

# Vertebrates of the Subcarpathian section of the River Tisa flood area (Ukraine)

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In fulfillment of the requirements set down by the Ramsar Convention, a study of vertebrates along the River Tisa basin in Subcarpathia was performed. The study addressed only amphibians, reptiles and mammals.

On the basis of our study we can summarize the results as follows:

Instead of suffering from human impact, vertebrates of the flood area are diverse and are in abundance.

The distribution of the species is as follows: amphibians, reptilians and mammals.

The abundance of species is characteristic of the river valley, and is in accordance with the heterogeneity of the environment.

The number of species varies along the river and the vertebrate fauna is the most abundant and diverse in the submountainous reaches.

Keywords: vertebrates, River Tisa, flood area

## *Results*

### *Amphibians/Amphibia*

Fire salamander *Salamandra salamandra* Laur. This species was found in the mountainous region (around 150-1500 m altitude, above Baltic sea level), near the stony and rocky environment of the riverside. Their activity begins at nightfall and in wet weather in daylight hours also. Their reproductive period lasts from April to November. They are viviparous animals. They are useful amphibians; a cutaneous gland excreta is a valuable material in pharmacology. Although it was found to be a frequent species in the Transcarpathian region, it is registered as a threatened species in the Ukrainian Red Book.

Smooth newt *Triturus vulgaris* L. One of the most abundant amphibians in the River Tisa flood area. The species is frequent in regions 600-700 m above sea level. Different small lotic basins, brooks and other shallow riverine habitats where

found as their environment. They active at night and they are useful, insectivorous animals. The protection of this species is recommended.

Carpathian newt *Triturus montandoni* Boulenger. It is one of the characteristic species of the Transcarpathian region, generally found at 150-2000 m altitude above sea level. It is encountered frequently in the its reproductive period in different wetland habitats of the flood area. It is a relatively small-sized species without a crest. The end of its tail is elongated. This useful species is registered in the Ukrainian Red Book.

Crested newt *Triturus cristatus* Laurenti. This species is distinct from *T. montandoni* with its verrucosus skin surface. The species is found in areas situated at not higher than 250 m above sea level. Its way of life is similar to that of *T. vulgaris*.

Alpine newt *Triturus alpestris* Laurenti. This rare species lives in areas of the flood area that are situated higher than 400 m above sea level. Their way of life is similar to that of *T. montandoni*. It was found in shaded mountainous brooks, rivers, pools. Its distribution is sporadic, therefore its registration in the Ukrainian Red Book is recommended.

Fire-bellied toad *Bombina bombina* L. One of the smallest and rarest anurans of the flood area, found in small pools, backwaters and canals. It is distributed only in lands lower than 120 m altitude above sea level. Like all amphibians they are insectivores, and have daylight activity. This useful species is recommended for protection.

Yellow-bellied toad *Bombina variegata* L. Its size is similar to *B. bombina*, but its abdomen is marked with yellow patches. It is a very abundant species, which was found in the backwaters and other small wetlands up to 1800 m altitude above sea level. Its biology is also similar to that of *B. bombina*. This very useful species is recommended for protection.

Common spadefoot toad *Pelobates fuscus* Laurenti. It is a middle-sized species, the internal part of its hind foot fingers is verrucosous. The product of its cutaneous gland smells slightly like garlic excreta. It was found only in the lower section of the Upper Tisa. It is a rare species and is recommended for protection.

Common toad *Bufo bufo* L. It is the greatest anuran species in Ukraine, of 83 mm length, weighing 150 gr. Females are generally larger than males. Their colour is greenish brown or dark grey. It is one of the common species of the flood area, distributed up to around 1300 m altitude above sea level. Their optimal habitats are wet oak forests and orchards, potato plantations. Its reproductive period is in March-April, when they breed in stagnant waters. They are usually insectivorous, but occasionally they can consume smaller mammals and birds. It is a very useful species that is recommended for protection.

Green toad *Bufo viridis* Laurenti. It is similar to *B. bufo* concerning its biology and distribution. It is a useful species recommended for protection.

Common tree frog *Hyla arborea* L. It is one of the small frog species found in Ukraine. It is different from the others bearing emerald-green colour and having suction pads on the tip of its fingers. It is a characteristic species of the lower part of Upper Tisa flood area. It lives mainly in forests and bushes, and in orchards and vineyards as well. They hunt for food in foliage and prefer leaf-beetles. They

are active from March to November. It is a useful species which is recommended for protection.

