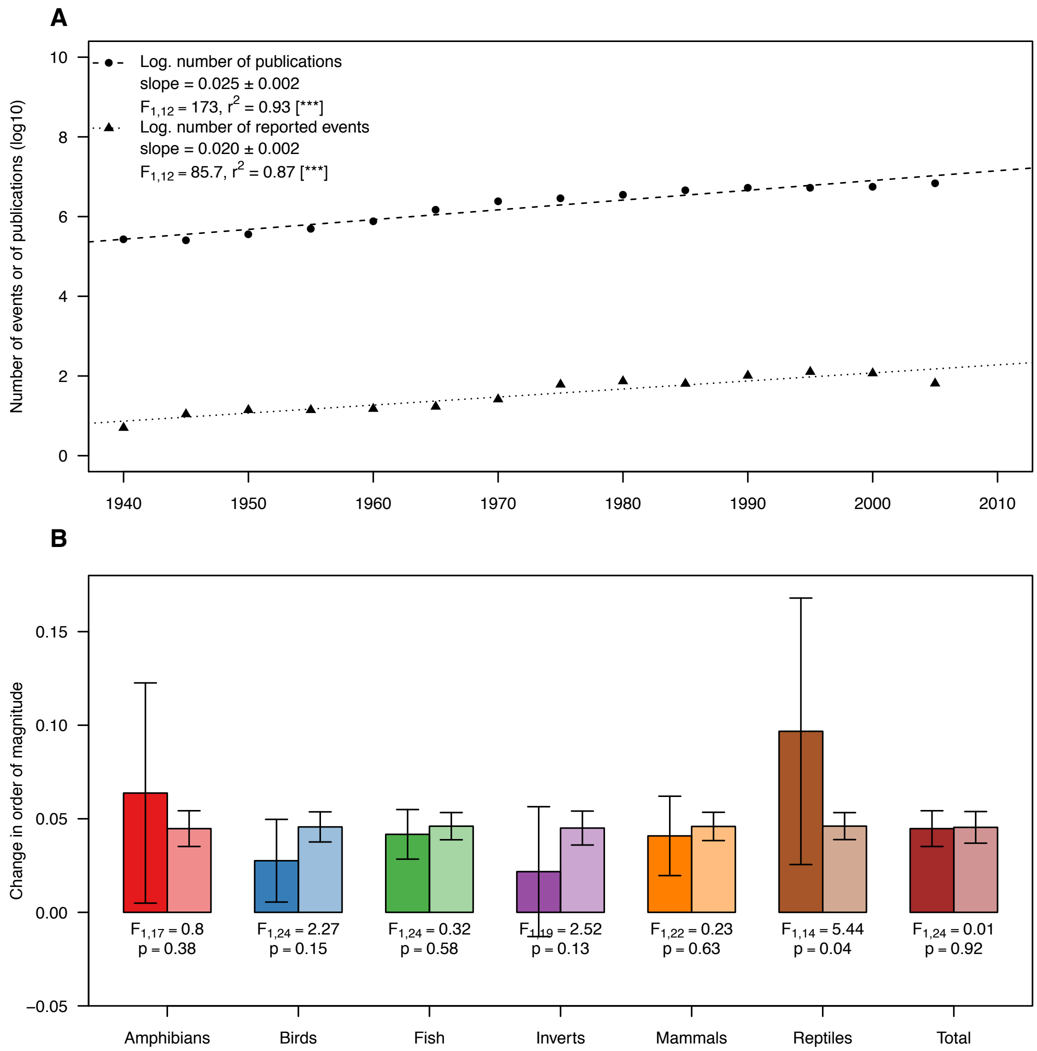

Figure S1. Examining potential publication bias in reported animal mass mortality events. (**A)** Both the number of reported mass mortality events and the number of publications for all taxa increase through time. (**B)** ANCOVA results comparing temporal trends between the number of publications for each taxon and the number of reported mass mortality events for each taxon. Bars are the slopes of each taxon-specific linear regression ± 1 SE. Darker colors correspond with reported numbers of mass mortality events and lighter colors correspond with total citations. The similar temporal trends between reported mass mortality events and publications related to each taxon suggest that some of the increases in reported mass mortality events may be attributed to an overall increase in productivity in the scientific community.

