

Eurasian beaver (*Castor fiber* Linnaeus, 1758) occurrence in eastern Slovakia based on indirect signs (2016 – 2017)

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I would like to dedicate this article to RNDr. Andrej Stollmann on the occasion of his 90th birthday

Abstract: The author states the occurrence of Eurasian beaver (*Castor fiber* Linnaeus, 1758) in the East Slovakia based on indirect signs from water courses. A total of 96 territories (localities) were observed over the years 2016 – 2017. The obtained data help spreading knowledge of species distribution in the territory of Slovakia.

Key words: beaver castle, dams, chewed tress, damaged tress, *Castor fiber*, Slovakia, distribution

Introduction

Valachovič (2012) summarised all published and unpublished data in Slovakia and estimated that the occurrence of beaver has been recorded in about 11.6% of the territory of Slovakia. It should be noted that the beaver was absent from Slovakia for 150 years. Since 1977, the southwestern population has grown dynamically in the catchments of the Morava and Danube rivers. In contrast, the beaver only appeared more recently in north-eastern Slovakia in 1981. All observations confirmed that the species predominantly inhabits lowlands in the region. Moreover, the beaver occupies about 30% of the potentially suitable parts of Slovak territory (about 56% of Slovakia's entire territory), and restoration of the population runs in two phases (Valachovič 2012).

Despite the mentioned study, it is evident that the beaver has expanded its range in Europe considerably in recent decades (Nolet & Rosell 1998, Halley & Rossel 2002, 2003, Baláž & Hreško 2008, Halley *et al.* 2012, 2021, Štofík & Bartušová 2016, Čanády *et al.* 2016, Barkaszi 2018, Ulicsni *et al.* 2020, Wróbel 2020, Jarčuška *et al.* 2020), and the current distribution map in Slovakia (cf. Valachovič 2012, Čanády *et al.* 2016) needs to be updated.

The main aim for this faunistic study emerged due to the lack of any collective and up-to-date data concerning the Eurasian beaver population throughout east Slovakia. The studies summarized by Valachovič (2012) contain information on the quantity and distribution of beavers. However, study refer to the previous years and must be updated, especially due to the dynamic development of the beaver population.

Material and Methods

The occurrence data were obtained from various sources: collected during field trapping of butterflies; direct verification of information from village mayors and inhabitants; and by targeted searches. Survey was carried out by the method of direct searching for the presence of signs (*per pedes*) along the Ondava, Topľa and Laborec Rivers and their tributaries in the years 2016 – 2017. Data collection on beaver residence traits took place in the spring and summer months (total 12 check dates). In total, beaver occurrence was confirmed in the vicinity of 96 villages (Tab. 1, Appendix 1–6).

In the field, residence traits on feeding, movement, sheltering and building activity of the species were searched according to Valachovič (2015, n.d.), Štofík & Bartušová 2016 (see below). At the same time, the species of damaged trees (determined at least to the genus) were also recorded with bite diameters were also surveyed. Names of watercourses were taken from an internet application (<https://mapy.cz>). GPS and altitude data were obtained using the GoogleEarth web portal (Image©Maxar Technologies 2022, Image©CNES /Airbus).

This study supplements the existing information which were collected from eastern Slovakia. In the following overview, the locations (localities) of beaver presence are listed with the GPS coordinates, water courses, presence signs and date of observations (Table 1).

Categorisation of presence signs:

- 1) food consumption – bites, chewed and damaged tress,
- 2) shelter signs – burrows and castles,
- 3) construction signs – dams and dykes,
- 4) others – footprints in the mud and carcass.

In terms of freshness, residential characters were also divided (cf. Valachovič 2015, Štofík & Bartušová 2016) into active (e.g., the bitten trees and branches were un-oxidized, un-blackened, un-stained, etc.) and inactive with no species present (e.g., abandoned burrows, the bitten trees and branches were blackened, greyed etc.).

Finally, I was tried to determine the number of individuals (see Tab. 1) on each locality by the number of fresh bitten or gnawed trees (cf. Djakov 1975). This method is based on the total number of completely (felled) and incompletely gnawed trees and their dimensions (diameter of the trunk) and then calculating the index which determine the approximate number of individuals (cf. Budayová 1995, Čanády *et al.* 2016).

Result

In the study area, 96 sites were registered with resident beaver signs, including 51 sites with dams (dykes) and/or castles or burrows (Fig. 1, 2). Most of the recorded signs were in catchment of the Ondava River ($n = 59$, 61.5%) followed by the Laborec catchment ($n = 20$, 20.8%) and finally the Topľa catchment ($n = 17$, 17.7%). The assessment of sites with dams (or dykes) and/or castles or burrows was as follows: a total of 51 sites, of which 62.7% ($n = 32$) in the Ondava catchment, 21.6% (11) in the Topľa catchment and 15.7% (8) in the Laborec catchment.

Overall, signs of beaver activity were recorded in the range of 100 – 520 m above sea level (a.s.l.). Altitude of sites with dams (dykes) and/or castles or burrows was: 165 – 520 (mean = 298.8, n = 51) m a.s.l. Sites with other residency traits had slightly lower elevation characteristics (n = 45, 100 – 448, mean (219.9) m a.s.l.).