Marsh frog *Rana ridibunda* Pall. It is one of the greatest frog species in Ukraine, similar to *R. lessonae*, but lacking isolated yellow marking on the hind feet. It is distributed only up to the submountainous region of the flood area, sometimes in abundance. It is usually insectivorous, but it consumes small fish occasionally. Its importance is questionable. In some places it is useful, in some other it is considered a pest. It is recommended for protection.

Pool frog *Rana lessonae* Camerano. Its body is smaller and slimmer than those of *R. ridibunda*, and its legs are shorter as well. It is one of the most abundant frog species of the flood area. It lives mainly in pools covered with floating vegetation and in other wetlands. It is insectivorous, 60% of its food is made up of species that are harmful for human activity. Its gastronomical importance could be important.

Common frog *Rana temporaria* L. It is a typical forest-dwelling species. Its back is from brownish to yellow-brownish. A deep brown streak can be seen extending from the eye to the hind leg, along its back. It was found in woody and bushy habitats of the flood area. During its reproductive period, they gather in brooks and pools. It is a useful species recommended for protection.

Moor frog *Rana arvalis* Nilsson. This species was found in similar habitats to that of the former species. Its numbers have drastically decreased in the past years and it is now registered in the Ukrainian Red Book.

Agile frog *Rana dalmatina* Bonaparte. It lives in the deciduous forests of the flood area. It has a characteristic leg that is longer than body length. It has been registered in the Ukrainian Red Book as a rare species.

## **Reptilians/Reptilia**

*Ten species were found in the flood area of the Upper Tisa.*

European pond terrapin *Emys orbicularis* L. It is found in the lower part of the flood area. This rare species lives sporadically in stagnant waters, oxbow lakes, canals and marshes. Its food consists of varied insects, molluscs, amphibians, as well as fish and aquatic weeds. This species is of no economic importance, but is decreasing in abundance as a result of human activities. As a rare species, it has been registered in the Ukrainian Red Book.

Slow-worm *Anguis fragilis* L. It is a legless lizard. In contrast with snakes, its tail is blunt and it has moveable eyelids. Its body is reddish-brown, sometimes bronze or copper-coloured. All sections of the Upper Tisa flood plain can serve as its habitat. It is usually observable in the edges or clearings of forests with ferns and stones. It is insectivorous and is a useful species recommended for protection.

Green lizard *Lacerta viridis* L. It is one of the rarest species of the flood area. It is found only in Chorna Hora (conservation area) near Vinogradiv, and in the Hust and Berehovo districts. It is the largest lizard species of Transcarpathia, with a length of 127 mm, without tail. It was found mainly in bushy, rocky and stony

habitats. A considerable part of its food is insects, but it consumes young mice occasionally. It is a protected species.

Sand lizard *Lacerta agilis* L. It is the most frequent lizard of the Upper Tisa flood area. Sexual dimorphism in colouration can be observed as well. This species was found mainly in bushy, rocky and stony habitats. It is insectivorous; there are lot of pests and insects in its diet. This useful species is recommended for protection.

Viviparous lizard *Lacerta vivipara* Jacquin. This species can be found in the mountainous reaches of the flood area, at altitudes of more than 650-700 m above sea level. Generally it lives along brooks, in the edge of forests, in alpic areas and young forest clearings as well. It is a useful species which is recommended for protection.

Grass snake *Natrix natrix* Laurenti. It is one of the most frequent species of the flood plain. Its body length is more than 1 m (max. 1.4 m). It has characteristic yellow or orange markings on the head. The upper part of its body is from light grey to dark grey or olive, adapting to different environmental conditions. It was found mainly along the banks of rivers, brooks, small lakes, on dykes and in forestation clearings. Generally it feeds on amphibians and insects, and it consumes fishes as well.

Dice snake *Natrix tessellata* Laurenti. Its body lengths reaches 930 mm. The colour of its body varies from olive to black; the ventral side is orange with black markings. It is a common species of the River Tisa flood plain, occurring mainly in the lowland and submountainous regions where it is frequently found on the stony banks of streams. This species consumes fish and frogs. Its distribution is sporadic.

