

The raccoon – an intruder in our nature

Zooreport provided information on the occurrence, biology and protection of the largest central European snake, the Aesculapian snake (*Zamenis longissimus*), which can be up to two metres long, in three articles published in 2009. Our return to this topic five years later is related to the danger from the more-and-more intensively growing population of non-indigenous predators which have been introduced to our natural environment. These predators present a threat to biological diversity primarily because autochthonous species which are highly or critically endangered can become their prey.

The Aesculapian snake, which has the status of a critically endangered animal in the Czech Republic, occurs at only three locations in the country: in the Podyjí region, the White Carpathians and the Poohří region. It seeks moist grassy biotopes with undulating terrain, overgrown with bushes – this type of landscape is gradually disappearing, however. The majority of land parcels have been combined to form larger units and heavy equipment is used on them. Other areas remain fallow and overgrown. Two extreme biotopes



Raccoon

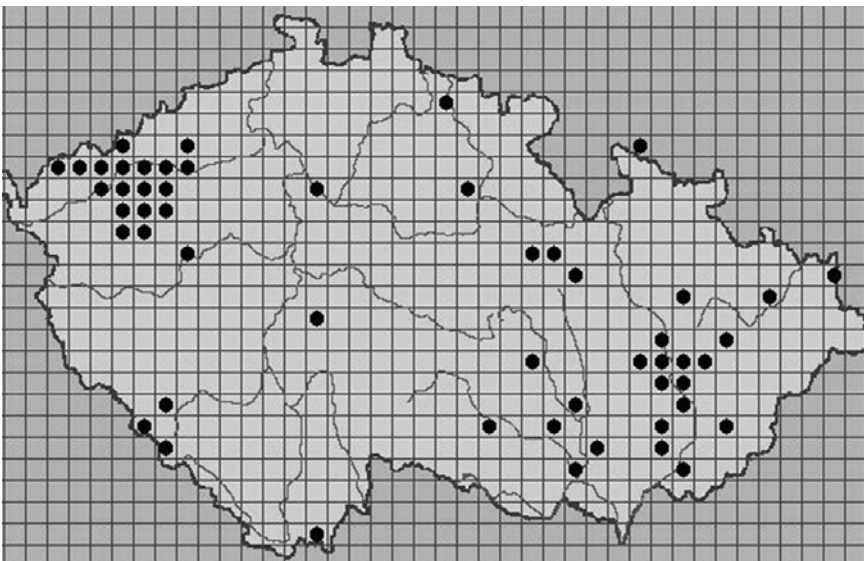
Photo: Jiří Bohdal

have been created which aren't suitable for the species and the Aesculapian snake is moving to villages and recreational chalet settlements. Roads are used as migratory corridors and the lives of these snakes often end under the wheels of cars. Also, the small walls, old paths, country lanes and dunghills

which were used by Aesculapian snakes as a winter shelter and a place for reproduction have disappeared. Other negative factors also exist, and probably the greatest danger these days comes from non-endemic predators, particularly the American mink (*Mustela vison*), the raccoon dog (*Nyctereutes procyonoides*) and the raccoon (*Procyon lotor*). The first-named animal has been spotted in the Podyjí region, and the occurrence of the other two has been proved in the Poohří region.

While the locations of the occurrence of the Aesculapian snake in Moravia are a projection of the continuous recent area which extends here from neighbouring countries, the population in the Poohří region is isolated, being several hundreds of kilometres away from other populations, and thus is also endangered due to the fact that losses cannot be compensated for by a supply of individuals from surrounding areas. The population in the Poohří region is a remnant of a larger area of occurrence which stretched up to the north, to Denmark, in a period when the planet had a warmer climate.

The *Zamenis* civic association has been active in the protection of the Aesculapian snake in the Poohří region since 2006.



Locations in the Czech Republic inhabited long term by raccoons, 2014 BioLib Map – Miloš Anděra



Aesculapian snake

Photo: Radka Musilová

Among other things, it monitored the occurrence of the raccoon in 2009 and 2010 in the valley of the River Ohře. The following text is a slightly adapted version of an article which was first published in the *Myslivost* (Hunting) magazine, issue No. 6/2011. (red)

Getting to know the predator

The numbers of raccoons living in the wild in the Czech Republic has been increasing constantly over the last few years. The occurrence of the raccoon is having a negative impact on our original fauna species. One of the species which is being affected significantly is the Aesculapian snake. One of the last isolated populations of this species in Europe still survives in the valley of the River Ohře. Unfortunately, this is where a permanent raccoon population has taken root. Our efforts to protect the exceptionally rare and endangered Aesculapian snake have brought us into contact with this intruder.

