

Results and Discussion

Summary data

Table 1 gives summary data for the Rockwood CBC for 1975-2004. The mean number of species per count is 81.4 (range 70.0 to 95.0) and the mean number of party-hours is 91.1 (range 57.5 to 123.5).

The cumulative number of species identified and recorded on count day for the Rockwood CBC is 146. Table 2 summarizes the species recorded on the count. Mean per ten party-hours is also included for ease of comparison to similar summaries (e.g., Craves and Fowler 2003). For species occurring on 5 or fewer counts, details rather than summary data are given.

The 10 most numerous species in descending order are Canvasback (scientific names given in Table 2), European Starling, Mallard, Herring Gull, Ring-billed Gull, Common Merganser, Canada Goose, House Sparrow, Mourning Dove, and Tundra Swan. Table 3 lists the 38 species that were recorded on every count over the 30-year period.

Trends and patterns

CANADA GOOSE – Canada Geese in southeast Michigan and southwestern Ontario are nearly all from two populations: migratory *Branta canadensis interior* and the resident *B. c. maxima* (Johnson 1991). Prior to reintroduction efforts begun in the 1930s in Ontario (Lumsden 1987) and in the 1920s in Michigan (Johnson 1991), the resident race, or Giant Canada Goose, was not present in the region. In southern Ontario, restoration efforts began in earnest in 1968 (Lumsden 1987).

These efforts have resulting in burgeoning numbers of Giant Canada Geese in the region. From the first surveys conducted in 1969 through at least 1979, the proportion of Giant Canada Geese in the Mississippi Flyway population (which covers this region) was less than 10%. During 1980-1989, it climbed to an average of 17%, to 25% from 1990-1994 (GCGC 1996), and as of 2002 had risen to nearly half of the flyway's Canada Goose population (Gnatkowski 2005). About 80% of the Giant Canada Goose population in Michigan resides in the southern part of the state (MiDNR 2001).

Although wintering geese in southeast Michigan include migrant *B. c. interior*, the trend on the Rockwood CBC reflect the increasing numbers of *B. c. maxima*, with especially steep increases beginning in the mid-1980s (Figure 2). The dip in the most recent years represent weather conditions (frozen water) in winter 2000 that pushed the geese out of the area. A similar drop can be seen in the Canada Goose trend for the count circle just to the north of the Rockwood circle, the Detroit River CBC (Craves and Fowler 2003).

MUTE SWAN – Mute Swans are not native to North America, and were introduced to the U.S. in the late 1800s (Ciaranca et al. 1997). This species began colonizing the lower Great Lakes in the mid-1960s and 1970s, and the population, based on analyses of 80 CBCs from 1980-2000, showed a population growth of 14 to 18% in the lower Great Lakes (Petrie and Francis 2003). Likewise, the trend on the Rockwood CBC has been strongly and significantly positive (Figure 3). The average number of Mute Swans per

year during the first decade of the count was 10.1. It climbed to 148.6 in 1985-1994, and has risen to 501.7 the last decade. The average is inflated by the high number of Mute Swans counted in 2004 between Humbug Island and the mainland, in an area kept open by warm-water discharge from a power plant just north of the site. That was the first time this area had been surveyed on the count, and it likely concentrates waterfowl when the rest of the river is frozen.

The most conservative growth-rate estimate given by Petrie and Francis (2003) for the lower Great Lakes is 10% a year, with a doubling of the population every 7 to 8 years. As Mute Swans have significant negative ecological impacts, with the potential to reduce the carrying capacity of breeding, staging, and wintering habitats for native waterfowl (AFC 2003, MdDNR 2003, Petrie and Francis 2003), their increasing numbers should be monitored to assist in potential management plans.

AMERICAN BLACK DUCK – Black duck populations have shown a long-term (1970-2003) decreasing trend in North America (NAWMP 2004), and for the Mississippi Flyway (1955-2004) (USFWS 2004). This decline has been attributed to habitat loss, hunting, and competition and hybridization with the Mallard (LePage and Bordage 1998, USGS 1998). Being much more adaptable to urbanization, Mallards occupy territory being vacated by black ducks (due to hunting or habitat changes), which increases hybridization opportunities; this appears to be especially prevalent in southern Ontario (Longcore et al. 2000).

