Studies of biotic responses to climate change over the last century have recovered a general trend towards upwards and poleward shifts of elevational and latitudinal boundaries of ranges1-7. However, there is considerable heterogeneity in the direction and magnitude of species’ responses and ranges of many species have not changed8-11. In most studies, there is potential for considerable sampling error because local colonization and extinction cannot be demonstrated statistically12. We characterized the elevational range responses of 60 species of mammals across California over the last century based on historical surveys and modern resurveys. We compiled 29,593 records from 192 sites spanning 3 regional transects, 3,800 meters elevation, and five degrees latitude. This represents the most complete and statistically verifiable record of mammalian elevational range shifts over the last century. Three-fourths of species shifted on at least one transect, however, none shifted both upper and lower limits in the same direction on all three. High elevation species exhibited a coherent pattern of range contraction at their lower limits, whereas low elevation species were heterogeneous. Our most significant findings were that most species had heterogeneous responses across regions and that localized climate predictions explained some but not all regional variability in species responses.