

RECORDS OF PANNONIAN ROOT VOLE (*MICROTUS OECONOMUS MEHELYI*) IN THE SOUTH–WESTERN SLOVAKIA IN 2011

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Abstract: The Pannonian root vole (*Microtus oeconomus mehelyi* Éhik, 1928) is one of the most endangered small mammal in Central Europe. The major cause of the vulnerability appears to be its habitat specificity. The Pannonian root vole lives in moist habitats mainly with reed bed and sedge cover. It needs stable water regime without extreme fluctuations (long-term dryness and floods). The distribution range of the root vole in Slovakia is restricted to south–west regions of country. In the present study we investigated the recent occurrence of species in suitable habitats of south–western Slovakia in 2011. Totally 40 localities were surveyed by live–trapping with traps deployed in lines with 5 – 15 m distance between trap points. Altogether 168 individuals of root vole were caught. The species has been recorded at 16 localities, whereas at 11 of these localities the root vole was found for first time.

Key words: *Microtus oeconomus*, small mammals, occurrence, distribution range, habitat, Slovakia.

INTRODUCTION

In Slovakia, the root vole, *Microtus oeconomus* (Pallas, 1776) occurs in the Podunajská nížina lowland and in the western part of Hronská pahorkatina upland (GUBÁNYI et al. 2009; AMBROS 2010; KRIŠTOFÍK & STOLLMANN 2012). This species inhabits wetland habitats in lowlands with higher herbaceous vegetation (mostly consisting of reed and sedge). Pannonian root vole (*M. oeconomus mehelyi* Éhik, 1928) lives in Slovakia, Hungary and Austria only. This subspecies is isolated from the continual distribution of *M. oeconomus* and is considered to be glacial

relict (for instance RÁCZ et al. 2005). A loss of connection with this continual area of species, higher habitat fragmentation in Pannonian lowland and the loss of suitable habitats, all these create high risk of decline of this subspecies. *M. oeconomus mehelyi* is strictly protected taxon and is included in international conventions (Annex III. Bern Convention, Annexes 2 and 4 of Directive 92/43/EEC – Habitat Directive). Protected areas should have been established for its protection.

The community of small terrestrial mammals were observed on localities with potential occurrence of



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M. oeconomus to the southwest of Slovakia with in projects Conservation of root vole **Microtus oeconomus mehelyi* (LIFE 08/NAT/SK/000239) and VEGA 1/1043/11. The aim of this article is to summarise the records of this species on Podunajská nížina lowland (SW Slovakia) in 2011.

MATERIAL AND METHODS

During the year 2011 we trapped small terrestrial mammals at wetland localities in southwest of Slovakia. Our prior aim determining selection of localities and method was to survey the occurrence of *M. oeconomus* in small mammal communities. Trapping of small mammals was usually carried out with 50 trap points set in line during two consecutive nights. The trap points were spaced 5 – 15 meters with one trap per trap point. At some localities trapping effort was modified (the number and distance of points in 1 line, the number of trapping nights – see description of sites).

RESULTS AND DISCUSSION

We surveyed 40 localities of the southwest Slovakia. The *M. oeconomus* occurrence was detected on 16 localities of them (Figure 1). All together 168 individuals (83 ♀♀, 82 ♂♂, 3 were not identified) were recorded (Table 1).

Localities with occurrence of *Microtus oeconomus mehelyi*:

1. – 4. Čiližská Radvaň, Čiližské močiare wetland (A – D) – Four trapping lines were exposed. On lines A and B (Čiližské močiare wetland A and

B) were performed 2 trapping actions. Locations of lines A and B were the same as in 2010 where 5 m distances were between trapping points (Miklós et al. 2011). On lines C and D (Čiližské močiare wetland C and D) were small mammals trapped during 1 trapping action. Distances between trapping points were 5 m. The individual parts of investigated area Čiližské močiare wetland were significantly different each other in vegetation cover. Line A was located to the south of busy road connecting villages Čiližská Radvaň and Ižop. The biotope was consisted by dense reed and sedge meadows with scattered bushes. This hygrophilous vegetation is bordered by tree species overgrowth from three sides. The biotope with the line B was situated to the north of the road. The vegetation here had a character of “ruderal wetland meadow” which was agrotechnically cultivated a few years ago.