A total of 721 completely (felled) gnawed trees were measured from 40 sites. Diameter of trunks varied from 1 to 67 cm (mean $\pm$ SD: 9.2 $\pm$ 8.7cm), with beavers most often preferring softwood trees, such as willows (*Salix* sp.). Other species recorded included poplars (*Acer* sp.), alder (*Alnus glutinosa* (L.) Gaertn.), common hornbeam (*Carpinus betulus* L.) and common hazel (*Corylus avellana* L.). Measurements for selected sites are presented in Table 2.

Estimated population abundance based on examination of the residence traits and measurement of the diameter of gnawed trees at each site is presented in Table 2. Based on the measurements, the predicted number of individuals ranged from one to seven (Tab. 1).

Discussion

The Eurasian beaver is a common species in the rivers of Europe and northern and eastern Asia, whose populations have been increasing in recent decades (Nolet & Rosell 1998, Halley & Rosell 2002, 2003, Halley *et al.* 2012, Rossel *et al.* 2005, Kemp *et al.* 2012, Law *et al.* 2017, Ulicsni *et al.* 2020, Wróbel 2020, Jarčuška *et al.* 2020).

Jarčuška *et al.* (2020) confirmed the use of burrows as shelters instead of castles at sites without dams (dykes), and at sites with constructed dams they registered both constructed castles and burrows. These findings were also in accordance with observation stated in this study.

Thompson *et al.* (2020) showed that beavers significantly alter the character of the surrounding landscape through their activities and are therefore also considered to be “ecosystem engineers”. The most significant changes occur in watercourses, where they alter stream parameters, stream dynamics, sedimentation, species composition of riparian vegetation, and water retention in the landscape. This activity increases the heterogeneity of the landscape and thus affects the diversity of habitats, as well as the abundance and diversity of species (Rossel *et al.* 2005, Kemp *et al.* 2012, Law *et al.* 2017). The abovementioned authors see the importance of beaver structures on watercourses in reducing erosion of watercourses, which can mitigate flood waves. Conversely, if they

are in the wrong place, they can also cause the river to break out of the channel and spill over, and if the dam breaks, they can even cause a flood.

Like Jarčuška *et al.* (2020), accumulations of municipal waste dumped into or towards the stream were observed in the dykes in the presented study. The number of dykes at sites can vary considerably (0 – 10), and this number is positively influenced by the length of beaver occupancy of the site, and thus also varies over time (Jarčuška *et al.* 2020). Although the numbers of dykes were not counted in this study, I can confirm the occurrence of more than one dyke within the site in several cases.

Beavers are known to be generalist herbivores (e.g., Haarberg & Rossel 2006), consuming mainly herbaceous food such as aquatic and riparian vegetation during the spring and summer months. Conversely, during the winter months they feed mainly on the bark of soft woody plants (such as e.g., willow, poplar, alder, birch) and the fine twigs of fallen trees. It also digs up the rhizomes and roots of aquatic plants and consumes most of the accessible herbs during the growing season. The same food composition based on damaged softwoods has also been confirmed in the Slovak Republic (Budayová 1995, Baláž & Hreško 2008, Valachovič 2012, Štofík & Bartušová 2016, Čanády *et al.* 2016, Jarčuška *et al.* 2020, data in this study).

The results of this study showed several sites with larger numbers of individuals (2 – 7), where castles (burrows) were present in addition to dikes and dams. Moreover, at several sites only signs indicating presence were recorded, i.e., the beaver was probably just passing through the area within its home range. This is particularly emphasised at sites close to the stream catchment (see Appendix 1–6). On the other hand, the occurrence of such solitary individuals may represent immature (subadult) individuals seeking new territories. Nevertheless, it should be noted, that method stated by Djakov (1975) only approximately estimates the number of individuals. Therefore, it is recommended to supplement the data by direct observation (or the use of photo traps) of beavers at the sites of occurrence, especially in summer when the family is together and the parental pair and its reproductive potential can be determined (Budayová 1995).

In conclusion, findings in eastern Slovakia are important for the evidence of beavers spreading (cf. Valachovič 2012). The occupancy of habitats and sites suitable for beaver in the study area indicates that they occupied the majority of suitable sites. Nevertheless, the population may still be dispersing into surrounding, as yet only minimally occupied or unoccupied areas of the study watersheds. This faunistic study, may serve as a starting point for future confirmation of this assumption.

