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Non-Lethal Management to Reduce Conflicts with Winter Urban Crow Roosts in New York: 2002 - 2007

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ABSTRACT: American crow populations have increased steadily since 1966 in many parts of the U.S. Large winter congregations of crows in urban environments have resulted in an increased number of requests for assistance in managing nocturnal roosts in New York. In 2002, the USDA APHIS Wildlife Services program initiated a large-scale non-lethal winter roost dispersal program in Troy, New York. Since that time, similar programs have been implemented in 4 other cities in New York to manage crow roosts ranging in size from 8,000 - 63,000 individuals. The goals of the programs were to minimize noise, accumulations of crow feces around residences, strong odors associated with droppings, property damage, clean-up costs, and potential threats to human health and safety. The primary management strategy relied on dispersing concentrated crow populations from high-impact high-conflict areas, to low-impact low-conflict areas. An integrated management program using pyrotechnics, amplified recorded crow distress calls, and hand-held lasers was implemented to successfully disperse local crow roosts, reducing populations at the majority of core roost sites each year by more than 98%. In some instances, significant reductions in crow numbers and associated damage persisted >8 weeks after management without additional interventions, although most sites required multiple additional “spot treatments.” High-profile urban wildlife management projects of this type require multiple meetings with key stakeholders and the public and often attract intense media interest, adding complexity to these programs. We provide summary information from 5 cities in New York documenting crow management techniques, intensity of effort, number of interventions required to relocate crow populations, and key lessons learned regarding science-based project documentation, project transparency, communication, and the need for long-term adaptive management strategies to meet project goals.

KEY WORDS: Corvus brachyrhynchos, crows, crow distress calls, hazing, lasers, New York, pyrotechnics, roosts

INTRODUCTION
American crows (Corvus brachyrhynchos) are common throughout most of their North American range (Verbeek and Caffrey 2002), and populations have increased in many parts of the U.S., including New York, since 1966 (Sauer et al. 2007). However, recent regional declines in crow populations of up to 45% have been documented by LaDeau et al. (2007), compared to population levels prior to the emergence of West Nile virus (WNV) in 1999 in New York City. In contrast, McLean (2004) reported no detectable population impacts beyond the local level. Fish crow (Corvus ossifragus) populations are also reported to be increasing throughout their range and may be found in New York, particularly along the coast (Lauro and Tanacredi 2003), and in some cities.

Crows roost in large congregations at night during the fall and winter months in many locations (Gorenzel and Salmon 1992, 1995). In New York State, populations begin to increase in the fall, reach peak population size during December and January (Chamberlain 1964), and begin dispersing in early March prior to nesting season (Simpson 1972). Statewide, New York
mid-winter crow populations were estimated in 1932-
1933 at “about 225,000” in 20 population units (15 of
which were previously documented in a 1911-1912
survey), with estimates ranging from 1,000 to 55,000
crows per unit (Emlen 1938). Winter surveys conduct-
ed in New York in the 1960s estimated 40,000 to 50,000
crows in 15 roost sites (Chamberlain 1964). A number
of researchers have noted the urbanization of crows in
the later half of the 20th century, as crow roosting sites
shifted from more rural areas to highly developed urban
areas with dense human populations (Fitzwater 1988,
Gorenzel et al. 2000).

Although large winter congregations of crows have
been found in urban environments for several decades,
the number of complaints regarding damage associated
with these large (2,000 - 60,000 crow) roosts appears
to be increasing (Gorenzel et al. 2000). In an effort
to assist the public in reducing impacts of urban crow
roosts, USDA APHIS Wildlife Services (WS) in New
York implemented large-scale non-lethal winter roost
dispersal programs (2002 - 2007). The goal of these
programs was to minimize associated noise, accumula-
tions of crow fecal droppings on and around residences
and commercial properties, odors from feces, property
damage, clean-up costs, and potential threats to human
health and safety (Gorenzel et al. 2000, Peh and So-
dhi 2002). Non-lethal hazing programs in 5 New York
State cities involved a combination of population sur-
veys and direct management targeting crows (primarily
American crows, with some fish crows). The primary
strategy involved human-facilitated dispersal of crows
from the site of damage (“high-impact areas”) to sites
where there was a lower risk of conflict (“low-impact
areas”), using an integrated approach with a variety of
hazing methods.

