

THE SARANAC LAKE CHRISTMAS BIRD COUNT:

A 60-year Record of Winter Bird Populations in the Central Adirondacks

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“PRIOR TO THE TURN OF THE 20TH CENTURY, PEOPLE ENGAGED IN A HOLIDAY TRADITION KNOWN AS THE CHRISTMAS ‘SIDE HUNT’: THEY WOULD CHOOSE SIDES AND GO AFIELD WITH THEIR GUNS; WHOEVER BROUGHT IN THE BIGGEST PILE OF FEATHERED (AND FURRED) QUARRY WON. CONSERVATION WAS IN ITS BEGINNING STAGES AROUND IN THAT ERA, AND MANY OBSERVERS AND SCIENTISTS WERE BECOMING CONCERNED ABOUT DECLINING BIRD POPULATIONS. BEGINNING ON CHRISTMAS DAY 1900, ORNITHOLOGIST FRANK M. CHAPMAN, AN EARLY OFFICER IN THE THEN NASCENT AUDUBON SOCIETY, PROPOSED A NEW HOLIDAY TRADITION—A ‘CHRISTMAS BIRD CENSUS’—THAT WOULD COUNT BIRDS DURING THE HOLIDAYS RATHER THAN HUNT THEM”.

—AUDUBON

OBJECTIVE

To explore the past 40 years of data from an Adirondack Christmas Bird Count including relating selected environmental and other factors to bird observation patterns for more than two dozen species that overwinter in the High Peaks region.

Every Christmas Bird Count takes place within an assigned territory—a 15-mile diameter circle in which the objective is to count as many birds as possible within one calendar day. Each circle has a compiler who picks the count date (sometime between December 14 and January 5) and assigns territories to the participants who will be counting the birds they see or hear. Birds seen or heard within three days of the selected date for a particular count, but not observed on count day, are noted as occurring within the “count period” for that count that year.

In 1947, Dr. Gordon M. Meade, a physician from Rochester who had a camp on Kiwassa Lake, was serving as the Associate Medical Director of the Trudeau Sanatorium in Saranac Lake. Meade was also a bird watcher, and in 1947 he helped organize and was elected first president of what became the New York Federation of Bird Clubs (now the New York State Ornithological Association). Also that year, Meade initiated the Saranac Lake Christmas Bird Count (SLCBC). Major and noteworthy habitat types in the count circle include mixed, boreal, and hardwood forests, lakes, streams, bogs, and fens. Elevations range from 445 to 1168 m, and the villages of Saranac Lake, Lake Placid, and Bloomingdale are within the circle (Figure 3).

The first SLCBC took place on December 21, 1947. The two bird counters, including Meade, observed 63 individual birds representing 15 species. Since that inaugural count, the number of observers, bird species, and individual birds has steadily grown. For example, on December 30, 2012, 44 observers recorded 4,123 individuals of 51 species on the count (Figures 1 and 2). To date, 91 species have been observed on this CBC over its 59 years of recording birds (through January 2015), plus an additional five species have only been observed in the count period. All species' scientific names are listed in Table 1 or in the text.

Some of the more unusual (one time only) species observed include American Bittern (*Botaurus lentiginosus*; 1981), Golden Eagle (*Aquila chrysaetos*; 2011), King Rail (*Rallus elegans*; 1967), Northern Hawk Owl (*Surnia ulula*; 2000), Great Gray Owl (*Strix nebulosa*; 1983), Long-Eared Owl (*Asio otus*; 1998), Winter Wren (*Troglodytes hiemalis*; 1987), Ruby-crowned Kinglet (*Regulus calendula*; 2009), Gray Catbird (*Dumetella carolinensis*; 1975), Field Sparrow (*Spizella pusilla*; 1980), and Baltimore Oriole (*Icterus galbula*; 2005). The five species observed only during the count period but never observed on the day of the count were Northern Bobwhite (*Colinus virginianus*; 1996), Red-necked Grebe (*Podiceps grisegena*; 2000), Iceland Gull (*Larus glaucoideus*; 1990), Northern Flicker (*Colaptes auratus*; 2008), and Hermit Thrush (*Catharus guttatus*; 1989).

Consistency in counting birds on a bird count is important so that the results are comparable from year to year. In the early years of the SLCBC, the participants were not as rigorous as they perhaps could have been about staying within the count circle or perhaps their map of the count circle was not accurately drawn. Regardless of the reason,

a handful of the more unusual birds in those early years (e.g., Eastern Meadowlark [*Sturnella magna*], American Kestrel [*Falco sparverius*], Lapland Longspur [*Calcarius lapponicus*]) were recorded in habitats that are somewhat outside the count circle (Norman's Ridge, Saranac Lake Airport) where the open habitat frequently harbors birds not found elsewhere in the count circle. I adjusted the count circle in 2000 and 2001 by moving it approximately 1.2 miles NNE of its previous location to encompass an area just north of the count circle where folks, unbeknownst to me, had been counting birds for years in the 80s and 90s. The change did not affect any prior records as the southern edge of the count circle is roadless (Figure 3).

Since I started compiling the count in 1975, for consistency's sake, we have always tried to hold the count near the end of the count period on the weekend nearest New Year's Day. Holding the count occasionally at the start of the count period in mid-December would likely yield more birds due to lingering fall migrants and gulls that linger before the lakes freeze but would yield results that are less comparable between years. Another benefit of holding the count late in the national count period is that winter finches (e.g., redpolls, crossbills, Purple Finches) often do not appear in significant numbers until late December or early January.

The Christmas Bird Count (CBC) is an enormously useful source of data for researchers studying the ongoing status and ranges of bird populations across the Americas. Another citizen-science conducted census is the Breeding Bird Survey (BBS), which is done in the breeding season. Co-analyses of CBC and BBS data provide a combined metric by which scientists can assess how bird populations are doing and where they occur across the Americas.