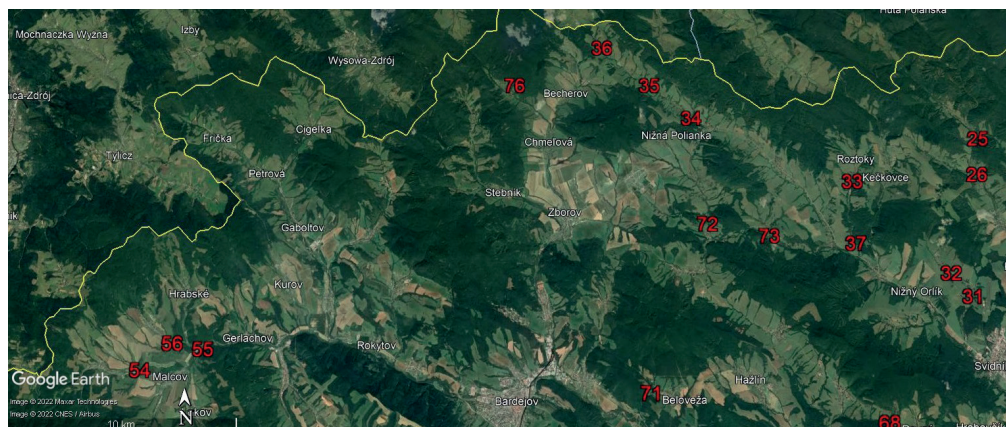


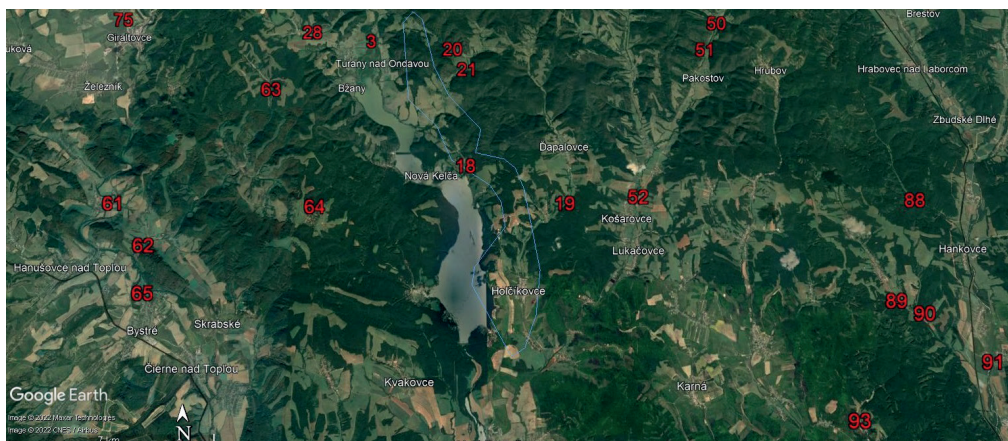
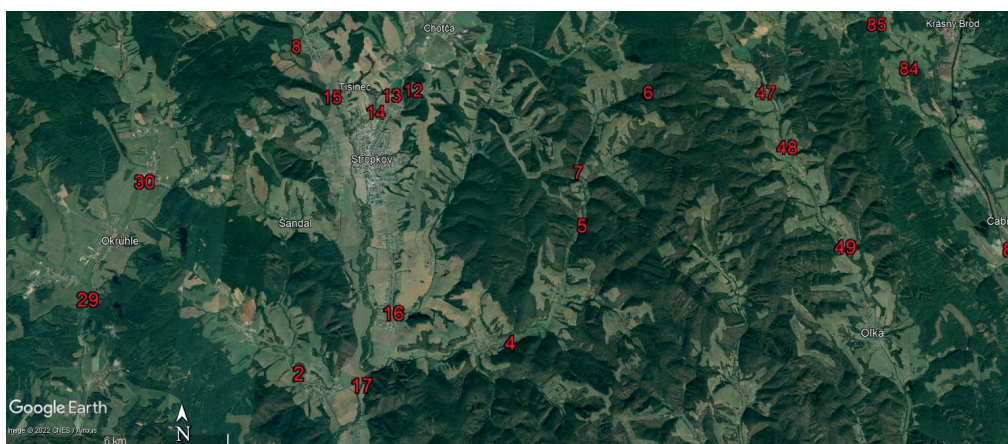
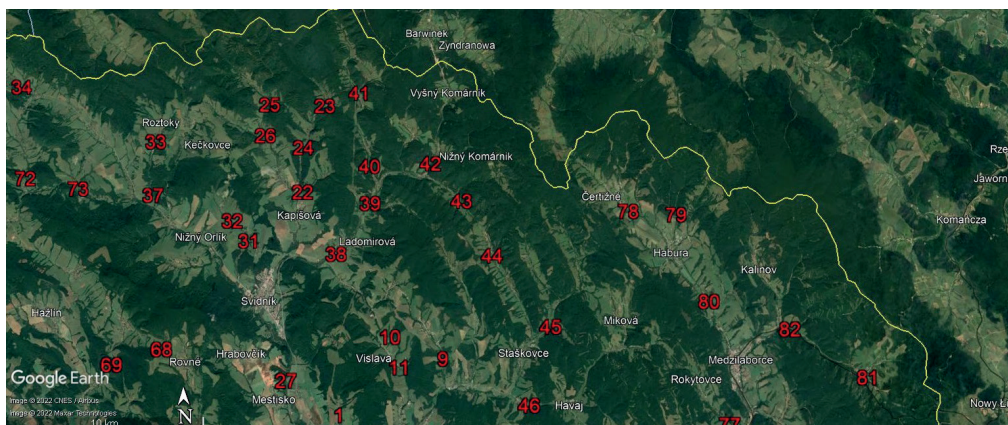
Fig 1: Presence signs of Eurasian beaver (*Castor fiber* Linnaeus, 1758) in studied areas of eastern Slovakia. **1** – beaver castle and dams (Medzilaborce part Vydraň, 09.V.2017), **2** – beaver castle and dams (Tokajík, 10.V.2016), **3** – dams (Regetovka, 08.V.2017), **4** – chewed tress and burrow (Solník, 11.IV.2016).