We document the results of 5 urban crow man-
agement programs in New York and analyze the effec-
tiveness of our integrated approach for meeting crow
damage management objectives. We also discuss key
lessons learned from conducting high-profile non-lethal
programs to reduce crow damage associated with win-
ter roosts in urban environments.

STUDY AREAS

The New York WS program provided crow dam-
age management services to reduce conflicts associated
with urban winter crow roosts under cooperative agree-
ments with the cities of Albany, Auburn, Troy, Watertown
and Utica, New York, from 2002 - 2007.

Albany City, Albany County, New York

New York WS conducted a program to reduce urban
crow conflicts in Albany, New York from 2004 -
2007. Albany is the capital of New York and is located
about 241 km north of New York City. Albany is the
largest city in which WS conducted a crow hazing pro-
gram. Albany had the highest human population, with
an estimated 95,658 human inhabitants in a total area of
56.5 km2. The population density was 1,693/km2 (U.S.
Census Bureau 2000). The primary winter crow roosts
in Albany targeted for management were located in three
main areas: 1) the tree line between New Scotland
Avenue and Hackett Boulevard; 2) University Drive on
the State University of New York, Albany campus; and
3) behind buildings near the end of Samaritan Road.

Auburn, Cayuga County, New York

New York WS conducted a program to reduce ur-
ban crow conflicts in Auburn, New York in 2005 and
2006. The city of Auburn is located in central New York
about 35 km west of Syracuse. Auburn is the smallest
city where WS conducted crow management (21.8
km2). Prior to implementing a crow management pro-
gram in the winter, crows (63,000) outnumbered people
(28,574) by more than 2 to 1. The population density
was 1,311/km2 (U.S. Census Bureau 2000). The core
crow roost targeted by the WS damage management
program was located primarily in small groups of trees
lining the Owasco Outlet, which runs through the center
of the city.

Troy, Rensselaer County, New York

Troy is the first city where New York WS attempted
to manage a winter urban crow roost in 2003, and again
in 2005-2007. The city of Troy is located 241 km north
of New York City. Troy has an estimated 49,170 hu-
man inhabitants located in a total area of 28.5 km2.
The population density was 1,725/km2 (U.S. Census Bureau
2000). Troy had the highest human population density
where crow management was conducted. The primary
crow roosts targeted for management occurred in three
locations: 1) the tree line behind the Rensselaer County
Office between 6th and 8th Streets; 2) River Street Park
along the Hudson River; and 3) on Adams Island in the
Hudson River, just off the shoreline along River Road.

Utica, Oneida County, New York

New York WS conducted a crow damage manage-
ment program in Utica from 2004-2007. The city of
Utica is located in the Mohawk Valley in central New
York, 89 km east of Syracuse. The city has an estimated
60,651 human inhabitants located in a total area of 43.0
km2. The population density was 1,410/km2 (U.S. Cen-
sus Bureau 2000). The core winter crow roosts where
WS initiated crow management were located near St.
Elizabeth Medical Center off Genesee Street, and also
in trees along the arterial roadway.

Watertown, Jefferson County, New York

New York WS conducted a program to reduce ur-
ban crow conflicts in Watertown in 2006 and 2007. The
city of Watertown is located in Central New York, 113
km north of Syracuse, and 48 km south of the Canadian
border. The city has an estimated 26,705 human inhab-
itants located in a total area of 24.1 km2. The popula-
tion density was 1,108/km2 (U.S. Census Bureau 2000).
It is the least densely populated of the 5 cities
where crow damage management was conducted. The
primary winter crow roost where crow management was
initiated was located near the Jefferson County Histori-
cal Society on Washington Street. Subsequently, man-
agement shifted to an area near the “JBY” parking and
the intersection of Washington Street and Court Street,
along the Black River.
METHODS
The process of developing and implementing a crow hazing program was similar in each of the 5 cities. Wildlife Services would typically receive a request for assistance from county or city government officials regarding concerns expressed by the public, related to conflicts with roosting crows near residential or commercial properties. Requests from the public to government officials (including congressional representatives) came in the form of phone calls, letters and signed petitions, or during public meetings.