There was not a significant trend for American Black Ducks on the Rockwood CBC overall (Figure 4). However, the trends for the years prior to 1987 was a strong decline ($R^2 = 0.92$, $p < 0.001$), with some recovery in numbers thereafter ($R^2 = 0.60$, $p < 0.001$). This increase may coincide with harvest restrictions that were implemented in the U.S. in 1983 (Longcore et al. 2000).

Since competition with Mallards has been implicated in black duck declines, a comparison of relative abundance between black ducks and Mallards was examined (Figure 5), a technique suggested by Bock and Root (1981). For nearly the last twenty years, the ratio has remained fairly stable, at roughly 1:17, despite a significantly positive trend in the numbers of Mallards. Confounding evaluation of these two species, however, is the difficulty of distinguishing many of the hybrids. It has been estimated that five to over 13 percent of birds that look like black ducks in North America are actually hybrids (Longcore et al. 2000, Wright and Wyndham 2005), although this is not reflected the Rockwood CBC numbers, where virtually no hybrids are ever reported. Thus, these numbers should be viewed with extra caution.

CANVASBACK– This duck, prized by hunters, experienced an overall decline in numbers from 1955 to 1993 (Hohman et al. 1995). From 1996 to 2005, Canvasbacks continued to decline over the entire Waterfowl Breeding Population and Habitat Survey area (CWSWC 2005). In the 1950s, nearly 80% of the continental Canvasback population wintered in the Atlantic and Pacific flyways; in the late 1980s the distribution shifted so that about 44% were wintering in the Central and Mississippi flyways (Hohman et al.

1995). The lower Detroit River is an important staging and wintering area for Canvasbacks (Robison 2005).

Canvasback numbers on the Rockwood CBC show a significant positive trend (Figure 6). November surveys of Canvasbacks on Lake St. Clair, the Detroit River, and western Lake Erie from 1974-2004 showed a slightly increasing trend as well, but with high year-to-year variability (Robison 2005, USEPA 2006). This variability is also evident in the Rockwood CBC numbers, which depend on the location of open water and weather conditions, which effects the ability of participants to see and count the ducks.

COOPER'S HAWK AND SHARP-SHINNED HAWK – Cooper's Hawk is a species of special concern in Michigan, listed after a decline that began in the 1950s which was attributed pesticide use (Soule et al. 1992, Cuthrell 2002). Cooper's Hawks have been on the increase, with a significant positive trend on the Breeding Bird Survey in the eastern U.S. over the same period as the Rockwood CBC (1975-2004) (Sauer et al. 2005). Michigan's populations of Cooper's Hawks have recovered so well that it has been recommended that the species be removed from the special concern list (Brewer et al. 2005, unpubl.).

On the Rockwood CBC, the trend for Cooper's Hawks has been strongly and significantly positive (Figure 7). The closely-related Sharp-shinned Hawk is also reported nearly annually on the Rockwood CBC. Because they are so similar, less experienced observers may misidentify an Accipiter not seen well. Therefore, the trend of Sharp-shinned Hawks was also examined, and found to be significantly positive as well (Figure 7). This corresponds with studies that have documented an increase in winter abundance of both species over the last 30 years in the eastern U.S. (Rosenberg 1995, Duncan 1996).

RING-BILLED GULL – Ring-billed Gulls were not recorded nesting in the Great Lakes between the late 1800s, when they were numerous, until they appeared again in 1926; none were recorded nesting from Lake Erie in the early 1940s (Ludwig 1943). Numbers grew, with an estimated 3,000 pairs in 1930 (Weseloh and Blokpoel 2003). The population remained stable between 1940 and 1960, and then began a rapid increase again in the 1960s (Dolbeer and Bernhardt 1997). An analysis of gulls from CBCs on the north shore of western Lake Erie showed a spectacular increase between 1950-1984 (Dolbeer and Bernhardt 1997). By 1999, there were approximately 92,000 gulls and terns nesting on the Detroit River, nearly all of them Ring-billed Gulls and all nesting on Ontario's Fighting Island (Weseloh et al. 2001). The reasons for the population explosion in general are poorly understood (Weseloh and Blokpoel 2003), but may have to do with increased food sources, including fish in a cleaner Lake Erie, burgeoning sanitary landfills, and agricultural lands (Dolbeer and Bernhardt 1997).