But users of these data must be aware of the limitations of the data and causes in the variation in the species and numbers of birds counted. Changes in the numbers of species and individuals counted can be affected by many variables and may not be purely representative of actual changes in species composition or population sizes in an area.

More than in most CBC territories in North America, we can be certain that the number of species and particularly the number of individuals counted is a gross underestimate of the birds actually present in the Saranac Lake CBC territory. There are many lines of evidence for this, as follows.

- Although more than 90 species have been recorded in the first 59 years of the SLCBC, we know that in late December that in a typical year there are only approximately 53 species that one could reasonably expect to find. Yet, the highest count to date is 51 species and the average count is only 40 species.

- Only a tiny fraction of the count circle is actually visited by counters. If every road in the circle were walked—listening for birds and “pishing” to attract birds during good weather in the morning when the birds are most active—such that all birds within 50 meters of the road were seen or heard, only 7% of the circle would be covered by birders (Figure 4). But most of the roads are driven rather than walked. (“Pishing” is the action of making a sound resembling the scolding note of a chickadee or titmouse. Birders and scientists use this technique to attract passerines (perching birds in the order *Passeriformes*), which approach the sound to assess the potential threat and potentially mob a predator (e.g., an owl). Making a squeaking sound also works similarly to attract some bird species.) Birds that are particularly under-sampled because of the lack of coverage of the 90% of the count circle without roads or trails are those species that live in the forest including owls, chickadees, nuthatches, kinglets, Brown Creepers (*Certhia americana*), woodpeckers, and, especially during conifer mast crop years, some of the winter finches. For example, the actual number of Black-capped Chickadees (*Parus atricapillus*) residing in the count circle might be conservatively estimated to be 10-20 times the number actually counted, or well over 10,000 individuals.
- Even when the roads are walked, most birds are likely missed due to the birds not vocalizing or not responding to pishing, poor hearing or experience in identification on the part of observers, or observers not pishing. Observers may also be concentrating on birds in the bushes and trees and miss birds flying silently high overhead (e.g., raptors, Snow Geese [*Chen caerulescens*]).
- The weather is often not conducive for hearing or seeing birds. A windy or rainy day or a day with heavy snow will significantly reduce the variety and especially the number of birds seen or heard, compared to walking the same area on a sunny morning with no wind.
- In alternate years with a poor wild food crop, the birds are concentrated in areas with bird feeders. For this reason, we have always tried to ensure that the villages and areas with known bird feeders as well as particular uncommon habitats (e.g., open fields, open water on lakes and rivers, large expanses of accessible boreal bog habitat) are as well and consistently covered as possible. But in years with a good crop of conifer mast (spruce [*Picea* spp.], fir [*Abies* spp.], eastern hemlock [*Tsuga canadensis*], pine [*Pinus*], and/or birch [*Betula* spp.]), the birds are much more dispersed and are under-counted.

There are likely multiple factors at play that affect the numbers of birds counted on any particular count. For example, on January 2, 2010 (the 2009 count), the numbers of species recorded was the lowest in two decades; without a near record number of American Goldfinches (932), it would have been the lowest recorded number of individual birds in 25 years. One might reasonably hypothesize that the low recorded numbers that day could be due to some combination of factors such as snowy cold

weather on count day, the bitter cold temperatures in the weeks preceding the count, the near absence of conifer mast, the absence of a flight year for redpolls, and/or poor reproductive success for local resident species due to the cold and rainy summer weather the previous year. A useful research project would be to tease out the relative importance of these or other contributing factors, which is an analysis requiring more data than are currently available.

Another well-documented variable affecting the results is observer effort, and so count participants record their effort in miles and hours walked, driven, kayaked, skied, etc. Count participants also record the number of hours spent birding with other participants, a metric known as “party-hours.” Although the number of observers and the number of party-hours is highly correlated ($r^2 = 0.77$), party-hours provides a better metric of observer effort and count results are often calibrated based on party-hours in the field. Statistical methods have been developed to account for variation in effort (e.g., Link and Sauer 1999). In the most recent four years, count participants have put in more than 100 party-hours, while party-hours from 1976 through 2010 ranged from 40 to 87 (without taking into account the three extremes at each end). Yet, because other factors (wild food crop, weather) are so influential in determining the birds seen on any given count, observer effort explains only 62% of the variation in number of species and 45% of the variation in the total number of individual birds seen. For some birds such as the permanent resident Black-capped Chickadee, there is a fair correlation ($r^2 = 0.63$) between observer effort (party-hours) and numbers of individuals observed. For many other species, however, the correlation is weak (e.g., American Goldfinch, $r^2 = 0.14$) as other factors, particularly the wild seed crop, are more critical (Figure 5).

The remainder of this paper will discuss questions that one might ask of the SLCBC data. Despite limitations in the data discussed above, there are conclusions that one can reasonably make regarding changes in the species recorded as well as trends and patterns in their occurrence over the years. The first two questions below will examine data over the entire period that the count has been conducted, from 1947-1954, 1957, 1959-1968, and 1975-2014. Because of some differences in the way the count was conducted prior to my tenure as compiler (beginning in 1975), which are reflected in the data (Figures 1 and 5), the third question posed will just examine the past 40 years of data.

HAVE THE SPECIES PRESENT ON THE SLCBC CHANGED OVER THE YEARS?

During the first 21 years of the SLCBC (19 counts spanning the years 1947-1968), several birds that were never or only rarely reported in this timeframe became much more regular in later years.

There are a number of likely explanations, depending on the species, for these increases in species occurrence over time.