This area was flooded due to high level of underground water in 2010. Habitats of both trapping lines are separated, except busy road approximately 15 m wide, by a narrow strip of trees and partly also by 50 m wide field. The nearest points of lines A and B were 300 m far away each other. Lines C and D were situated in the northern part of locality Čiližské močiare wetland (to the north from the road Č. Radvaň – Ižop). From the space of line B these lines were separated by Hanský kanál channel. The nearest points of lines B and C, respectively B and D were approximately 300 and 150 m apart. The vegetation consisted of small islands of reed and bulrush (*Typha*) in hygrophilous meadow vegetation with sedge on lines C and D. This part of the Čiližské močiare wetland was agrotechnically cultivated in the past. Because of the short distances

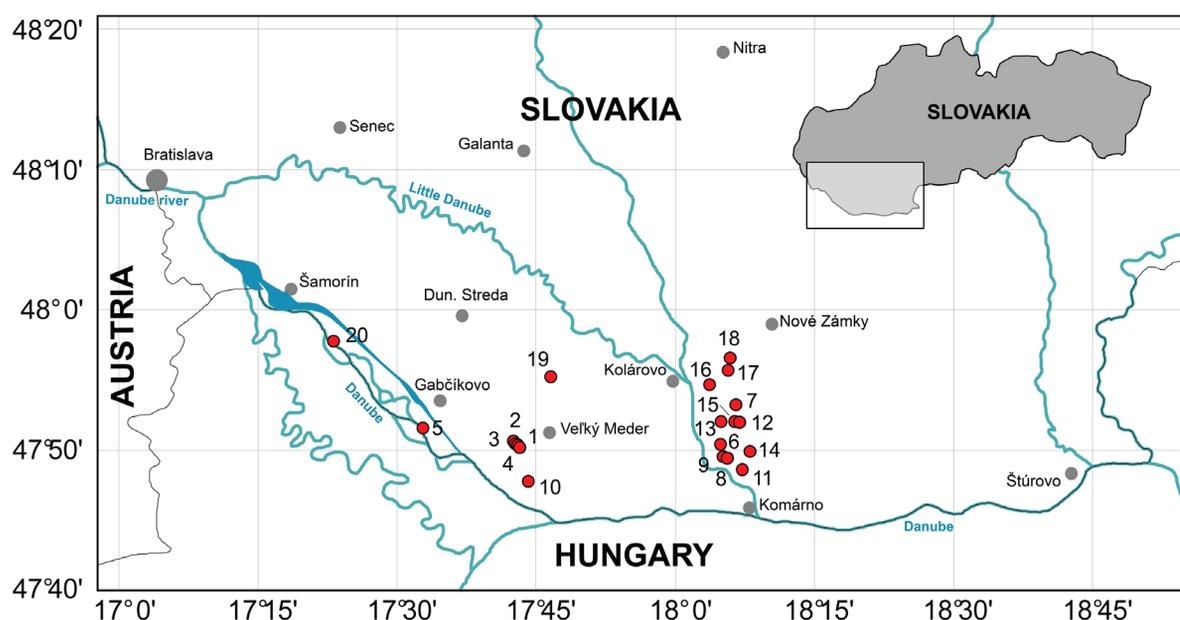


Figure 1. The map of sites with presence of *Microtus oeconomus mehelyi* recorded in 2011.

Numbering of sites is identical to the numbering in text of article and sites ID in Table 1.

Table 1. List of sites with *Microtus oeconomus mehelyi* occurrence in 2011.

