The plight of the spadefoot toad in Belgium

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The spadefoot toads of the old world belong to the family Pelobatidae, an ancient family of frogs which is widespread in western Eurasia, the Near East and the extreme northwest of Africa. The six species in the sole extant genus (*Pelobates*) share a fossorial lifestyle, tunnelling backwards into sandy substrate using their rigid metatarsal tubercles (spades) and spending most of their lives underground.

The Common Spadefoot Toad (*Pelobates fuscus*) ranges through much of continental Europe. They are nocturnal, only surfacing when weather conditions are favorable. Under the cover of darkness they feed on a wide range of invertebrates before digging back into the substrate at dawn. Breeding occurs in Spring, when they enter their breeding waters and call from under the surface. Eggs are deposited in strands, each containing up to several thousand eggs. Larvae may grow to large sizes (over 15cm) and require ample food to reach metamorphosis. As with many amphibian species, the timing of metamorphosis is flexible. Spadefoot toad larvae usually start the terrestrial part of their life cycle at the end of Summer, as the larvae take several months to grow sufficiently large. Historically, the species is associated with seasonally flooded wetlands along rivers and streams, where vast areas of suitable water habitats are adjacent to sandy soils. In areas where these habitats have remained functionally present, spadefoot toads can be the most common amphibian species. However, this specific combination of habitat types has become scarce in Western Europe, where streams and rivers are canalised, floodplains have been drained and structural diversity of the surrounding habitats lost. As a result, spadefoot toads have adapted towards living in agricultural areas, especially in those environments where agricultural practices are small-scale and offer a variety of crops. In these anthropogenic environments, they breed in sufficiently large and deep cattle ponds. With the agricultural intensification of the last decades, functioning metapopulations in these secondary habitats were lost however, leading to small, relictual populations.

Adult female Common Spadefoot Toad (*Pelobates fuscus*). Photo: Loïc van Doorn.

Consequently, the Common Spadefoot Toad is declining substantially along the entire western edge of its range. The species has become locally extinct in Switzerland and Luxembourg and is deemed threatened in seven more West- and Central-European countries. In Belgium, after the extinction of several populations over the last decades, it has become restricted to two small and isolated localities. Next to loss of habitat and connectivity, further degradation, due to the introduction of invasive fish species, such as pumpkinseed, eastern mudminnow, brown bullhead and topmouth gudgeon in the breeding habitats, resulted in reduced larval survival, aggravating the population declines in Belgium.

Part of the breeding facility Research Institute for Nature and Forest in Belgium, which has a permanent flow system. Photo: Johan Auwerx.

Common Spadefoot Toad egg strands can contain up to several thousand eggs. Photo: Jeroen Speybroeck.

A large Common Spadefoot Toad tadpole. Photo: Loïc van Doorn.

To turn the tide, the Agency for Nature and Forest of the Flemish Region (ANB) issued a protection program for the species, including a reintroduction effort, assigned to the Research Institute for Nature and Forest (INBO). To this end, each Spring, egg strands are collected in the two populations. They are then reared into fully grown larvae and metamorphosed juveniles, that are subsequently released to restock the remaining populations and (re)introduce spadefoot toads in suitable habitats within their historical range. Prior to the reintroductions, management efforts have resolved habitat issues that led to the initial demise of the spadefoot toad populations.

Egg strands are reared *ex situ* in the specialised breeding facilities of INBO. As such, survival and growth can be maximised, while maintaining a disease-free stock. In 2020, 11,465 larvae and 190 juveniles were released into the two extant and two historical populations. In 2021, however, very few egg strands could be collected, possibly due to atypically cold and dry Spring weather, highlighting the need for additional sources to allow for a continued successful introduction effort. Two solutions are currently being worked out. A breeding stock of native animals is being built up, to allow for captive breeding of spadefoot toads. Next to captive breeding, collection of egg strands or larvae from healthy populations or breeding stocks in neighbouring countries could offer major advantages in terms of enhancing quality and quantity of the available material. Both as a backup in case of failing natural and/or captive local reproduction, as well as to increase the genetic diversity.

The aim is to repopulate high-potential habitats for spadefoot toad with larvae and juveniles during at least four consecutive years, ensuring a natural population structure. Thus, depending on the available larval stock, spadefoot toads will be introduced into a subset of predetermined locations before moving on to other potential locations. This rationale has successfully been implemented in the Netherlands, where spadefoot toads are once again heard calling all over the country. Hopefully, Belgium can likewise become a safe haven for this emblematic species.