Canada Goose, mergansers, Great Blue Heron, and gulls. The degree of open water was not recorded on earlier counts (1947-1968); it seems probable that there was less open water in early winter than in more recent years, based on documented changes in ice-in dates on Adirondack lakes (Beier et al. 2012, Stager et al. 2009). It is also likely that no one boated the Saranac River or surveyed the Moose Lodge boathouse “bubblers” on Lake Placid before dawn where the mergansers have been found in recent years. But Canada Goose populations have also increased dramatically over the years in New York and across much of the country (Johnsgard and Shane 2009). The New York breeding population alone increased from about 5,000 pairs to 90,000 pairs in 2005 (McGowan and Corwin 2008).

Wild Turkey. Turkeys were extirpated from New York State as well as all of New England by the start of the 20th Century. However, releases of wild-caught birds from other states were successful in reestablishing turkeys throughout New York State, even in the central Adirondacks where it had been postulated that they could not establish a population (DeGraff 1973). Wild Turkeys first appeared on the 1994 SLCBC and by 2002 more turkeys than Ruffed Grouse (*Bonasa umbellus*) were being counted. On a typical count in recent years, 25-30 turkeys were counted (Figure 6).

Bald Eagle. Due to persecution by humans and deleterious effects on their reproduction by the pesticide DDT, bald eagles were functionally extirpated as a breeding species from New York by the mid-20th century (NYS DEC 2015). The NYS Department of Environmental Conservation mounted an aggressive restoration effort in the mid-70s that was very successful. Eagles were first counted on the 1987 SLCBC and one to four eagles are now observed every year, mostly along the open waters of the Saranac River (in late December).

Accipiters (forest-dwelling hawks). Northern Goshawks (*Accipiter gentilis*) staged a resurgence starting in the 1950s in New York as the forests in which they nest matured (Crocoll 2008), and perhaps the increase in their numbers accounts for the increase of Northern Goshawk sightings on more recent counts. Cooper’s and Sharp-Shinned Hawks (*Accipiter* spp.) are mostly found in winter near bird feeders. There are unquestionably many more people feeding birds in recent years, which explains why the number of bird species that are drawn to feeders (goldfinches, Purple Finches, redpolls) have dramatically increased since the earlier counts.

Buteos (hawks with broad wings). Both Red-Tailed Hawks (*Buteo jamaicensis*) and Rough-Legged Hawks (*Buteo lagopus*) were not observed on the SLCBC until the mid-80s. This change may or may not relate to a general pattern of shifting centers of early winter

distribution reported for Rough-Legged hawks and other birds by Niven et al. (2009). Red-Tailed Hawk populations have also been increasing over the past 50 years (Johnsgard and Shane 2009).

Mourning Dove, Tufted Titmouse, Carolina Wren, Northern Cardinal, Common Grackle. The first mourning dove was recorded in 1976, the first titmouse in 1979, and the first Carolina Wren in 1986. Cardinals and grackles were rarely recorded prior to the 1970s and are now expected every year, with as many as 26 cardinals and 10 grackles reported on a single count. These increases can be attributed to the northward expansion of the ranges of these species correlated with warmer January weather experienced in the contiguous 48 states over the past 40 years (Niven et al. 2009, Zuckerberg et al. 2009), likely aided by bird feeders allowing overwinter survival in the central Adirondacks.

Barred Owls. Barred Owls were not recorded in the 19 years of the count prior to 1975. Since 1975, they have been recorded on 23 of 40 counts, with a high count of 8 in 2013. There is some evidence that Barred Owls have become more common over the past 60 years (McGowan and Corwin 2008), but there is also reason to believe that Barred Owls were overlooked in the earlier counts. Ninety percent of the Barred Owls counted have been individuals heard at night, most of them lured into responding by playback or imitation of their calls—a technique that was likely not done in the early years of the count.

Black-backed Woodpecker and Gray Jay. Habitat for these species is easily accessible only in a few limited spots in the count territory (primarily Chubb River Swamp and Bloomingdale Bog/Bigelow Road areas), and these areas may not have been adequately surveyed on the earlier counts, particularly prior to 1961. Occurring in the same coniferous habitat are Boreal Chickadees (*Poecile hudsonicus*), which were missed in counts prior to the 60s. Gray Jays have increased in abundance locally in these areas as double digit numbers of this species are now routine but were unrecorded prior to 1997. Further, prior to the 1980s they were only observed at two (suet and breadcrumb) feeders that may have been overlooked or may not have existed prior to 1967.

American Three-Toed Woodpecker. Six individuals of this species were recorded on seven counts from 1978-1985, but only one individual has been recorded once since then (in 1998). The two New York Breeding Bird Atlases (Andrle and Carroll 1988, McGowan and Corwin 2008) and earlier reports summarized by Bull (1974) are indicative of a significant decline for this species in New York, where it is largely confined to the Adirondacks. The rarity of this species hinders anything other than idle speculation as to the reason(s) for a decline, if any, on the SLCBC.

Common Raven. Forest clearing and persecution nearly eliminated this species from New York. The population began to naturally recover in the 1970s, and the first raven appeared on the SLCBC in 1968. The numbers of ravens in annual SLCBC counts hit double digits in 1985 and reached a high to date of 67 birds in 2008 (Figure 6).

American Robin. First recorded in 1983, robins have been recorded on one-third of counts since then with a high of 46 individuals in 1998. Their winter range may be expanding northward as the climate warms (Niven et al 2009), aided by ornamental crab apple trees whose fruit lingers into the winter months, if not stripped bare by waxwings and robins in fall migration.

Bohemian Waxwings. This species winters every year in the St. Lawrence and Champlain Valleys. It is only occasionally reported on the SLCBC, having usually passed through the count territory by early December and consuming most of the crab apples and available wild fruits en route.