Aesculapian snake *Elaphe longissima* Laurenti. It is the largest grass snake of the River Tisa basin. Its body length can reach 2 m. Its ventral side is white or yellow. It is found in the submountainous sections, mainly in thin beech woods, shrubs, forest edges and stony places as well. Its diet consists of birds, mice, voles, and shrews. It is a useful species, but its populations have decreased in the last few years, and it is therefore recommended to be added to the Ukrainian Red Book.

Smooth snake *Coronella austriaca* Laurenti. It is a medium sized grass snake with brown, rust-brownish colours. They prefer deciduous, stony forests, shrubs and forest clearings. They feed on reptiles, mainly lizards, and snakes, too at times. Cannibalism is frequent in this species. It is a rare species noted in the Ukrainian Red Book.

Adder *Vipera berus* L. A triangle-shaped head is its primary characteristic. Its body is squat and the tail is short. Body colouration ranges from grey to rust-brown or black. The adder belongs to the mountain foest ecotype in the Upper Tisza area. In the highlands its primary habitats were forest clearings, shrubs, blueberry bushes. It feeds on smaller rodents and occasionally on lizards. Its bite is dangerous to humans.

**Mammals/Mammalia**  
Insectivores/*Insectivora*

- Hedgehog *Erinaceus europaeus «concolor» Martin*. This species is our largest insectivorous mammal. It is a common species of deciduous forests, shrubs, orchards and vineyards. This species is a 'visitor animal' in the flood area, therefore it is rare here. It feeds on all smaller animals: molluscs, insects and mammals, and fruits, mushrooms as well. It is a very useful species recommended for protection.
- Mole *Talpa europaea L.* It is a typical insectivorous mammal which is frequent in the flood area. Its body formation is adapted for living underground. It lacks auricles, and its eyes are vestigial. The forelegs are used for digging. It usually feeds on insects, but it is generally viewed as unwanted in gardens and fields.
- Pygmy shrew *Sorex minutus L.* It is one of the smallest mammals of this area. and it is quite rare here. It lives in meadows, and feeds on insects, snails and earthworms. It is a protected species.
- Common shrew *Sorex araneus L.* It is our most frequent and prolific shrew species. It occurs in old forests where there are decaying woods and vegetation and an abundance of food sources. It is a nocturnal animal feeding on insects and snails. It is a useful animal which should be protected.
- Alpine shrew *Sorex alpinus Schinz.* It is an inhabitant of mountainous and submontane regions of the flood area. Its biotope is pinewoods, and deciduous forests on occasion. Like other shrew species, it takes shelter in decayed trees, subshrubs and under dry leaves where it can usually be found. It is a useful species listed in the Ukrainian Red Book.
- Water shrew *Neomys fodiens Schreb.* It is our largest shrew species. Its colour is deep brown-black on the dorsal side and dirty-white on the underparts. It is thought to settle down near water basins; it has been noted to be good swimmer. It feeds on insects, snails, earthworms and fishes sometimes. It is a nocturnal species but it appears at daytime, too. It is a useful and protected species.
- Miller's water shrew *Neomys anomalus Cabrera.* It is smaller than the water shrew but their markings are similar. The biology of this species is the same as that of the previous one. It is found in smaller numbers and its distribution is not uniform. It is an infrequently seen shrew species. It has been registered in the Ukrainian Red Book.
- White-toothedshrew *Crocidura leucodon Hermann.* It is a medium-sized shrew species. Its fur is brown on top and white underneath. These two colours separate quite distinctly. It is a ubiquitous inhabitant of the flood areas along River Tisa. It is also found in dry areas. It is found in gardens, meadows and buildings, too. Their reproduction does not get a fix time, and can take place any time between May and August. This shrew eats insects mainly. It is a useful mammal that must be protected.
- Lesser white-toothed shrew *Crocidura suaveolens Pallas.* It is like the previous species, but it is not as big. The stomach (abdomen) becomes white in winter. In contrast to the other shrews it prefers cultivated fields. Sometimes it withdraws to

different buildings. The den is made from hay. They reproduce once a year. They feed on various insects. They are useful mammals which must be protected.

