Invasions, Irruptions, and Trends

The Christmas Bird Count Database

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The National Audubon Society's Christmas Bird Count has served many purposes since its inception December 25, 1900. Initiated by Frank M. Chapman as a means of bringing popular support to the fledgling bird-protection movement, it was as such an early tool for conservation. Over the ensuing century the geographic scope of coverage, observer skills, and acceptance of the value of the Count have all grown tremendously. The Count has helped bring beginners into both the hobby and profession of birds, and CBC data have been used over the decades both to document the ebb and flow of early-winter bird populations across North America and to promote conservation within the Count circles (Bock, 1982; Brennan & Morrison, 1991; Davis, 1974; Root, 1988; Smith, 1986). The upcoming Christmas Bird Count season, beginning December 16, 1999, and ending January 3, 2000, will mark the completion of 100 years of census effort by a dedicated pool of counters who have come to be known as Citizen Scientists.

The past two years have brought radical, exciting changes to the infrastructure of the Count. Through funding from the Patuxent Wildlife Research Center, the entire historical Christmas Bird Count database has been entered into electronic form. That downloadable flat file has been converted by the Cornell Laboratory of Ornithology and National Audubon Society into a more user-friendly tool, a relational database, available through the BirdSource website <*http://birdsource.cornell.edu*>. For the first time ever, the entire Christmas Bird Count database is readily available to anyone wishing to peruse or utilize it. In another equally important, high-technology step, during the recently completed 99th CBC, for the first time ever Count Compilers were able to enter their data directly into the CBC database on-line. Half of all counts in the 99th Count were submitted electronically, and the rest of the data that came in via the traditional paper forms were then entered through the website by BirdSource staff. The Regional Editing process has also been converted to an on-line process, all of which enables a much more accurate and streamlined reporting process from field observer to final CBC data. Errors discovered in the historical database by those visiting the website will be directly reportable to a database correction manager, and after review by the Regional Editors the edits will be completed. The "oldest and longest-running database in ornithology" is now viewable through BirdSource, and soon will have on-line clickable analyses and many overlays of G.I.S. information available for perusal.

The combination of long time span and great geographic scope provides the opportunity to look at continental early-winter bird populations in decade-long periods, minimizing the effects of variance in both weather and observer pool. Recent studies utilizing the relational Christmas Bird Count database in BirdSource have begun looking into two aspects of North American bird populations near and dear to the hearts of many observers—range expansions of colonizing species and patterns of dispersal of winter irruptive birds. Features utilizing CBC data on the BirdSource website display animated maps showing the spread of the Eurasian Collared-Dove *(Streptopelia decaocto)* as it begins its colonization of North America and the continental early-winter patterns of occurrence of the Pine Siskin *(Carduelis pinus)*.

EURASIAN COLLARED-DOVE: EXPANDING COLONIST

The Eurasian Collared-Dove is a native species of the Indian subcontinent. Hundreds of years of introductions and the concurrent spread of both natural and introduced populations give the species a large range extending from extreme western Europe through the Middle East and India to China and Japan. Like many doves and pigeons, it cohabits very well with humans. This species was also introduced into the Bahamas in the 1970s (Hochachka, BirdSource website 1998 <*http://birdsource.cornell.edu*>) and apparently spread on its own to southern Florida. As can be seen in the accompanying maps, the species was confined to coastal southern and central Florida from the late 1980s to the early 1990s when it began a rapid expansion to the north and west as documented by its reports on Christmas Bird Counts. The initial reporting of Eurasian Collared-Doves in North America was slightly muddied by identification issues between this species and the captive-bred and widely released Ringed Turtle-Dove, also formerly present in good numbers in southern Florida. The similar appearing Ringed Turtle-Dove *(Streptopelia "risoria")* is not a true species as this form was produced as a long-domesticated form of the African Collared-Dove *(Streptopelia roseogrisea)*. In the last quarter of the 20th Century in North America Eurasian Collared-Dove populations have been rapidly increasing while turtle-doves appear to be remaining stable or declining in regions where both occur.

