

How to standardise Fire salamander research, get help from citizen scientists but minimise the risk of spreading the “Salamander Plaque”

Lara Gemeinhardt¹, Tim Borutta^{1,2}, Sebastian Steinfartz¹ & Timm Reinhardt^{1,3}

¹University of Leipzig, Institute of Biology, Molecular Evolution and Systematics of Animals, Talstraße 33, 04103 Leipzig, Germany

²University Duisburg-Essen, Universitätsstraße 2, 45141 Essen, Germany

³Bundesamt für Naturschutz (BfN), Konstantinstraße 110, 53179 Bonn, Germany



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The fire salamander (*Salamandra atra*) typically inhabits broadleaf forests in low-mountain ranges with first-order streams throughout Central and Western Europe. There are only a few optimal rainy spring and autumn nights each year to encounter adult fire salamanders in the field. Therefore, we use a coordinated approach involving citizen scientists.

Since its first description in 2013 in the Netherlands, the chytrid fungus *Batrachochytrium salamandrivorans* (*Bsal*) caused several mass declines in fire salamander populations. *Bsal* feeds on the creatin of the skin of urodeles causing the disease chytridiomycosis, also called “Salamander Plaque”. Salamanders or newts infected with *Bsal* show lesions and ulcerations of the skin. Infected urodeles develop secondary infections that lead to a septic shock. Infected fire salamanders typically die within a few weeks after infection.

Bsal arrived in the Ruhr District (Germany), in 2017 which resulted in crashes of several fire salamander populations. The Ruhr District is now a hotspot for *Bsal* together with the Eifel mountains.



What are we doing?



Since 2018 we have been monitoring a fire salamander population in the south of the city of Essen in the Ruhr District (North Rhine Westphalia, Germany) to investigate the development of this population with the occurrence of *Bsal*. In 2023, we started to involve citizen scientists to help find more Fire salamanders during a perfect salamander night. This is primarily important for our research but also helps to educate citizens on how to act and behave appropriately in the field to counteract further spreading of *Bsal* in amphibian populations.

At first, we contacted the NABU in Essen and students from the University Duisburg-Essen to find volunteers. Then we planned the field trips.

