfish were observed there during last decade.

Among newly reported sites, crayfish were found in abandoned and awashed hoisting shaft near village Ploské (Figure 5). The water body is surrounded by beech and fir forests and there is the most

abundant population of *Astacus astacus* reported in the region during our study.

Fish ponds used for commercial as well as leisure fishing belongs to places where crayfish frequently live. Fishponds near village Muránska Lehota are



Figure 3. Male of *Astacus astacus* with plenty of branchiobdelid from the fishponds near the Muránska Lehota village.



Figure 4. Remains of chelae of *Astacus astacus* at the Pálmanská Maša water reservoir near Dedinky village (more carapaces indicated foraging activity of otter).

known as stable site of occurrence of crayfish (Figure 3).

Fishpond below city Tisovec is a new site of known crayfish occurrence (Figure 2).

During sampling of freshwater insects in streams at area southward from the National Park Muránska planina, we found crayfish in the stream below

village Ratkovské Bystré. The stream bottom is covered by blue ceramic glas-like fractions originated from local metal ore processing in the past, so the occurrence of crayfish here was unexpected. Moreover, this locality is the only site where the presence of *Astacus astacus* was reported in running waters – all other records presented in this study do



Figure 5. Female of *Astacus astacus* from the hoisting shaft near Ploské village.



Figure 6. Female of *Astacus astacus* from the hoisting shaft near Ploské village.

origin from stagnant water (water dam reservoir or fish ponds).

Surprisingly negative results we got at the hollow basin north and north-eastward from the National Park Slovenský raj, where no crayfish were reported by us in streams and stagnant water. Rare reports on the local crayfish occurrence can be found at some websites of municipalities and there are also several inaccurate records in the files of the State Nature Conservancy, but our investigation did not prove crayfish presence in large part of the Spiš region.

Many municipalities (e.g. Dobšiná, Hrabušice etc.) have crayfish listed on their environmental agenda, regional development plans or at the web sites, but the real validity of such an information is doubtful.

In spite many negative records, noble crayfish, *Astacus astacus* (Linnaeus, 1758) probably do occur in some isolated places in the regions of Spiš and Gemer which can serve as a species refuges, and further attention should be given to detailed inventory of its occurrence. This study was focussed mostly on its presence in running waters and only few stagnant water bodies were sampled.

While the noble crayfish is the only crayfish species reported in the region, we assume the presence of *Astacus leptodactylus* Eschscholz, 1823 in area nearby the National Park Slovenský kras (e.g. fish ponds in south-eastern direction).

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