House Finch. This western North American species was released on Long Island in 1940 and spread over the eastern U.S. over the next 50 years. House Finches first appeared on the SLCBC in 1985, then reached a peak of 72 individuals in 1994, and were last recorded on the count in 2004 (Figure 7). Their rapid decline after 1994 on the SLCBC was likely caused by the epidemic of House Finch eye disease caused by the bacterium *Mycoplasma gallisepticum*, which spread through the eastern range of the House Finch in the mid-90s (Driscoll 2008).

Hoary Redpoll. This species was likely overlooked among small flocks of Common Redpolls (*Acanthis flammea*) prior to the 1990s when significant numbers of common redpolls began to be counted at nyjer (or niger, sometimes called thistle) feeders on count day. Typically one out of every 200 redpolls will be an identifiable hoary redpoll, but the actual percentage is likely closer to one percent due to the difficulties in identification of this species of questionable taxonomic validity (Mason and Taylor 2015).

HAVE THE NUMBERS OF INDIVIDUAL SPECIES THAT HAVE BEEN PRESENT SINCE THE COUNT STARTED CHANGED SIGNIFICANTLY OVER THE ENTIRE 67 YEAR PERIOD OF THE COUNT?

American Crow (*Corvus brachyrhynchos*). Before 1982, no more than 30 crows were counted in any given year on the count and fewer than six crows were counted most years. Then their numbers increased rapidly, peaking in 1991 with 355 crows; more than 100 crows have been recorded in 19 of the past 21 counts (Figure 6). This increase corresponds to an accelerating long-term increase in BBS data for New York in the 1980s. The data, however, are too variable from year to year to say whether there was decline in the early part of this century when crow numbers elsewhere declined due to the 1999 outbreak of West Nile Virus—a virus commonly spread by infected mosquitoes that affects humans and birds, especially crows and jays (CDC 2015).

Evening Grosbeak (*Coccothraustes vespertinus*). Evening Grosbeaks were a species of the central and western U.S. and Canada until the mid-1940s when they moved eastward and later began to breed in New York (Young 2008). In three of the first seven years of the SLCBC, Evening Grosbeaks comprised a quarter of the birds counted. Numbers then declined somewhat but peaked again in the late 70s and early 80s when they comprised more than half of the birds in two counts and more than 29% of the birds counted on five other counts. Since the late 1990s Evening Grosbeaks have declined, consistent with reports from other CBCs in the Northeast. In the last two years no Evening Grosbeaks have been recorded, which is the first time that none have been recorded since 1947 (Figure 8). Breeding of this species in New York increased between the 1980-85 New York Breeding Bird Atlas (Andrle and Carroll 1968) and the 2000-05 Atlas (McGowan and Corwin 2008). It is unclear whether these changes relate to major outbreaks in the eastern spruce budworm (*Choristoneura fumiferana*) in New York in 1945-55 and again in 1968-88 (Young 1988), but these two periods correspond with high SLCBC counts for this species. Birders and scientists have long been aware that populations of Evening Grosbeaks and several warbler species increase during outbreaks of spruce budworms (*Choristoneura* spp.), a preferred food of these species when nesting and feeding their young (e.g., Bolgiano 2004).

ARE THERE OBVIOUS PATTERNS IN SPECIES OCCURRENCE RELATED TO CHANGES IN FOOD SUPPLY?

A cursory examination of Figure 1 reveals significant annual variation in the number of individual birds recorded, but the data for individual species are striking (Figures 9-11). Some years there may be hundreds or thousands of individuals of a particular “winter finch” species (Purple Finch, Pine Siskin, White-winged Crossbill, American Goldfinch, Common Redpoll, and Pine Grosbeak), and in other years there are none or almost none. Numbers of two short-distance migrating passerines—Blue Jay and Red-Breasted Nuthatch—show similar degrees of variation involving hundreds of individuals.

The variation in the numbers of winter finches observed is not random. The peak counts for one or more of the conifer seed-eating birds (Red-breasted Nuthatch, White-winged Crossbill, Pine Siskin) occurred consistently on the odd-numbered years from 1984-1991, on the even-numbered years from 1994-2008, and on the odd-numbered years again starting in 2009 (Figure 9). The peak counts for American Goldfinches follow the same pattern of even-numbered years from 1994-2008 and odd-numbered years starting in 2009. However, the largest count recorded for goldfinches occurred in 2013, a year with almost no other finches. Prior to 1994, the peaks for goldfinch numbers were on the even-numbered years going back to 1975 (Figure 10). Peaks for redpolls have been on odd-numbered years from 1987-2007 and on the even-numbered years starting in 2010—years when the other winter finches were not observed or were observed in low numbers (Figure 10).

It is well known that winter finch numbers are tied to the abundance of their food (Pittaway 2014). Since 1975 the wild food crop has been recorded with other data for the Saranac Lake CBC. What has been recorded is my qualitative judgment as to whether the autumn spruce cone mast is excellent, good, fair, or poor. These conifers tend to mast synchronously not only across species but also across large geographic areas (e.g., the Adirondacks and adjacent areas in Canada and New England) (Jensen et al. 2012). For purposes of this paper “good” and “fair” mast cone crops have been combined. In general, excellent or good to fair cone crops occur every other year, and in 17 of the past 40 years (42%) the conifer mast has been rated “poor.”

A comparison of the mast crop with numbers of Red-Breasted Nuthatches, White-Winged Crossbills, Pine Siskins, Purple Finches, and Blue Jays shows that all of the top five counts were in years with excellent or good/fair mast cone crops, and the average number of birds counted in a poor year was as much as an order of magnitude less than the count in a year with an excellent or a good to fair mast crop (Figures 9 and 11; Table 2).