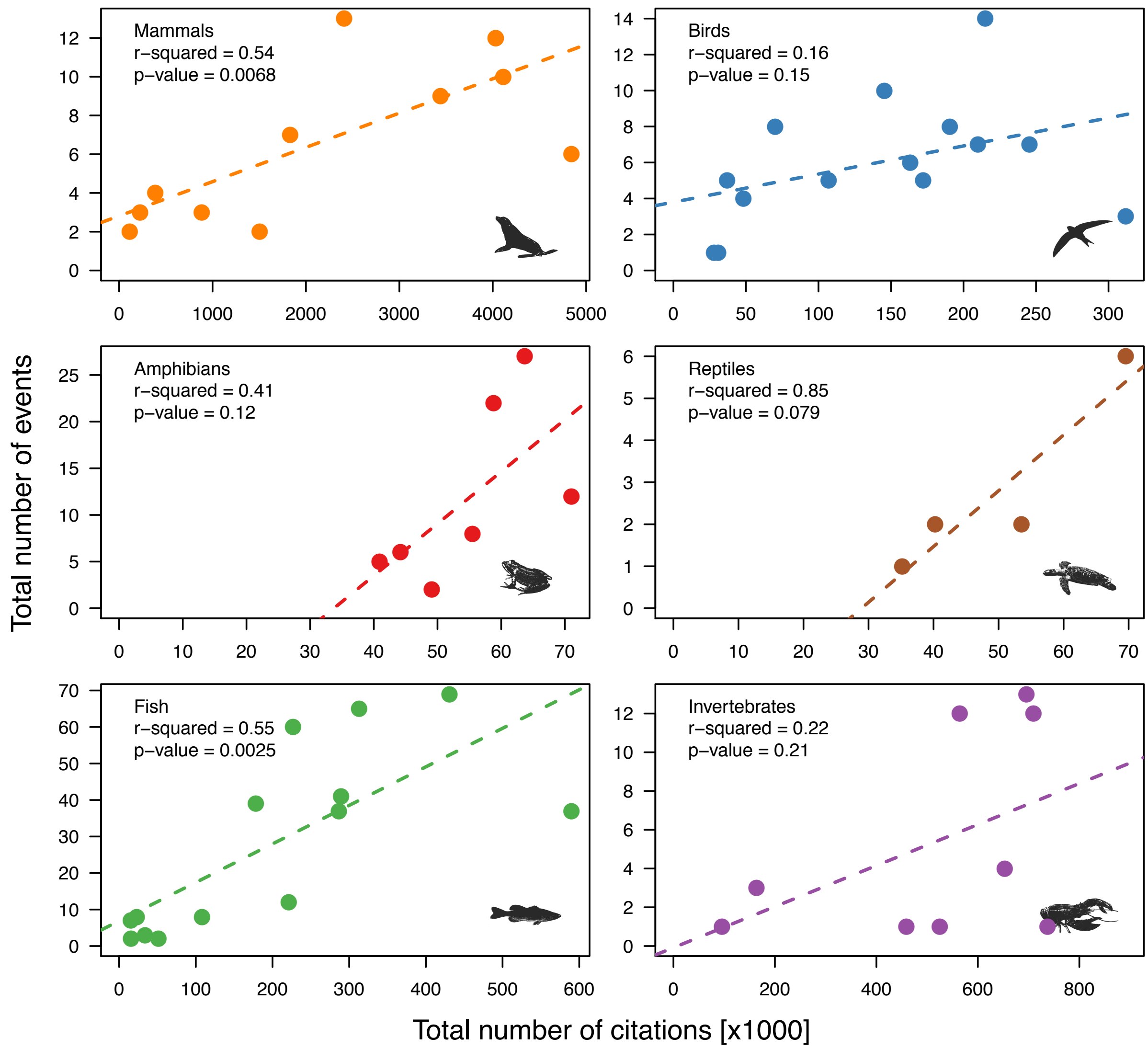

Figure S2: Variation in mass mortality events occurrence explained by the variation in taxon-specific publication trends. The number of mass mortality events for a five-year period for each taxon is plotted against the total number of taxon-related citations for the same five-year period (as depicted in Fig. 1). The percent of variance in reported mass mortality events not explained by the publication trends (1-r^2 values reported above) was on average 54.5% (Range= 15-84%), suggesting that much of the variation in mass mortality event occurence is not explained by a publication bias alone.