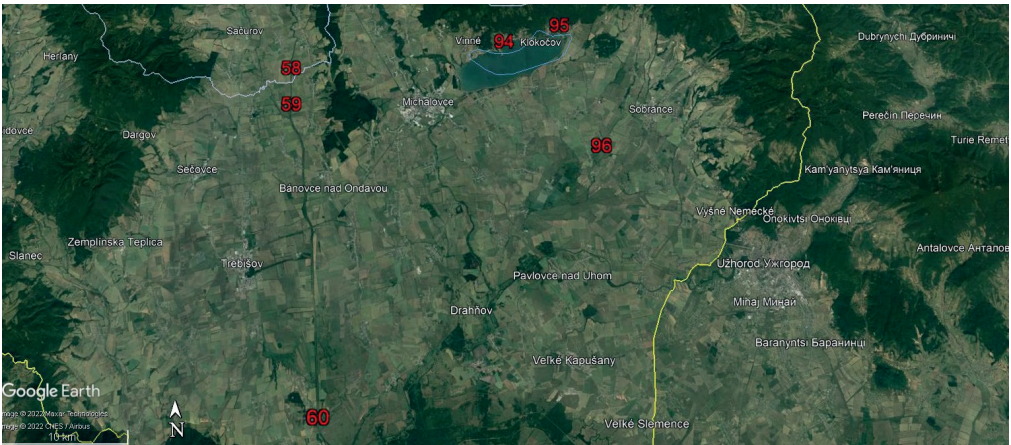


Fig 2: Presence signs of Eurasian beaver (*Castor fiber* Linnaeus, 1758) in studied areas of eastern Slovakia. **1** – beaver carcass (Buclovany, 04.IV.2017), **2** – damaged tress (Detrik 04.IV.2017), **3** – older chewed tress (Vislava, 09.V.2016), **4** – fresh chewed branches (Beloveža, 05.IV.2017).

Appendix 1–6: Localities of beaver signs on eastern Slovakia (Image©Maxar Technologies 2022, Image©CNES /Airbus).







Tab 1: Sites with Eurasian beaver (*Castor fiber*) occurrence in eastern Slovakia in 2016 – 2017.

No. Sites	Sites	water course ^{a, b, c}	Presence signs ^{1-5, 7}	Until date*	GPS
1	Potoky	Lozina ^a	damaged trees, chewed trees, dam, burrow ³	11.04.2016	49°15'12.0" 21°37'32.6"
2	Nížná Olšava	Olšavka ^a	damaged trees, chewed trees	11.04.2016	49°08'40.6" 21°37'44.3"
3	Lomné / Turany nad Ondavou	Ondava ^a	damaged trees, chewed trees, footprints in mud	11.04.2016	49°06'39.1" 21°38'49.7"
4	Brusnica	Brusnička ^a	damaged trees, chewed trees	11.04.2016*	49°09'10.3" 21°41'22.9"
5	Kolbovce	Brusnička ^a	damaged trees, chewed trees, dykes, burrow ²	11.04.2016	49°10'59.3" 21°44'5.6"
6	Solník	Brusnička ^a	damaged trees, chewed trees, dams, burrow ⁷	07.05.2016	49°13'12.5" 21°45'51.5"
7	Korunková	Brusnička ^a	damaged trees, chewed trees, burrow ¹	07.05.2016	49°11'51.8" 21°44'3.9"
8	Duplín	Ondava ^a	damaged trees, chewed trees ³	08.05.2016	49°14'19.4" 21°37'11.3"
9	Olšavka	Olšavka ^a	damaged trees, chewed trees, dykes ³	09.05.2016	49°16'39.0" 21°41'53.4"
10	Vislava	Vislavka ^a	damaged trees, chewed trees	09.05.2016*	49°17'16.5" 21°39'40.3"
11	Vyškovce	Vislavka ^a	damaged trees, chewed trees	09.05.2016	49°16'27.2" 21°40'1.4"
12	Krušinec	Chotčianka	damaged trees, chewed trees	09.05.2016	49°13'33.1" 21°39'48.5"
13	Stropkov	pond ^a	damaged trees, chewed trees ¹	09.05.2016	49°13'4.9" 21°39'16.6"
14	Stropkov	Chotčianka ^a	damaged trees, chewed trees	09.05.2016	49°13'2.5" 21°39'10.4"
15	Tisinec	Ondava ^a	damaged trees, chewed trees	10.05.2016	49°13'55.9" 21°38'17.5"
16	Breznica	Vojtovec ^a	damaged trees, chewed trees, dykes ¹	10.05.2016	49°09'42.2" 21°40'16.5"
17	Miňovce	Ondava ^a	damaged trees, chewed trees ¹	10.05.2016*	49°08'36.9" 21°39'5.2"
18	Nová Kelča	Hrabovčík ^a	damaged trees, chewed trees, dykes ¹	10.05.2016	49°03'39.4" 21°41'54.8"

