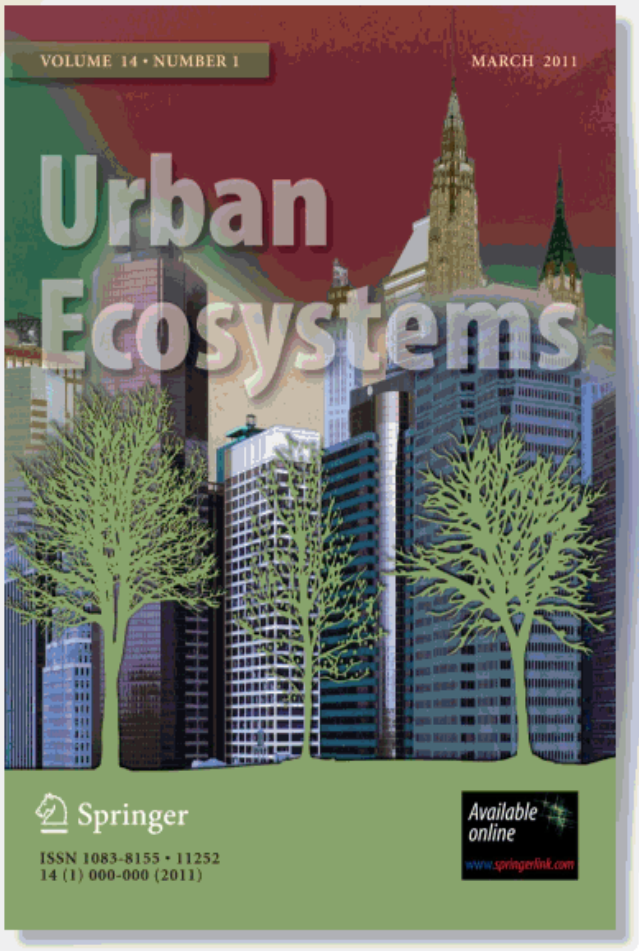
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Urban parakeets in Northern Illinois: A 40-year perspective

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Abstract Monk parakeets (*Myiopsitta monachus*) are the most abundant and widely distributed of the naturalized parrots in the United States. We summarize monk parakeet population data from 1970 to 2010 for northern Illinois, one of the best-known populations. Throughout the 1970s, parakeets were seen in small numbers at scattered locations, but none of the nesting sites persisted and the birds either died or moved elsewhere. The species became established in the Hyde Park neighborhood of Chicago in 1979 and this population grew exponentially and expanded over the next 25 years, doubling in size every 2 to 3 years. In the mid to late 1990s parakeets became established in many other localities in the Chicago region. The population in Hyde Park began to rapidly decline in 2005, a trend also exhibited in national counts. The reasons for this decline are unknown but we suggest

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that the decline is more apparent than real and that the decline in Hyde Park is the result of shifts in population structure from a few dense aggregations to progressively more spatially separated smaller groups. As evidence for this, the population of parakeets in the greater Chicago region does not appear to have declined but is still growing in size and distribution. Monk parakeets are a novel addition to many urban ecosystems, with a neutral impact to most other bird species but an increasingly complex interaction with human residents in urban areas.

Keywords Monk parakeet · *Myiopsitta monachus* · Chicago · Introduced species · Invasion · Urban birds

There are now at least 25 naturalized species of parrots in the contiguous United States (Kale et al. 1992; Garrett 1997). It is believed that these species first occurred in the wild in the United States as the result of escapes from captivity or purposeful or accidental releases by people that had the birds as pets. The majority of these parrot species are restricted to southern climes (e.g., Florida and southern California) and their populations are fairly localized. The one exception is the monk parakeet (*Myiopsitta monachus*), which is native to Argentina and Uruguay. Monk parakeets were first confirmed in the wild in the United States in New York in 1967 (Lever 1987). Multiple far ranging sightings (from New York to Florida to California) were made in the late 1960s (Bull 1973; Freeland 1973; Owre 1973; Simpson and Ruiz 1974) and it appears that the species began breeding in multiple localities at about the same time.