Site ID is identical to the numbering of sites in Figure 1; Date – date of capture; Coordinates – coordinates of the trapping line mid-point; DFS map square – identification of the square according to the Databank of Slovak Fauna; * – individuals of unidentified sex

Site ID	Site name	Date	WGS 84 coordinates	DFS map square	Number of individuals		
					Females	Males	Total
1	Čiližská Radvaň, Čil. močiare A – wetland	6.–7. Aug.	N 47°50'12" E 17°43'19"	8172	12	6	18
1	Čiližská Radvaň, Čil. močiare A – wetland	3.–4. Nov.	N 47°50'12" E 17°43'19"	8172	14	9	23
2	Čiližská Radvaň, Čil. močiare B – wetland	6.–7. Aug.	N 47°50'23" E 17°43'3"	8172	18	27	45
2	Čiližská Radvaň, Čil. močiare B – wetland	3.–4. Nov.	N 47°50'23" E 17°43'3"	8172	15	19	34
3	Čiližská Radvaň, Čil. močiare C – wetland	17.–18. Sept.	N 47°50'41" E 17°42'33"	8172	8	8	16
4	Čiližská Radvaň, Čil. močiare D – wetland	17.–18. Sept.	N 47°50'31" E 17°42'46"	8172	6	4	10
5	Gabčíkovo, Veľký les, ox–bow	27. March	N 47°50'25" E 18°4'54"	8171	0	1	1
6	Hliník, Hlinický kanál – channel	12. July	N 47°50'25" E 18°4'54"	8174	1	1	2
7	Imeľ, kanál Ďotva – channel	17. June	N 47°53'16" E 18°6'33"	8174	1	0	1
8	Kava, Vrbovský kanál A – channel	12. July	N 47°49'28" E 18°5'39"	8174	1	0	1
9	Kava, Vrbovský kanál B – channel	13. July	N 47°49'30" E 18°5'12"	8174	1	0	1
10	Ključovec, reed bed	6. July	N 47°47'46" E 17°44'12"	8272	1	0	1
11	Lándor, spojovací kanál – channel	13. July	N 47°48'37" E 18°7'14"	8174	0	1	1
12	Martovce, Detvické lúky – meadow	29. Apr.	N 47°51'59" E 18°6'59"	8174	3	0	3
13	Martovce, kanál Tátoš – channel	16. June	N 47°52'3" E 18°4'57"	8174	1	2	3
14	Martovce, Katicaszög	13. Sept.	N 47°49'53" E 18°8'5"	8174			3*
15	Martovce, reed bed	12. May	N 47°52'3" E 18°6'22"	8174	0	2	2
16	Nesvady, Hantovský kanál – channel	12. May	N 47°54'43" E 18°3'40"	8074	0	1	1
17	Nesvady, Malá Aňala kanál, channel	6.–7. Oct.	N 47°55'44" E 18°5'44"	8074	3	1	4
18	Nesvady, Stará Gúta	7. Oct.	N 47°56'38" E 18°5'54"	8074	0	1	1
19	Okoč, Malobelský kanál – channel	28. Apr.	N 47°55'13" E 17°46'34"	8072	0	2	2
20	Vojka nad Dunajom, Stará trstina – reed bed	11.–12. Dec.	N 47°57'49" E 17°23'12"	8070	5	3	8

between trapping lines and narrow potential barriers between suitable overgrows it is possible to consider this locality as one unit for *M. oeconomus* population.

We observed total 133 individuals of target species on locality Čiližské močiare wetland (Tab. 1). On the line A 3 females were trapped in November 2011 which were known from August 2011. On the line B