19	Rafajovce	Ondalík ^a	damaged trees, chewed trees, dykes	10.05.2016	49°02'48.6" 21°44'59.6"
20	Tokajík	Hrabovčík ^a	damaged trees, chewed trees, dam, beaver castle	10.05.2016	49°06'19.7" 21°41'29.5"
21	Vyšný Hrabovec	Hrabovčík ^a	damaged trees, chewed trees, dam, beaver castle ⁵	10.05.2016	49°05'50.8" 21°41'58.1"
22	Kapišová	Kapišovka ^a	damaged trees, chewed trees, dam ⁴	11.05.2016**	49°21'21.9" 21°35'51.0"
23	Vyšná Pisaná	Kapišovka ^a	damaged trees, chewed trees, dykes ⁵	11.05.2016	49°23'49.7" 21°36'46.7"
24	Nižná Pisaná	Kapišovka ^a	damaged trees, chewed trees, dykes ¹	11.05.2016	49°22'37.2" 21°35'52.6"
25	Dlhoňa	Mostovka ^a	damaged trees, chewed trees, dykes ¹	11.05.2016	49°23'52.8" 21°34'16.2"
26	Svidníčka	Svidničanka ^a	damaged trees, chewed trees, dykes ¹	11.05.2016	49°23'1.8" 21°33'58.6"
27	Stročín	Ondava ^a	damaged trees, chewed trees ¹	11.05.2016	49°16'12.9" 21°35'17.1"
28	Kručov	Kručovský potok ^a	damaged trees, chewed trees, dykes ²	14.06.2016	49°06'48.1" 21°36'54.8"
29	Valkovce	Radomka ^a	damaged trees, chewed trees, dykes	14.06.2016*	49°09'56.3" 21°32'44.3"
30	Radoma	Radomka ^a	damaged trees, chewed trees ¹	14.06.2016	49°11'49.2" 21°33'41.0"
31	Nižná Jedľová	Jedľovský potok ^a	damaged trees, chewed trees ¹	14.06.2016*	49°20'2.7" 21°33'36.8"
32	Vyšná Jedľová	Jedľovský potok ^a	damaged trees, chewed trees ¹	15.06.2016	49°20'29.4" 21°32'43.5"
33	Roztoky	Roztocký potok ^a	damaged trees, chewed trees, dykes ¹	15.06.2016	49°22'51.3" 21°29'24.5"
34	Varadka	Varadský potok ^a	damaged trees, chewed trees, dykes ²	15.06.2016	49°24'31.6" 21°23'19.3"
35	Vyšná Polianka	Ondavka ^a	damaged trees, chewed trees, dykes ³	15.06.2016	49°25'22.7" 21°21'42.0"
36	Ondavka	Ondava ^a	damaged trees, chewed trees, dam, beaver castle	15.06.2016	49°26'29.0" 21°19'54.0"
37	Vyšný Orlík	pond ^a	damaged trees, chewed trees ²	15.06.2016	49°21'27.6" 21°29'22.4"

38	Ladomírová	Ladomírka ^a	damaged trees, chewed trees, dykes	16.06.2016*	49°19'34.6" 21°37'20.9"
39	Krajné Čierno	Ladomírka ^a	chewed trees	16.06.2016*	49°20'58.9" 21°38'46.0"
40	Hunkovce	Hrišov ^a	damaged trees, chewed trees, dykes ³	16.06.2016	49°22'3.3" 21°38'44.7"
41	Medvedie	Hrišov ^a	damaged trees, chewed trees dams, beaver castle	16.06.2016	49°24'11.4" 21°38'17.7"
42	Nižný Komárnik	Ladomírka ^a	damaged trees, chewed trees ¹	16.06.2016*	49°22'7.1" 21°41'25.4"
43	Bodružal	Bodružalik ^a	damaged trees, chewed trees dams, beaver castle ³	16.06.2016*	49°21'1.4" 21°42'44.4"
44	Miroľa	Mlynský potok ^a	damaged trees, chewed trees, dykes	16.06.2016*	49°19'27.7" 21°44'2.7"
45	Vladiča	Chotčianka ^a	damaged trees, chewed trees, dykes	16.06.2016*	49°17'29.4" 21°46'25.3"
46	Makovce	Poliansky potok ^a	damaged trees, chewed trees, dykes, beaver castle ¹	17.06.2016*	49°15'22.9" 21°45'28.5"
47	Varechovce	Ol'ka ^a	damaged trees, chewed trees, dykes	17.06.2016*	49°13'10.1" 21°48'51.0"
48	Repejov	Ol'ka ^a	damaged trees, chewed trees, dam, burrow	17.06.2016*	49°12'14.0" 21°49'10.5"
49	Ol'ka	Ol'ka ^a	damaged trees, chewed trees, dam, beaver castle	17.06.2016*	49°10'33.3" 21°50'10.2"
50	Ruska Kajňa	Ol'ka ^a	damaged trees	17.06.2016*	49°06'51.6" 21°50'9.9"
51	Pakostov	Ol'ka ^a	damaged trees, dykes ²	17.06.2016*	49°06'14.0" 21°49'41.6"
52	Košarovce	Ol'ka ^a	damaged trees	17.06.2016*	49°02'54.5" 21°47'9.7"
53	Ondavské Matiašovce	Ondava ^a	damaged trees	17.06.2016*	48°55'30.5" 21°44'14.3"
54	Malcov	Večný potok ^c	damaged trees, chewed trees, dykes ²	13.07.2016*	49°18'30.8" 21°02'43.3"
55	Gerlachov	Topľa ^c	chewed trees	13.07.2016	49°18'54.1" 21°04'51.0"
56	Snakov	Titel ^c	damaged trees, chewed trees, dykes ¹	13.07.2016	49°19'8.5" 21°04'11.6"

