**Appendix S1: Methods of systematic literature review of papers analyzing biological responses to weather.**

In July-August 2015 four of the authors (MvdP, LDB, NM, LR) systematically searched the scientific literature for recent papers that analyzed how one or more weather variables affected any type of biological response variable on any type of organism. We used the search engine Google Scholar ([www.scholar.google.com](file:///C:\Users\u4620427\SkyDrive\Data\HowTo\MS\www.scholar.google.com)) and the search terms: ‘climate’, ‘biology’, ‘response’. Results were constrained to the years 2012-2015 (each author focusing on one year) and we investigated the resulting papers in order of appearance in the search results from Google Scholar, which means—due to the way that google scholar search algorithm works—that we focused on papers that were most often looked at by people, and also generally more highly cited than papers that appeared lower in the search results and were not included in the systematic review.

For each paper in the search results we read the title and abstract, and when required also read parts of the paper to assess whether it (1) concerned a peer-reviewed and original research paper (reports, book chapters, PhD theses, reviews, and responses to other papers were excluded), (2) studied the effect of a weather variable on a biological response variable, and (3) contained a quantitative analysis to determine which (set of weather) variable(s) in what way affected the biological response variable. We classified each paper whether it met these selection criteria or not, until we obtained a set of 50 papers that met the above criteria (out of 152 papers investigated).

For the 50 papers that met the inclusion criteria we read the paper in detail. If a paper analyzed many response variables, we focused on a single response variable (the first one mentioned in the paper) and scored the following information:

1. The type of biological response variable (phenological, physiological, behavioural, demographic, population, metapopulation/species, community).
2. The type of model organism (microbe, plant, invertebrate, mammal, bird, fish, reptile, amphibian).
3. Number and identity of all weather variables considered (e.g. temperature, precipitation, humidity).
4. Justification of choice of weather variables (unspecified, confirmatory: based on other study same population OR based on other study different population OR based on other study different species OR reasoned from biological mechanism likely to be involved, explorative (tried many different variables)).
5. Whether interactive effects between weather variables were considered or not.
6. Did they address issues of collinearity (NO: not dealt with or not specified; YES: PCA-like methods; collinearity is taken into account when interpreting the biological relevance of the results).
7. The number of different environments (e.g. years or sites) that were sampled for the biological response variable (a measure of effective sample size)
8. The number of competing time windows considered in the analysis.
9. Whether absolute or relative time windows were used.
10. The type and number of aggregate statistics used (mean, sum/duration, growing degree/chill days, min/max, slope, range/variance/standard deviation)
11. Whether or not a nonlinear response curve was explicitly considered (note that a linear effect of a weather variable in a logistic or Poisson regression was scored as a ‘NO’)

If a paper considered multiple weather variables we scored points 8-11 for each weather variable.