10 observed individuals were trapped like these (4 females and 6 males). The abundance of *M. oeconomus* was 22.17 ind./100 trapping nights or 24.33 after the adding recaptured individuals in November 2011 on locality Čiližské močiare wetland after the expression of abundance for 100 trapping nights. In the area of lines A and B, *M. oeconomus* was observed also in 2010. However its abundance was much lower – 10 individuals, 3.33 ind./100

trapping nights (MIKLÓS et al. 2011). It is historically known catching of 170 individuals of *M. oeconomus* from the area of Čiližske močiare wetland (KRATOCHVÍL & ROSICKÝ 1955), which is the largest collection of specimens obtained from the same locality in Slovakia. In the second half of 20th century locality Čiližske močiare wetland nearly disappeared due to melioration activities and agricultural interventions. *Microtus oeconomus* was not found in this area during the inventory control in 1982 (ŠTOLLMANN & AMBROS 1998). The return of species and its occurrence in such high numbers in this area is probably the result of improved habitat conditions (extraordinary wet year 2010 and absence of agricultural intervention for a few years). Important is also an existence of suitable corridor connections with source population. If the viable population of *M. oeconomus* remains long term on this study sites, the area of Čiližske močiare wetland will belong to the probably most important areas of this species distribution in Slovakia.

5. Gabčíkovo, Veľký les ox-bow – The seasonal flooded ox-bow of Danube is situated between the Gabčíkovo Dam discharge channel and the old riverbed of the Danube. The banks are overgrown with mainly woody vegetation but in the area of trapping line also continual line shaped reed bed was present. There were agricultural areas to the southeast. The ox-bow riverbed was dried in the time of trapping. One line with 50 points with 5 m distances was exposed on this locality for 2 nights. Only 1 individual of *M. oeconomus* (1 ind./100 trapping nights) was observed. The small mammal community was studied near this line also in 2010 but this species was not detected (Ambros *unpubl.*). The observation of 10 *M. oeconomus* individuals in 1982 on locality called Gabčíkovo – Vnútorná Tejka is well-known from published data (PACHINGER 1987, 1994; GUBÁNYI et al. 2009). This locality is possible to identify as locality Veľký les ox-bow after the additional consultation (PACHINGER *in verb.*). In the surroundings of Gabčíkovo we know also other localities of occurrence of this species that are close to study area, for example: marsh Vranie (HODKOVÁ 1979), Dedinský ostrov (DUDICH et al. 1985; KRIŠTOFÍK 1997; ŠTOLLMANN & AMBROS 1998).

6. Hliník, Hlinický kanál channel – This locality is a horseshoe-shaped terrain depression of a 10 – 15 ha area. It is a residue of a former meander of Váh River. The locality is situated to the west of the village Hliník and 1.2 km far from the locality Kava – Vrbovský kanál channel. Vegetation consists mostly of the reed and sedge cover with some shrubs and small tree overgrowth. There was situated 1 line with 50 trapping points 10 – 15 m far from each other for 1 night. Only 2 individuals of *M. oeconomus* were observed (4 ind./100 trapping

nights). The closest occurrence locality known from former researches is 2 km far – locality Nature Reserve (NR) Martovská mokrad' near the village Martovce. Ten individuals were caught in this area in 2000 (AMBROS et al. 2001).

7. Imeľ, kanál Ďotva channel – This linearly shaped locality is situated to the southwest of village Imeľ. It goes along the dike of the Stará Nitra River and the Ďotva channel which supplies the water to this locality because of dike damage. The channel could serve as the corridor for *M. oeconomus* spreading to south to connect this locality with localities Detvické lúky and Katicaszeg. Herbal undergrowth consists of hygrophilous vegetation and continual overgrowth of sedge. One line was exposed with 50 trapping points on this locality for 1 night. One *M. oeconomus* individual was caught (2 ind./100 trapping night). Approximately 500 m far from this line was exposed another trapping line in 2011. There was different vegetation and target species was not observed there. The nearest localities of *M. oeconomus* occurrence are known from Martovce and Nesvady surroundings (BRIDIŠOVÁ et al. 2006, GUBÁNYI et al. 2009), or from NR Listové jazero lake (BINDER & ŠTOLLMANN 1975, KRIŠTOFÍK 1997).

