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Fencing alleviates nuisance molting goose problems in an urban park in Tennessee

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Abstract: Canada geese (*Branta canadensis*; geese) often congregate in high public use areas while molting during summer, resulting in increased nuisance complaints. We censused geese that inhabited a Cookeville city park in Tennessee, USA on a weekly basis from 2013–2014 to determine the magnitude, trends, and seasonal nature of problems caused by urban goose flocks. Fewer than 50 geese were counted in most months except during the molt, when numbers increased to >200. Most geese dispersed from the park shortly after completion of the molt. Molt site fidelity to the park was estimated to be 51.5%, indicating that permanent relocation or euthanasia would not provide long-term nuisance relief and may impact local hunting opportunities. To mitigate the nuisance aspect of high densities of molting urban geese in the park, we herded molting and flightless geese to a closed portion of the park and fenced them out of the public use area. Our temporary fencing, coupled with reduced human disturbance in the area where geese were relocated, alleviated the nuisance problems typically associated with large concentrations of geese. We recommend that other municipalities that are experiencing similar seasonal nuisance goose problems consider using nonlethal fencing options.

Key words: *Branta canadensis*, Canada geese, harvest management, human–wildlife conflicts, molt site fidelity, molting chronology, temporary fencing, urban parks

Canada geese (*Branta canadensis*; geese) were released throughout the southeastern United States during the 1960s to 1980s to provide hunting opportunities that did not exist previously (Babcock et al. 1990). Translocations were highly successful. In 2015 alone, >750,000 Canada geese were harvested in the Mississippi Flyway, many of which were locally-breeding Canada geese (Raftovich et al. 2016). However, many goose populations still inhabit urban and suburban areas during at least part of the year, creating conflicts between the desires of hunters and people who consider the birds a nuisance. Thus, managers desire practical management solutions that address stakeholder concerns (Laycock 1982, Conover and Chasko 1985, Conover 1992, Nelson and Oetting 1998).

Geese are especially problematic during summer because they often congregate to molt in urban parks, golf courses, and other areas with lakes surrounded by open fields (Smith et al. 1999). Many urban park visitors are intolerant of large numbers of geese because of the accumulation of feathers and droppings, whereas others enjoy feeding and viewing them, thereby creating an urban wildlife management conflict (Smith et al. 1999). Although removal through translocation or euthanasia often is considered and implemented, these strategies are not always effective (Cooper 1978, 1986; Conover and Chasko 1985; Keefe 1996). Additionally, many people are opposed to widespread euthanasia (Smith et al. 1999). Alternative approaches to alleviate nuisance goose problems during the molt are needed.

One of the primary molting locations for geese of the Upper Cumberland (UC) flock in Tennessee, USA is the city-owned Cane Creek Park (CCP) in Cookeville (White and Combs 2004). City personnel requested the assistance of Tennessee Technological University (TTU), also located in Cookeville, to manage the nuisance problems created during the summer by large goose flocks. After an initial site review, we suggested that most of the nuisance complaints