Although only three of these species (crossbill, siskin, nuthatch) are dependent on conifer seeds in the Adirondacks in winter (Blue Jays eat acorns, beechnuts, and other “hard mast”, while Purple Finches eat “soft mast” such as fruits as well as seeds and buds), the numbers of all five species are linked to conifer mast. This is likely because of the synchrony between conifer species and other fruiting plants in the Adirondacks. A 24-year study at Huntington Wildlife Forest found that most of the 50 fruiting herbs, shrubs, and trees are on a two year cycle that is congruous among them, including conifers (Jensen et al. 2012, S. McNulty email correspondence). That cycle is congruous with the conifer mast production observed on the SLCBC and with beech, oak (*Quercus* spp.), and maple mast in central Ontario, Canada (Bowman et al. 2008).

There is also considerable variation between species in the years of their highest count. For example, 1976 was the best year for both Purple Finch (1,033 individuals) and Red-breasted Nuthatch (311 individuals), but this was not a “top five” year for any of the three other species. The best year for White-Winged Crossbill (1,146 individuals) was 1989, but this was only a “top five” year for Pine Siskin and no other species. The best two years for Pine Siskin (2,021 individuals in 2008 and 1,903 in 1987) were not “top five” years for any of the other species (Figures 9 and 11). There are several reasons for these differences. Pine Siskins depend on hemlock mast and hemlock mast crops are usually but not always synchronous with spruce mast, on which the other conifer mast-eating species depend. Also, food supplies to the north in Canada play a major role in which species occur in the Adirondacks in winter, although conifer and other mast in the Adirondacks tend to be similar to mast crops in adjacent parts of Canada (Jensen et al. 2012).

The numbers of American Goldfinch, which eat seeds of grasses, alder, birch, and cedar, also tend to peak every other year. Counts of more than 100 goldfinches were synchronous with counts of more than 100 Purple Finches, crossbills, and siskins in 12 of 19 years (Figures 9-11). This partially synchronous pattern may be a result of simultaneous biannual

variation in the availability in Canada and in the Adirondacks of the wild foods that they consume in the winter. The Moran effect (correlated environmental patterns) operates in small mammal populations synchronized to wild food crops in Ontario and other systems (Bowman et al. 2008) and is potentially driving synchrony among some Adirondack winter bird populations. However, the Moran effect is not sufficient to explain synchronous mast fruiting events of boreal trees (Koenig and Knops 2000). Both the reasons for mast fruiting (e.g., predator satiation, increased seed production) and the mechanisms of synchrony remain open areas of research.

Pine Grosbeak numbers irrupt southward in winter when mountain ash (*Sorbus americana*) berry crops are poor in the boreal forest as these birds are ash seed specialists. Although somewhat irregular in their appearance on the SLCBC (Figure 10), Pine Grosbeaks tend to show an every-other-year pattern of abundance tied to annual variation in mountain ash seeds in Canada. The mountain ash berry crop in the Adirondacks must be synchronous into Canada where our Pine Grosbeaks originate. Jensen et al. (2012), working at a forested site in the southern High Peaks, found mountain ash produced a berry crop in most even autumns from 1990-2010, just the years when Pine Grosbeaks did not irrupt southward and appear on the SLCBC (Figure 10).

Prior to 1980, the largest count of redpolls was 31 individuals. Since 1980, redpoll numbers are typically in the hundreds, and as many as 1,535 individuals have been recorded. Redpolls have quite reliably appeared every other year since 1987, first on the odd numbered years from 1987 through 2007 and then on the even numbered years starting in 2008 through 2014 (Figure 10). Low redpoll counts in some flight years are due to the fact that the birds often do not appear in numbers until after the SLCBC period. This was the situation in the winter of 2014-15 when only 26 redpolls were found on count day. Then, starting in February, many hundreds were seen daily in the count territory. The movement of the birds is caused by the biannual failure of birch (and possibly alder) seed crops in the boreal forest. (For more information on irruptive boreal mast-consuming birds, see Ron Pittaway's past winter finch forecasts for southern Ontario (Neily 2011) and his current forecast for Ontario and adjacent states (Pittaway 2015).

WINTER BIRDS AND FEEDERS

A significant percentage of birds counted on the SLCBC are observed at or near bird feeders. On the 2014 count (held on January 3, 2015), 17 (44%) of the 38 species observed were seen exclusively or primarily at feeders, and approximately one-third of the individual birds counted were at feeders. The percentage of individuals counted which are at least partially dependent on feeders is even greater. For example, most Rock Pigeons (*Columba livia*) and Mallards (*Anas platyrhynchos*) are not counted when they are at feeders (as they are counted at their communal roosting sites), but both of these species are dependent on feeders in the winter months.

When redpolls arrive for the winter in the Adirondacks, they can be found feeding on wild food (e.g., birch and alder seeds); redpolls are also seen at bird feeders, especially those stocked with nyjer seed or sunflower chips/hearts. Because the birds travel in flocks, having many feeders attracts and holds the birds, as the large flocks can be accommodated. On the SLCBC, most people do not put out more than a couple of feeders, so the redpolls are particularly concentrated at the three or four houses in the count territory with many feeders (e.g., with > 100 feeding perches or where a deck railing, porch, picnic table, or cleared area on the ground has been sprinkled with nyjer or sunflower hearts). The scarcity of redpolls on counts prior to 1980 (maximum count was 31 individuals; see Figure 10) is likely due to the near absence of feeders, especially groups of several feeders with either nyjer or sunflower hearts.