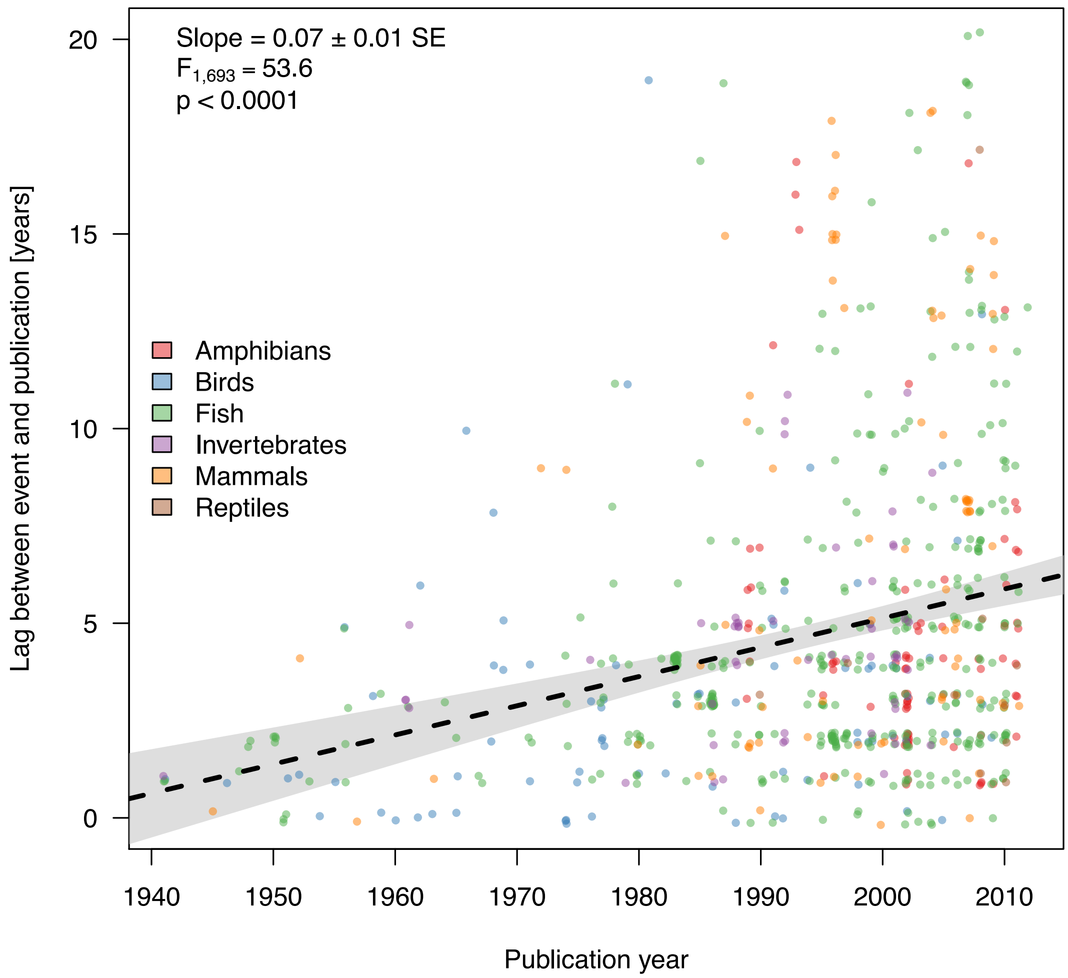

Fig. S3. Publication lag between the occurrence and publication of animal mass mortality events. The line is the least squares linear regression and the shading demarcates slope 95% confidence intervals. Each point is a single mass mortality event. The increased publication delay through time may be driven by an increase in the time that scientists take before publishing findings on a particular event, or by an increased tendency to utilize older, existing data. Regardless of the mechanisms behind this trend, this lag partly accounts for the recent decreases observed in the reported number of mass mortality events across all taxa (Fig. S4).