It is interesting to note the pattern of dispersal as documented by the accompanying CBC maps. Eurasian Collared-Doves began increasing dramatically after 1988 as seen below. By 1994 they had begun to spread westward along the Gulf Coast. In 1996 they expanded inland as far as the Great Plains and near the Great Lakes. The 1997 map shows some of these distant reports dropping out, others appearing, and the species' increasing numbers in the rest of the range. These far-flung attempts at colonization illustrate what may be seen with expanding species as distant potentially inhospitable areas are reached by dispersing birds, but breeding populations are not immediately established.

As more and more birds are produced in the expanding core range of Eurasian Collared-Doves in North America, it seems that this hardy, adaptive bird will colonize much of the continent. In Scandinavia, populations have recently become established above the

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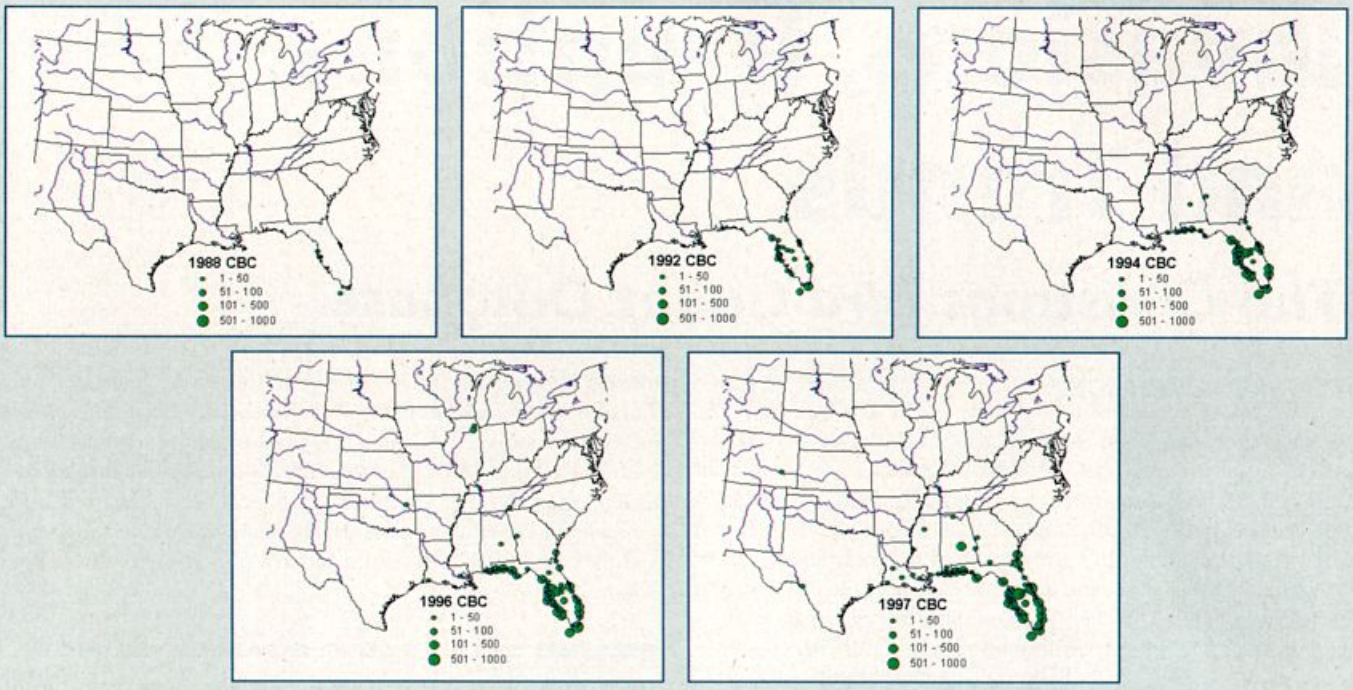


Eurasian Collared-Dove CBC maps: 1988, 1992, 1994, 1996, 1997. Source: http://birdsource.cornell.edu

Arctic Circle. Bird feeding by humans is an increasingly popular activity in North America and will provide a beneficial food source for colonizing collared-doves, enhancing survival in regions where winter survival would otherwise be difficult.