Cooperation with Municipalities and Public Involvement
Prior to establishing a crow damage management program in each city, WS conducted multiple meetings with key local officials and stakeholders to discuss crow management options in terms of the scope of the problem, state and federal regulations, projected program costs, the potential limitations and effectiveness of various hazing methods, and public acceptance of proposed methods. Management options considered were: no action, public information and education, habitat management (tree thinning and removal), roost dispersal (non-lethal hazing) and limited shooting to reduce roosting populations. Toxicants were not considered during negotiations with cities because there were no avicides registered in New York at that time that could be used to target crows at roosting locations in cities.

Once a plan of action had been agreed upon among WS and local government agencies and a cooperative agreement had been signed, the public was notified of the proposed action through town meetings, press releases and extensive media coverage in newspapers, radio, and television. In general, the public was in favor of non-lethal hazing programs to manage local crow roosts. Opposition to these programs was limited, although some citizens expressed concern about the additional cost to local taxpayers. Others doubted that the non-lethal program would successfully reduce the damage, and some were philosophically opposed to management and preferred public education programs promoting tolerance of roosting crows.

Standardized Crows Population Surveys
To estimate city-wide winter crow populations and document impacts of local management programs, crow population surveys were conducted in each city. A "primary" crow roost was defined as a tree or group of trees used by crows throughout the night, which contained the majority of roosting crows in the city and which had been the original source of conflict or complaints from the public (Gorenzel et al. 2002). Standardized pre-treatment crow population surveys were conducted by WS, during November – early January, to establish baseline population information, document flight lines, and identify core roosting sites. Post-treatment surveys were conducted after each 5- to 7-night hazing treatment. Survey methods were similar to those described by Gorenzel and Salmon (1993) and Gorenzel et al. (2002), where up to 4 observers were stationed before dawn with binoculars and hand-held counters at different fixed observation points, where they counted crows leaving roosts along flight lines in different directions. Surveys were completed once crows were no longer observed leaving the roosting area. Crow surveys were frequently conducted in the morning, in conjunction with hazing, to document the establishment of alternate roosting sites.

Crow Damage Management
Winter crow damage management programs in each of the 5 New York cities consisted of an integrated, non-lethal hazing program. Hazing is defined as the use of non-lethal scaring methods that included hand-held lasers, pyrotechnics, and amplified crow distress calls. The methods implemented for these projects are commonly used for wildlife damage management targeting birds in other conflict situations (Naef-Daenzer 1983, Gorenzel and Salmon 1993, Glahn et al. 2000, Slate et al. 2000, Chipman et al. 2004). Standardized field procedures for crow hazing projects were used for all cities. After pre-treatment crow population surveys were conducted (November to January), hazing projects were initiated. For each city, the initial hazing period ("treatment") lasted 5 to 7 days, during which 1 to 4 mobile teams consisting of 2 biologists each attempted to disperse crows from their assigned area of the city, generally from 1600 to 2000 hours (or until no large flocks of crows could be located), using a combination of pyrotechnics, distress calls, and hand-held lasers. Pertinent data were collected during this time to document the effectiveness of management techniques and the effort required to successfully manage roosting crows. Data collected included the number and location of management "events"/night (an event is defined as any action by biologists to haze crows), methods used (number of times lasers or distress calls were used and number of pyrotechnics fired), hours worked and mileage driven. After the initial 5- to 7-day treatment, post-treatment crow population surveys were conducted to document crow numbers and identify newly established roosting sites. For each city, the number of "re-treatments" needed was determined based on post-treatment crow surveys, input from municipal officials, and the number of complaints received from the public.