The raccoon is a mammal from the procyonid family. It is 40–70 cm long and comes from North and Central America. Generally, it prefers biotopes near rivers and lakes, but it is known for its ability to adapt itself to various environments. As a dietary opportunist and omnivorous predator, the raccoon is good at climbing and swimming and can utilize all available sources of food. The introduction of the species to the Old World started in the first half of the 20th century. In the 1930s, raccoons were released into the wild in Germany, where they acclimatized very well – the new population spread fast in all directions. Introduction to other countries followed, e.g. in Russia in 1936, and also later in Belarus, in 1954. Since the beginning of the 1980s, the rapid expansion

of this species has been observed in Europe. Other individuals from breeding farms have joined the fast growing colony of raccoons who have no natural enemies in Germany (unlike in North America, where their numbers are reduced regularly by pumas, lynxes and other predators). They were later also joined by individuals released by animal keepers. It is estimated that about a million raccoons now live on German territory, and they are spreading into surrounding countries (Austria, the Czech Republic, Poland and the Baltic states). Outside Europe, prospering introduced populations of raccoons can be found in the Caucasus, and also in Japan, where they have escaped from breeding facilities.

The numbers of observations and shootings of this species is constantly increasing in the Czech Republic. While the raccoon was observed only in three quadrants (11x12 km) of standardized zoological mapping until 1950, and from 1951–1990 it was found in 8 quadrants, from 1991–2012 there are records of raccoon encounters at more than 120 locations in 85 quadrants, which means 13.5 % of the territory of the Czech Republic. The first records concerning hunted individuals (28 animals) appeared in hunting statistics in 2003, while in 2009 were killed 111 animals by hunters. The development of the situation is predictable to a certain degree, as not only Germany but also Poland and the Baltic States are dealing with a raccoon population explosion.

Even though raccoons have resided in Europe for more than 80 years, we are lacking a lot of information about their ecology. Specific data about raccoon behaviour and feeding habits in various environments are missing. We don't have enough information about the influ-

ence of this predator on original fauna and the information about its interspecies competition with autochthonous predators in central Europe is also minimal. Available sources claim that competitive fights for shelter and sources of food do not occur between the omnivorous raccoons and the original local predators. However, only a few studies have been conducted concerning the negative influence of the raccoon on the original fauna. According to research from Finland, raccoons can threaten indigenous populations of birds more than the American mink or the raccoon dog as they often look for hiding places in trees, where they then plunder bird nests. Furthermore, researchers believe that raccoons can also seriously threaten populations of reptiles and amphibians and thus render their protection more difficult.

The first run-over raccoon in the valley

It was during our systematic study of our rarest snake population, the isolated population of the Aesculapian snake in the valley of the River Ohře, that we had the opportunity to get to know the raccoon better. Snake research has taken place there since 2005, and in the 2007 season (14. 10.) we found the first run-over raccoon on the road between the villages of Boč and Stráž nad Ohří. Coincidentally, in the same season, we found an Aesculapian snake on a river bank near the site of the collision, with its head bitten off. Even though it occurred to us that there might be a certain connection between the two events, we didn't give it any more thought, considering the run-over raccoon to be an individual which had escaped from captivity. The finding of another run-over raccoon at almost the same place the following year (12. 9. 2008) began to raise certain doubts, and we decided to devote some of our resources to the monitoring of this non-endemic species and potential predator of the Aesculapian snake.

In the Poohří region, the Aesculapian snake can be found near the northern edge of the area of occurrence of the species, at the limit of its existential capabilities, and all negative influences affect it with greater intensity than they would elsewhere. Changes in the landscape over the last decades and increased pressure from human activities also present a serious threat. As a result of the destruction of biotopes, the lack of suitable nesting places and increased mortality on roads, the size of the population has dropped to only 400–600 individuals at present. Since 2008, an Aesculapian snake conservation programme has been operating in the Poohří region (see www.zachranneprogramy.cz). The practical protection and support for the local population which is provided by Zamenis civic association consists mainly of the maintenance of dry stone walls and stone heaps, and the establishment of nesting sites. The nesting sites, which conservationists are

building around the countryside, are similar to garden compost heaps. To build one, an approximately one metre high fence is constructed from round poles, enclosing a 3 x 3 m area of ground. This is filled with a suitable substrate such as horse dung, hay, straw, wood filings, bark, etc. The heat released during the decomposition of the substrate enables the successful incubation of snake eggs. Such nesting sites are surrounded by netting to prevent the undesired intrusion of predators. Non-indigenous predators (raccoons, raccoon dogs and American minks) are a relatively new but very significant threat to Aesculapian snakes. Predation can affect both individual Aesculapian snakes and their laid eggs. For these reasons, non-endemic predator monitoring has become part of the project called Support for the Isolated Population of Aesculapian Snakes in the Poohří Region, which is supported by funding from the European Economic Area and Norway.

Scent stations and photo traps

The project was conducted in 2009–2010. Its aim was both to get an idea about the occurrence of predators in the area and to find out whether the predators are trying to penetrate the intentionally built nesting sites and dig in the material containing laid eggs. The project utilized the scent station and photo trap methods, with the selection of suitable locations taking place at the end of June 2009. The locations were selected with regard to the occurrence of potential predators of the Aesculapian snake, i.e. in the vicinity of the River Ohře and its tributaries.