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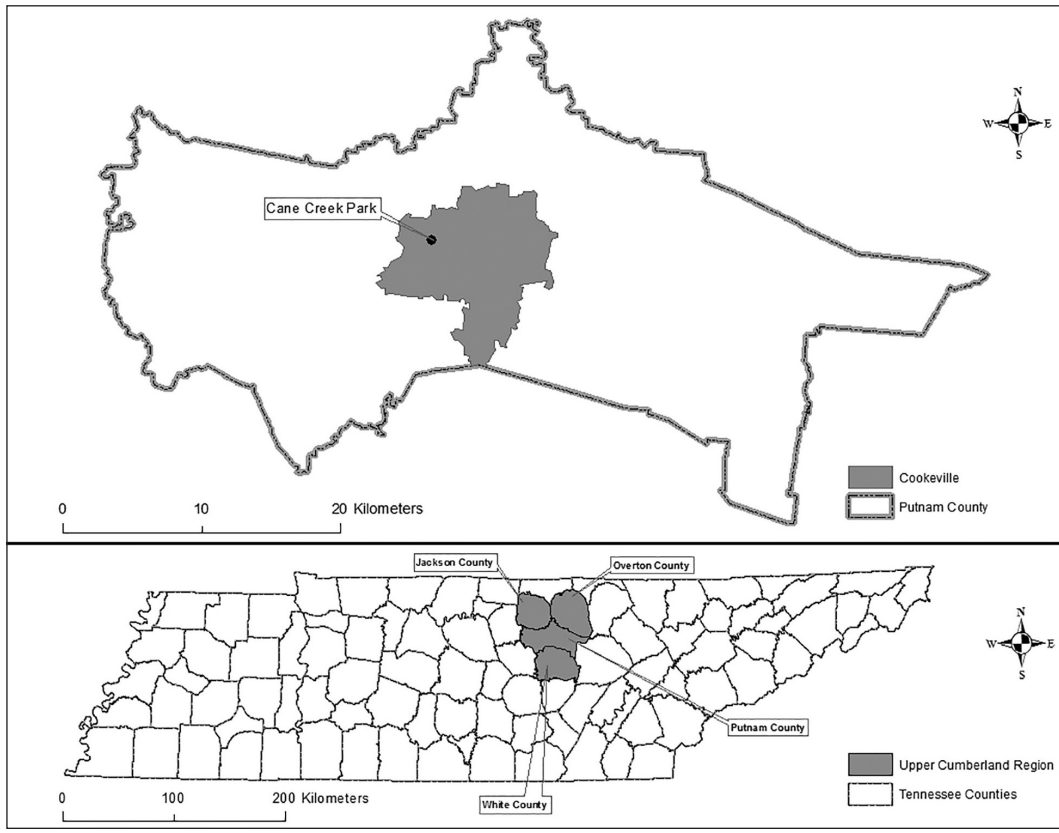

Figure 1. Location of the Cane Creek Park study area in the Upper Cumberland region, Tennessee, USA.

might be addressed by relocating molting and flightless geese to more remote areas of the park and holding them there by using fencing. This approach seemed feasible at CCP because it was surrounded by a chain-link fence, and there is a portion of the park that can be closed to the public and fenced separately from the public use area. Our case study was designed to assess the extent of nuisance problems at CCP and to evaluate the efficiency of this approach in alleviating the problems.

Study area

The UC goose flock is distributed across 4 counties in Tennessee: Jackson, Overton, Putnam, and White (White 2002; Figure 1). This study was conducted at CCP in Putnam County, which is located in the northeastern part of middle Tennessee (Figure 1). Putnam County's 104,376 ha consists of 27% farmland (mostly pastures), 58% forest, and 15% urban, with approximately 2,880 wetlands and farm ponds (U.S. Census Bureau 2007, 2010, National Land Cover Database 2006, Tennessee Federal GIS user group 2013).

The 106-ha CCP is owned by the city of Cookeville and managed by the Department of Leisure Services. The park is 1 of 2 primary molting sites for geese in Putnam County and includes a 23-ha lake with an average depth of 3.5 m (White and Combs 2004). The lake is surrounded by open, mowed fields that are attractive to geese. A road divides the park into 2 sections, a large section that will be referred to as the public use area or open area and a smaller, 5-ha section that will be referred to as the closed area (Figure 2). A culvert beneath the road connects the 2-ha portion of the lake in the closed area to the main part of the lake. Both areas are surrounded by fences. During summer, a livestock gate is placed across the culvert to prevent geese from swimming between the 2 areas, the lone gate to the closed area is locked once the geese are inside, and a sign prohibiting entry is placed on it to reduce disturbance to molting geese.

Figure 2. Cane Creek Park, Cookeville, Tennessee, USA.