Pistol-launched pyrotechnics were one of 3 visual and noise deterrents used in all New York crow hazing projects. Single-shot and revolver-type pyrotechnic launchers were used with 6-mm blank caps to fire 15-mm "Bird Whistlers" (Zink-Feuerwerk GmbH, Germany, 74389 Cleebroon, Auf der Heide 1). Amplified recorded crow distress calls were also used to locate flocks of crows (Gorenzel and Salmon 1993) for more precisely targeted management and to disperse roosts. Several commercially available standard game callers, including the Johnny Stewart MS-512 game caller (Hunter’s Specialties, Cedar Rapids, IA) and Cabela’s Electronic Game Caller (Cabela’s, Oshkosh, NE) were used to amplify crow distress calls in conjunction with the Johnny Stewart tape “CT 201A Death Cry of a Crow.” Since 2005, WS teams have used the Prey Master Digital Caller (Cabela’s) with a sound chip “crow #1” (crow distress, crow/ow fight, excited crow,
Table 1. Estimated winter crow primary roost population size for 5 cities in New York, 2002 - 2007.

| City       | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|------------|------|------|------|------|------|------|
| Albany     | -    | -    | 13,230 | 25,740 | 27,960 | 30,500 |
| Auburn     | -    | 20,240 | -    | 16,320 | 21,840 | 12,300 |
| Troy       | 7,920 | 12,000 | 11,340 | 10,796 | -    | -    |
| Utica      | -    | -    | -    | -    | -    | -    |
| Watertown  | -  | -    | 5,000 | 9,900 | -    | -    |

crow reveille). Finally, hand-held lasers (Blackwell et al. 2002, Gorenzel et al. 2002) were used in a variety of situations, both as a stand-alone tool in areas where the use of pyrotechnics was difficult or unsafe, and in combination with the other two methods. A low-powered red laser (the Avian Dissuader®; SEA Technology, Inc., Lebanon Junction, KY) was used on perched and roosting crows (U.S. Department of Agriculture 2002). The laser was used at dusk and after dark, when it was visible to the birds and most effective for dispersing roosting crows.

Regular and timely communication with the public was a WS priority in order to provide project status updates and to underscore program goals and expected outcomes. Techniques to enhance communication included working with cooperators to produce press releases, give interviews, and make presentations at public meetings.

RESULTS AND DISCUSSION

Sixteen non-lethal crow hazing projects were conducted in New York from 2002 - 2007. Projects were conducted in Albany (4), Auburn (2), Troy (4), Utica (4), and Watertown (2). Public concern regarding the significant accumulation of crow feces and associated damage to public and private property was the primary conflict expressed to government officials in these 5 cities. Enhanced communication with media and the public by WS led to extensive coverage (sometimes daily project updates) in the local press as well as national media, including National Public Radio’s Living on Earth series and MSNBC’s Countdown with Keith Olbermann. The majority of coverage was supportive of program objectives. Opposition to non-lethal crow management was expressed by small but vocal groups in Auburn and Albany, who opposed direct crow management and promoted a reliance on education and volunteer crow feces clean-up in public areas as an alternative solution to crow conflicts.

Pre-treatment crow population surveys documented roosting crow populations that ranged from approximately 5,000 crows in Watertown in 2006 to >63,800 crows in Auburn in 2005. Roosting crow population size appeared to increase each year in Albany (13,230 to 30,500) and Watertown (5,000 to 9,900), but decreased in Auburn (63,800 to 36,525). Median crow roost size for all roosts surveyed across all years was 14,775 crows, and the cumulative mid-winter crow population estimate for the 5 cities in New York in 2006 was 102,665 (Table 1). By comparison, statewide estimates in 1932-33 from 20 locations were of 225,000 crows (Emlen 1938), and a partial estimate of 40,000 to 50,000 crows was reported from 1963-64 (Chamberlain 1964). These previous surveys provide conservative estimates of mid-winter crow populations in New York and do not appear to include crow roosts from any of the 5 cities included in the 2006 surveys, although crows likely roosted in these locations historically, although possibly in smaller numbers.

