

Study finds lasting severe weather impact in feathers of young birds

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While studying a ground-nesting bird population near El Reno, Okla., a University of Oklahoma-led research team found that stress during a severe weather outbreak of May 31, 2013, had manifested itself into malformations in the growing feathers of the young birds. The team witnessed a phenomenon termed 'pallid bands' in a large proportion of fledgling Grasshopper Sparrows and found spikes in the chemical signatures of 'pallid bands,' which led to abnormalities in the new feathers.

"This may be the first example of severe thunderstorms being scientifically implicated in sub-lethal stress impacts on wildlife," says Jeremy Ross, who led the study at the Oklahoma Biological Survey, College of Arts and Sciences. Other co-collaborators on the study include Jeffrey F. Kelly and Eli S. Bridge, Oklahoma Biological Survey; Michael H. Engel, ConocoPhillips School of Geology and Geophysics; Dan L. Reinking, Sutton Avian Research Center; and W. Alice Boyle, Kansas State University.

The groundbreaking study arose by near accident in August 2013, after the team observed a high incidence (44%) of 'pallid bands' across the tail feathers of juvenile Grasshopper Sparrows captured near the site as part of another study. Ross and his collaborators hypothesized that the 'pallid bands' were induced by the stress during the severe weather outbreak earlier that year when the bird population was pummeled by 2.2 inch-wide hailstones during a storm that spawned a 2-mile wide EF5 tornado just south of the site.

The team predicted that the feather tissue with 'pallid bands' would contain a spike in certain nitrogen isotopes. In a stress response, muscle tissue breaks down shifting the nitrogen composition of the blood, which is then incorporated into the developing feathers. From 18 young [birds](#) at the site, the team measured the nitrogen isotope levels in the 'pallid bands' relative to other sections of the same tail feathers.

As a result, the team was definitively able to attribute these [stress](#) markers to the May 31, 2013, [severe weather](#) outbreak by confirming the expected proportion of young birds in an average year that would have hatched as of May 31, 2013 with the proportion of young birds showing 'pallid bands.' The results of this study have been published in the open access journal *PeerJ* at <http://dx.doi.org/10.7717/peerj.814>.

Provided by University of Oklahoma

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