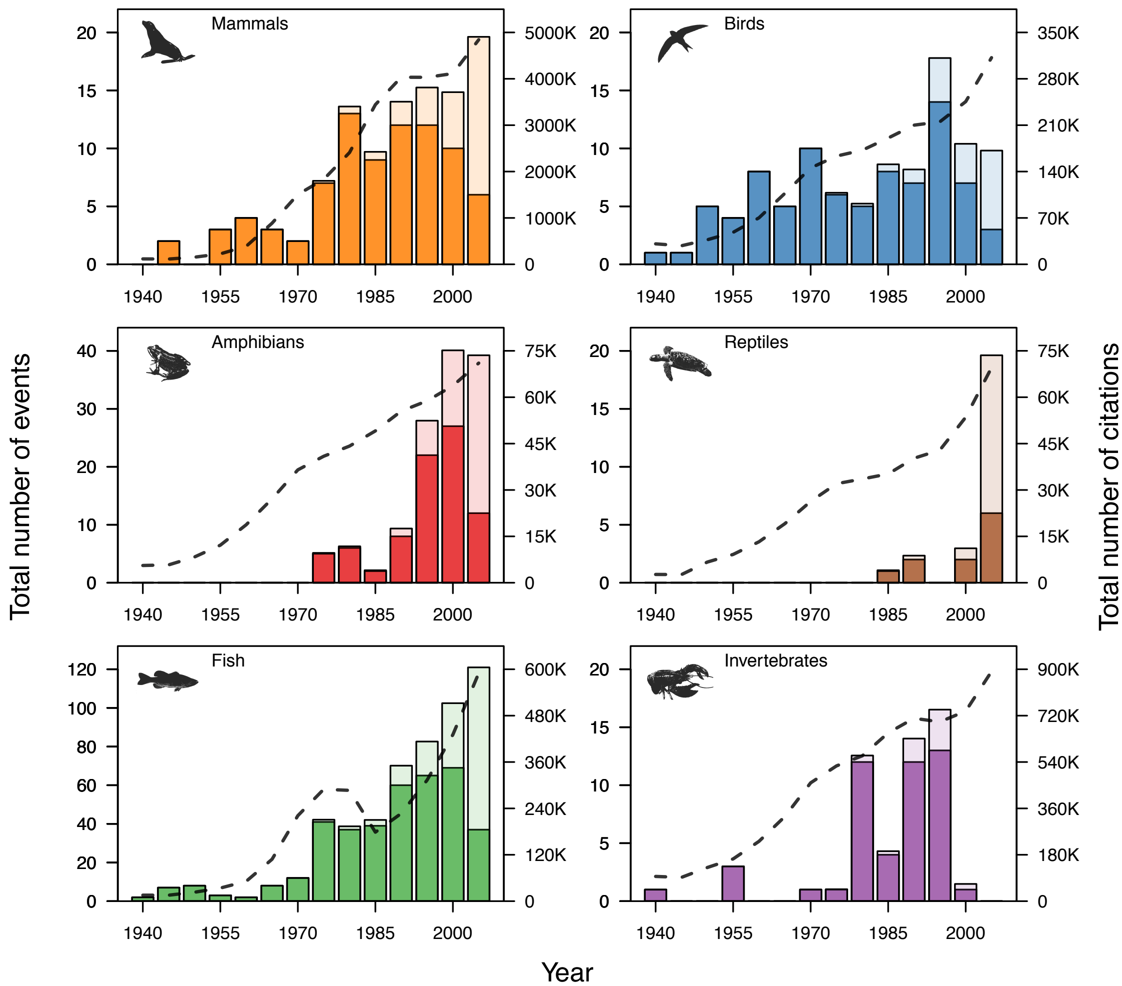

Figure S4: Occurrences of animal mass mortality events and taxon specific publication trends through time, corrected for predicted publication lags. Colored bars indicate the number of events over a 5-year interval (e.g., 1940 stands for the 1940-1944 period) and dashed lines show trends in the total number of papers published each year for each taxon. The faded portions of bars represent a conservative estimate of the mass mortality events which have occurred, but have not yet been published based on historical, taxon-specific lag times between the occurrence and publication of an event (see Materials and Methods).

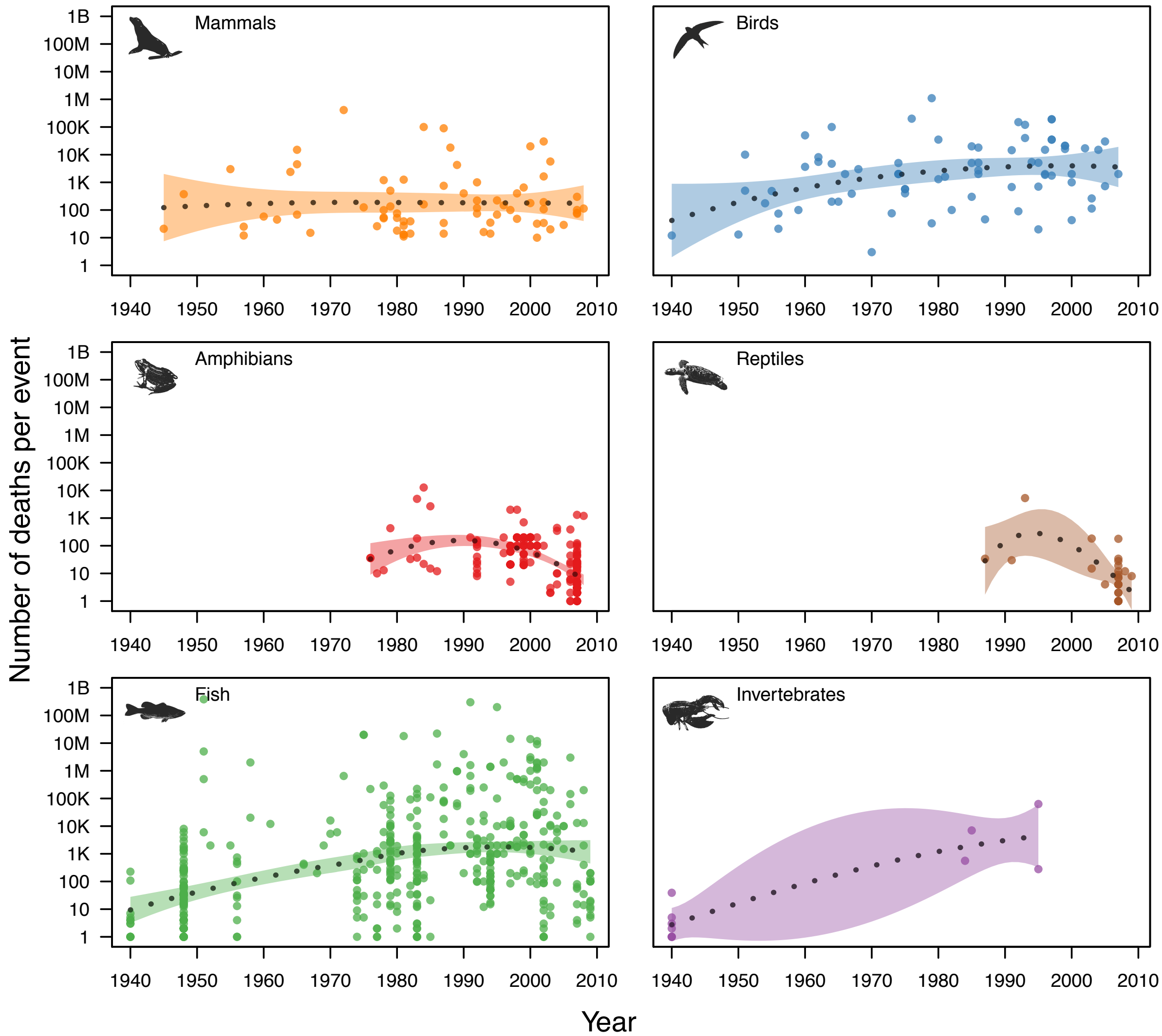

Figure S5: Non-parametric approach to resolving temporal trends in the occurrence of animal mass mortality events. Each point is a single mass mortality event. Dotted lines represent the estimated local regression (LOESS), and the fit for each year is computed with a weighted linear regression using all the points of the dataset. The weight is inversely proportional to the distance in years between the fitted point and the rest of dataset. Thus, the more distant the points, the smaller the weight. Here we used a standard tricubic weighting proportional to $[1 - (distance/maxdistance)^3]^3$, with *maxdistance* being 1.5 times the actual maximal distance (e.g., 70 years with data from 1940 to 2010). The shaded intervals demarcate the 95% confidence intervals.