### Bats/*Chiroptera*

There are many species of Chiroptera in the flood area of River Tisa. This region is primarily a hunting territory for such bats as *Rinolophus hipposideros*, *Rinolophus ferrum-equinum*, *Myotis oxignatus*, *Myotis myotis*, *Myotis mystacinus*, *Plecotus autitus* L., *Plecotus austriacus* Fischer, *Nyctallus noctula* Schreb., *Pipistrellus pipistrellus* Schreb., *Pipistrellus nathusii*, *Eptesicus serotinus*, *Myotis daubentoni* Kuhl. These bats nest in hollow trees next to the flood plain.

Daubenton's bat *Myotis daubentoni* Kuhl. It is a medium-sized bat with proportionate ears. Usually it lives alone or in small groups. In the daytime it finds shelter in hollows or in attics of houses. Its activity starts at nightfall. The hunting territories are near water. This bat frequently flies above the water surface. A part of the population migrates in winter, while others hibernate in warm hollows, caves or cavities of buildings. This species feeds on tiny insects. It is a very useful species which must be protected.

Common long-eared bat *Plecotus auritus* L. It is an average-sized bat with long ears (35-39 mm). It lives alone or in small groups. Its hiding places are hollows, wood-stocks, and attics of buildings, and larger underground cavities. This species stays in the same area for several years. It hibernates from the second half of November to the middle of March. It eats large quantities of insects and is therefore a very useful animal. This species is under protection.

Grey long-eared bat *Plecotus austriacus* Fischer. It is a bit larger than the common long-eared bat. This species is grey, the ears are bordered by a dark stripe, the first finger of the wing is short. Its way of life is the same as that of *Plecotus auritus* L. This species is under protection.

Noctule *Nyctallus noctula* Schreb. It is one of the largest bat species. Usually it lives in large groups. Its hiding places are hollows. It is seldom found in buildings in wintertime. It feeds on a variety of insects. It lives in colonies. It is a protected species.

Pipistrelle *Pipistrellus pipistrellus* Schreb. It is our smallest bat species. It lives in colonies, often sharing the same hiding place with noctules. This bat is a migratory species. It is a useful bat species requiring protection.

The remaining bat species in the area are also very useful small mammals which are registered in the Ukrainian Red Book. Because they are migratory species, we recommend their international protection.

### Carnivores/*Carnivora*

Pine marten *Martes martes* L. It is a relatively small carnivore. This species lives in deciduous forests throughout the year. It makes a nest in tree hollows. Martens

are active at nightfall and at night hours. They hunt on smaller mammals such as mice, shrews, dormice, and birds. They also eat forest fruits. Their fur is very valuable. Hunting on martens is limited.

Beech marten *Martes foina* Erxleb. It is like the previous species but it has a white patch extending from the neck onto the forelegs. There is no fur on its footpads. It lives in rocky and stony areas of the flood area along River Tisa, often in the neighbourhood of people. This species has been found to build its den in attics, crevices or slits and stone-stacks on buildings. Although it moves fast in the trees, it hunts on the ground and it feeds on various rodent species. Its fur is very valuable. Hunting of them is limited.

Polecat *Mustela putorius* L. Polecats are slimmer than martens. There is a black mask around the eyes and on the forehead. There is a white border on its ears. Its colouration along its side is dark-brown to black. Usually it lives near people in the flood area of River Tisa. It feeds mainly on fish and amphibians. It causes damage to poultry stocks. Its fur is of quite good quality, therefore polecats are hunted.

Mink *Mustela lutreola* L. Its size and body form is similar to those of the polecat. The fur of this species is usually of various shades of brown, but there are white spots on its lips. It lives next to water. It has webbed feet. It lives along fast-flowing creeks in the mountains. The main items of mink diet are fish, amphibians and small rodents, but when food is limited, it eats insects as well. It is an infrequently seen and protected mammal. It is registered in the Ukrainian Red Book.

Weasel *Mustela nivalis* L. This species is our smallest carnivorous mammal. Its fur is brown in summer except for the abdomen. In winter it is totally white. It has a thin and slim body. It exists in the plain and submountains in the flood area of River Tisa. It eats mice and voles. Sometimes it attacks young rabbits and pheasants as well. It is a useful small mammal which must be protected.