Monk parakeets are now widely distributed in the United States and in many areas they have established large breeding populations (Hyman and Pruett-Jones 1995; Van Bael and Pruett-Jones 1996; Pruett-Jones et al. 2005; Burger and Gochfeld 2009). There are two equally important aspects of the biology of monk parakeets that have facilitated this range expansion and population increase. First, monk parakeets build their own nest, either in a tree or more commonly now on anthropogenic structures including buildings, cell phone towers, light poles, electrical utility structures, etc. (Spreyer and Bucher 1998). Thus, the birds are not restricted to tree hollows or palm trees for nesting sites and they can nest virtually anywhere with either trees or man-made structures. Second, monk parakeets have a diverse, vegetarian diet that changes seasonally to whatever is available (Spreyer and Bucher 1998; South and Pruett-Jones 2000). For example, in the winter in Chicago their diet consists almost entirely of seed and grain at backyard bird feeders (South and Pruett-Jones 2000), a foraging site that is not commonly used at other times of the year.

Besides representing an interesting, if somewhat unusual, addition to local avifaunas monk parakeets are also a controversial species. In their native range, they are reputed to be a significant agricultural pest (Bump 1971; Bucher 1992). Because of this, the United States Department of Agriculture and the United States Fish and Wildlife Service instituted a control program for monk parakeets in the early 1970s after the species was found to be increasingly widespread (Neidermyer and Hickey 1977). That control program removed 163 (44%) of the known 367 birds (from 30 different states) at that time (Neidermyer and Hickey 1977). After the control program ended, the populations began to slowly rebound in areas where the birds were not completely eliminated and by the 1990s the birds were once again widely distributed and fairly common where they occurred (Van Bael and Pruett-Jones 1996).

The possibility that monk parakeets would become a serious agricultural pest has not materialized to date although in Florida they are a local pest species at fruit orchards

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(Tillman et al. 2001). Also, monk parakeets are a nuisance species to utility companies in areas where the birds are common (Avery et al. 2002, 2006). In Florida, for example, during a five-month period in 2001 nests of monk parakeets caused 198 power outages and affected over 10,000 customers (Newman et al. 2008). Nevertheless, despite these negative impacts of monk parakeets, there are increasing efforts by people to protect them (New York Senate Bill S7850, "monk parakeet protection act"; New Jersey Assembly Bill A1237) and to disseminate knowledge about the species (e.g., www.monkparakeet.com, www.brooklynparrots.com, and www.quakerville.com).

For the past 35–40 years, populations of monk parakeets have exhibited general population increases typical of an introduced species successfully colonizing a new area with suitable habitat. Recently, however, the population in the United States appears to be declining in numbers (see below). In this paper we examine this apparent population decline, focusing on the population in northern Illinois, specifically in the greater Chicago region. Within the United States, the population of parakeets in northern Illinois has been the best monitored at least with respect to population size (Hyman and Pruett-Jones 1995; Van Bael and Pruett-Jones 1996; Pruett-Jones and Tarvin 1998). We will argue that, at least for northern Illinois, the apparent population decline is a result of a changing geographical distribution by the birds, not a real decline in population size. We also discuss the changing and complex effect that monk parakeets have on the urban ecosystem.

Methods

Because nests of monk parakeets can either be single or compound, we adopt the terminology of Hyman & Pruett-Jones (1995) whereby a *nesting structure* is a stick structure that contains one or more chambers (a cavity in a nesting structure), an *active chamber* is one that is or appears to be occupied by birds, and a *substrate* is the physical site where at least one nesting structure is built (tree, pole, etc.). Chambers (nests) were determined to be active if birds were observed entering or leaving the chamber or if there was other indirect evidence of use, such as fresh feces at the entrance or new down feathers stuck to sticks at the entrance. As previously (Hyman and Pruett-Jones 1995; Pruett-Jones and Tarvin 1998) the number of nesting birds was estimated as twice the number of active nesting chambers, under the assumption that one pair of birds occupied each active chamber.