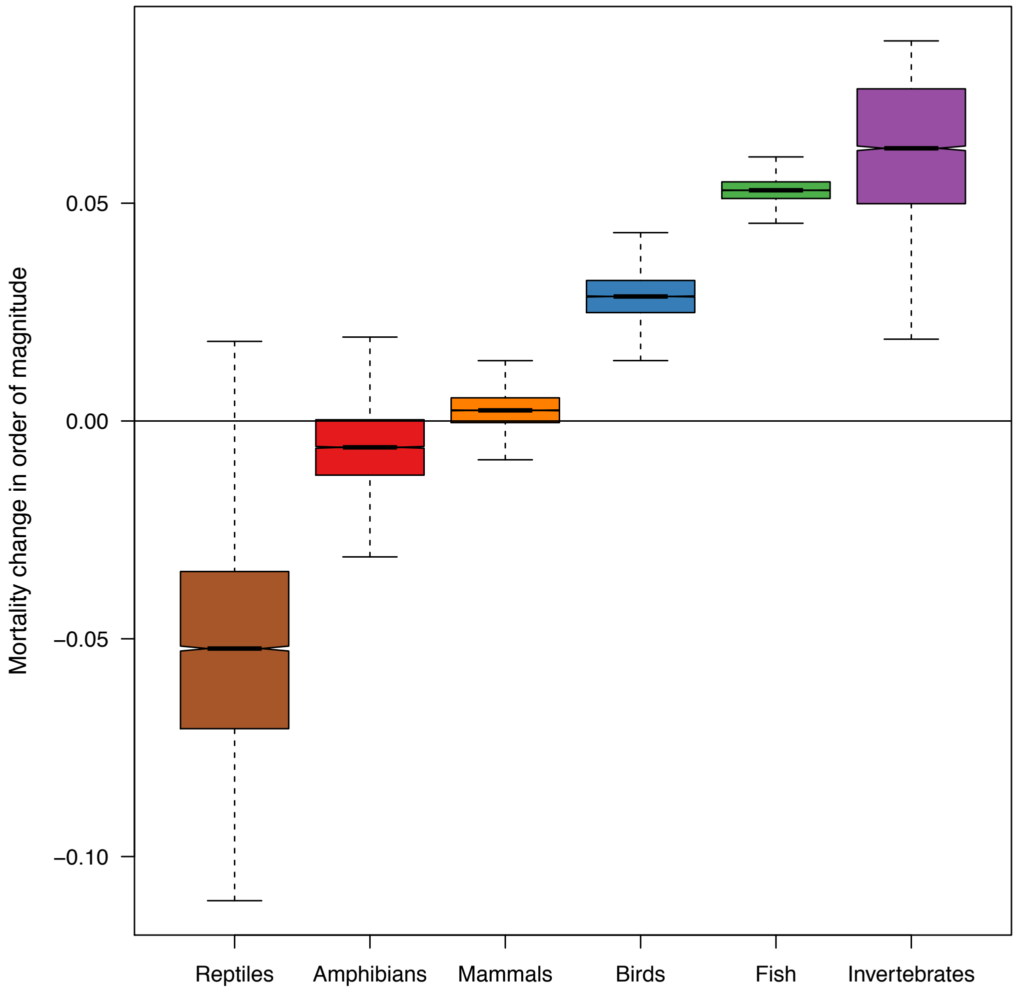

Fig. S6. Trends in mass mortality event magnitudes through time after accounting for uneven publication records. The plotted change in mortality rate from 1940 to 2010 was computed from 10,000 iterations of subsamples of mass mortality events and associated magnitudes with replacement. Boxes indicate taxon median ± interquartile range; whiskers indicate the complete range of data. The changes in mortality rate obtained from this iterative subsampling approach are consistent with the reported temporal trends in mass mortality event magnitudes (Fig. 2).