57	Tovarne/ Kladzany	Ondavka ^a	damaged trees, chewed trees, footprints in mud ³	10.03.2017	48°54'28.8" 21°44'53.1"
58	Nižný Hrušov	Ondava ^a	damaged trees, chewed trees	10.03.2017***	48°47'8.7" 21°45'19.9"
59	Rakovec nad Ondavou	Ondava ^a	damaged trees, chewed trees	10.03.2017***	48°45'19.5" 21°45'27.2"
60	Širník	Ondava ^a	damaged trees, chewed trees	10.03.2017***	48°31'6.4" 21°48'27.5"
61	Ďurďoš	Topľa ^c	chewed trees	04.04.2017	49°02'57.4" 21°31'8.8"
62	Remeniny/ Prosačov	Volianský potok ^c	damaged trees, chewed trees, dykes, burrow	04.04.2017	49°02'5.1" 21°32'13.6"
63	Ruská Voľa	Volianský potok ^c	damaged trees, chewed trees. dykes ¹	04.04.2017	49°05'25.7" 21°35'42.3"
64	Detrík	Surový potok ^c	damaged trees, chewed trees, dykes ¹	04.04.2017	49°02'48.8" 21°37'19.1"
65	Bystré	Topľa ^c	damaged trees, chewed trees	04.04.2017	49°01'5.4" 21°32'19.8"
66	Jastrabie nad Topľou	Topľa ^c	damaged trees	04.04.2017	48°56'19.0" 21°35'39.9"
67	Buclovany	Koprivnička ^c	damaged trees, chewed trees, dykes, beaver carcass ²	04.04.2017	48°09'24.0" 21°21'33.7"
68	Rovné	Šindliarka ^c	damaged trees, chewed trees, dykes	05.04.2017	49°16'28.5" 21°31'13.5"
69	Ortuťová- Osada	Černinka ^c	damaged trees, chewed trees, dykes	05.04.2017	49°16'37.7" 21°27'58.3"
70	Dubinné	Černinka ^c	damaged trees, chewed trees ²	05.04.2017	49°14'41.2" 21°26'37.3"
71	Beloveža	Belovežský potok ^c	damaged trees, chewed trees, dykes ²	05.04.2017	49°17'48.0" 21°21'27.2"
72	Cigla	Ondava ^a	chewed trees	05.04.2017	49°21'51.6" 21°23'49.9"
73	Dubová	Ondava ^a	damaged trees ¹	05.04.2017	49°21'33.5" 21°26'8.7"
74	Oľšavce	Černošina ^c	damaged trees, chewed trees, dykes ¹	05.04.2017	49°12'33.1" 21°22'56.9"
75	Giraltovce	Topľa ^c	damaged trees, chewed trees	05.04.2017	49°07'11.4" 21°30'36.7"
76	Regetovka	Kamenec ^c	damaged trees, chewed trees, dam	08.05.2017	49°25'25.3" 21°16'34.0"

77	Krásny Brod	Rakytovec ^b	damaged trees, chewed trees, dykes, beaver castle	09.05.2017	49°14'46.4" 21°53'46.7"
78	Čertižné	Laborec ^b	damaged trees, chewed trees	09.05.2017	49°20'37.2" 21°49'55.3"
79	Habura	Habura ^b	damaged trees, chewed trees, dykes	09.05.2017	49°20'28.5" 21°51'59.9"
80	Medzilaborce (part Borov)	Laborec ^b	damaged trees ¹	09.05.2017****	49°18'5.1" 21°53'11.3"
81	Palota	Vydranka ^b	damaged trees	09.05.2017****	49°15'55.9" 21°59'34.4"
82	Medzilaborce (part Vydraň)	Vydranka ^b	damaged trees, chewed trees, dam, beaver castle	09.05.2017****	49°17'15.1" 21°56'29.9"
83	Čabiny (part Nižné Čabiny)	Laborec ^b	damaged trees	09.05.2017****	49°10'28.6" 21°54'8.9"
84	Sukov	Sukovský potok ^b	damaged trees	09.05.2017****	49°13'33.6" 21°52'28.5"
85	Roškovce	Sukovský potok ^b	damaged trees, chewed trees, dam, beaver castle ¹	09.05.2017****	49°14'23.4" 21°51'52.3"
86	Svetlice	Svetlica ^b	damaged trees, dams	10.05.2017	49°09'31.7" 22°03'12.8"
87	Zbojné	Výrava ^b	damaged trees, chewed trees, dams, beaver castle ¹	10.05.2017	49°09'12.7" 22°00'34.4"
88	Koškovce	Krosná ^b	damaged trees, dykes ¹	10.05.2017	49°02'45.5" 21°55'36.0"
89	Nižné Ladičkovce	Ľubiška ^b	damaged trees, dykes	10.05.2017	49°00'41.9" 21°54'31.9"
90	Ľubiša	Ľubiška ^b	damaged trees, chewed trees	10.05.2017	49°00'26.1" 21°55'17.3"
91	Veľopolie	Laborec ^b	damaged trees	10.05.2017	49°59'30.5" 21°57'1.6"
92	Papín	Udava ^b	damaged trees	10.05.2017	49°04'39.1" 22°03'40.0"
93	Brestov	Hlboký potok ^b	damaged trees ¹	10.05.2017	48°58'27.0" 21°52'56.4"
94	Kaluža	Zemplínska Širava ^b	damaged trees, chewed trees	23.05.2017	48°48'25.2" 21°00'33.8"