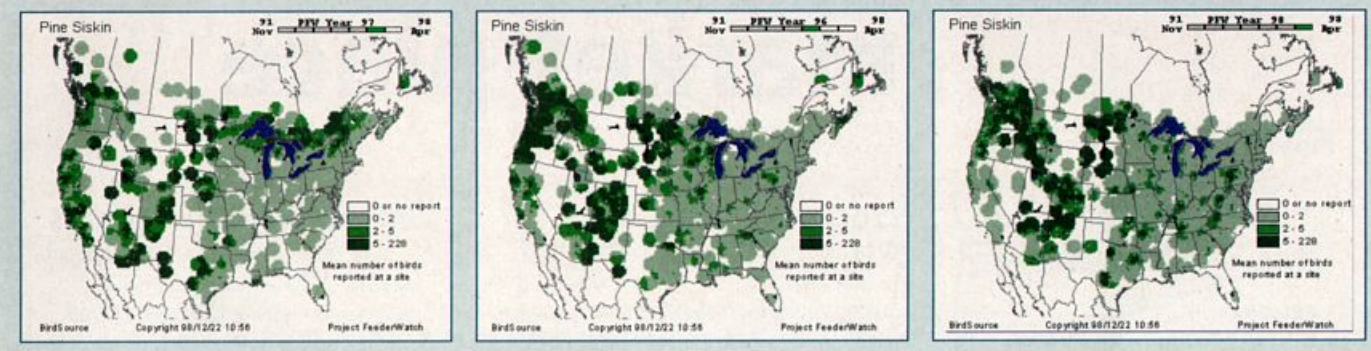
PINE SISKIN: CONTINENTAL IRRUPTIVE

Irruptive boreal species of birds, often collectively referred to as "winter finches," are one major catalyst that gets birders out of their warm living rooms and into the field for Christmas Bird Counts and other outdoor winter birding excursions. Each fall, many bird watchers (especially those in the central latitudes of North America) eagerly anticipate the arrival of these species. "Will it be a big winter finch year?" "Will I spend half my budget on feeding Evening Grosbeaks or redpolls?" "Will Pine Siskins arrive with winter goldfinches?" Results from the Christmas Bird Count, as well as early counts from Project FeederWatch, often provide indications of how many winter finches the season will bring. As demonstrated by Steve Kelling (BirdSource website, 1998 *<http://birdsource.cornell.edu>*, these two databases viewed in combination may provide an even deeper insight into winter bird abundance.

The patterns of these irruptions may be as interesting as the timing of the appearance of the species. It would seem logical that when large numbers of a given species are in one region of the continent, they will be absent from others. In recent winters, the pattern of occurrence of Pine Siskins has seemed to follow a bimodal asynchronous pattern such as this. For example, during the period 1991 through 1998, when siskins were present in big numbers in the East, they were low in the west, and vice versa. The accompanying range abundance maps, generated from Project Feederwatch from January 1996, 1997, and 1998, illustrate this seesaw pattern. This could lead to the inference that Pine Siskins will only be expected to occur in alternating regions of the continent in winter, after dispersal from their northern or higher-elevation breeding grounds.

