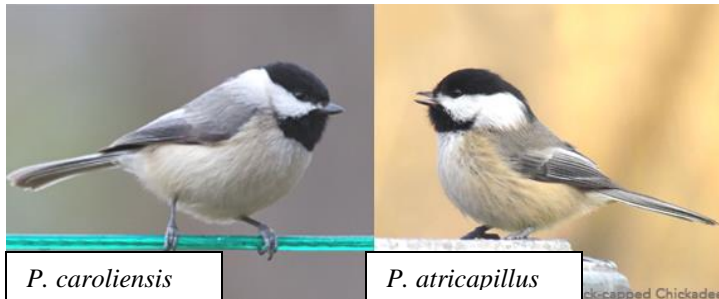


## ScienceWatch – A Song Not Heard Here—Yet

**“A lot of time climate change doesn’t really seem tangible. But here are these common little backyard birds we all grew up with, and we’re seeing them move northward on relatively short time scales. ” – S. Taylor**



Looking almost identical, the black-capped chickadee (*Poecile atricapillus*) and its southern cousin, the Carolina chickadee (*Poecile carolinensis*) are best told apart by where they are and by their song. In the east the Carolina chickadee’s range

extends into southern Pennsylvania and New Jersey, and its song has four (*fee bee fee bay*) notes instead two (*fee bee*)

Although genetic research shows the two species separated about 2.5 million years ago, they can still interbreed, producing a narrow “hybrid zone” where their ranges overlap. Near this zone many chickadees may sing both songs. The northern edge of the Carolina chickadee’s range is limited by cold winter temperatures. In contrast to their northern cousins, they are unable to withstand temperatures much below  $-7^{\circ}\text{C}$  ( $19^{\circ}\text{F}$ ). Now a report in the March 17, 2014 issue of *Current Biology* shows they are moving slowly northward due to climate change.

The researchers, headed by Scott Taylor, Cornell Lab of Ornithology, Ithaca, NY, chose a narrow strip, about 20 miles wide, in southern Pennsylvania where both species were present, as the hybrid zone. To detect hybrids they collected blood samples for genome analysis from 83 birds in 2000-2002 and 84 birds in 2010-2012. The hybrid zone is small and compact because the hybrids are unable to compete with either of the pure species—a fact ensuring they remain separate species into the future. “Hybridization is kind of a brick wall between these two species. Carolina chickadees can’t blithely disperse north without running into black-caps and creating hybrids. That makes it possible to keep an eye on the hybrid zone and see exactly how the ranges are shifting,” said Robert Curry, Villanova U., Villanova, PA, who headed the field component of the study.



Taylor *et al.* used data from eBird, an online, citizen-science database providing real-time information on bird distribution and abundance to outline the hybrid zone. A region was considered to be a “contact zone” if at least 5% of its surrounding eBird sites contained both species.

Birds containing a set of DNA clusters that overlapped with both parental species were considered hybrids.

When they compared the field observations and genetic data for both time periods, the team found that the hybrid zone is moving northward at an average rate of 1.0 km (0.6 mi.) per year. Field observations showed that female Carolina chickadees are the determining factor; they are nesting an average of 0.6 miles north of where they were born. “The rapidity with which these changes are happening is a big deal,” said Taylor.

The research team also looked at the change in average temperatures since 2000. They found that the average minimum winter temperature was moving northward at the same rate as the hybrid zone. Significantly, the  $-7^{\circ}\text{C}$  isotherm—the region where the average lowest winter temperature is  $-7^{\circ}\text{C}$ —was moving in lock step with the hybrid zone. While a correlation is not proof of causation, the scientists believe they have strong evidence that climate change is responsible for the northward movement of the hybrid zone.

Eventually, Curry says, “the black-capped chickadees will probably drop out of Pennsylvania and the Carolina chickadees will take over Pennsylvania. And that will also happen in Ohio and Indiana.”

One hundred years from now or even sooner *fee bee fee bay* instead of *fee bee* may be heard in Central Park.

Saul Scheinbach