95	Jovsa	Viničný jarok ^b	damaged trees, chewed trees	23.05.2017	48°49'15.2" 22°04'37.2"
96	Bunkovce	Okna ^b	damaged trees	24.05.2017*	48°42'56.9" 22°07'7.5"

Note:

^aOndava River catchment,

^bLaborec river catchment,

^cTopľa River catchment,

^{1-5, 7}Estimated number of individuals of *C. fiber* based on the method by Djakov (1975). The number represents the presence of one to seven individuals. If a number is not given, it was not possible to measure the diameter of the destroyed trees due to terrain conditions. Nevertheless, even in such cases it is possible to confirm the presence of at least one individual at the site. In some cases, trees were not measured because there were signs of presence on the site older than 2 years (cf. column until date),

*older signs of beaver (*C. fiber*) presence before year 2016,

**first observation of *C. fiber* on 25.05.2007 and, later 25.07.2008 by Mr. Milan Pavela which observed minimum of 5 individuals (in verb. and in litt.),

***older signs of presence from year 2016 and fresh signs of chewed trees from 2017,

****older data before year 2017 (i.e., 2009–2013) obtained also by Mgr. Martin Šepela from CHKO Východné Karpaty (in litt.).

Tab 2: Diameter of tree trunks (N = 721) completely gnawed by Eurasian beaver (*Castor fiber*) in selected localities in eastern Slovakia.

No. Sites	Sites	N	Range	Mean±SD
1	Potoky	10	6.5–46.0	18.8±12.2
5	Kolbovce	5	2.9–60.0	17.3±24.2
6	Solník	21	8.0–31.3	19.8±6.4
7	Korunková	5	6.8–22.1	13.8±7.4
8	Duplín	4	17.0–60.0	38.0±22.6
9	Olšavka	24	5.0–37.0	12.3±9.04
13	Stropkov	16	5.0–21.0	8.3±4.2
16	Breznica	3	5.0–10.0	7.0±2.7
17	Miňovce	10	6.0–10.0	7.0±1.4
18	Nová Kelča	12	3.0–24.0	6.4±6.0
21	Vyšný Hrabovec	29	3.0–67.0	14.2±14.2
22	Kapišová	17	7.0–30.0	16.6±7.5
23	Vyšná Pisaná	22	4.0–25.0	15.0±5.4
24	Nižná Pisaná	13	2.0–11.0	5.8±2.9
26	Svidníčka	17	3.0–10.0	4.7±1.7
28	Kručov	71	2.0–14.0	4.7±2.1
30	Radoma	30	1.0–17.0	3.7±3.9
31	Nižná Jedľová	18	2.0–14.0	7.6±3.5
32	Vyšná Jedľová	4	3.0–5.0	3.8±1.0
34	Varadka	25	3.0–67.0	8.2±13.0
35	Vyšná Polianka	10	3.0–50.0	16.9±18.3
37	Vyšný Orlík	7	12.0–22.0	15.4.0±4.6
40	Hunkovce	16	5.0–34.0	20.8±8.3
42	Nižný Komárnik	2	15.0–32.0	23.5±12.0
43	Bodružal	35	4.0–24.0	9.2±4.3
46	Makovce	5	3.0–26.0	13.6±9.9
51	Pakostov	43	3.0–22.0	6.3±3.7
54	Malcov	22	3.0–24.0	8.1±6.3
57	Tovarne/Kladzany	12	6.0–30.0	17.8±8.3
63	Ruská Voľa	6	4.0–25.0	13.5±9.4
67	Buclovany	11	5.0–40.0	16.5±13.5
70	Dubinné	28	2.0–20.0	8.0±5.1
71	Beloveža	17	3.5–25.0	11.1±6.2