This study focused initially on the neighborhood of Hyde Park, approximately 10 km south of the city center in Chicago, because this was the site of the best documented breeding colonies of monk parakeets. The population data for Hyde Park come from several sources. The population accounts for the early 1980s come from accounts in the popular press (see Results). One of us (S.P-J.) censused the population in 1992, 1993, 1995, and 1997 (Hyman and Pruett-Jones 1995; Van Bael and Pruett-Jones 1996; Pruett-Jones and Tarvin 1998). Since 2000, the population has been censused as a laboratory exercise in the Environmental Ecology class (Bios 13107) taught at University of Chicago (first by M.L. and then by Dr. Trevor Price). During these censuses the entire Hyde Park neighborhood was completely surveyed. Our censuses consisted of checking old nests, verifying new nests reported to us, and driving on every major street in Hyde Park to search for new nests. Monk parakeets roost in their nests all year, a behavioral habit that facilitates counting birds during the winter time and early spring before deciduous trees have leafed out.

We also report numbers for the greater Chicago area, but our coverage of this area is less complete than the Hyde Park area specifically. The historical numbers for the greater

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Chicago area come from Neidermyer and Hickey (1977). Data for the 1980s come from observations by bird watchers sent to us. Beginning in 1995 we began systematically soliciting sightings from ornithologists and bird watchers in the Chicago region via email. Also, Pruett-Jones and Tarvin (1998) conducted an initial census of all reported sightings from Zion in the north to the Calumet area to the south. In 2007–2008, when it became obvious that monk parakeets were dramatically expanding their distribution in northern Illinois, we began to solicit the help of the public in identifying active nesting sites. Initially this comprised appeals for sightings during radio interviews and newspaper accounts. In 2009, we officially began the Chicago Parakeet Project (http://www.uic.edu/labs/minor/chicago-parakeet.html) for the public to contribute location data for nesting sites. At that web site, a form is provided for interested parties to report sightings and known nesting locations. This effort has resulted in a total of 271 observations (as of March 1st 2010). Many of these observations were duplicate sightings. Nevertheless all unique sightings and nest locales were checked during the period September 2009 to April 2010 to confirm current status. We also searched for nests ourselves at various times over the past decade and added new nesting areas to the list of sites and Mr. William Marcisz (Marcisz 2005) also contributed the locations of nesting sites. The data collected at each nest included substrate (tree, power pole, cell phone tower, etc.), number of nesting structures, and number of active chambers in each nesting structure.

For comparison with population trends in the Chicago region, we briefly summarize here records from the National Audubon Society's annual Christmas Bird Counts (CBC) for Illinois specifically and for the contiguous USA generally. These records were obtained with permission from National Audubon Society.

Results

Monk parakeets were first seen in Chicago in 1968 and the first confirmed nest was seen in 1970 (Spreyer and Bucher 1998). Throughout the 1970s there were scattered reports of birds in Chicago and in surrounding communities (Ingersoll 1973; Larson 1973; Neidermyer and Hickey 1977), but none of the known nests persisted and the birds either died or moved elsewhere. The largest count of parakeets during the 1970s was for 1973 when 11 individuals were confirmed (Neidermyer and Hickey 1977) although no nests are known from that year.

The fate of monk parakeets in Chicago changed when birds took up residence in Hyde Park. The first nest there, in 1979, was at a park close to Lake Michigan (Walsten 1985; Garber 1993). This nesting area persisted and provided a base for the establishment of a larger population. It was also the nesting area that became the focus of widespread public attention (and frequent media coverage) because the nest happened to be in a park across the street from the apartment building where the Chicago mayor, Harold Washington, lived (Gilbert 1984).

By 1985, at least 17 parakeets were in Hyde Park (Walsten 1985, 1988) and occasional sightings were made of birds in surrounding communities. Whether the birds were breeding outside of Hyde Park in the mid-1980s is not known. In the first year of our count, 1992, there were 64 parakeets living in Hyde Park (Hyman and Pruett-Jones 1995). That year parakeets were also reported in at least two other localities in northern Illinois, within 40 miles of Chicago (Hyman and Pruett-Jones 1995).

