

Migration? Weather? What's Up?

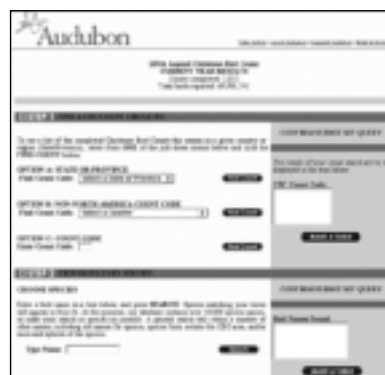
CBC DATABASE HELPS BIRDERS FIND THE ANSWERS

Has it ever occurred to you that the typical conditions on your local Christmas Bird Count are no longer what they were 10 or 20 years ago? Or have you had conversations with other local birders about the “good old days” when during spring migration huge mixed flocks of warblers seemed to arrive each night, often in predictable patterns—seemingly unlike nowadays? Or that there is less snow in the winter, more rain in the summer, cooler temperatures in the spring, or warmer conditions in the fall? Or, perhaps most to the point, is the fact that you just can't figure out what's up with the weather—or the birds?

Wayne Petersen, Christmas Bird Count Regional Editor for New England for nearly 25 years, and Kathleen “Betty” Anderson, longtime CBC participant, have often participated in such discussions. Fortuitously, Betty's meticulous record keeping on the avifauna of the farm where she has lived for over 50 years gave them fodder for addressing some of these questions. Christmas Bird Count data played a part in their findings.

A quick visit to the CBC database can also be very instructive in trying to answer some of these questions—at least about the birds. Are you worried about local numbers of Common Murres over the past 30 years? Check out what the CBC results reflect. Are Hairy Woodpeckers really decreasing as Red-bellied Woodpeckers increase? Or, are Scaled and Gambel's quail declining as much as some birders believe? The online CBC database can help you answer these questions. What about your favorite bird of prey, game bird, or waterfowl? How are they doing in your area as compared with other regions? The CBC database is a great tool for obtaining quick information about a host of such inquiries, including highlighting the need for further and more in-depth studies where necessary. This kind of inquiry is exactly what's happening now in Audubon Science, as we initiate additional analyses on population trends of the birds of the Americas using the wealth of sightings provided by CBC participants over time. Other scientists are studying the effects of climate change as it relates to bird population trends and shifts in distribution. The Christmas Bird Count provides key information for many such studies.

Now, I invite you to enjoy “The View From Anderson's Farm” on the following pages. See how Wayne and Betty have put the CBC database into practice.



http://cbc.audubon.org/cbccurrent/current_table.html

—GEOFFREY S. LEBARON

The View From Anderson's Farm

GLOBAL WARMING AND MASSACHUSETTS BIRDS

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Growing up in the suburbs of Boston, one has distinct, if not wishful, memories of how winters used to be. There are recollections of snowbanks high enough that it was all one could do to see over the tops, and old family photo albums containing pictures of snow practically to the windowsills of houses. Today, folks seem to refer nostalgically to such images as reminders of “good old-fashioned New England winters.” Are recollections of deep snow and extended cold simply products of youthful imaginations, or has there really been an amelioration of weather and climate? Even the experts seem to be at odds trying to resolve this dilemma.

Yet, despite disagreement about whether New England winter weather today is less severe than in our youth, there seems to be growing congruence among climatologists about this point.

World authorities agree that the 1990s represented the warmest decade on record, and that in the northern hemisphere the 20th century was probably the warmest 100-year period in the past thousand years. These are not inconsequential statistics!

A number of events resulting from global warming have already been quantified. Among the most dramatic of these are changes in polar and subpolar environments where pack ice and seasonal ice conditions are rapidly changing, either as a result of earlier seasonal melting, or by a net loss in the overall extent of polar ice caps. The implications for Arctic seabirds are tremendous, to say nothing of the potential for gradually increasing sea levels throughout the oceans of the world. And as with the old, albeit primitive, technique of carrying a canary

into a coal mine to test the presence of poisonous gasses, ornithologists have been using birds as an indicator for detecting the possible consequences of climate change.