73	Dubová	26	1.0–20.0	6.2±4.2
74	Olšavce	12	5.0–17.0	8.0±3.5
80	Medzilaborce (part Borov)	4	4.0–9.0	6.0±2.2
85	Roškovce	18	3.0–18.0	5.5±3.9
87	Zbojné	37	3.0–9.0	4.4±1.2
88	Koškovce	40	3.0–8.0	5.0±1.1
93	Brestov	14	1.0–4.0	1.9±1.4
	Total	721	1.0–67.0	9.2±8.7

References

- Baláž I. & Hreško J. (2008): The new locality of the European Beaver occurrence in floodplain forest in the Eastern Slovakia. – *Phytopedon* 7: 171–174.
- Barkaszi Z. (2018): Changes in the rodent fauna (Mammalia, Glires) of the region of the Ukrainian Carpathians during the XIX–XXI cent. – *Geo & Bio* (16): 48–62.
- Budayová J. (1995): European beaver (*Castor fiber* L. 1758) is the part of Slovakia's fauna again. – *Folia Venatoria* (Slovakia) 25: 175–182.
- Čanády A., Krišovský P., Bajomi B., Huber A., Czabán D. & Olekšák M. (2016): Is new spread of the European beaver in Pannonian basin an evidence of the species recovery? – *European Journal of Ecology* 2(2): 44–63.
- Djakov J.V. (1975): Beavers of the European Part of the Soviet Union (Morphology, Ecology, Ways and Methods of Economic Use). Moscow. Moskovskii Rabochii. 479 pp. (in Russian).
- Halley D.J. & Rossel F. (2002): The beaver's reconquest of Eurasia: status, population development and management of a conservation success. – *Mammal Review*, 32: 153–178.
- Halley D.J. & Rossel F. (2003:) Population and distribution of European beavers (*Castor fiber*). – *Lutra* 46(2): 91–101.
- Halley D.J., Rosell F. & Saveljev A. (2012): Population and distribution of Eurasian beaver (*Castor fiber*). – *Baltic Forestry* 18(1): 168–175.
- Halley D.J., Saveljev A.P. & Rosell F. (2021): Population and distribution of beavers *Castor fiber* and *Castor canadensis* in Eurasia. – *Mammal Review* 51(1): 1–24.
- Haarberg O. & Rosell F. (2006): Selective foraging on woody plant species by the Eurasian beaver (*Castor fiber*) in Telemark, Norway. – *Journal of Zoology* 270: 201–208.
- Jarčuška B., Klíč V., Kunštárová V.K. & Fulín M. (2020): On occurrence of Eurasian beaver (*Castor fiber*) in Levočské vrchy Mts., Slovakia. Pp. 394–403. In: Krempaská Z. & Števík M. (eds): *Vlastivedný zborník Spiš*, 10: 455 pp. (in Slovak with an abstract in English)
- Kemp P.S., Worthington T.A., Langford T.E., Tree A.R. & Gaywood M.J. (2012): Qualitative and quantitative effects of reintroduced beavers on stream fish. – *Fish and Fisheries* 13: 158–181.
- Law A., Gaywood M.J., Jones K.C., Ramsay P. & Willby N.J. (2017): Using ecosystem engineers as tools in habitat restoration and rewilding: beaver and wetlands. – *Science of the Total Environment* 605: 1021–1030
- Nolet B.A. & Rosell F. (1998): Comeback of the beaver *Castor fiber*: An overview of old and new conservation problems. – *Biological Conservation* 83: 165–173.

- Rosell F., Bozser O., Collen P. & Parker H. (2005): Ecological impact of beavers *Castor fiber* and *Castor canadensis* and their ability to modify ecosystems. – Mammal Review 35: 248–276.
- Štofík J. & Bartušová Z. (2016): The current state of Eurasian beaver (*Castor fiber*) in the north-eastern part of Slovakia. – Ochrana prírody 28: 39–52. (in Slovak with an abstract in English)
- Ulicsni V., Babai D., Juhász E., Molnár Z. & Biró M. (2020): Local knowledge about a newly reintroduced, rapidly spreading species (*Eurasian beaver*) and perception of its impact on ecosystem services. – PloS one 15(5): e0233506.
- Valachovič, D. (2012): European beaver (*Castor fiber*). Pp. 81–85. In: Krištofík J. & Danko Š. (eds): Mammals of Slovakia: Distribution, Bionomy and Protection. Veda – Slovak Academy of Sciences (SAS) Publishing House, Bratislava, 712 pp. (in Slovak with a summary in English)
- Valachovič D. (2015): Eurasian/water/European beaver. Pp. 88–89. In: Saxa A. Černecký, J., Galvánková J., Mútňanová M., Balážová A. & Gubková Mihaliková M. (eds): Handbook of monitoring methods for biotopes and species of European importance. Štátna ochrana prírody Slovenskej republiky, Banská Bystrica. 148 pp. (in Slovak)
- Valachovič, D. (n.d.): Methodology for monitoring the development of a stabilized beaver population. Eurasian/water/European beaver *Castor fiber* Linnaeus, 1758. Available on shorturl.at/oyAW7. Last visited 18.09.2022 (in Slovak)
- Wróbel M. (2020): Population of Eurasian beaver (*Castor fiber*) in Europe. – Global Ecology and Conservation 23: e01046.

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