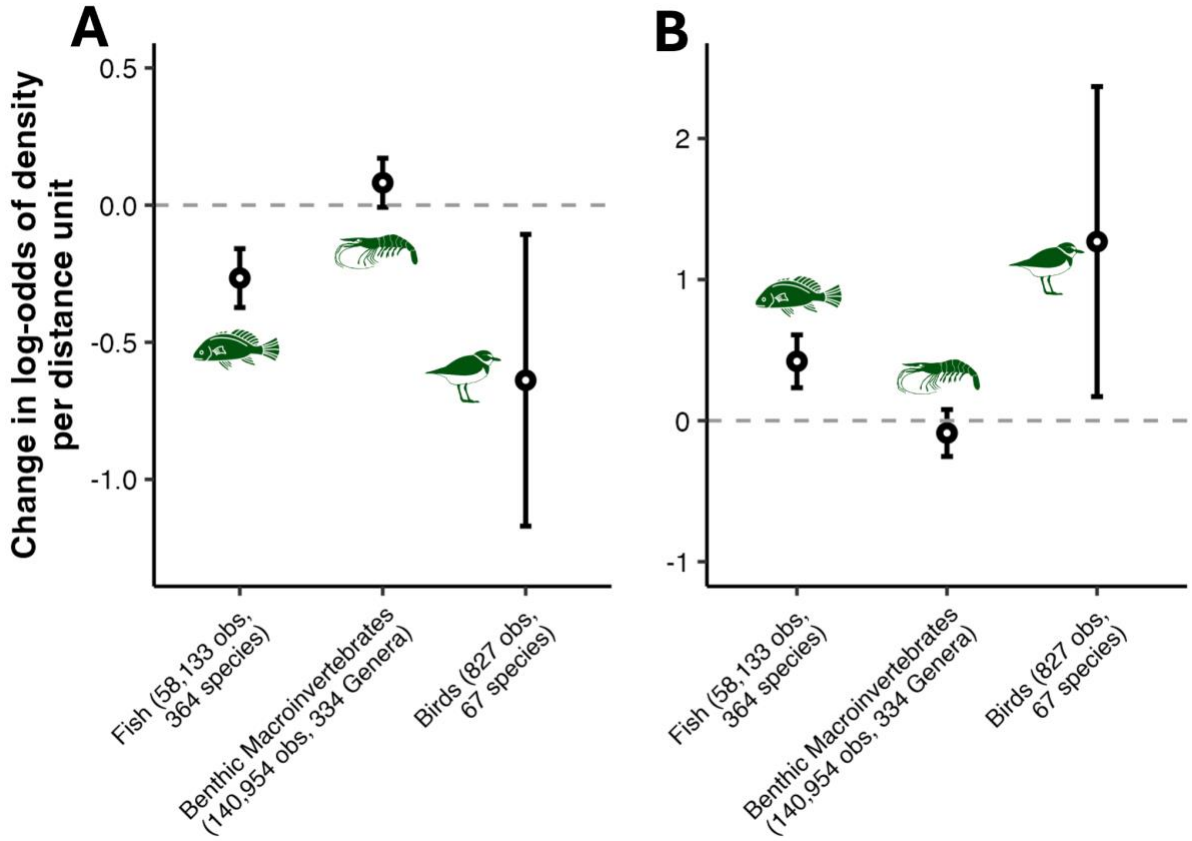
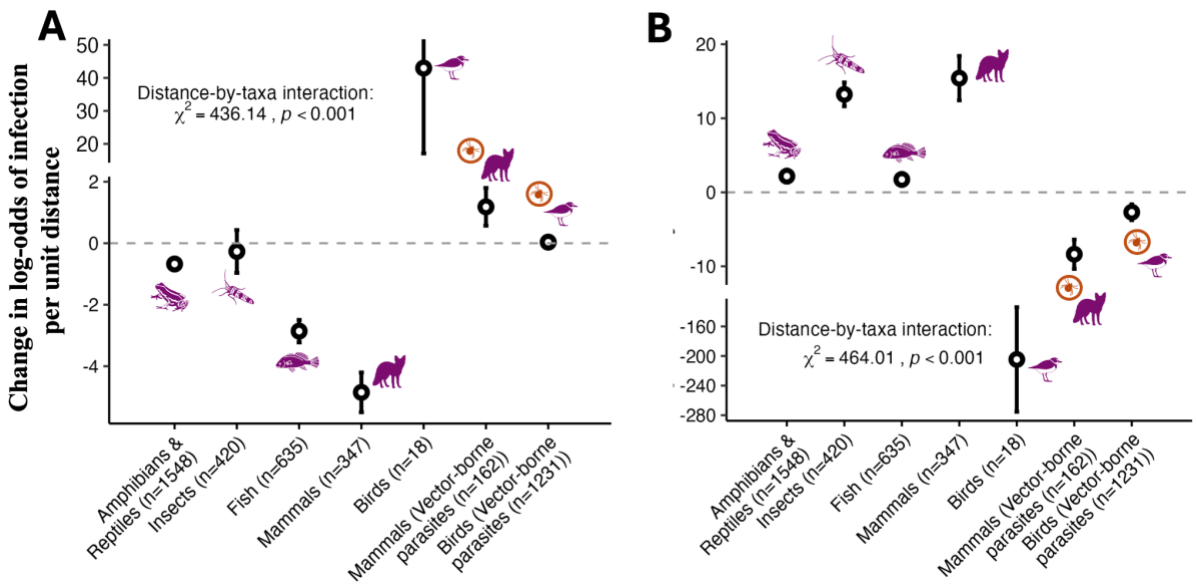
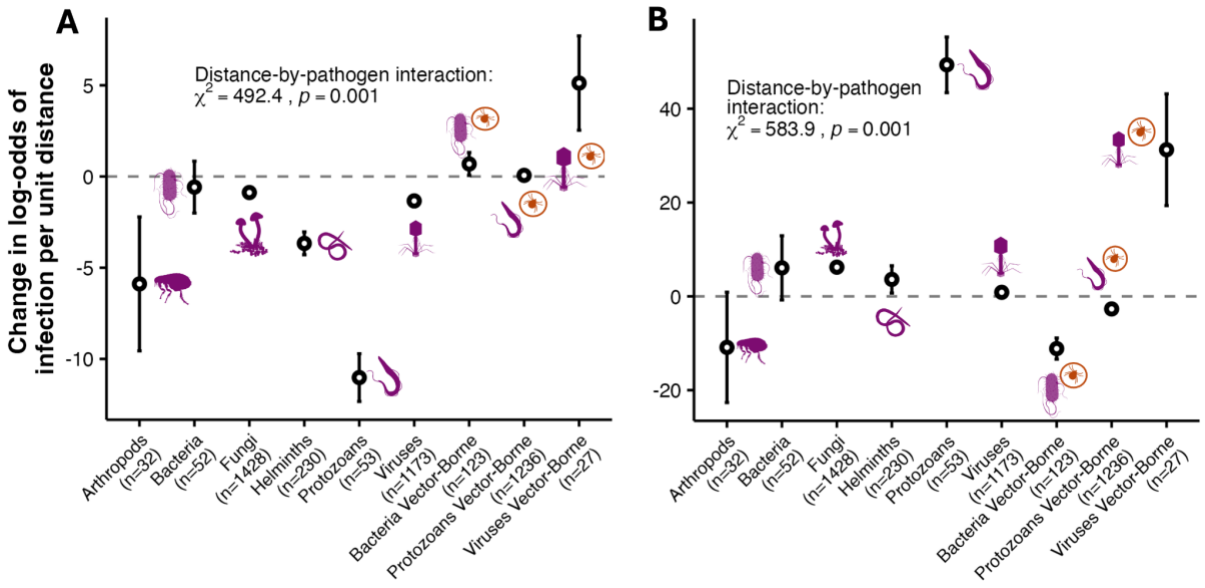


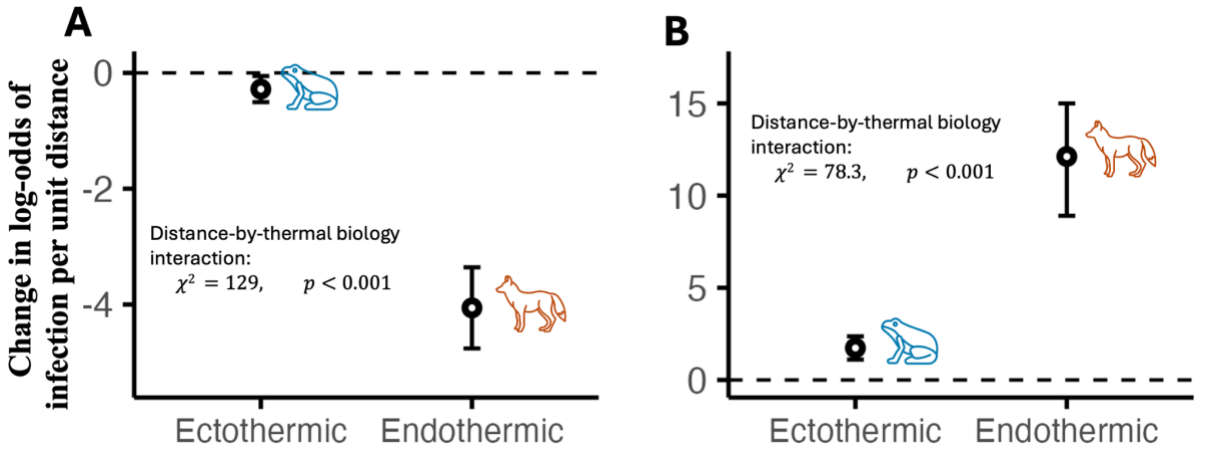
Extended Data Figure 1. **Spatial variation in organism density within species distributions.** Change in log-odds (95% confidence intervals) of organism density per distance unit relative to **(A)** the centroid and **(B)** the edge of the species distribution. Silhouettes illustrate representative taxa for each group. In both panels, species density decreases near the edge of the distribution for fish and macroinvertebrates. In **(A)**, as distance from the centroid increases, density declines, reflecting lower abundances at the periphery. In **(B)**, density increases with distance from the edge, indicating higher abundances toward the center.



Extended Data Figure 2. Density-dependent and frequency-dependent pathogen prevalence trends across local host species distributions grouped by taxa. Change in log-odds of infection (95% confidence intervals) with increasing distance from the host local distribution centroid **(A)** and range **(B)**. Silhouettes represent host