

# New methods for estimating the total wing area of birds for comparative studies of flight and dispersal

Hellen Fu<sup>1</sup>, Michelle Su<sup>1</sup>, Alexandra Margaritescu<sup>1</sup>, and Santiago Claramunt<sup>1</sup>

<sup>1</sup>University of Toronto

June 5, 2023

## Abstract

Dispersal is a fundamental process in evolution and ecology. Due to the predominant role of flight in bird movement, their dispersal capabilities can be estimated from their flight morphology. Most predictors of flight efficiency require an estimate of the total wing area, but the existing methods for estimating wing area are multi-stepped and prone to compounding error. Here, we validated a new method for estimating the total wing area that requires only the measurement of the wingspan plus two measurements from the folded wings of study skin specimens: wing length and secondary length. We demonstrate that the new folded-wing method estimates total wing area with high precision across a variety of avian groups and wing shapes. In addition, the new method performs as well as the old method when used to estimate natal dispersal distances of North American birds. The folded-wing method will allow for estimates of the total wing to be readily obtained from thousands of specimens in ornithological collections, thus providing critical information for studies of flight and dispersal in birds.

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# Spread-wing method      Folded-wing method