By the early 1990s the population of parakeets in Hyde Park began growing very rapidly and it exhibited exponential population growth throughout the 1990s. The

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1997 census counted a total of 208 birds in Hyde Park. Compared to the 1992 census, this increase represents a population growth rate of 22.8% each year (Pruett-Jones and Tarvin 1998).

The exponential population growth in Hyde Park continued until 2002 (Fig. 1). From 2002 to 2006 the population in Hyde Park was relatively stable at approximately 300 birds, but since 2006 the population has been declining rapidly and on the 2010 census, just 84 birds were counted there. The decline in the Hyde Park population is mirrored, at least approximately, by the counts of monk parakeets on the Illinois CBCs and more directly by the national CBCs (Fig. 1). As regards the Illinois CBCs, over the past 20 years monk parakeets have been recorded at nine different localities, all of them within the area we have censused during this study. In the 2008/2009 CBC monk parakeets were recorded at just three localities in northern Illinois. The national trend, showing a decline in both parakeet numbers (Fig. 1) and localities where the species is recorded, is also shown in the records for Florida, the state with the largest current population (data not shown).

Despite the population decline in Hyde Park, monk parakeet numbers in the greater Chicago region have never declined but have continued to grow. This growth is simply occurring in areas other than Hyde Park. During the 1997 survey parakeets occurred in just four to six localities outside of Hyde Park (Pruett-Jones and Tarvin 1998). By the year 2000, however, we began to see increasing numbers of birds in the southern and western suburbs of Chicago and we received increasing reports of birds in locations further to the north and west of Chicago. In our survey during 2009–2010 associated with the Chicago Parakeet Project, we counted 389 active nest chambers in 249 nesting structures on 169 individual substrates. Trees comprised 71 (42%) substrates and man-made structures represented 98 (58%) substrates; these structures included telephone and light poles, satellite dishes, highway and railroad overpasses, and electrical utility structures. Both trees and man-made structures had similar numbers of nesting chambers (Minor, unpublished data).

The count of 389 active nest chambers yields an estimate of 778 birds currently in the greater Chicago region (Fig. 2). Of these estimated 778 birds only 84 (10.8%) were in the Hyde Park neighborhood. This contrasts sharply with the 1997 survey, when of the total of 266 parakeets counted, 208 (78.2%) were in the Hyde Park neighborhood. This difference illustrates the extent to which the distribution of monk parakeets has changed.

Discussion

We acknowledge that with the exception of the specific population counts in Hyde Park the data that we summarize here are non-standard. Nevertheless, sightings of monk parakeets reported to us by the public on the web site and previously through radio and newspaper appeals were always verified directly by one of us. Additionally, monk parakeets are a highly 'visible' species to the public in Chicago and the extent of the media coverage of our surveys has been extensive enough that we believe that we know of the vast majority of parakeet nests.

Over the past 40 years, the population of monk parakeets in Chicago has experienced four different stages in population establishment and growth, with each stage lasting approximately 10 years. In brief, during the 1970s, parakeets were seen or were known to breed at scattered locations in and around Chicago but the nests did not persist. During the 1980s, the birds established a permanent breeding colony in Hyde Park and the population began to increase in numbers. During the 1990s the population grew rapidly in Hyde Park