Methods

Surveys were randomly conducted at different times of day each week in 2013 and 2014 to determine the number of geese using the CCP public use area. After most geese had become flightless, geese were captured by drive-trapping (Cooch 1953), and they were moved to the closed portion of the park. Kayaks were used to drive geese through the culvert to the closed portion of the park in 2013, where geese were captured as a group and released individually after marking them within the enclosure. In 2014, we captured geese in the open portion of the park at a site near the relocation area and moved each goose individually by hand, dropping them over the fence. Site preparation in advance included supplemental feeding of corn (*Maize* spp.) and mowing the grass in the closed area. Once geese were in the closed portion of the park, supplemental feeding was continued to encourage them to remain there. Geese that returned to the open portion of the park were relocated to the closed portion 2 weeks later.

Since 1998, almost every goose at CCP has been individually marked with neck collars bearing unique 4-digit alphanumeric codes and U.S. Geological Survey Bird Banding Lab (BBL) metal legbands. We also captured many geese elsewhere in the UC region. The BBL provided us with recovery records from geese that had been marked in the UC region between 1998 and 2015. We compared TTU banding records to the harvest records to assess the extent of which geese molting at CCP are harvestable.

To assess molt site fidelity at CCP, we used a database of records for individual geese captured during the molt in the UC region between 1998 and 2017. Cane Creek Park is the only location in the database where geese have been captured every year. Only geese that were captured over at least a 5-year capture span (i.e., number of years between first and last capture) were included in our analysis. We determined the number of years within these capture spans when geese were captured at CCP, captured elsewhere, and not captured at all (i.e., missing).

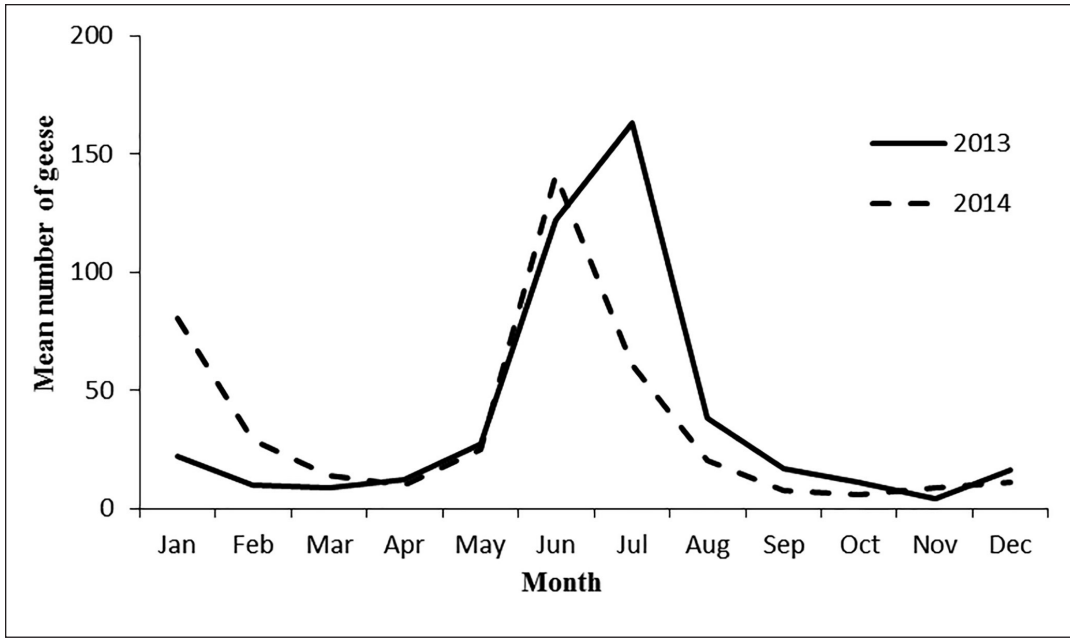

Figure 3. Mean number of Canada geese (*Branta canadensis*) observed at Cane Creek Park, Cookeville, Tennessee, USA per month during 2013 and 2014.

The percentage of years captured at CCP across these capture spans was used as an estimate of molt site fidelity to the park.