Stoat *Mustela erminea* L. It is a bit larger than the weasel. It is different from the weasel in its white-tipped tail which remains so both in summer and winter. It is a very cautious animal. This is a very infrequently found species in the flood area of River Tisa. It feeds on mice and voles. This species is one of the most useful animals, which is protected and has been registered in the Ukrainian Red Book.

Badger *Meles meles* L. The badger is a medium-sized mammal. Its fur is coarse and long. Black stripes run through its eyes to the ears on both sides of the white head. It has white tail and black legs. This species is not indigenous to the flood area of River Tisa. It builds its underground den with multiple entrances hidden in the stony and rocky mountains or alpine areas. It is a very tidy animal; it always cleans its den and leaves its waste in specific places. It eats insects, earthworms, molluscs, small rodents, birds and birds' eggs, seeds, forest fruits and mushrooms. Badgers are hunted for their skin and fat. Due to their small numbers it is reasonable to register this species in the Ukrainian Red Book.

Otter *Lutra lutra* L. The otter is a medium-sized mammal. It can be found in smaller streams of the mountains or submountains. The body of the otter, which is long and flexible, is adapted to living in water. The head is flat and the ears are small. It has thick brown fur. It lives in or near water. The entrance of the den is found below the water surface, but the den itself is above the water. It usually feeds on

fish but will eat frogs or small mammals, too. This rare mammal is registered in the Ukrainian Red Book.

Brown bear *Ursus arctos L.* This is the largest land mammal in the area. This non-indigenous creature lives only the high mountains in the flood area of River Tisa. Usually it spends the daytime hours in large hollows or caves. It is a night hunter. The bear hibernates during cold winters, but hibernation is interrupted when the weather becomes milder. Bears are omnivorous. They have not been hunted in the last decades which practice should be continued, as the number of bears is not more than just satisfactory.

Wolf *Canis lupus L.* It is the most well-known carnivore. Similarly to bears, wolves live in the high mountains in the flood area of River Tisa only as a transient animal. It is rarely found in submountainous areas. Its weight is around 70 kilograms. This species lives in packs. It is a brave predator. Wolves hunt on living prey ranging in size from mice to large ungulates. It is only seldom dangerous to humans, but it does much damage to game and livestock. Hunting is open all year.

Red fox *Vulpes vulpes L.* This species is quite widespread. It is a visitor animal to the flood area of River Tisa. It usually lives in the forest or in clearings. Although hunters eagerly persecute them, they have an importance in the ecosystem. Hunting foxes is not limited, but it is worth hunting them in winter, when its fur coat is thickest.

Wild cat *Felis silvestris Schreb.* It is a relative of house cats but its body is more massive. Wild cats have a short, strong tail with dark rings. In the flood area of River Tisa it usually lives in mixed or deciduous forests of the mountains. It hunts at night. It feeds on small rodents but it catches small birds as well. The number of wild cats in the Carpathians is low, therefore it has been registered in the Ukrainian Red Book.

Lynx *Lynx lynx L.* It is the largest carnivore among the felids of the Carpathians. It is a visitor animal there. The lynx feeds on young roe deer or weakened red deer. Its fur is a very valuable hunting-trophy, but at present its hunting is prohibited. It has been registered in the Ukrainian Red Book as a rare carnivore.

#### Ungulates, Artiodactyles /*Ungulata, Artiodactyla*

Wild boar *Sus scrofa L.* The wild boar has a strong bristle coat. It has a typical long head. Fully grown males have well-developed strong fangs. The young are striped. Boars can be found everywhere in the flood area of River Tisa, but it is rare in the plains. They usually live in the forests, but occasionally they sally out to cornfields. The wild boar is most active at nightfall. It lives in groups except for older males that roam alone in the forests. The wild boar is a typical omnivorous mammal. Hunting on them is regulated. Its coat, flesh and fangs are valuable trophies.

Roe deer *Capreolus capreolus L.* The roe deer can be found everywhere in the flood area of River Tisa. It mostly lives in the forests, but a field population has developed in the recent years. It is the most frequent species among the

Artiodactyla. The roebuck sheds its antlers in autumn. The roe deer is a valuable game animal. It feeds on sap-rich vegetation of forests and meadows. Hunting on the roe deer is permitted but regulated. Its skin, flesh and antlers are valuable trophies. Roe deer meat is very delicious and its skin is used as souvenirs or rugs.

