



Reducing disease risks in captive amphibians and protecting our wild native amphibians from invasive disease

If you keep amphibians, it is important that you ensure disease does not pose a risk to captive or wild amphibians. In addition to a newly-emerged pathogen called *Batrachochytrium salamandrivorans*, there are other amphibian diseases that are a cause for concern, including *Batrachochytrium dendrobatidis* and ranaviruses. There are also diseases that we do not yet know about. This leaflet provides information and guidance on what you can do to reduce disease risks to captive and wild amphibians in Europe.

Chytrid fungi - There are two species of chytrid fungi known to infect amphibians: *Batrachochytrium dendrobatidis* (Bd for short) and *Batrachochytrium salamandrivorans* (Bsal for short). Bsal is a relatively recently discovered species of chytrid fungus that can kill a wide range of newts and salamanders. This fungus has become established in a few wild amphibian populations in parts of Europe where it is causing devastating population declines. It is thought to come from Asia and to be spread internationally mainly by the amphibian trade. Unless all concerned (e.g. pet traders, scientists and amphibian keepers) take great care and apply some simple biosecurity measures, there is a risk that it could be introduced to captive and wild amphibian populations across Europe and elsewhere. **Bsal has already been found in captive newts and salamanders in Europe and has driven population declines in wild salamanders in The Netherlands, Belgium and Germany.**

Bd can infect and kill frogs, toads, newts, salamanders and caecilians. Bsal is known to infect newts, salamanders, frogs and toads but is only known to kill newts and salamanders. Often animals can carry chytrid infection without signs of disease for weeks or months, during which time they are infectious to other animals.

Chytrid fungi can be spread by direct contact between animals or from contaminated materials, such as water, equipment, soil, gravel, aquatic plants, etc. The fungi can persist in the environment without amphibians for several weeks.

For both Bd and Bsal, non-invasive skin swabs can be used to diagnose infection. Treatments are available for sick animals and to eradicate infection from animals carrying chytrid fungi.

Ranaviruses - There are several strains of ranavirus and some have been linked to amphibian mass mortalities around the world, including in Europe. In Spain and the UK they have been implicated in long-term amphibian population declines. Ranaviruses are present in the international pet trade and non-native strains could be extremely dangerous to European wildlife, especially to frogs and toads, but also to newts and reptiles. (Some ranaviruses are known to kill snakes and chelonians).

Ranaviruses are spread through direct contact between animals or from contaminated materials. These viruses can remain infectious for long periods of time (months or years) in water and pond sediment.

As internal tissues are required to make a diagnosis, there is currently no reliable diagnostic test for live animals. No treatment is available for ranavirus infection.

Neither chytrid fungi nor ranaviruses can infect or cause disease in people.

Signs of disease

Amphibian disease can usually not be diagnosed based only on physical signs and ante- and/or post- mortem laboratory testing is required to provide robust diagnoses. Many of the below signs of disease (especially inappetence, skin lesions, excessive skin sloughing, lethargy and loss of coordination) can also be due to sub optimal husbandry practices in amphibians, and probably also to disease caused by as yet unknown pathogens.

Newts or salamanders with Bsal can lose weight and body condition, develop skin ulcers and they may become listless and show incoordination, but they might just be found dead.

Amphibians sick with Bd infection may have reddening or excessive shedding of their skin, ulceration of their toes, or unusual behaviours such as terrestrial animals sitting in water for longer periods than normal. In many cases, however, apparently healthy animals are simply found dead.

Amphibians sick with ranavirus may develop skin ulcers or reddening of the skin. In acute cases, affected animals might vomit bloody mucus or pass blood from the vent, or apparently healthy animals can be found dead.

More information on the signs of different amphibian diseases can be found at: <http://www.gardenwildlifehealth.org/disease-factsheets/factsheets/>

If you find sick or dead amphibians

Please report any sick or dead amphibians found in the wild

In the UK Garden Wildlife Health at: <http://www.gardenwildlifehealth.org/>

In mainland Europe to the relevant contact on the “Report cases” tab at www.bsaleurope.com

What else can you do?

Following the advice below will help minimise the risk of inadvertently spreading amphibian diseases within or between captive collections and also to wild populations:

- Never release any (native or exotic) amphibians from captivity into the wild.
- Never transfer wild amphibians between sites. Do not stock ponds with spawn/tadpoles/adult amphibians – they will colonise new ponds naturally (and often surprisingly quickly).
- Do not assume that a healthy looking animal is free of infection; some animals can act as carriers without exhibiting signs of disease. Adopt the precautionary principle and manage all amphibians as if they are infected.
- Know the health status of your collection. Get your animals tested routinely and ensure any dead amphibians are submitted for post mortem examination.
- If dead animals are not submitted for testing, care should be taken when disposing of them. They should be incinerated or buried in such a way that scavenging animals cannot access them.
- Quarantine new arrivals and screen for chytrid infections on arrival with multiple tests across the quarantine period. Any positive animals should be treated under veterinary supervision and give negative results in two tests, two months apart before being added to your collection.
- Avoid keeping amphibians in outdoor enclosures as they may come into contact with native wild amphibians and infect them with disease agents (even if the captive animals appear healthy).
- Do not clean tanks or vivaria outside where there is a possibility of contaminating areas used by wild animals.
- Disinfect all waste water from amphibian enclosures. Bleach, Virkon, Safe4 and F10 are the names of some disinfectants that will kill the majority of amphibian pathogens provided the manufacturers’ guidelines are followed. Disinfected waste should be discarded in a way that minimises environmental contamination.
- To avoid spreading disease within a collection, disinfect equipment between enclosures or have dedicated equipment for each enclosure. Equipment and furnishings should be regularly cleaned and disinfected, with waste water discharged into the sewer system.
- Substrates (soil, sand, gravel, etc.) can harbour infections and should be discarded carefully. Ideally these should be sent for incineration by a registered company that can dispose of clinical waste (e.g. those used by veterinary practices). If this is not possible, disinfect and dispose with the household refuse for collection by your local council. Smaller quantities of substrate can be desiccated and/or heat treated within domestic facilities, e.g. using an oven, before disposal if incineration is not feasible.
- Register with a veterinary surgeon who has an interest in, and knowledge of, amphibians (see the special interest list on www.bvzs.org (in the UK) or using the “find a specialist” function on www.eczm.org (across Europe)) and seek advice on keeping your collection healthy.