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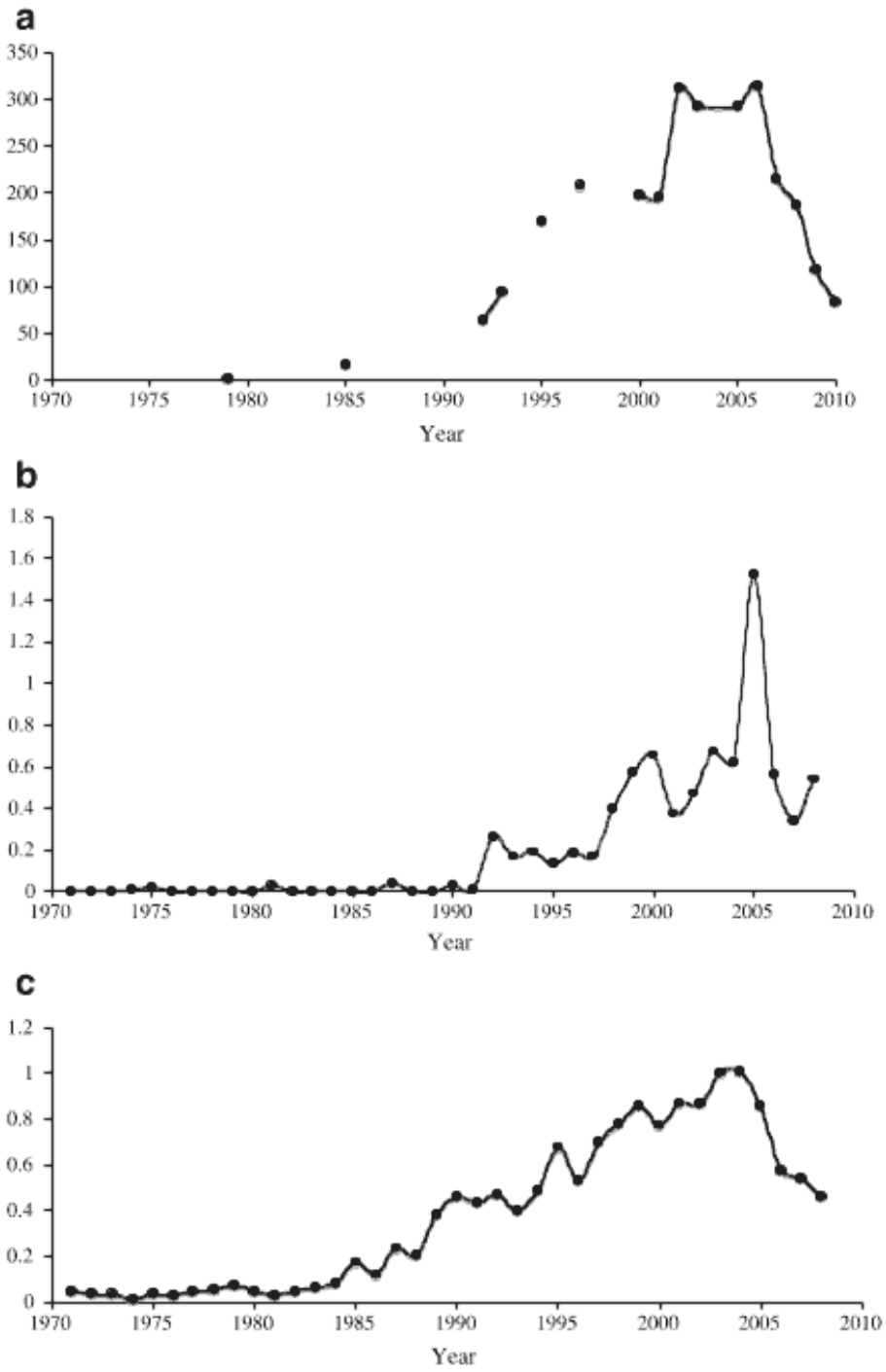


Fig. 1 Population trends of monk parakeets in northern Illinois from 1972 to 2010. **a** The number of birds nesting in the Hyde Park neighborhood. **b** The number of monk parakeets (number per party hour for counts on which at least one parakeet was seen) in Illinois recorded on annual Christmas Bird Counts (National Audubon Society). **c** The number of monk parakeets (number per party hour for counts on which at least one parakeet was seen) in the contiguous United States recorded on annual Christmas Bird Counts (National Audubon Society)

and increasing numbers of birds began to be seen in the surrounding communities. And lastly, during the 2000s, the population of parakeets simultaneously continued to grow in the greater Chicago region but declined rather precipitously in Hyde Park.