Urban crow roosts were successfully dispersed in 2002-2007 in 5 New York cities using a combination of pyrotechnics, amplified recorded crow distress calls, and hand-held lasers (Figure 1). The crow population reduction for all roosts across all years after the initial 5-

Figure 1. Percent urban crow roost population size reduction based on USDA APHIS Wildlife Services management activities in 5 cities in New York between 2002 - 2007.
to 7-night treatment ranged from 60%-100% representing a substantial initial local reduction in crow numbers and associated damage. In all cases, crows eventually relocated (at least temporarily) to lower conflict-lower impact areas within the city or to less-developed areas outside the city, where they often remained until moving back to the original roost site within 2 to 8 weeks post-treatment.. The number of treatments (crow hazing over multiple days for a finite period of time during the implementation of the project) (including re-treatments) required to successfully maintain sufficient reduction in crow damage for all projects ranged from 1 - 6. Re-treatments or follow up “spot-treatments” were necessary every year and in every city (except Utica in 2006), either to disperse crows at the original core roost site or to move birds from an alternate high-impact / high-conflict roost site. Spot treatments typically consisted of 3 additional nights. The range of follow-up treatments required across all hazing projects ranged from 0 - 5. Albany required the most re-treatments each year (4 - 6), with Utica requiring a maximum of 2 additional treatments.

Effective crow hazing requires an integrated management approach with access to all 3 methods that may be used in various combinations; however, in some situations, only one of these methods may be effectively used for a period of time. The number of management “events” (interventions where one or more hazing techniques were used to scare crows) during treatments was highly variable among projects, cities, and years. The range of events required to relocate crows (including the number of events associated with re-treatments) was 128 (Utica, 2006) to 986 (Auburn, 2005) (Table 2).

### Table 2. Crow damage management hazing events in 5 cities in New York, 2004 - 2007.

| City       | 2004 | 2005 | 2006 | 2007 |
|------------|------|------|------|------|
| Albany     | 310  | 316  | 222  | 453  |
| Auburn     | -    | 986  | 818  | -    |
| Troy       | 229  | 223  | 233  | 443  |
| Utica      | 219  | 197  | 128  | 230  |
| Watertown  | -    | -    | 212  | 188  |

The number of miles driven to successfully complete these projects ranged from 453 - 2,843 miles (729 - 4,575 km). These data provide a context for budget and personnel planning as well as a baseline to assess and compare project cost effectiveness for future crow hazing projects in cities in New York and the northeastern U.S.

### CONCLUSIONS

Urban crow roosts ranging in size from 5,000 to 63,800 crows were successfully dispersed during 2002 - 2007 by WS in 5 cities in New York, using non-lethal methods. Typically, these urban roosts required multiple treatments each winter to successfully relocate crows from high-conflict/ high-impact areas to low-conflict/ low-impact areas within the city, or to less developed areas outside the city. Public and media interest in these high-profile projects remained intense, even after multiple years in the same cities, and this underscored the need to develop communication strategies that prioritized transparency in project implementation and meeting management objectives. Successful implementation of these crow hazing projects required detailed planning meetings between biologists and municipal officials. These sessions clarified likely program outcomes and underscored a long-term commitment of the resources required, for both annual and within-season treatments needed to maintain a significant reduction in damage.

Conflicts with roosting American crows appear to be increasing during the winter in urban environments in New York. Although the majority of the public is unaffected by crow damage, an increase in requests for assistance by the public to government representatives indicates growing public support and need for crow management. Future crow hazing projects in New York will likely have to contend with habituation to current methods, and program managers will be required to maintain an adaptive management approach to meeting changing local needs associated with crow conflicts.

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