Red deer *Cervus elaphus L.* It is the biggest artiodactyle. Like the roe deer, it sheds its antlers in autumn. It is a forest animal but it regularly comes out to glades and clearings. The deer eats several times a day, mainly in the early morning, at twilight and at midnight. Its diet consists of grasses, leaves and young shoots. It lives in groups. Within the flood area of River Tisa it can be found only in the mountains or seldom in the submountains. Its skin, flesh and antlers are valuable trophies. Its hunting is regulated.

#### Lagomorphs/*Lagomorpha*

Hare *Lepus europaeus Pall.* It is different from the rodents in having a tiny incisor behind each of the two long incisors. It is fairly frequent in the flood area of River Tisa. It lives in open or semi-open areas, but it can be found in the forests as well. Its highly characteristic footprints talk about its presence in wintertime. It is a herbivorous animal which causes damage in young orchards, but is important as a game animal: it is hunted in large numbers each year for its flesh and sometimes for its fur.

#### Rodents/*Rodentia*

Red squirrel *Sciurus vulgaris L.* The red squirrel lives in trees. It is a forest animal tolerating the presence of humans, therefore it also lives in the small groves or parks of cities. Its long tail with thick hair helps the animal to balance while making a flying jump from tree branch to another. It is herbivorous, but its food varies throughout the year. It feeds on hazelnuts or other nuts and seeds in autumn, and on the seeds of the pinecone in the winter months. Red squirrels have interesting ways of storing their food. For example they pin out mushrooms on trees in order to dry them. They live in hollows or in small nests. They can be found in the mountains or submountains in the flood area of River Tisa. It is a valuable furry animal. Their hunting has been stopped.

European suslik *Citellus citellus L.* The souslik, as opposed to the red squirrel, lives on the ground. It is found only in the plains in the flood area of River Tisa. The souslik prefers dry and warm places which are found amongst and within dykes, elevated fields next to agricultural areas that have not been ploughed recently. It usually lives in communities. Its main food supply is various seeds, but it feeds on the green parts of the local vegetation as well. The souslik hibernates during the wintertime. It is a rare species in the Carpathians; it can be found only sporadically. It has been registered in the Ukrainian Red Book.

Fat dormouse *Glis glis L.* It is a dormouse much like a small grey squirrel, though its ears do not end in brush-like tips. It is a very rare animal of deciduous forests of

the submountains in the flood area of River Tisa. This dormouse species hides in hollows and nests during the day. Its activity begins at sunset. It eats the seeds of different trees. A typical behaviour of this species is that it rings tree branches. It hibernates during the winter.

Hazel dormouse *Muscardinus avellanarius L.* It is a tiny mammal. It is very rare in the flood area of River Tisa. It can be found in the submountains but it appears also in pinewoods. This species builds its nests among the small branches of lower trees or in the grass. It hibernates in wintertime. This dormouse species feeds on buds, seeds and the bark of young sprigs. Though rarely, it eats insects as well. It needs to be protected as a biological species.

Common rat *Rattus norvegicus Berk.* Its distribution has developed alongside that of humans everywhere in the flood area of River Tisa. It lives in places that are inhabited by man. This rat species is fond of wet places; therefore in nature it is not rare next to the water. It lives in hierarchically organised colonies. It is an omnivorous rodent that can cause serious damage to goods in stores or warehouses. It is pathogenic by transmitting germs dangerous to humans, and must often be eradicated from populated areas.

House mouse *Mus musculus L.* It lives everywhere in the flood area of River Tisa where people live. It is a tiny rodent which, with human influence, has become omnivorous. It is very prolific. This mouse causes considerable damage to humans, similarly to most rats. It is a carrier of pathogens of different diseases and must often be exterminated from populated areas.

Harvest mouse *Micromys minutus Pall.* It is the smallest mouse species. It is infrequently found in the flood area of River Tisa. Usually it lives in bushy, wet areas or in cereal fields. This mouse builds its nest on long-stem grasses and sometimes on the ground. The nest is made of leaves and it is much like the nest of birds. The animal retires to the nest only at night. It also hides in straw-stacks or abandoned buildings. Because of its small population and tiny stature it does not cause large damages, so there is no need for controlling its numbers.