8. – 9. Kava, Vrbovský kanál channel (A, B) – This locality is situated near the Vrbovský kanál channel between villages Kava and Hliník. Continual overgrowth of reed and sedge covers the terrain depression with area 15 ha. Melioration channel flows across the depression centre. Trees dominated in the central part of this horse-shoe shaped depression. There were exposed 2 lines (A, B) with 50 trapping points from 10 to 15 m far from each other for 2 nights. Two individuals of *M. oeconomus* were observed (1 ind./100 trapping nights). The closest locality of *M. oeconomus* is locality the Hlinický kanál channel known in 2011 (see above).

10. Klúčovec, reed bed – This small and relatively isolated terrain depression has an area approximately 1 ha. Vegetation consists of reed beds with some woody plants. The sedge represents the undergrowth. The Čiližský potok brook is about 300 m far from there and can serve as potential corridor connecting this locality with locality NR Čičovské mŕtve rameno ox-bow which is situated approximately 2 km to the south. The occurrence of target species in locality Čičovské mŕtve rameno ox-bow and in near locality Hamské trstie reed bed was recorded in 1959 (ŠTOLLMANN 1962). It was observed also in 2010 from Hamské trstie reed bed (MIKLÓS et al. 2011). Other localities of occurrence in closeness were found in 2010 about 1 – 1.5 km far to the southeast (marsh Čičov – mokrad') or to the north (Ključovec – Vára) from this actual locality (MIKLÓS et al. 2011). All these localities around the Čičovské mŕtve rameno ox-bow

represent one of the most important systems of sites with *M. oeconomus* occurrence in Podunajská nížina lowland (ŠTOLLMANN 1962, DAROLA & ŠTOLLMANN 1984, DUDICH et al. 1985, PACHINGER 1994, KRIŠTOFÍK 1997, STOLLMANN & AMBROS 1998). One typical trapping line was exposed on locality Klúčovec, reed bed and one individual of *M. oeconomus* was caught – 1 ind./100 trapping nights.

11. Lándor, spojovací kanál channel – This locality is situated to the east from village Kava and 2.2 km far from locality Kava – Vrbovský kanál channel. The nearest published data about occurrence of *M. oeconomus* were done on locality Gamota near village Martovce. There were caught 4 individuals of target species in 2000 (AMBROS et al. 2001). Area of Lándor, spojovací kanál channel is approximately 30 ha and there is continual reed and sedge cover which is in some places mown. A drainage channel flows across the depression and it supplies water to this locality due to damage of dike. This drainage channel can serve as corridor. There were in 1 line exposed 50 trapping points 10 – 15 m far from each other. Only 1 individual of target species was caught (2 ind./100 trapping nights).

12. Martovce, Detvické lúky meadow – This linear locality is to the north from village Martovce, next to the Stará Nitra River's dike. It was exposed 50 trapping points 10 – 15 m far from each other on the edge of wet mown meadow. Water is detained in depressions of Nitra River's old meanders and the water is from damaged dikes of drainage channels. Overflowed parts are covered by hygrophilous vegetation mainly by sedge. The channel can serve as corridor connecting this locality with locality Imeľ – kanál Ďotva channel. One line of traps was exposed for 1 night and 3 individuals of *M. oeconomus* were caught (6 ind./100 trapping nights). Agrocenosis divides this locality from another locality of target species' occurrence Martovce – reed bed (see below). On the other side the locality is separated from locality Martovce – Stará Nitra River (BRIDIŠOVÁ et al. 2006) by regulated flow of the Nitra River. The most significant barriers there are probably mown parts of dikes along the river.

13. Martovce, kanál Tátoš channel – This locality is situated about 3 km far from village Martovce to the northwest in sparse forest stand with continual sedge and reed undergrowth. Locality is surrounded by agricultural landscape. For 1 night there was exposed 1 line with 50 trapping points 10 – 15 m far from each other. The Tátoš channel passes across the locality; it detains water to this locality and also can connect this locality with NR Martovská mokraď 1 km far to the south. There were detected 3 individuals of target species (6 ind./100 trapping nights). *Microtus oeconomus* was observed on locality NR Martovská mokraď in 2000 (AMBROS et al. 2001).

