



Avian body size changes and climate change: warming or increasing variability?

There has been a growing interest in whether climate change can explain and predict changes in animal body size and structure.

To investigate change in the body sizes of birds in western North America we analyzed changes in mass and wing length among multiple-species using bird banding data collected at PRBO Conservation Science's Palomarin Field Station (40 years) and San Francisco Bay Bird Observatory's Coyote Creek Field Station (27 years). We examined whether birds were decreasing in size, as predicted by a thermoregulatory explanation as has been documented elsewhere, or increasing, as a possible response to climate variability or food availability changes.

Wing length of birds captured at both sites has been steadily increasing at a rate of 0.024–0.084% per year. Although changes in body mass were not always significant, when they were, the trend was positive and the magnitudes of significant trends were similar to those for wing length (0.040–0.112% per year). There was no clear difference between the rates of change for long-distance vs. short-distance migrants or between birds that bred locally compared to those that bred to the north of the sites.

Previous studies from other regions of the world have documented decreases in avian body size and have used increases in mean temperature to explain these shifts – i.e., warming favors smaller sizes. Because our results do not support this pattern, we propose that, rather than responding to increasing mean temperatures, bird body size in western North America may be influenced by

changing climatic variability or changes in primary productivity.

Our results show that a large assemblage of bird species are increasing in size and demonstrate that, while body size changes may be a pervasive response to climate change, sizes are not universally decreasing.

Main Points

- Wing length of birds banded at the Palomarin and Coyote Creek Field Stations in coastal California has increased at a rate of 0.024–0.084% per year and body mass has increased at a rate of 0.040–0.112% per year.
- Factors such as climate variability or climate-related patterns in primary productivity may be as important as increasing temperatures in driving morphological change associated with climate change.

Paper citation:
Goodman, R.E., G. Lebuhn, N. E. Seavy, T. Gardali, and J. Bluso-Dembers. 2011. Avian body size changes and climate change: warming or increasing variability? *Global Change Biology*. Online-early. PRBO contribution #1818.