However, going back further in time by analyzing 1979–1998 Christmas Bird Count data shows that this bimodal pattern breaks down. The graph comparing Pine Siskin numbers in California and North Carolina shows the same alternating pattern as the Project FeederWatch data from 1998 back to 1991. When birds were abundant in the West, they were low in the East and vice versa. However, factors affecting early-winter dispersal of Pine Siskins must have been different prior to 1991 as the graph shows a strikingly dissimilar pattern in earlier years. Abundance patterns were nearly the same in both East and West from 1979 through 1990—alternating low numbers one year with high numbers the next year in each region. In the span of these years birds apparently stayed north in droves during every other winter season, while broadly invading the central and southern latitudes of the continent in the alternate years. Two major variations from this pattern appear during this period. In 1987–1988, siskin reports from North Carolina remained high when it would be expected that they would have dropped in the second season, and in 1991–1992 reports from North Carolina stayed low when it would be predicted that they would have increased during the second season. Following the second break, the alternating bimodal pattern appears. It is quite likely that these changes are due to different populations of Pine Siskins moving in response to factors in different regions of the continent. During some winters, the movements are synchronous, and in others they are out of phase. The dual analysis of Christmas Bird Count and Project FeederWatch data can help monitor the status of populations of siskins that breed in areas far-flung from the points of census by observers, by tracking siskins' distributions in winter.

What causes these patterns of dispersal and abundance, and what might cause the continental changes in the winter distribution of Pine Siskins? Christmas Bird Count and FeederWatch data cannot answer these questions, but they do give an indication of the overall health of siskin populations by facilitating analyses of long-term trends in numbers of birds reported. These data also allow researchers to chart the patterns of dispersal on a continental basis over time and to begin to look at other large-scale factors that may affect breeding success or winter survival. It is generally believed that Pine Siskins, and winter finches as a group, undertake their winter movements in response to food supplies.



Pine Siskin: 1996, 1997, and 1998 Project FeederWatch maps and CBC graph. Source: http://birdsource.cornell.edu

Siskins feed primarily on the small seeds of a variety of plants, especially conifers, composite seed plants, and alder and birch. Reduction or failure of the seed crops would encourage siskins to vacate large geographic areas in search of better forage. Large-scale migrations are physiologically stressful, especially if initiated by food crop failure, when birds may not be in good physical condition at the beginning of their journey. A contributing factor for Pine Siskin winter survival is the species' affinity for bird feeding stations where they often arrive in large numbers in either conspecific or mixed flocks. Siskins have been documented as being particularly affected by Salmonella bacterial poisoning at feeders, in some instances dying by the thousands regionally (USGS/National Wildlife Health Center Salmonellosis Fact Sheet, 1998; Wildlife Health Center Bull. Vol. 1–2, 1993). Large numbers of siskins moving significant distances in winter in response to reduced food supply in the vacated areas would presumably be arriving at feeders in a weakened condition compared to winter resident species and therefore could suffer greater effects of Salmonellosis.

The diet of Pine Siskins in summer also consists of a small but significant proportion of small insects and spiders. Among frequently consumed insect prey are spruce budworm larvae, pupae, and egg masses. With increased spraying of pesticides on large areas of spruce forests on a continental basis, pesticide consumption by Pine Siskins may well be on the increase, negatively affecting populations by direct mortality of adults, depressed breeding success, and reduced winter survival. It would be interesting to compare Christmas Bird Count data on the winter dispersal patterns of Pine Siskins, as well as the overall numbers of siskins reported continentally over time, with any documented recent large-scale spraying of pesticides to control spruce budworm outbreaks.

SUMMARY

In the millennium to come the Christmas Bird Count will continue to provide a source of invaluable raw material to researchers and conservationists interested in studying the status of early winter avian populations. This is a vast sea of data, spanning the 20th Century when much human-induced habitat alteration affected bird populations across the Western Hemisphere and the globe. The conversion of the CBC database into an electronic form that is readily accessible through the BirdSource website <*http://birdsource.cornell.edu*> will allow a much wider constituency to utilize this wonderful tool. In addition, as features are developed that will display the historical Count results through BirdSource to an increasingly information hungry and bird friendly public, the value of the Christmas Bird Count as an education tool will grow by leaps and bounds. The closing of the first hundred years of the Christmas Bird Count January 3, 2000 will mark the first-ever completion of a century-long, volunteer-generated census. As we move into the 21st Century, the initiation of the second hundred years of the CBC will continue to add to our understanding of early-winter avian population dynamics and will also add to the power of the growing field of citizen science.

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