

Methods

The CBC, which is a sample, not a census, of birds was not designed for statistical analyses of population change and presents serious challenges in examining these trends (Drennan 1981, Sauer and Link 2002, Francis et al. 2004, Dunn et al. 2005). CBCs have annual changes in effort, varying degrees of skill and diligence of observers, and biases in habitat coverage (Bock and Root 1981, Butcher 1990, Peterjohn 2000). A sophisticated, complex hierarchical model has been developed to calculate population indices using CBC data that is effort adjusted, based on species-specific relationships of the number of birds counted and different measures of effort, and weighted to account for geographic variables corresponding to whether or not circles are representative of the habitats in the larger landscape (Sauer and Link 2002, Sauer et al. 2004). This model is being fitted to all species from CBC data, and will eventually be available online (Sauer et al. 2004), much as Breeding Bird Survey data can now be queried (Sauer et al. 2005). While the goal is to calculate indices for different geographic scales, including individual circles (Francis et al. 2004), the initial model will calculate regional composite yearly population indices (Sauer et al. 2004). To examine data from the single Rockwood CBC circle, a simpler approach will be taken, very similar to what has been used historically, to allow for comparisons with the plethora of published single-count analyses.

In order to examine trends of relative abundance on CBCs, actual numbers of individuals counted is often adjusted to some standardized measure of effort, usually individuals per party-hour – the number of hours spent looking for birds by a party of one or more observers (Butcher and McCulloch 1990). However, standardizing data in this manner assumes that increased effort will result in more birds counted, and that the relationship is linear, assumptions which are frequently violated. Butcher and McCulloch (1990) noted that for some species, such as those that occur in habitats that can be covered in a few hours or birds that concentrate in certain areas, the amount of effort does not increase the number of birds counted. Raynor (1975) and Bock and Root (1981) noted that in count circles that contain water, increased effort in areas away from water actually dilute the number of waterfowl counted per party-hour, if the amount of effort counting areas containing water remains roughly the same each year, which is usually the case.

Butcher and McCulloch (1990) recommended examining the correlation between effort and numbers of birds counted. If the relationship was non-significant, zero, or negative, actual numbers of individuals counted should be used to examine relative abundance. If it were positive and significantly different from zero, then actual numbers of birds could be adjusted to the appropriate measure of effort. For species of interest in the Rockwood CBC, the relationship was non-significant, zero, or negative in all cases. Therefore, the Rockwood CBC data were examined using actual numbers not adjusted for effort.

Year-to-year fluctuations in the number of individuals of each species counts are common in CBC data, especially due to variable weather conditions. In order to smooth data and produce more accurate trends, a three-year moving average of actual numbers was used (Raynor 1975). For the species of interest examined, a simple linear regression was calculated using year as the independent variable, with the three-year moving average as the dependent variable.

All data includes only birds identified to species counted on count day. It does not include birds not identified to species (i.e., "*Buteo* sp.") or birds that were recorded only during "count week" (the period three days on either side of count day) or "count period" (any time during the designated time for a CBC on a particular year).