

1 **Long-term monitoring of an amphibian community after a**
2 **climate change- and infectious disease-driven species**
3 **extirpation**

4
5 **Running head:** amphibian monitoring and global change

6
7 **Jaime Bosch^{1,2*}, Saioa Fernández-Beaskoetxea¹, Trenton W. J. Garner⁴ & Luis**
8 **María Carrascal¹**

9 ¹Museo Nacional de Ciencias Naturales-CSIC, José Gutiérrez Abascal 2, 28006 Madrid,
10 Spain

11 ²Centro de Investigación, Seguimiento y Evaluación, Parque Nacional de la Sierra de
12 Guadarrama, Cta. M-604, Km. 27.6, 28740 Rascafría, Spain

13 ³Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY,
14 UK

15
16 *Author for correspondence (+34677772402; bosch@mncn.csic.es)

17 **Keywords:** wildlife diseases, chytridiomycosis, climate change, global amphibian
18 declines, amphibian monitoring

19 **Paper type:** primary research article

20

21 **Abstract**

22 Infectious disease and climate change are considered major threats to biodiversity and
23 act as drivers behind the global amphibian decline. This is to a large extent based on
24 short term studies that are designed to detect the immediate and strongest biodiversity
25 responses to a threatening process. What few long term studies are available, although
26 typically focussed on single species, report outcomes that often diverge significantly
27 from the short term species responses. Here we report the results of an 18 year survey of
28 an amphibian community exposed to both climate warming and the emergence of lethal
29 chytridiomycosis. Our study shows that the impacts of infectious disease is ongoing but
30 restricted to two out of nine species that form the community, despite the fact all species
31 can become infected with the fungus. Climate warming appears to be affecting four out
32 of the nine species, but the response of three of these is an increase in abundance. Our
33 study supports a decreasing role of infectious disease on the community, and an
34 increasing and currently positive effect of climate warming. We caution that if the
35 warming trends continue, the net positive effect will turn negative as amphibian
36 breeding habitat becomes unavailable as water bodies dry, a pattern that already may be
37 underway.