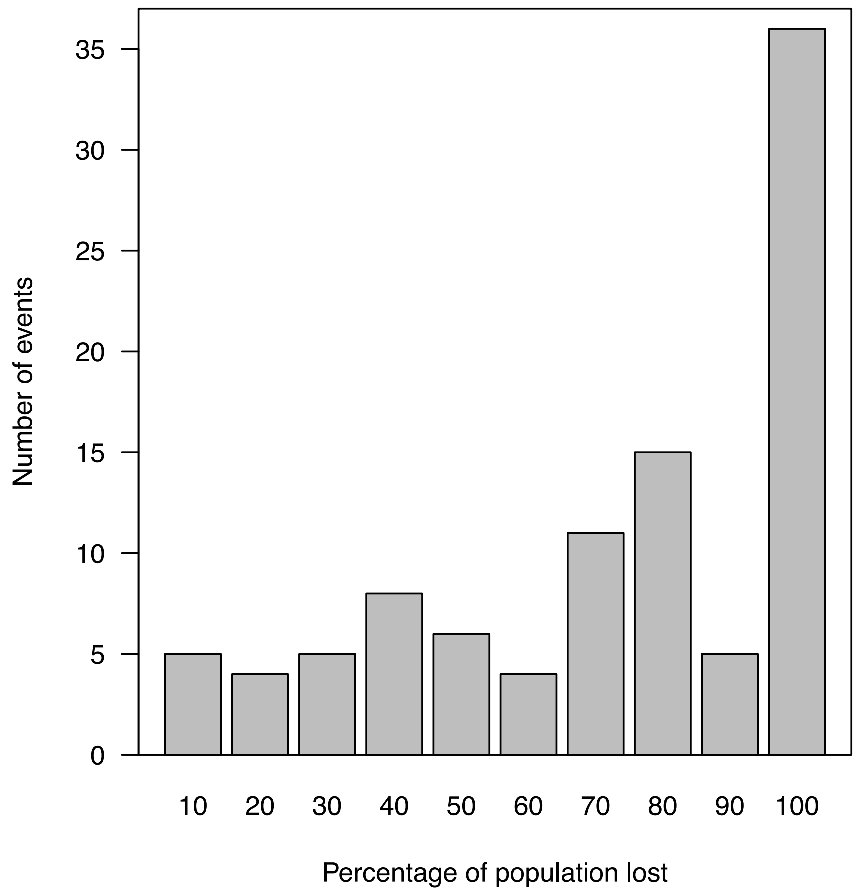

Fig. S7. Population-level losses from mass mortality events. The distribution of mass mortality event magnitude as defined by the proportion of the population removed per event. X-axis labels represent number of events accounted for by the ten percentage points preceding the listed number (e.g., 100% represents events that reported 91-100% population lost). The large proportion of high magnitude events may have resulted from reporting bias of researchers reporting only the most severe mortality events, or shaped by a negative correlation between small, easy to estimate population sizes, and high relative mortality events.