Striped field mouse *Apodemus agrarius Pall.* Its main characteristic is a black stripe that runs down in the length of the back from head to tail. It can be found in the plains or in the submountains. It is a common species, which is characteristicly found in fields. Some years it is very prolific under which circumstances it can cause considerable damage to the agriculture. Although it is herbivorous, it often eats insects as well.

Small-footed wood mouse *Apodemus microps Kratochvil.* It is a recently discovered species. It is typical of the plain territories of the flood area of River Tisa. This mouse species lives in the fields and pastures. It can also occur in wet places. Its lifestyle is like that of other mice species. It has a relatively small population and it may be concluded that it does not cause large damage to the agriculture.

Wood mouse *Apodemus sylvaticus L.* It can be found everywhere in the flood area of River Tisa. It is interesting that it can not be found deep inside forests. Its favourite living places are bushes and forest edges. A peculiar trait in this species is a long tail, and the unbroken transition from dorsal to ventral colour. Sometimes it has a light rust-coloured patch on its throat. Its population size depends on the quantity of beech nuts. Occasionally it can cause damage to the

newly planted forests and nurseries. Its population should be monitored and controlled.

Yellow-necked wood mouse *Apodemus flavicollis* Melchior. It differs from the wood mouse by its the bigger size and more contrasting colours. The rust-coloured spot is always discernible. Its lifestyle is similar to that of the former species.

Hamster *Cricetus cricetus* L. It is a fairly large rodent. In the flood area of River Tisa it can be found in cultivated lands and gardens. This hamster species lives alone. Its burrows can be recognised from the small mounds of earth dumped near the entrances. It keeps large quantities of food in its underground burrow, particularly during the winter. It feeds on the seeds of cereals, on potato, carrot and fruits. It is a very aggressive animal causing great damage in the fields and gardens from time to time. Its presence is unpopular here.

Bank vole *Clethrionomys glareolus* Schreb. It is a relatively small rodent. It is different from the mice in that it has a relatively short tail measuring only half of its body length. It has smaller ears as well. The teeth of this vole species have no roots. It can be found in the mountains and submountains in the flood area of River Tisa. Its population size is dependant on the quantity of the beech nuts. It is species harmful to human economy. Its population size must be kept within limits.

Muskrat *Ondathra zibethica* L. It is the largest of our rodents. It is an aquatic animal but it feeds on the mainland. It has thick fur and a vertically flattened tail. It lives in hollows or in small dens with the entrance under the waterline. The nest itself is higher than the water level. In the flood area of River Tisa it can be found in the plains or in the submountains. It is mainly herbivorous, but also feeds on molluscs, crustaceans or other invertebrates. Its fur is valuable but it is not allowed to be hunted at present.

Water vole *Arvicola terrestris* L. It has size of a rat. It builds its underground burrow in the banks of waters, close to the surface. Often it builds a rounded nest from dried grasses at ground level. The food supply of this vole species is found near its nest. It is a herbivorous animal. This species is very prolific in the flood area of River Tisa. It is a harmful rodent, and its population must be limited.

Little water vole *Arvicola sherman* Shaw. It can be found in the mountainous area of the flood area of River Tisa. Its lifestyle is like that of the previous species. In some years it can cause much damage, therefore its numbers must be controlled.

Field vole *Microtus agrestis* L. In the flood area of River Tisa it is typically found in the mountains. It lives on the banks of the creeks where there is lush vegetation. It is herbivorous and it feeds on the green parts of plants. In the winter it eats the bark of deciduous trees. It is active in the daytime and at night as well. It does not cause considerable damage, but its proliferation is undesirable.

Common vole *Microtus arvalis* Pall. It is the most populous and frequently found rodent, living mainly in the plains and submountains of the flood area of River Tisa. It lives in open areas. It is most prolific in grazing grounds, in grain and trefoil fields. In some years it has explosive population growth and causes serious damage. Therefore it must be controlled in agricultural fields. Carnivores and raptors should be given priority in controlling their numbers.

Common pine vole *Pitymys subterraneus* De Selys Longchamps. It is a tiny rodent. In the flood area of River Tisa it lives in the mountains. Its living place is well recognisable from its beaten tracks on the ground. It is a herbivorous rodent which feeds on the green parts of plants. In some years its population increases detrimentally and it can cause great damage to grazing grounds.

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