Similarly, American Goldfinches and Pine Siskins tend to be concentrated at homes with multiple nyjer or sunflower heart feeders. Purple Finches, Blue Jays, and Red-breasted Nuthatches tend to concentrate at home with feeders stocked with black oil sunflower seed or sunflower hearts. Pine Grosbeaks occasionally come to black oil sunflower seed feeders but are more frequently observed eating soft mast, especially mountain ash seeds and crab apples (*Malus* spp.). Prior to 1975, there were only three counts exceeding 100 individuals for these six species collectively. Since 1975, however, there have been 41 counts exceeding 100 individuals and six counts exceeding 1000 individuals (Figures 9-11). This is due not only to better count coverage by more participants but also, particularly, to more people feeding birds with appropriate seeds (nyjer, sunflower hearts, and black oil sunflower). Historically (in the 1970s and prior), most feeders in the area appeared to be stocked with a seed mix of millet, milo, and a few sunflower seeds that appealed to few birds except Mourning Doves and the one or two flocks of House Sparrows (*Passer domesticus*) that persisted in the count territory.

CONCLUSIONS

Sixty years of data of bird occurrences on the Saranac Lake Christmas Bird Count, consistently collected by citizen scientists since 1975, reveal changes in the winter bird populations in the central Adirondack Mountains of upstate New York. The data also reveal a primarily biannual pattern of occurrence of winter finches, a result of their species-specific dependence on mast crops of spruce, birch, ash, and other trees.

Key places to see winter birds include the Paul Smiths College Visitor Interpretive Center and the SUNY College of Environmental Science and Forestry Adirondack Interpretive Center in Newcomb. Contacting an Adirondack guide who specializes in birding trips is another excellent way to see winter birds in the Adirondacks. To participate in a CBC in your area, contact the local Audubon Society chapter (see Thaxton this issue).

Table 1. Number of counts in which a species was recorded in two time periods: 1947-1968 ($n = 19$) and 1975-2014 ($n = 40$) (only dramatic increases in species occurrence are included; listed in taxonomic order).

SPECIES	SCIENTIFIC NAME/FAMILY	1947-1968	1975-2014
Canada Goose	<i>Branta canadensis</i>	1	11
Hooded Merganser	<i>Lophodytes cucullatus</i>	2	23
Common Merganser	<i>Mergus merganser</i>	2	13
Wild Turkey	<i>Meleagris gallopavo</i>	0	17
Great Blue Heron	<i>Ardea herodias</i>	2	9
Accipiters (3 spp.)	<i>Accipitridae</i>	2	19
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0	15
Buteos (2 spp.)	<i>Accipitridae</i>	0	11
Gulls (3 spp.)	<i>Laridae</i>	0	14
Mourning Dove	<i>Zenaida macroura</i>	0	37
Barred Owl	<i>Strix varia</i>	0	23
American Three-Toed Woodpecker	<i>Picoides dorsalis</i>	0	7
Black-Backed Woodpecker	<i>Picoides arcticus</i>	0	26
Gray Jay	<i>Perisoreus canadensis</i>	1	30
Common Raven	<i>Corvus corax</i>	1	40
Tufted Titmouse	<i>Baeolophus bicolor</i>	0	9
Carolina Wren	<i>Thryothorus ludovicianus</i>	0	3
American Robin	<i>Turdus migratorius</i>	0	10
Bohemian Waxwing	<i>Bombycilla garrulus</i>	0	8
Northern Cardinal	<i>Cardinalis cardinalis</i>	3	40
Common Grackle	<i>Quiscalus quiscula</i>	4	23
House Finch	<i>Haemorhous mexicanus</i>	0	13
Hoary Redpoll	<i>Acanthis hornemanni</i>	0	8

Table 2. Distribution of “top five” and mean counts for five species in years of excellent, good/fair, or poor mast conifer crops, especially spruce and fir (listed in taxonomic order).

CONIFER MAST				
NUMBER OF TIMES IN TOP 5 (OUT OF 5)	PRIMARY FOOD	EXCELLENT	GOOD/FAIR	POOR
Blue Jay	Acorns, beechnuts	1	4	0
Red-breasted Nuthatch	Buds, fruits, seeds	2	3	0
Purple Finch	Spruce	3	2	0
White-winged Crossbill	Spruce, hemlock, tamarack	4	1	0
Pine Siskin	Hemlock, birch	1	4	0
MEAN COUNT (NUMBER OF INDIVIDUALS)				
Blue Jay		211	222	134
Red-breasted Nuthatch		151	119	61
Purple Finch		243	47	2
White-winged Crossbill		134	89	3
Pine Siskin		334	356	6

Figure 1: Saranac Lake Christmas Bird Count, Birds Recorded and Participation, 1947-2014

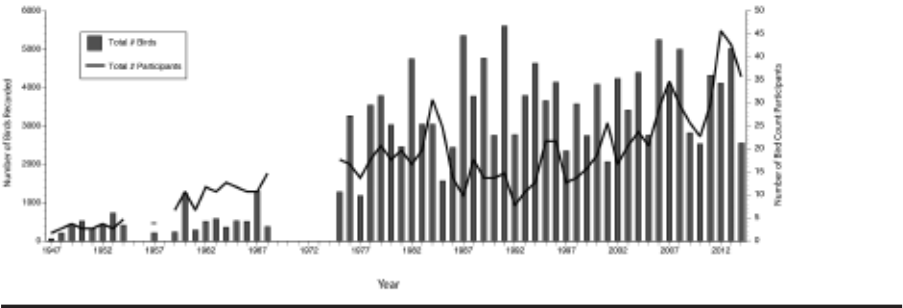


Figure 2: Saranac Lake Christmas Bird Count, Bird Species Recorded and Participation, 1947-2014