Birds are warm-blooded and require an abundance of food to maintain a constant body temperature. They must also live where the ambient temperatures will permit them to obtain food throughout the year. Needless to say, since birds are highly mobile creatures empowered with the ability to fly, many species are programmed to travel seasonally to different environments, often separated by many degrees of latitude, in order to find adequate food supplies and climatic circumstances that will permit them to survive throughout the year. One would presume that seasonal migration, as well as breeding and wintering strategies, remain fixed over time.

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Kathleen S. Anderson was the founding director of the Manomet Bird Observatory and currently chairs the Natural Heritage and Endangered Species Advisory Committee to the Massachusetts Division of Fisheries and Wildlife. She is also actively involved in many conservation organizations.

That is not the case, however. The forces of natural selection are constantly molding and modifying behavior to meet environmental changes.

The evolution of migration, breeding, and wintering patterns of bird species currently inhabiting Massachusetts has taken many millennia to evolve, and the birdlife of our region 14,000 years ago, a period when most of New England was covered by a sheet of glacial ice nearly a mile thick, was decidedly different. Furthermore, there is evidence indicating that during previous interglacial periods, tropical conditions actually existed that supported a very different avifauna than we see in New England today. Given this great range of climatic variability over long spans of time, it is not hard to imagine that organisms as mobile as birds evolved behaviors and distribution patterns that have changed considerably in order to adapt as climate and habitat changed.

There are numerous questions that can be posed concerning the likely consequences of a fast-forward in the rate of global warming. Will migratory birds quickly evolve new migration strategies and suddenly begin arriving earlier in spring? Will southern species begin nesting farther north in order to take advantage of milder temperatures? Will species with northern affinities disappear as breeding birds? Will Christmas Bird Counts in Massachusetts show an increase in the number of wintering species historically only found farther to the south?

Obviously, the answers to these questions are difficult to obtain, but there is mounting evidence to suggest that “yes” is the answer to all of them.

By using birds as a barometer, it is possible to document the effects of global warming by examining some of the data supporting the notion that birds may already be responding to accelerated warming trends. Admittedly, changes detectable within only a few human generations may at first appear suspect, but, when these changes are subjected to the rigor of scientific analysis, the evidence is compelling.



Wood Duck (*Aix sponsa*) is one of five species that showed an earlier spring arrival time over the past 33 years. Illustration/John James Audubon

Important sources of information come from studies that provide data systematically gathered over long spans of time, such as bird banding data, and make it possible to analyze changes in the timing of migration within a climatic context, measured against standardized effort. Similarly, changes in winter bird distribution may be reflected by Christmas Bird Count data. Changes and shifts in the breeding range of various bird species may be registered by a careful perusal of breeding bird atlases. A final source of information is the records of birders and naturalists, many of whom have kept personal journals with great precision over extended periods of time. Although seemingly anecdotal, such data

is actually quite useful when it is faithfully gathered and critically analyzed.

For example, one of the authors (Anderson) has lived on a 100-acre farm in Middleborough, Massachusetts, for 53 years. During the period from 1960 to the present, a phenological record of the spring arrival dates of common birds occurring on the property, along with emergence data for amphibians and first-blooming dates for various plants, was carefully maintained. Because of the systematic way in which this information was recorded, as well as the ease with which it could be retrieved, the Anderson journals represent an ideal data set for statistical analysis. With this in mind, Richard Primack and several of

his students at Boston University undertook a comprehensive analysis of the Anderson journals for the period 1970 to 2002. The intent of the analysis was to determine whether any measurable changes in the timing of certain avian events mirrored changes that could be correlated with changes in climate. The results, when compared with other data sets, were most informative.