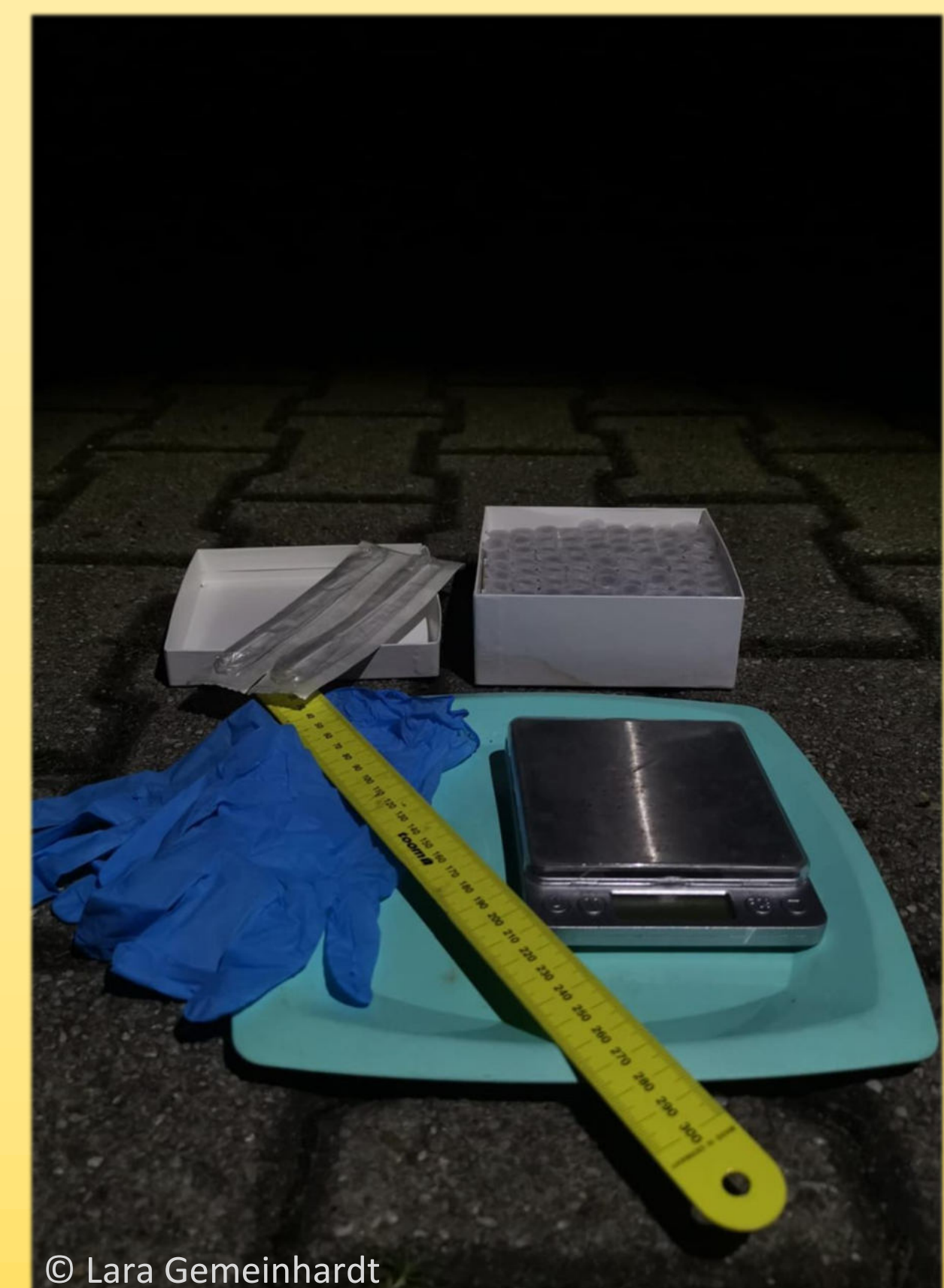
In the field we **1. briefed and educated** the volunteers about *Bsal* and how to behave in the field. Then we **2. started to search** for fire salamanders in groups, where each group was equipped with nitrile gloves, swabs, Eppendorf tubes, a scale, a ruler, and Ethanol. When a fire salamander was found, it was **3. swabbed** with two swabs first and then **4. examined** by looking closely if there were any anomalies on the skin and by measuring the weight and total length. All measurements as well as the position and the condition of the animal were then **5. documented** and a photo of the back pattern was taken for the capture-recapture study. After the work in the field, all shoes were **6. disinfected** thoroughly at the meeting point, and the used materials were disinfected and cleaned directly at home following a concrete **hygiene standard**. All samples were stored in a freezer until the **7. analysis** with a qPCR in the laboratory of the University Leipzig.



Hygiene standard is key!

1. Single usage of nitrile gloves while handling the animals
2. Use materials that are easy to disinfect (e.g., plastic or metal) no wood or soaking materials!
3. All materials that have been used in the field must be disinfected afterward with 70-80% Ethanol or 1% Virkon S solution.
4. All shoes, that were worn in the field must be cleaned and disinfected properly (both when entering and leaving the field site)!
5. Clothes worn in the field should be washed before being worn elsewhere.

Respecting these hygiene rules helps to prevent the spreading of *Bsal*!



Contact

Lara Gemeinhardt: LarGem@web.de

Tim Borutta: tim.borutta@stud.uni-due.de

Dr. Timm Reinhardt: Timm.Reinhardt@uni-leipzig.de

Prof. Dr. Sebastian Steinfartz: steinfartz@uni-leipzig.de

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