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The rise and fall of the introduced invasive signal crayfish in Sweden – sixty years with an alien.

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Abstract text

The North American freshwater species signal crayfish was introduced starting in the 1960ies to substitute the noble crayfish fisheries lost due to the lethal disease crayfish plague. Introduced species often show instable population dynamics and are known to collapse or oscillate heavily after passing through the initial growth phases. We use long-term semi-quantitative data on the invasive signal crayfish, capturing its population development after introduction in 44 Swedish lakes. In total 18 (41 %) of these populations had experienced a collapse. A stepwise discriminant function analysis including 20 different ecological or physicochemical characteristics identified three variables explaining collapses in this order: stocking year, population age and mean air temperature. Populations stocked in the 1980ies were more likely to collapse than populations stocked in the 1970ies. Lakes with collapses were located in areas with 0.4 C higher yearly mean air temperatures than still viable populations. Collapses also depended on the time phase of the population and started to occur 12 years after stocking and were most frequent in the interval 16–20 years after stocking and after 11–15 years duration of the established phase with harvestable densities. An analysis showed crayfish plague to be present in all signal crayfish populations but neither the level of prevalence nor the pathogen load in infested specimens differed between lakes with or without collapses. This highlights the potential sensitivity and instability of introduced crayfish. The importance of density dependence and temperature suggest that both climate variability and fisheries can influence these processes. If the occurrence of these collapses were generally known the sadly frequent illegal introductions of signal crayfish taking place today, threatening the critically endangered native noble crayfish, would probably decline or even cease. This would be beneficial both for the conservation of the noble crayfish and for the fishery in itself.