taxa. Red circled ticks denote vector-borne (frequency-dependent) pathogens, whereas silhouettes without red circled ticks represent density-dependent pathogens. **(A)** The prevalence of density-dependent pathogens declines significantly with distance from the local centroid in amphibians, fish, and mammals. The prevalence of vector-borne pathogens in birds remained stable, while the prevalence in mammals significantly increased near the range edge. **(B)** The prevalence of density-dependent pathogens increases significantly with distance from the local range edge in amphibians, insects, fish, and mammals. The prevalence of vector-borne pathogens in birds and mammals significantly increases near the range edge.



Extended Data Figure 3. Density-dependent and frequency-dependent pathogen prevalence trends across local host species distributions by pathogen group. Change in log-odds of infection (95% confidence intervals) with increasing distance from the host local distribution centroid **(A)** and range **(B)**. Silhouettes represent pathogen groups. Red circled ticks denote vector-borne (frequency-dependent) pathogens, whereas silhouettes without red circled ticks represent density-dependent pathogens. **(A)** The prevalence of density-dependent pathogens declines significantly with distance from the local centroid in amphibians, fish, and mammals. The prevalence of vector-borne pathogens in birds remained stable, while the prevalence in mammals significantly increased near the range edge. **(B)** The prevalence of density-dependent pathogens increases significantly with distance from the local range edge in amphibians, insects, fish, and mammals. The prevalence of vector-borne pathogens in birds and mammals significantly increases near the range edge.



Extended Data Figure 4. Density-dependent pathogen prevalence trends across local host species distributions grouped by thermal biology. Change in log-odds of infection (95% confidence intervals) by distance unit from the host local distribution centroid **(A)** and the host local distribution edge **(B)**, grouped by host thermal biology. In both panels, endotherms exhibited steeper slopes, with stronger declines near the centroid **(A)** and sharper increases near the range edge **(B)**, compared to ectotherms.