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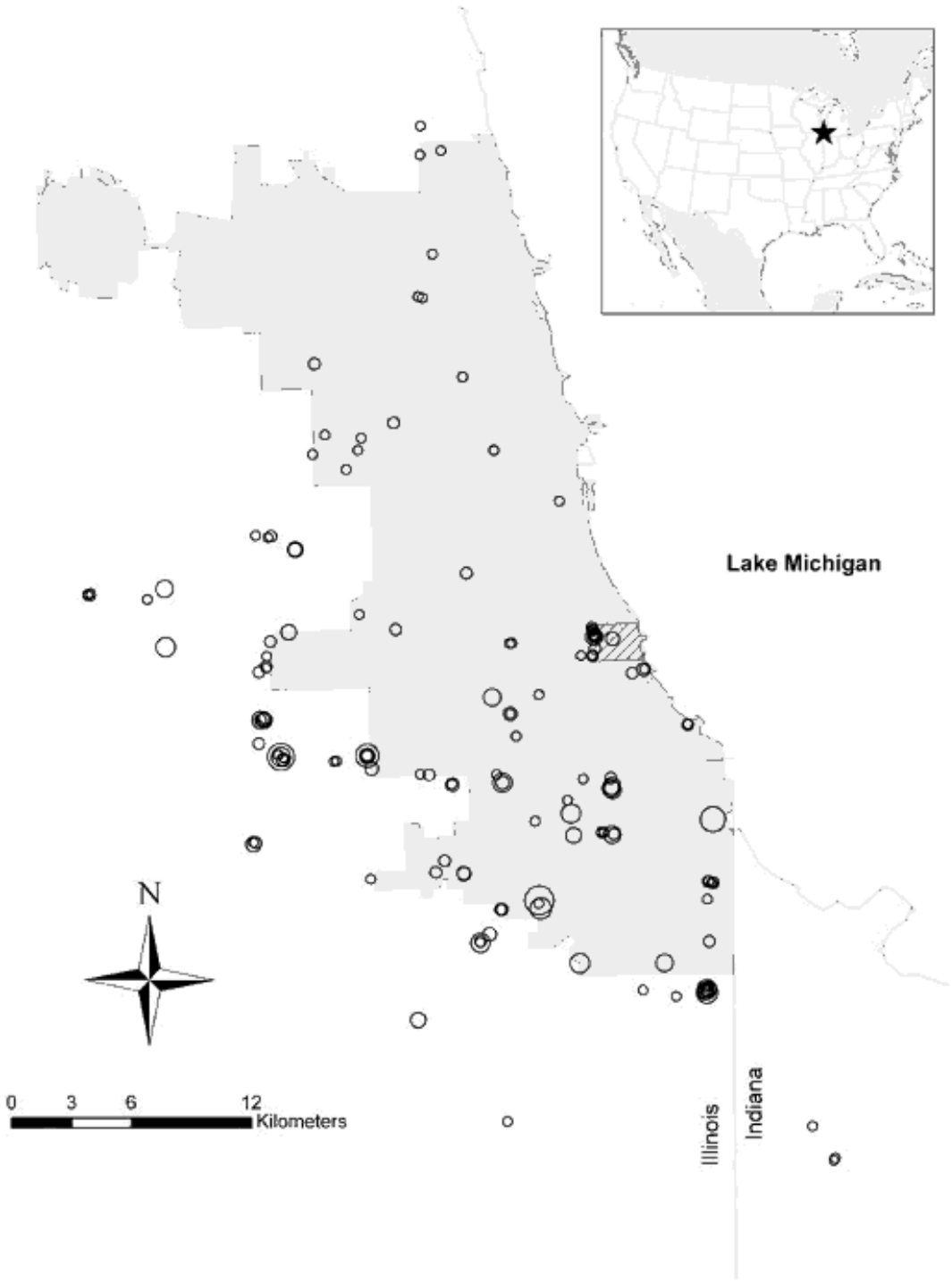


