

## Langzeituntersuchung (1987–2016) zum Laichgeschehen einer Metapopulation des Grasfrosches (*Rana temporaria*) im Spessart (Nordwestbayern) und die Auswirkungen nach Einwanderung des Bibers (*Castor fiber*)

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### Long-term study (1987–2016) of spawn counts and spring phenology in a metapopulation of the common frog (*Rana temporaria*) in the Spessart (northwestern Bavaria), and the effects of beaver (*Castor fiber*) immigration

We analysed the spawning phenology and counted egg clumps of a meta population of the common frog *Rana temporaria* in 30 ponds at the Kaltengrund valley in Bavaria, Germany, between 1987 and 2016. We used yearly spring weather data (e.g. temperature and precipitation sum) to test for correlation with spawning parameters. Duration of spawning period varied from 15 to 43 days, beginning between 13<sup>th</sup> of February (in 2004) and 11<sup>th</sup> of March (in 2006). During 20% of all years, spawning began in the 2<sup>nd</sup> decade of February, in 50% of all years in the 3<sup>rd</sup> decade. Number of spawn counts per cluster vary between 1 and 233. About 35% of all clusters had less than 10 clumps, about 19% more than 50. Total egg clump counts in all ponds per year vary between 661 in 1995 und 1,659 in 2015, significantly increase over years partly due to increasing pond number in the valley. Possible other reasons for this development are discussed. Total number of egg clumps was not affected by temperature sum nor precipitation sum in the year prior to a spawning period. Neither begin, nor median or end or duration of spawning period showed a significant trend over the 30 years as was initially expected with respect to climate change although spawning phenology in a single year is strongly correlated with temperature sum in February and March. Likewise, total population size of frogs does not significantly affect spawning phenology. Since the beaver appeared in the valley in 2012, he built 21 dams that strongly altered hydrodynamics of ponds and changed egg cluster distribution of frogs in the valley. The number of small clusters with less than 10 egg clumps increased to 64% as well as the number of cluster sites increased to 34. In 2015, more than 40% of all egg clumps were found in beaver ponds.

**Key words:** Common frog, *Rana temporaria*, phenology, spawning period, spawn counts, climate change, beaver, *Castor fiber*.

### Zusammenfassung

Über einen Zeitraum von 30 Jahren (1987–2016) wurden Ablaihbeginn, Länge der Laichperiode sowie Schwankung der Laichballenzahl einer Metapopulation des Grasfrosches an 30 Laichgewässern in einem Bachtal im Zentralspessart (Kaltengrund-