Results

During 2013, the mean number of geese at CCP did not exceed 50 except during June and July. During 2014, 80 geese were observed once at CCP during January, but these numbers were present for a short time during harsh weather conditions. Otherwise, monthly trends were similar between years (Figure 3).

Geese congregated for the molt between the last week in May and first week of June. The highest number of geese present in the park in 2013 was 193 and occurred during the peak of molting. They were driven into the closed area on June 27, but 125 geese escaped from the enclosure soon afterwards. On July 9, 123 geese were recaptured in the CCP public use area and relocated to the closed area for a second time. This effort was only partially successful, and 96 geese returned again. Numbers of geese began to decline rapidly after they regained the ability to fly, and the number present at CCP declined to <50 by the second week in August.

During 2014, the highest number of geese observed in the park was 237, and 220 geese were captured and relocated to the closed area on June 26. Only 74 geese escaped from the closed area, and 50 of these escaped a second time after being relocated again on July 9. Dispersal from the park in 2014 occurred at the same time and rate as the previous year.

Between 1998 and 2017, 395 geese were captured at least once at CCP and also captured over at least a 5-year capture span (Table 1). Of these, only 22.8% were captured every year between the years of first and last capture. Most of the missing records can be attributed to geese molting at locations other than CCP because we captured or recorded almost all molting geese at CCP every year between 1998 and 2017. Capture rates elsewhere varied among years and among locations, hence the reason for the large number of geese with missing records. Only 53.2% of geese captured at CCP molted there ≥50% of the time, and only 9.1% were captured there every year (Table 1). Mean percentage (+ standard error) of captures at CCP of the 395 geese was 51.5 + 1.4%.

Sixteen goslings and 83 unmarked adults were captured at CCP in 2013. Of the 138 previously collared geese that also were captured, 53.6% were captured during the previous summer at CCP. Similarly, 37% of captured geese were

Table 1. Number and percentage of Canada geese (*Branta canadensis*) captured during the molt at Cane Creek Park (CCP), Cookeville, Tennessee, USA over at least a 5-year capture span, 1998–2017, by percentage of records when captured at CCP.

% of records from CCP	Geese with no missing records		Geese with missing records[a]	
	n	% of total	*N*	% of total
<10.0	0	0.0	10	3.3
10.0–19.9	4	4.4	44	14.4
20.0–29.9	7	7.8	42	13.8
30.0–39.9	5	5.6	25	8.2
40.0–49.9	13	14.4	35	11.5
50.0–59.9	5	5.6	33	10.8
60.0–69.9	9	10.0	54	17.8
70.0–79.9	2	2.2	22	7.2
80.0–89.9	9	10.0	37	12.1
90.9–99.9	0	0.0	3	1.0
100.0	36	40.0	0	0.0
Total	90		305	

[a] Geese with missing records were geese that were not captured during at least 1 year anywhere in the Upper Cumberland Region between the years of first and last capture.

uncollared (72 adults and 11 goslings of 222 total geese) in 2014. In 2014, 61.5% of captured birds had been captured at CCP in 2013. Thus, most geese in the park displayed a moderate, but not high, level of molt site fidelity.

Between 1998 and 2015, we marked 5,881 individual geese in the UC region, and 1,156 were reported as harvested to the BBL. Of these, 517 (44.7%) were captured at least once at CCP. Of the 12,417 total capture, recapture, and sight records in the TTU database, 4,563 (36.7%) were of geese molting at CCP. Thus, geese that molt at CCP are as harvestable as other geese in the UC flock.

Discussion

In 2014, we successfully alleviated nuisance complaints at CCP by capturing geese during the molt when their numbers were highest, and holding them in a closed portion of the park. We were less successful in 2013 because many geese were able to escape from the enclosure. In both 2013 and 2014, geese dispersed from CCP soon after the molt was completed, alleviating problems associated with large numbers of geese.