After the researchers carefully extracted observations from the journals, the data was subjected to statistical analysis, a process that necessarily had to take into account a number of variables that could affect the interpretation of the findings. Most important of the many variables was weather. Weather data collected from the town of Rochester, Massachusetts, and archived at the Northeast Regional Climate Center in Ithaca, New York, during the 33 years under consideration was collated and compared with the Anderson farm data. Analysis revealed that mean annual temperatures rose an average of 1.25 degrees Fahrenheit per decade, for a total increase of 3.5 degrees Fahrenheit for the 33-year interval. Once the journal material and the climate data were compared, an interesting correlation became apparent.

Primack's analysis revealed that five of 16 bird species studied showed a statistically significant tendency to arrive earlier in spring during the course of the 33 years for which data was collected. The five species showing a mean earlier spring arrival time were the Wood Duck, Ruby-throated Hummingbird, House Wren, Ovenbird, and Chipping Sparrow. Wood Ducks and Chipping Sparrows are short-distance migrants, Ruby-throated Hummingbirds and Ovenbirds are long-distance neotropical migrants, and House Wrens are intermediate in their migratory behavior.

The differences in the types of migrants are interesting when one considers that the conditions that trigger northward spring migration for species wintering in the tropics may be quite different from the stimuli that initiate migration for species spending the win-

ter in the southeastern United States. In other words, it is possible that global, rather than immediate, conditions closer to home might account for apparently changing migration schedules.

The critical point is that representative species from each migrant group showed statistically significant tendencies to arrive earlier in spring during the study period, a period that also showed an increase in mean annual temperature. The Wood Duck is particularly interesting in that it showed the strongest correlation to local variations, specifically the ice-out of a small pond on the Anderson farm. While it could be argued that ice-out alone was the determining factor in influencing the spring arrival of Wood Ducks, it is equally significant to point out that ice-out is the direct result of increasingly warm early spring temperatures!

When differences in the spring arrival time of migrant birds on Anderson's farm are compared to systematically gathered bird banding data from the Manomet Center for Conservation Sciences (formerly Manomet Bird Observatory) in Plymouth, further evidence of changes in spring migrant arrival times becomes apparent. A recent analysis conducted by Trevor Lloyd-Evans of Manomet's spring banding data for the periods 1970–1979 and 1993–2002 revealed that Red-eyed Vireos on average arrived at Manomet two days earlier during the second 10-year period than the first. A similar comparison of the mean arrival dates of migrant Blue Jays and Eastern Towhees showed an eight-day earlier arrival date for Blue Jays and a six-day earlier arrival date for towhees, both in the second-decade interval. Similar to the Anderson farm sample, the Manomet data contains a mix of long-distance and short-distance migrants.

Jeff Price, director of Climate Change Impact Studies at the American Bird Conservancy in Boulder, Colorado, has produced models showing the possible effects of global warming on Massachusetts breeding birds. Price has generated

lengthy lists of Bay State bird species that are already showing, or could reasonably be expected to show, changes in local breeding status as a result of global warming. For example, northern species withdrawing, or predicted to withdraw, from Massachusetts as nesting birds include the Olive-sided Flycatcher, Least Flycatcher, Cliff Swallow, Winter Wren, Blackburnian Warbler, White-throated Sparrow, and Purple Finch. Species that are increasing, or that might reasonably be expected to increase their range in Massachusetts, include the Acadian Flycatcher, Carolina Wren, White-eyed Vireo, Yellow-throated Vireo, Pine Warbler, Cerulean Warbler, and Orchard Oriole.

While there are many factors that influence the global distribution and behavior of birds (e.g., topography, elevation, forest cover, food availability, habitat fragmentation, human land use, etc.), it remains unequivocal that a warming climate is producing, or inevitably will produce, profound changes in the distribution and behavior of bird populations in Massachusetts.



Carolina Wren (*Thryothorus ludovicianus*) is a species whose presence has greatly increased in Massachusetts.
Illustration/John James Audubon