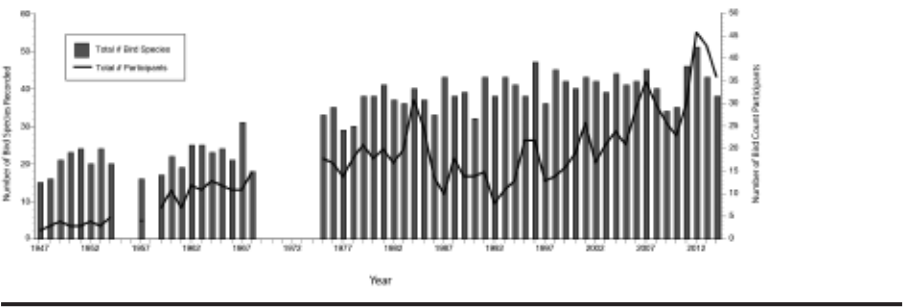


Figure 3: Saranac Lake Christmas Bird Count location



Figure 4: Saranac Lake Christmas Bird Count size and road distribution

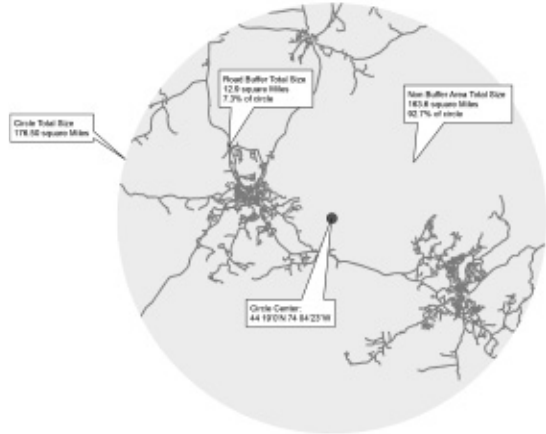


Figure 5: Saranac Lake Christmas Bird Count, Observation Records and Party Hours, 1947-2014

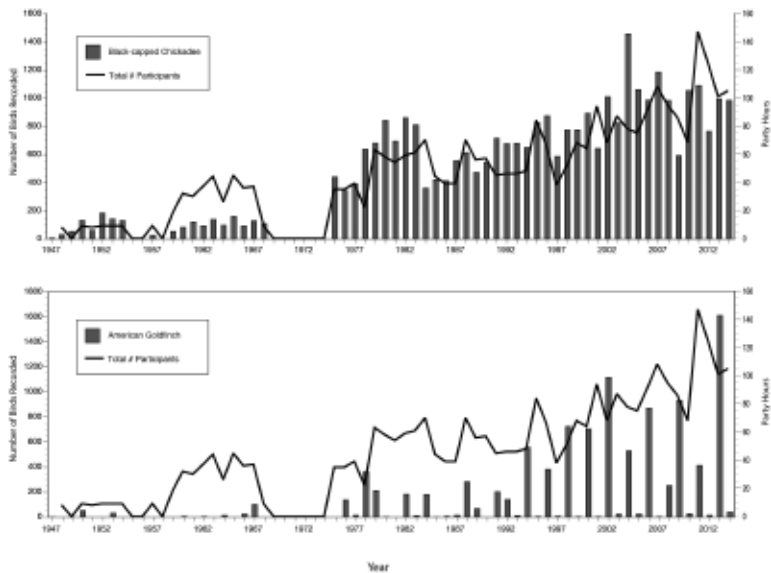


Figure 6: Saranac Lake Christmas Bird Count, Wild Turkey, American Crow, and Common Raven Records, 1947-2014

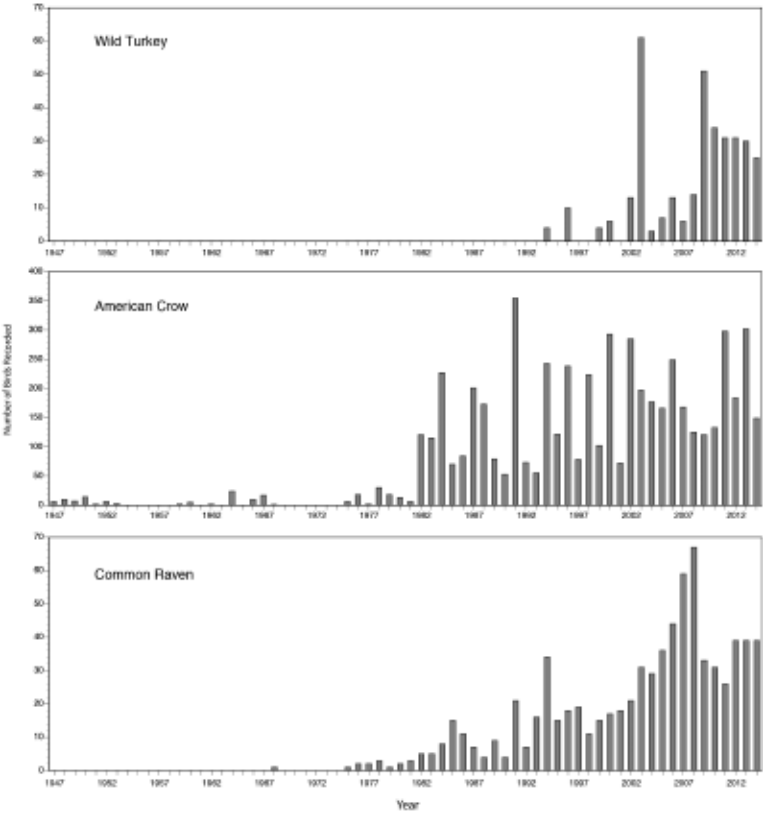


Figure 7: Saranac Lake Christmas Bird Count, House Finch, 1975-2014

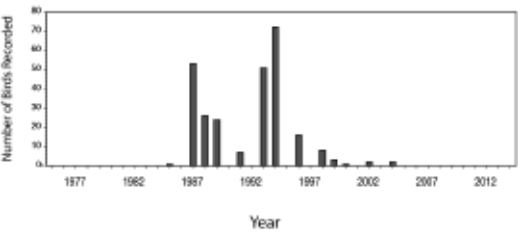


Figure 8: Saranac Lake Christmas Bird Count Evening Grosbeak with Spruce Budworm Outbreaks, 1947-2014