The trend for Ring-billed Gulls on the Rockwood CBC is flat and not significant (Figure 8). There is a great deal of year-to-year variability. While some Ring-billed Gulls winter in the Great Lakes (Weseloh and Blokpoel 2003), most winter along the Gulf Coast (Gabrey 1996), so CBCs may not be an appropriate tool for monitoring population trends. Further, gulls in the area are seldom stationary, and are typically seen flying overhead as they move between coastal areas where they roost overnight to inland areas where they

feed (pers. obs.). Flying birds are not as accurately counted on CBCs because participants are not concentrating on the sky, especially for extended periods of time.

AMERICAN CROW – Crow population trends are of interest because this species is a frequent victim of West Nile virus (WNV), vulnerable to all routes of transmission with extremely high mortality (Caffrey 2003). WNV was first detected in the United States in New York in 1999, and in Michigan in 2001 (SOM 2005). Analyses of CBC data and Project FeederWatch data (a winter “citizen science” project sponsored by Cornell Lab of Ornithology) has indicated that crow declines have been geographically patchy (Bonter and Hochachka 2003, Caffrey and Peterson 2003) and that the recent crow declines were within the magnitude of previous fluctuations that have been seen on CBCs over the last 30 years (Bonter and Hochachka 2003). Nonetheless, crow counts decreased 60% in the upper Midwest in a comparison of Project FeederWatch results between the winters of 2001-2002 and 2002-2003, while 79% of CBC circles showed crow declines between those two winters (Bonter and Hochachka 2003).

The mean number of crows per year (636) on the Rockwood CBC during the pre-WNV period, 1975-2001, was substantially and significantly higher than the mean for 2002-2004 (35), after WNV was detected in Michigan ($t=3.7$, $df=26$, $p=0.001$), consistent with other studies comparing these periods. The overall trend for crows on the Rockwood CBC also shows a significant decline (Figure 9). This trend on the Rockwood CBC is a long-term one, however. Data from 1975-2001, the period prior to the occurrence of WNV in Michigan, showed a nearly identical trend. This is somewhat at odds with the results of other regional CBCs for the pre-WNV period. An analyses of CBC trends from 1959-1988 showed significant increasing annual trends for American Crows in Michigan ($n=60$) and Ontario ($n=91$) count circles (Sauer et al. 1996). The trend for the nearby Detroit River CBC for 1978 (its first year) to 2001 was slightly negative, but not significant ($p>0.05$, unpub. data).

The crow counts on the Rockwood CBC have varied greatly from year to year, while they were much more consistent on the Detroit River CBC. These differences may reflect the tendency of crows to form large winter flocks and roosts (Caffrey and Peterson 2003), some of which may be very localized or displaced by changing land use. Because many of these flocks contain migratory birds CBC data may not accurately sample resident birds (Caffrey and Peterson 2003).

AMERICAN TREE SPARROW – American Tree Sparrows are widespread and abundant birds which breed primarily above the tree line in northern Canada and Alaska and winter in the southern Canada and the U.S. (Naugler 1993). The remoteness of their nesting grounds makes population monitoring difficult, and recent apparent declines in CBC numbers from 1959-1988 have prompted concern (Dunn 2005). However, the CBC trend analysis is outdated and may be unreliable (Sauer et al. 1996, Dunn 2005), and Project FeederWatch data suggest that tree sparrows may shift their wintering ranges from year to year (CLO 2001), and that the percentage of feeders visited and average number of tree sparrows seen at one time has remained fairly stable for the period 1988-2004 for the Great Lakes region (CLO 2005).

On the Rockwood CBC, American Tree Sparrow numbers show a small but significant decline (Figure 10). The last nine years of the count, however, show a much steeper and significant decline ($R^2 = 0.86$, $p < 0.001$). This coincides with the trend of all Michigan CBCs (average 44 counts reporting this species annually) for the same periods ($R^2 = 0.46$, $p < 0.05$); Ontario and Ohio CBCs for this time frame did not show significant declines (NAS 2002).