

Can a breeding program save the Common Midwife Toad in Flanders, Belgium?

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Loss and degradation of its habitat have led the Common Midwife Toad (*Alytes obstetricans*) in Flanders, Belgium, into a very precarious state. A Species Protection Program was launched in 2017. This is an official policy document with binding commitments. It proposes all kinds of measures, including the establishment of a breeding program as a last measure to strengthen existing populations and to establish new ones.

Midwife Toads are small amphibians (approximately 5 cm) that only occur in western Europe and north-western Africa. The Common Midwife Toad is the most widespread species of this genus. It is native to parts of Portugal and Spain, France, Switzerland, Luxembourg, Germany, Belgium and the Netherlands. Its name refers to the parental care behaviour of the males who wrap the fertilised egg strands around their hind legs and take care of them until the time of hatching, when the tadpoles are deposited into the water. The downside of this elaborate care is that only a few eggs are laid. Egg strands seldom contain more than thirty eggs. Thus, failed reproduction may quickly endanger small populations. The reproductive period extends over a long period, particularly during the warm summer months. Tadpoles that are deposited after the end of July will, however, mostly not leave the water in the same year, as they will spend the winter in the water. These animals will only metamorphose during the next (late) spring or summer.

The Common Midwife Toad poses specific demands to its terrestrial and aquatic habitats. In the northern parts of its range (including Belgium), the terrestrial habitat has to be warm, has to



Male Common Midwife Toad (*Alytes obstetricans*) carrying egg strands around the hind legs. Photo: Jeroen Speybroeck.

offer sufficient shelter, and has to be close to permanent, fish-free water.

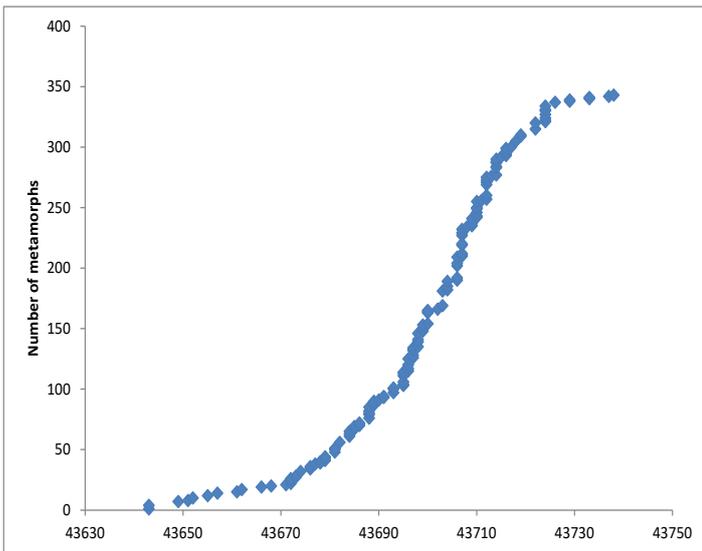
Until the second half of the last century, rural areas were unintentionally used and managed to the benefit of the species. For instance, cattle drinking ponds were available in close proximity to farm buildings, with worn-out joints and other crevices offering daytime, and winter shelter to adult animals. Active sand or stone quarries feature many open, warm patches, and the dug pits will fill up with fish-free water after a while. In recent times, however, cattle ponds have become less abundant and are not as well-managed. Joints in old buildings are neatly sealed, and old quarries are overgrown, with suitable, warm terrestrial habitat disappearing.

According to the most recent IUCN Red Data List of amphibians and reptiles in Flanders, the Common Midwife Toad is Threatened. If notable action is not taken soon, the species is likely heading towards the category Critically Endangered. At the European level, the species is included in Appendix II of the Bern Convention (1979) and Appendix IV of the Habitats Directive (1992).

The Species Protection Programme, developed by the Flemish Agency for Nature and Forests in 2017, aims to restore the number of midwife toads to a safe level in the remaining populations as soon as possible. This program will run for five years, and it is the first policy document containing precise, binding measures. In order to implement this plan, government agencies, scientific institutions, universities and non-profit organisations have joined forces. The remaining suitable terrestrial and aquatic habitats are examined, all known Flemish populations are monitored in a standardised way, and a breeding program will support the recovery of the populations.



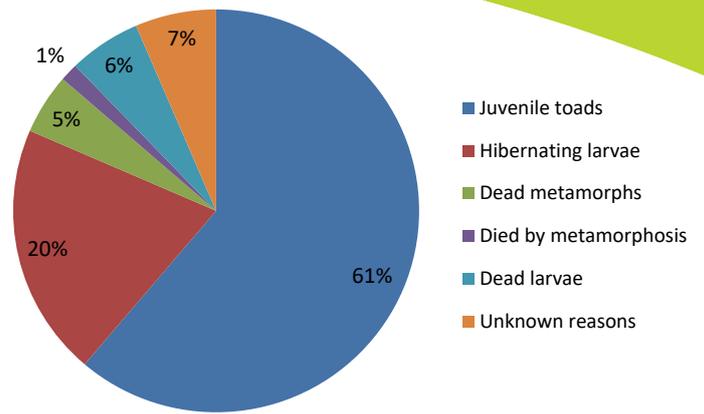
Midwife toad larvae eating blanched organic endive. Photo: Johan Auwerx.