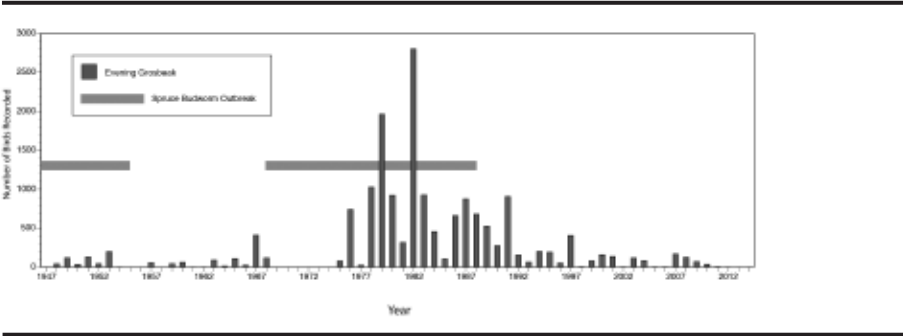


Figure 9: Saranac Lake Christmas Bird Count, Red-breasted Nuthatch, White-winged Crossbill, and Pine Siskin with annual quality of conifer seed mast crop, 1947-2014. (Note breaks in y-axes.)

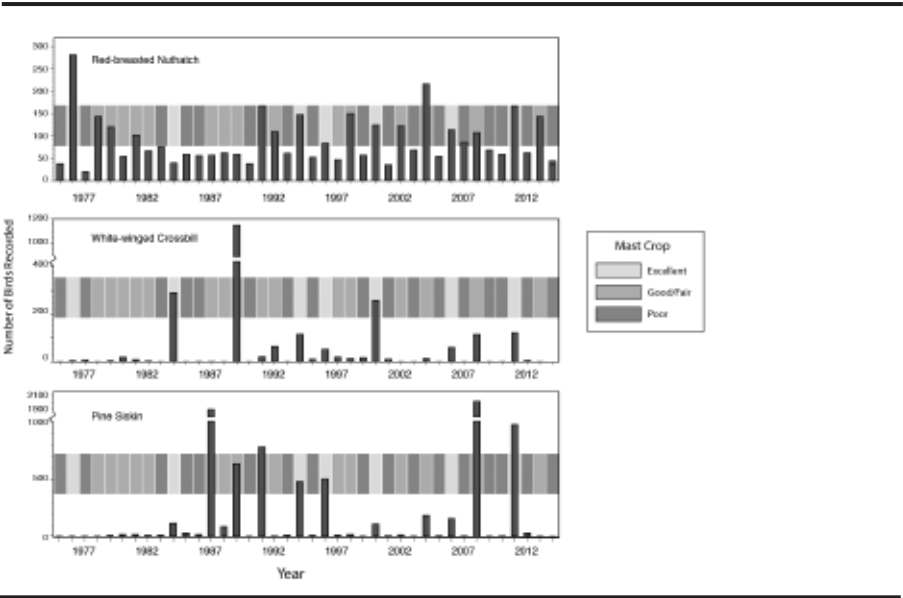


Figure 10: Saranac Lake Christmas Bird Count, Redpolls, American Goldfinch, and Pine Grosbeak, 1975-2014

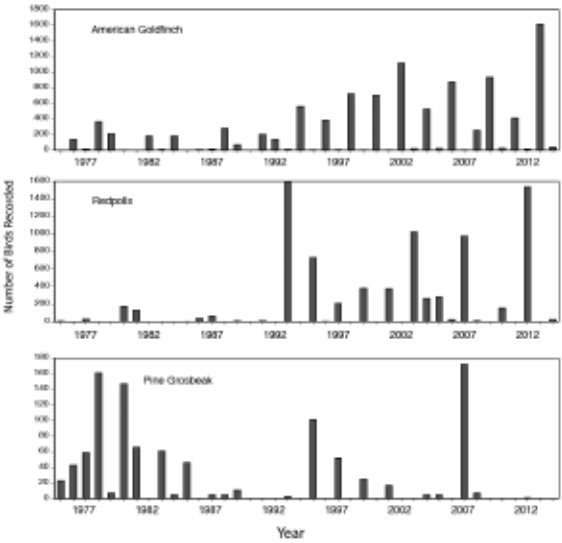
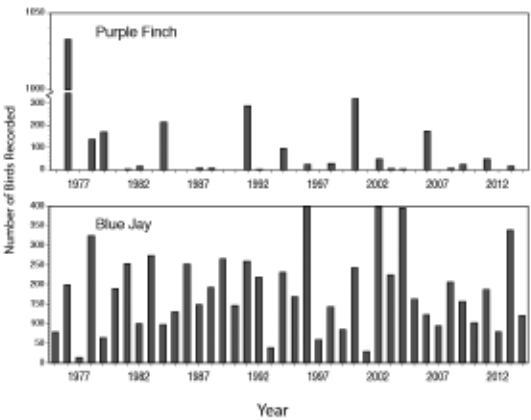


Figure 11: Saranac Lake Christmas Bird Count, Purple Finch and Blue Jay, 1975-2014. (Note break in y-axis.)



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