Several problems contributed to the reduced success in 2013. Park staff indicated that high water levels associated with heavy rainfall shortly after the initial relocation event enabled geese to swim over the gate used to block the bridge culvert separating the 2 sections of the park. Later, geese were observed diving and swimming under the gate, which did not reach the bottom of the culvert. We also observed several geese escape from the closed portion through sections of the fence that had been damaged by people who entered the area while geese were present. Repairs were made to the fence prior to 2014, preventing flightless geese from returning to the open portion of the park. We also think that disturbance caused by capturing geese inside the enclosure contributed to the problem in 2013 because several geese ran directly to the fence when released, and several escaped through holes in the fence, hence the reason for the change in relocation methods between years. In 2014, geese did not return to the public use area even after they regained the ability to fly, perhaps because of reduced disturbance and supplemental feeding in the closed area.

Translocation to distant sites has been used effectively for controlling nuisance geese

(Laycock 1982, Conover and Chasko 1985, Powell et al. 2004). However, translocations are costly and require moving geese in several successive years to be successful (Laycock 1982, Conover and Chasko 1985, Keefe 1996). The moderate level of molt site fidelity to CCP, as determined in this study, suggested that translocation would only partially alleviate the problem and thus not provide a long-term solution at this location. We suspect that additional geese would soon replace those that have been removed after only a few years. Molt migrations are a widespread phenomenon (Salomonsen 1968, Lawrence et al. 1998, Abraham et al. 1999, Luukkonen et al. 2008, Dieter and Anderson 2009), and we suspect that many of the unmarked geese at CCP each year are molt migrants (Kaufman 2016), further indicating that translocation would be ineffective.

Finding locations willing to accept geese can also make long-distance translocation difficult in Tennessee and elsewhere (B. G. Dunlap, U.S. Department of Agriculture Wildlife Services, personal communication). Consequently, euthanasia commonly is used when translocation is not an option, but it is less acceptable to the general public (Gosser et al. 1997, Smith et al. 1999). In addition to the unlikelihood of providing long-term relief at CCP because of the same reasons previously discussed for translocation, euthanasia would remove a significant number of geese from the hunted population in the UC region. Euthanizing geese that would otherwise be available for harvest creates a conflict of interest between hunters and people that consider geese a nuisance.

Fencing for geese at CCP was relatively inexpensive. Much of the closed area was already fenced with a traditional chain link fence, but one side of the closed area was previously open before installing inexpensive woven-wire fencing. In addition, a livestock gate was purchased to block the culvert. Total cost was estimated by City of Cookeville personnel to be only $1,100 because park personnel installed the fence and labor costs were not included. Approximately $200 was spent on corn for supplemental feeding per year; park personnel believed that it helped keep geese on the closed portion of the park, but supplemental feeding was not evaluated in this study. At CCP, TTU personnel captured and moved the geese, thereby eliminating a cost that might be incurred in other locations. Thus, total costs would undoubtedly be more in most situations. Also, appropriate permits are needed to relocate geese.

Techniques used to manage molting geese at CCP are applicable to some other locations. For example, small coves or isolated ponds that are on-site or off-site but nearby can be fenced, and geese can be confined there while they are flightless. Adequate food, water, and shade must be provided; thus, the size of the fenced area will depend on the number of molting geese. Minimal grazing damage to the closed area was observed at CCP after geese completed the molt and dispersed elsewhere, but potential damage should be considered when determining the size of the area to be used. Maintaining the grass at a proper level in the enclosure will require periodic mowing, but this should be done only occasionally to minimize disturbance to molting geese.

Management implications

Our case study confirmed that confining flightless geese to non-use areas in public parks can be a cost-effective option to reduce nuisance problems during the annual molt while minimizing conflicts with humans. Isolating geese during the molt rather than translocating or euthanizing them provides an alternative where translocation or euthanasia of geese is costly or unacceptable to the public. Human dimensions issues, such as media coverage and intentional release of geese from enclosures, justify additional consideration when considering this approach. The long-term impacts of recurring translocation and mass euthanasia justifies additional research.

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