The scent stations consisted of a 3–5 cm thick layer of fine sand spread over 1m². Bait was placed in the middle of the station – fish in oil, which are a sufficiently strong attractant. The predators lured by the bait will leave



Image of a raccoon taken by an automatically-triggered camera (photo trap) installed in the Poohří region during the monitoring of non-autochthonous predators during 2009–2010

footprints in the fine sand. The scent stations were placed at intervals ranging from several hundreds of metres to several kilometres from one another, along both sides of the River Ohře. In order not to increase the risk for Aesculapian snakes unnecessarily, the scent stations were situated at safe distances from their nesting sites and known hiding places. The stations were regularly checked, which involved the determination and photographic documentation of footprints, restocking the stations with bait, smoothing the sand, and also total renovation (e.g. after a visit from wild boars). A total of 8 scent stations were created during 2009–2010.

They were checked in three blocks of four or five days (21.–24. 7. 2009, 24.–28. 8. 2009 and 19.–23. 7. 2010).

Automatically-triggered cameras were installed at fifteen locations in the Poohří region. The installation took place at the same time as the construction of the scent stations. The cameras monitored the occurrence of predators near the scent stations, in the vicinity of nesting sites built as part of the conservation programme, near the road and migration corridor under the road, and at various other suitable places. The material from the cameras was collected continuously from July till October 2009, and from May till September 2010. During this period, some of the cameras were moved repeatedly in order to prevent theft or to find a better locality. Snapshots were collected at approximately one-week intervals. Batteries were charged approximately once a week, depending on the amount of images taken. The digital cameras, which featured a greenish brown camouflage pattern, were most often placed on tree trunks or were effectively incorporated into vegetation in order to prevent the discovery of the device. According to the manufacturer, the cameras only switch themselves on when an object which radiates heat moves in front of them. Every photograph includes the date and time the image was acquired. If the camera detected more than one visit of the same kind during the night, only one event was recorded in the result.

As far as non-indigenous predators are concerned, the research (camera images and footprints at scent stations, run-over individuals) confirmed the abundance of raccoons and the



Scent station for detecting potential predators of the Aesculapian snake in the Poohří region Photo: Štěpán Alexander



The raccoon dog, a canine predator which some people confuse with the raccoon Photo: Eduard Stuchlík



Raccoon Photo: Vladimír Motyčka

rarity of the raccoon dog and American mink (one run-over individual from each species was found on the E13 road between Damice and Klášterec nad Ohří).

During the research, 41 footprints belonging to the following seven species were recorded at the scent stations – the wild boar, domestic cat, dog, brown rat, raccoon, red fox and roe deer. The following results demonstrate that the raccoon cannot be considered to be a rare animal in the region: evidence of its existence was found at three of the eight monitored scent stations (37.5 %), and it left seven footprints, which was 17.1 % of all found footprints. The species captured on camera were the same as in the case of the scent stations, though badgers were also recorded. A total of 124 visits were documented, twelve of them from raccoons, which is 9.7 %. In total, raccoons were recorded at three of the fifteen localities monitored by the cameras. Evidence of the reproductive success of this species in the monitored area can be seen in the visit by a female with two young. Our results also show that the raccoon is mainly a nocturnal animal. It is obvious from the time records from the cameras that the visits to their locations took place between eight p.m. and 3 a.m.

The time to act is right now

Of all non-indigenous predators it is the raccoon that is the largest threat for the Aesculapian snake at present. Just during our research in 2007–2011 we recorded twenty individuals in an area of approximately 8 km² – we observed one live animal, we also identified four run-over individuals and our cameras recorded raccoons fifteen times, although some images probably recorded the same individual repeatedly. Nevertheless, we can supplement our database of

findings with a lot of data from hunters and local inhabitants, and from the owners of recreational chalets, whose rubbish bins are visited by raccoons. With regards to their mainly nocturnal activity, they are active at a different time from the diurnal Aesculapian snake; however, predation on non-active snakes in their hiding places during the night cannot be ruled out. To date, no attempt by predators to enter nesting sites has been recorded. Despite this, one needs to be watchful as raccoons are very intelligent and cunning animals, and when an easy source of food suddenly appears, a raccoon can destroy a whole clutch of eggs at a nesting site and then return to this location repeatedly. Our German colleagues who work in dice snake conservation have experience with this.

We can expect the expansion of non-endemic predators in the Poohří region to continue. It is therefore important to continue the research in this area but also to force responsible authorities to accept appropriate measures. One of the ways of preventing the further propagation and growth in the numbers of these invasive species could be their re-classification as animals which can be controlled via hunting. At present, the raccoon is classified as an introduced species which is undesirable in the environment but which can only be killed by game wardens. Experience with non-autochthonous predators in both the Czech Republic and abroad suggests that if their occurrence isn't suppressed in the early states of expansion (which is now underway), it will quickly grow to dimensions which can no longer be dealt with by available means.

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Raccoons in Budapest Zoo

Photo: Milan Kořínek