14. Martovce, Katicaszeg – This horse-shoe shaped locality is to the south of village Martovce and covers an area of about 1 ha. It is situated in the system of smaller terrain depressions with hygrophilous vegetation, mainly with reed and sedge. Habitat consists of reed and sedge overgrowths in terrain depression at the edge of which were woody plants. There was exposed 1 line with 40 trapping points 15 m far from each other for 1 night. Three individuals of target species were recorded (7.5 ind./100 trapping nights). It is possible to consider this locality to be a part of smaller terrain depression system of locality Gamota near Martovce. The observation of *M. oeconomus* is known from locality Gamota in 2000 (AMBROS et al. 2001). Distance between locality of observation from 2000 and locality Katicaszeg is about 2 km. In the 2010 the small mammal communities were mapped approximately 500 m far to the north from this actual trapping. *Microtus oeconomus* was not caught during that research (HULEJOVÁ SLÁDKOVIČOVÁ et al. 2013).

15. Martovce, reed bed – Linear locality is 1.5 km far to the northwest from village Martovce. The habitat is consisted by continual overgrowth of reed and sedge. The drainage channel flows across the centre of depression and which supplies the water to the habitat and also represents suitable corridor. This locality is about 500 m far from locality Detvické lúky meadow but divided by agrocenosis. For 1 night there was situated 1 line of traps with 50 trapping points 10 – 15 m far from each other. Two individuals of *M. oeconomus* were observed (4 ind./100 trapping nights). Except locality Detvické lúky meadow the nearest localities (Martovce – Stará Nitra and NR Martovská mokraď) are 1.3 km distant (AMBROS et al. 2001; BRIDIŠOVÁ et al. 2006).

16. Nesvady, Hantovský kanál channel – This locality is situated near city Kolárovo at the Hantovský kanál channel approximately 1.5 km on the east of settlement Veľká Gúta (city district of Kolárovo). Locality is formed by economic poplar forest in removal age. The northern part of the overgrowth (about 3.5 ha) was worked out and today there is poplar planting (5 – 10 years old) with herbal undergrowth consisting of hygrophilous vegetation, mainly of sedge. This locality is relatively far from the other localities where *M. oeconomus* was detected and there are not any suitable corridors. The closest locality is NR Listové jazero lake (BINDER & ŠTOLLMANN 1975, KRIŠTOFÍK 1997). One line with 50 trapping points 10 – 15 m far from each other was situated on the border of old overgrowth and the plantation for 2 nights. Observed was 1 individual of *M. oeconomus* (1 ind./100 trapping nights).

17. Nesvady, Malá Aňala – kanál channel – This locality is to the west of village Nesvady at the Malá Aňala channel in depression between a dike of channel and railway embankment. Locality was

overgrowth by ruderal vegetation with reed islands. This habitat is fed by water from the damaged channel which flows near there. The nearest known locality is about 2 km to the south, near village Nesvady (GUBÁNYI et al. 2009). One line was exposed with 50 trapping points for 2 nights. Four individuals of target species were recorded (4 ind./100 trapping nights).

18. Nesvady, Stará Gúta – This locality takes place to the north from village Nesvady and to the east from settlement Stará Gúta. Locality is in the shallow terrain depression in the middle of a field. Its borders are formed by ruderal vegetation which proceeds into continual reed and sedge overgrowth. Two lines with 25 trapping points were exposed with 10 – 15 m separation. One individual of target species was caught (1 ind./100 trapping nights). This locality together with Vojka – Stará trstina reed bed (see below) belongs to the northernmost known recent place of *M. oeconomus* occurrence. The nearest place of target species occurrence is known from village Nesvady and is situated 3.5 km to the south (GUBÁNYI et al. 2009).