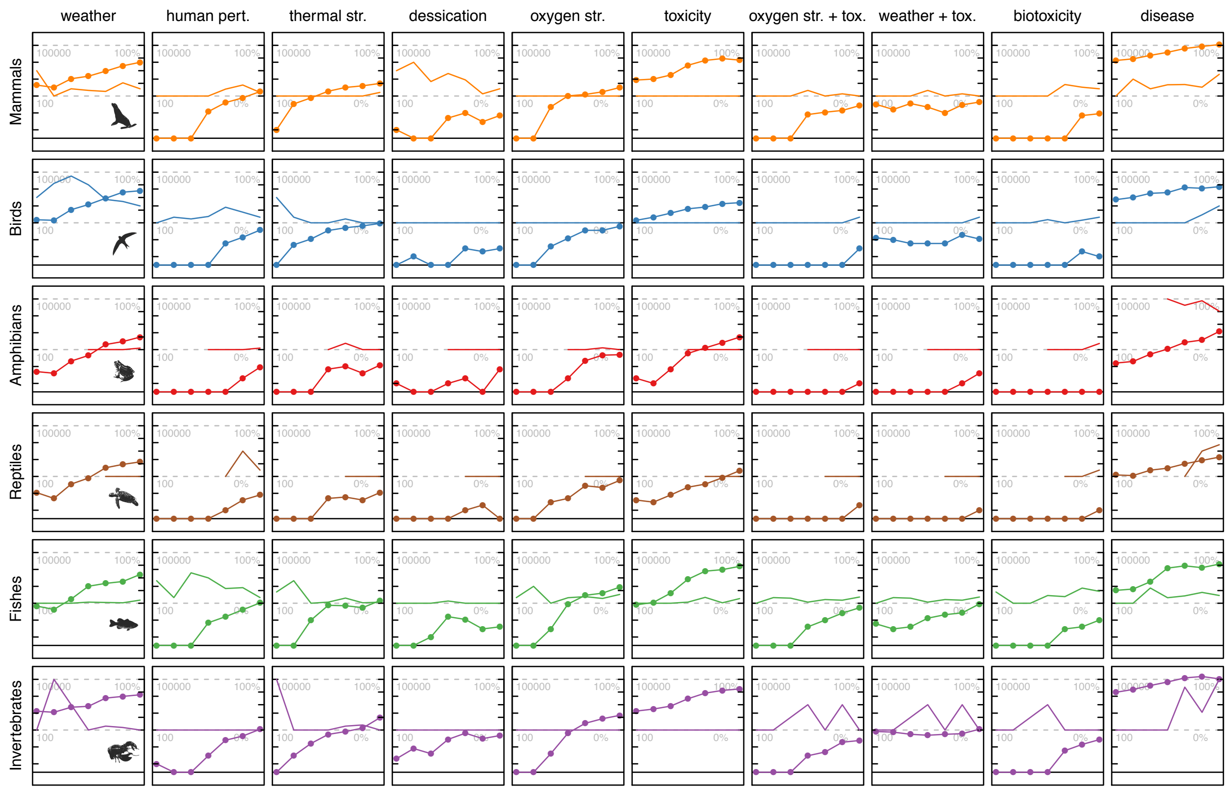

Figure S8: Trends in the relative occurrence of animal mass mortality causes compared to publication trends through time. The x-axis is time binned into 10-year intervals from 1940-1949 (furthest left) to 2000-2009 (furthest right). Thick lines connected by dots indicate the number of citations per decade using cause and taxa keywords (note $\log_{10}$ scaling of the left y-axis). Thin smooth lines represent the proportion of each cause (the right y-axis) within each taxon (data presented in Fig. 4). Columns show the causal categories that represent the nine most common causes of mass mortality events. Additionally, two of the most common combinations of causes contributing to events classified as multiple stressors "oxygen stress and toxicity" and "weather and toxicity" are included to show patterns associated with the "multiple stressors" category.

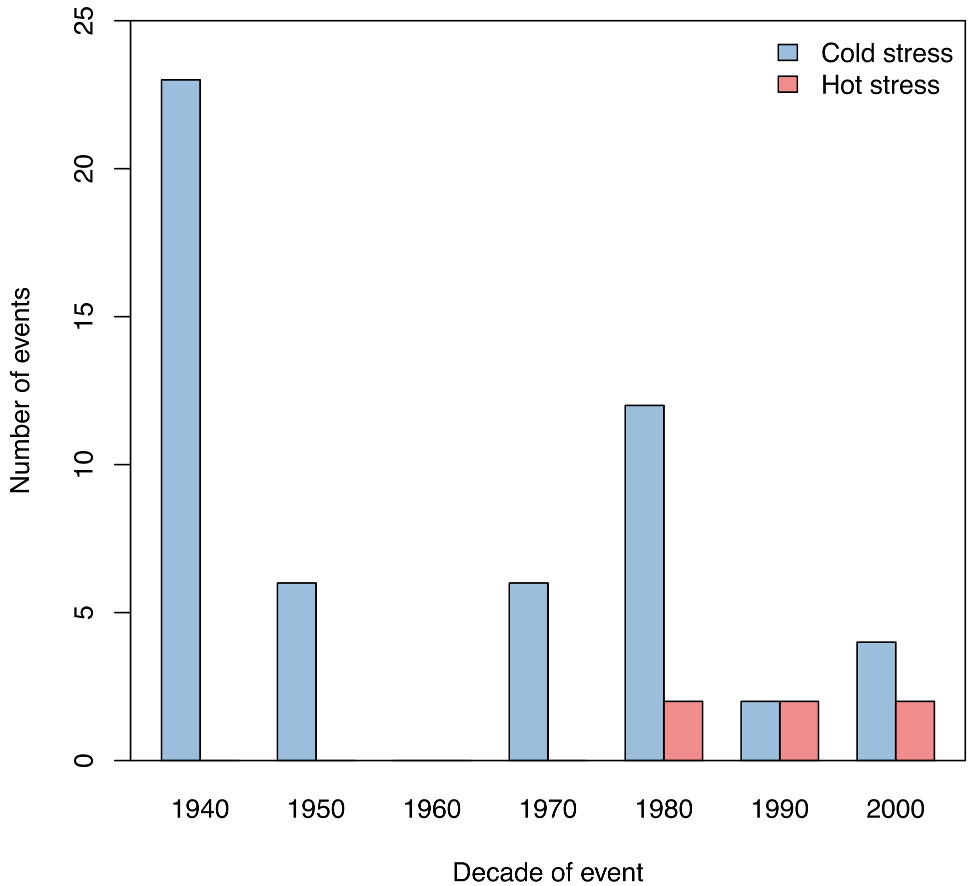

Figure S9: Temporal trends in the number of reported animal mass mortality events caused by cold thermal stress (blue bars) and hot thermal stress (red bars). Decade of event represents the ten-year period following the listed year (e.g., 1940 represents years 1940-1949). Mass mortality events attributed to cold thermal stress tended to decrease over time, while events caused by hot thermal stress did not appear in our database until the 1980s.