Number of tadpoles that successfully made the transition to the terrestrial phase.

First results

In the summer of 2019, the Research Institute for Nature and Forest (INBO) started a breeding program, funded by the European LIFE BNIP program (LIFE14 IPE BE 002 BNIP). Midwife toad tadpoles were collected from the remaining five Flemish populations. As these populations are very small and likely to have undergone genetic erosion, larvae from Wallonia (southern Belgium) and the Netherlands were included as well. In total, 557 tadpoles from thirteen different populations were collected from the end of June to the beginning of July 2019, ranging from 1 to 171 individuals per site.



Fate of 557 collected tadpoles of the Common Midwife Toad at the end of the first rearing season.

To be able to ensure genetically balanced breeding groups, DNA samples were taken from all populations where tadpoles were collected. After their release, populations founded from or supplemented with captive-bred animals will be monitored. Information on the genetic profile will form the basis to evaluate the success of the breeding program, as well as that of site management measures.

Collected larvae were first placed in quarantine in the INBO breeding facility in Linkebeek. There, following a biosecurity protocol developed by Prof. An Martel and Prof. Frank Pasmans from the Wildlife Health lab of Ghent University in Belgium, they were

A fully developed juvenile Midwife Toad. Photo: Johan Auwerx.



treated to prevent amphibian diseases, such as chytridiomycosis, from entering the breeding group.

We aimed to have a minimum of 50% survival to metamorphosis. Larvae were given a varied diet, composed of blanched (organic!) endive and zucchini, frozen mosquito larvae, and algae flakes. They also appeared to nibble on dead conspecifics. With a water temperature of 25-30°C, offering a lot of food and regular water renewal, the larvae grew quickly, with only 6% mortality. As soon as the larvae developed four firm limbs, and before their tails began to reduce, they were transferred to smaller containers with lockable lids. During the period of metamorphosis (three to eight days), the animals may easily drown, therefore, they were put in containers with very shallow water and moist moss, stones and a limited number of small prey items (springtails, *Collembola*).

The first animals to leave the water were the larger tadpoles, and their advanced growth indicated that they hatched in 2018, hibernated as tadpoles, and were subsequently collected in 2019. Towards the end of July, the young of the year also started to metamorphose. By autumn, 341 of the 557 (61%) collected tadpoles successfully made the transition to the terrestrial phase, while 113 tadpoles (20%) were still in the water and would hibernate as larvae.

Mortality was limited, occurring at different stages. A limited number of larvae died during the rearing season (6%), some died during metamorphosis (1%), some as juveniles (5%), and some died or disappeared due to unknown causes (7%). To allow examination of cause of death at a later stage, all dead animals were stocked at -20°C.

At the end of the first rearing season, much better results were obtained than anticipated. A total of 341 juvenile toads and 113 tadpoles had survived. Thus, we actually had a surplus on what we had set as the required number to ensure genetically balanced breeding groups. Therefore, a number of animals were ready to be released in order to strengthen existing populations. Prior to their release, these surplus larvae (n = 99) and juvenile toads (n = 78) were screened for diseases (*Rana*-viruses and *Bd*). As the results were negative, they were subsequently released at three different locations.

Prospects

The young toads that remained in the breeding program are currently being raised until they become sexually active and until they are able to produce offspring for several successive years. Maturity is expected to be reached at the age of two or three years. The offspring will be released to strengthen existing populations but will also be used to establish new populations in locations optimally suited and managed for this purpose. To the best of our knowledge, large-scale breeding of this species has not been done before. INBO will draw up an optimal breeding protocol that can serve as a basis for similar tasks in neighbouring countries.



Small containers to support the critical period during which the animals exit the water. Photo: Johan Auwerx.

Monitoring

In 2019, standardised monitoring of all existing and recently lost populations of the Common Midwife Toad in Flanders was started by the NGO Natuurpunt. Together with a group of enthusiastic volunteers, calling male counts and larval surveys will be carried out over a period of three years, in order to obtain a detailed overview of the current state of conservation. As a first surprising result, the whistling call of seven Common Midwife Toads was heard again in a location where no observations have been made for ten years. Suddenly, it became the second most active population recorded in 2019. Hopefully, the Species Protection Program will bend the trend for this rare and intriguing amphibian.