19. Okoč, Malobelský kanál channel – Continual reed beds are situated on the sides of depression of the Malobelský kanál channel. Reed overgrowth had clear border with agrocenosis from one side. Drainage channel flows in the middle of S-shaped depression. The length of the locality is 2.5 km and the width 200 m. Dikes of drainage channels can serve as a possible corridors connecting the nearest suitable habitats. Through this net the locality can be in connection with other known localities of *M. oeconomus* occurrence near settlement Jánošíkovo na Ostrove (KRIŠTOFÍK 1997; STOLLMANN & AMBROS 1998) and near village Okoč (record from 2010) (MIKLÓS et al. 2011). These places are approximately in 2 – 3 km distance from the locality of its actual observation. One line with 50 trapping points 10 – 15 m far from each other was exposed for 2 nights. Two individuals were detected (2 ind./100 trapping nights).

20. Vojka nad Dunajom, Stará trstina reed bed – This locality is in the Danube branch system. Biotope is formed by small reed beds and sedge overgrowth on the Danube branch bank. Hygrophilous herbal overgrown gradually switching over to the continual overgrowth of forest cover. On the next side the suitable hygrophilous vegetation is adjacent to a ruderal invasion herbal overgrowth which massively inhabited area of forest cutting. Area of continual reed–sedge overgrowth is relatively small, about 0.5 ha. Eight individuals of *M. oeconomus* were recorded in 1 line with 50 trapping points. Distances between points were 5 m and traps were exposed for 2 nights (8 ind./100 trapping nights). The nearest localities of *M. oeconomus* occurrence are 1 km far from there

(Vojka nad Dunajom – ostrov; Vojka nad Dunajom – Žofín) (PACHINGER 1987, 1994). The new locality of occurrence is probably connected through the bank's of Danube branches overgrowths and its hygrophilous vegetations with the nearest known localities. Among the well-known recent localities of *M. oeconomus mehelyi* is Stará trstina reed bed the northernmost and westernmost locality in Slovakia at same time. Much more to the north and west is situated only locality NR Šúr (BRTEKOVÁ 1957; NOGA & OBUCH 2004; GUBÁNYI et al. 2009). Location and being of viable population of *M. oeconomus* in NR Šúr is still discussed. The reason is that from Šúr comes only one direct record of target species from the year 1956 (BRTEKOVÁ 1957). Another record of this species comes from pellets of *Strix aluco* in 1998 (NOGA & OBUCH 2004). The low number of records is remarkable because communities of small mammals were intensively studied in the area NR Šúr (KMINIAK 1968; PACHINGER & NABAGLO 1978; PACHINGER 1982; ŽIAK & KOCIAN 1996; MIKLÓS & ŽIAK 2002, etc.).

SUMMARY

Trapping of small mammals was carried out in wetland ecosystems of Podunajská nížina lowland in 2011. The aim was to bring evidence about recent occurrence of *M. oeconomus* in suitable habitats in the southwest part of Slovakia. We recorded 168 individuals of target species all together on 16 localities. These localities are situated in the area of historically known target species occurrence but some of them put more exactly the northern and western border of its recent area. Although in the closeness to each our described locality was historically known locality of *M. oeconomus* occurrence but 11 of them can be considered to be new ones. The occurrence of target species in these localities was not documented till now. Two localities can be identified as localities already known in the past (Čiližské močiare wetland; Veľký les ox–bow). Another 3 localities (Martovce – kanál Tátoš channel; Martovce – Katicaszeg; Vojka – Stará trstina – reed bed) is possible to cover into the complex of biotopes where the occurrence of species was documented. In 2011 the most of described localities is situated in the area of river confluence of the Nitra River and the Váh River. This region actually represents one of the most important areas of *M. oeconomus* occurrence in Slovakia (GUBÁNYI et al. 2009, AMBROS 2010). A lot of relict wetland habitats are there with various habitat conditions (different size, composition of vegetation, soil–sedimentation stage, degree of isolation, etc.). Careful mapping of studied species is necessary for revealing its ability to colonize habitats with different quality. Notable are also other described sites of the so called intra-embankment area of the Slovak part of the inland

delta of the Danube (Vojka nad Dunajom, Stará trstina reed bed) and nearby places outside the embankment (Gabčíkovo, Veľký les ox-bow) where there was lack of information from the last decade.

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