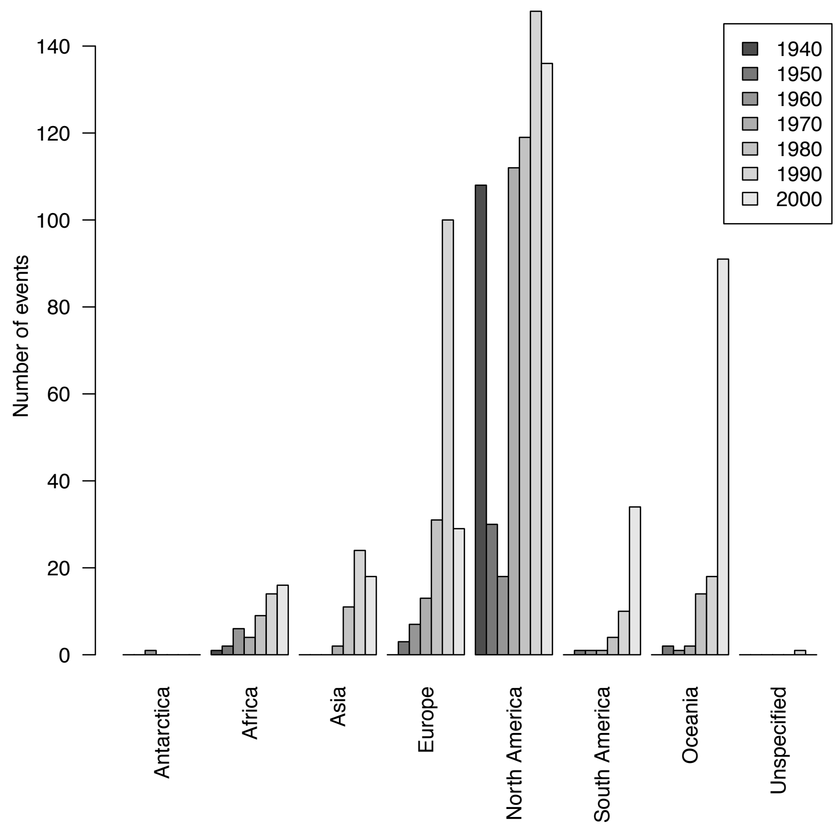

Figure S10: The number of reported mass mortality events through time occurring on each continent. This graphical analysis reveals a publication bias in where mass mortality events are reported, as 75% of all reported mass mortality events occur in Europe and North America.

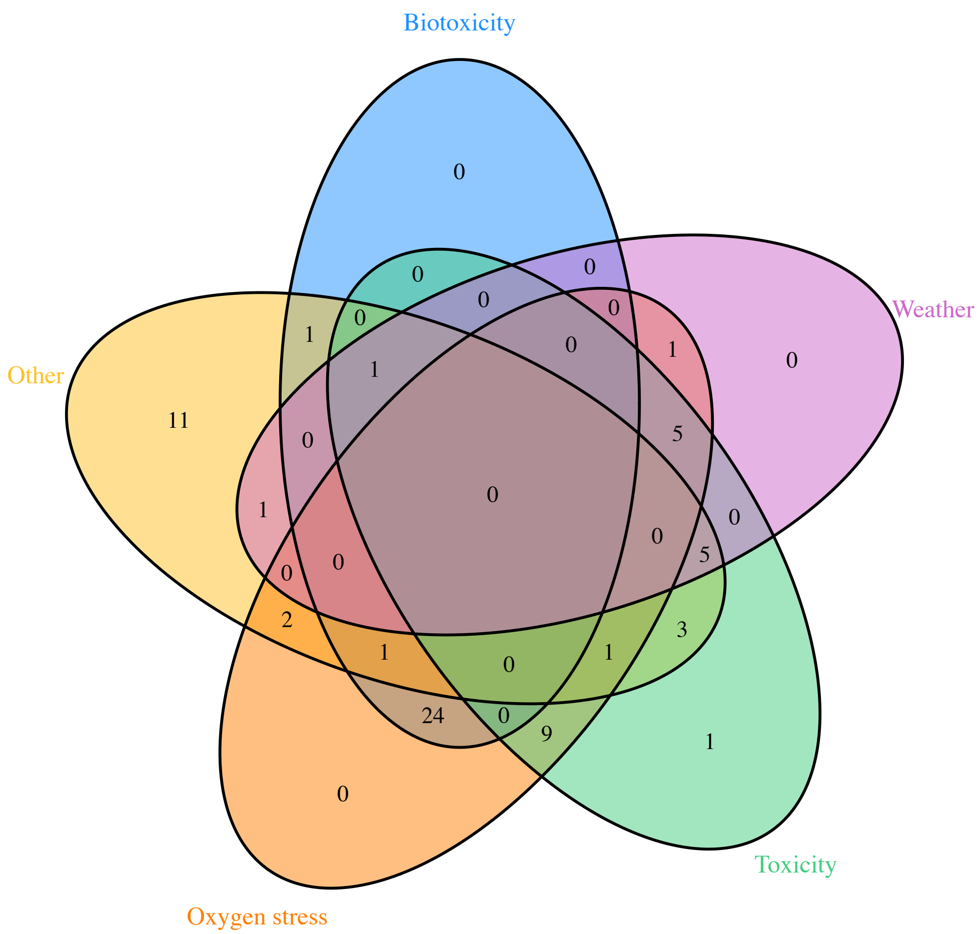

Figure S11: Commonalities among contributing stressors to animal mass mortality events categorized as being caused by multiple stressors. Ovals indicate the four most common contributing factors (biotoxicity, weather, toxicity, and oxygen stress) and the less frequent contributing factors (combined into 'other'). The number of animal mass mortality events is provided in the intersections. The most common combination of two interacting stressors was oxygen stress and biotoxicity (*n* = 24 events) and oxygen stress and toxicity (*n* = 9 events). The most common combination of three interacting stressors was weather, oxygen stress, and toxicity (*n* = 5 events), and weather, other stressors, and toxicity (*n* = 5 events).