Fig. 2 Distribution of monk parakeets in the greater Chicago region in 2010. The *shaded area* defines the Chicago city limits and the *small shaded* and hatched area is the Hyde Park neighborhood. Each *circle* represents a nesting area of monk parakeets and the relative size of the *circle* defines the number of active nest openings at that site. A total of 169 individual nesting substrates, 249 nests, and 389 active nest chambers were recorded. This yields an estimate of the population size of 778 birds. The inset shows the location of the study area within the United States

We do not know the extent to which the current population represents the establishment and breeding of birds released in multiple locations or the growth and expansion of just the

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population in Hyde Park. Although we suspect that both processes have occurred, it is our belief that the most important factor underlying the current size of the population has been the growth and subsequent expansion of the Hyde Park population. Over the last 15 years, the increase in sightings in areas outside of Hyde Park generally followed the rapid increase in the Hyde Park population. It is our hypothesis that the outlying breeding groups were formed by density-dependent dispersal (Matthysen 2005) of birds out from Hyde Park as that population grew. Recent genetic evidence from Florida (Gonçalves da Silva et al. 2010) indicates that monk parakeets can disperse up to 100 km, much further than previously suggested. If this is true for birds in Chicago, movement of birds out of the Hyde Park community to the eastern extent of their current distribution (approximately 50 km) would not be difficult. It seems unlikely to us that the increase in numbers of birds outside of Hyde Park was due to a sudden rise in simultaneous releases of birds by pet owners. Nevertheless, there may have also been colonies of parakeets outside of Hyde Park that we did not know of that also contributed to the population growth.

If we are correct in this argument, why have monk parakeets left Hyde Park? The parakeets use man-made structures more frequently than trees but there is no shortage of such structures in Hyde Park. The natural habitat in Hyde Park also appears suitable for parakeets and the population has certainly done well there in the past. Additionally, there has not to our knowledge been any major change in the urban forest structure in this area that could explain the population decline there. In all communities of Chicago, the American elm tree (*Ulmus americana*) continues to suffer from Dutch elm disease and each year hundreds of diseased trees are removed, but this situation is true for all communities, not just Hyde Park. Thus, the loss of elm trees cannot by itself explain any shift in the population of monk parakeets.

Alternatively, the decline of monk parakeets in Hyde Park could be the result of life history, i.e., an increase in mortality or a reduction in breeding. A nesting survey in 2011 (Pruett-Jones unpublished data) showed that fewer than one-third of the parakeet nests in Hyde Park produced fledglings that year and a low reproductive success could certainly contribute to the local decline. The decline has been both dramatic and quick (from 316 birds in 2006 to just 84 birds in 2010) suggesting that disease may also be involved. We do not think that predation is involved because although monk parakeets are likely depredated by migrating Cooper's hawks (*Accipiter cooperii*) or resident peregrine falcons (*Falco peregrinus*) it is unlikely that predation would be concentrated in just the Hyde Park neighborhood. Similarly, the very localized nature of the decline suggests that weather or other environmental variables are unlikely. It is, of course, also possible, that multiple factors are influencing the Hyde Park population. Birds could be moving to other neighborhoods, reproduction in this area could be low, and disease or other factors may be locally important.

The decline of the population in Hyde Park has also been observed in counts of monk parakeets in the United States generally (Fig. 1). Based on CBC counts, the number of monk parakeets in the United States is declining. However, we know that the Hyde Park decline does not reflect the greater Chicago region, in which the parakeet population is still growing. It could be that regardless of what is going on in Chicago, the parakeets are declining in numbers across the country. Or, nationally the birds could be doing the same thing that we are here proposing for Chicago, i.e., the species still may be expanding its range and increasing in numbers, but those numbers are not being reflected in national counts like the CBC. More accurate population counts and long-term censuses in large areas will be necessary in other states before we know whether this is true.

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The current geographical range of monk parakeets in the United States is a complex result of the interaction between human behavior (accidental or purposeful release of birds) and the biology of the birds. Comparing Hyde Park to other urban areas in the United States, on a historical basis the birds succeeded there because once they established a breeding population, the birds were tolerated and no attempt was made to reduce the population size (Neidermyer and Hickey 1977). By their very nature, urban areas will always include a combination of natural areas and a large number of man-made structures and such areas appear ideal for a species like the monk parakeet.

The interaction of monk parakeets with other bird species in urban environments in the United States has not yet been formally quantified. During the winter months monk parakeets in the Chicago get virtually 100% of their food from backyard bird feeders (South and Pruett-Jones 2000). Large flocks of parakeets repeatedly visit individual feeders until the available seed and grain is gone. Reduction of this food may impact other species that over winter in Chicago, in particular black-capped chickadees (*Poecile atricapillus*). During the summer months, approximately three quarters of the parakeet's diet comes from fruit trees (mulberries, crabapples, hawthorn berries) and again, this may influence foraging behavior of other bird species. Surveys of avian species diversity in Chicago neighborhoods by one of us (C.W.A.) during 2006–2008 suggested that species diversity in areas with monk parakeets is not significantly different than diversity in areas without the parakeets (Appelt, unpublished data). One significant finding in those surveys was that there was a significant correlation between the number of monk parakeets and those of European starlings (*Sturnus vulgaris*) and rock pigeons (*Columba livia*) suggesting that these species use similar habitats in urban areas.

The most important interaction involving monk parakeets and the urban ecosystem is with the human occupants of urban areas. People are seldom 'neutral' as regards monk parakeets. People seem to either value the birds and make efforts to effect legislation protecting the birds, or people do not like the birds because of the noise when the birds nest close to homes, or more directly because of the danger the nests pose when they are built on utility structures. In the Chicago region, monk parakeets are becoming an increasing difficult species for the utility company Commonwealth Edison that serves this region. Monk parakeet nests have caused fires and electrical service disruptions in Hyde Park and the increasing number of nests at electrical substations has resulted in efforts by Commonwealth Edison to control the numbers of nests. This situation in Illinois mirrors that in New York, New Jersey, Texas, and most importantly Florida where monk parakeets cause regular and increasingly predictable power outages and blackouts. Additionally, at least for Chicago we know of several businesses that have destroyed nests on their property due to the noise of the birds or because the nests were on telephone poles serving the business.

Despite the fact that there are approximately 780 monk parakeets in the greater Chicago region, there have been no reports (either published or reported to us) of agricultural damage by this species in Illinois. The first obvious reason for this is that the parakeets do not yet occur or nest in agricultural areas. The birds are getting close to agricultural areas in every direction away from Chicago (north, west, and south) but they are not yet within reach of croplands (without a very long flight). If and when the birds continue to expand their distribution into agricultural areas, whether they will actually become a pest is unknown. We do not think they will, if for no other reason than during the winter in Illinois the birds are limited by the availability of backyard bird feeders, a resource that is rare in agricultural areas. In other areas where the birds are common, e.g., Florida, the situation is

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very different. Winter survival in southern states is not limited by bird feeders, and once the parakeets there reach agricultural areas we suspect that they will, in fact, become an agricultural pest.

Despite the population decline in Hyde Park, it is our prediction that the population of monk parakeets in northern Illinois will continue to increase in size and geographical range. Every year we receive reports of parakeets during the winter in localities far to the west of Chicago where the birds are not yet breeding. We suspect that these sightings are either birds at established nesting colonies that are traveling great distances to forage, or of dispersing birds looking for suitable sites to breed the following spring. Either way, these sightings suggest to us that the birds will eventually be breeding in these areas. It is less clear what will happen to the population of monk parakeets nationally because we do not yet know the cause of the apparent decline in numbers of birds.

The monk parakeet will continue to be both an interesting and controversial species and one that highlights the complex interaction between public sentiment, public policy, and biology. There is no sign that this controversy is decreasing and in fact, we anticipate it increasing dramatically in states where the species is common.

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