CHARACTERISTICS OF THE PRIVATE NUISANCE WILDLIFE CONTROL INDUSTRY IN NEW YORK

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ABSTRACT: The nuisance wildlife control industry is rapidly expanding in New York State. To gain additional insight about this industry and the number of animals handled, we reviewed the 1989-90 annual logs submitted by Nuisance Wildlife Control Operators (NWCOs) to the New York State Department of Environmental Conservation (DEC). The specific objectives of this study were to determine: (1) the number and species of different wildlife responsible for damage incidents, (2) the cause of damage complaints, (3) the disposition of animals handled, (4) the location of damage events (i.e., urban, suburban, rural), and (5) an estimate of the economic impact of the nuisance wildlife industry in Upstate New York. The Nuisance Wildlife Logs (NWLs) were examined for 7 urban and 7 rural counties (25.5% of Upstate counties), and these data were used to estimate total NWCO activity in DEC Regions 3 through 9 (excludes Long Island). Approximately 75% of NWCOs licensed by DEC were active during 1989-90, and nearly 2,800 complaints were handled in the 14 counties sampled. More than 90% of complaints came from urban counties, and we estimated that NWCOs responded to more than 11,000 calls in Upstate New York. At a conservative estimate of $35/call, revenue generated by this industry exceeded $385,000 annually. Six wildlife species accounted for 85% of the nuisance complaints in urban and rural counties. During 1986 to 1993, the number of NWCOs licensed by DEC nearly quadrupled, and there is no indication that this trend will change in the near future.

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Many different publics, including agriculturists, residential property owners, motor vehicle operators, commercial businesses, and others are impacted by wildlife damage management problems (Sayre and Decker 1990). San Julian (1987) and Decker (1987) noted that conflicts between suburban residents and wildlife were increasing due to greater urbanization in the United States. Decreased funding for animal damage programs operated by government agencies, and increases in numbers of some problem wildlife species have contributed to greater numbers of animal damage complaints. Agricultural program leaders in more than half of the County Cooperative Extension Service (CES) offices in New York indicated there has been either a slight or substantial increase in the number of wildlife complaints received between 1985 and 1990 (Curtis and Decker 1990).

Traditionally, government agencies handled many of these conflicts by providing technical advice, educational materials, and/or capturing and removing problem wildlife. Most wildlife complaints were handled by either the state fish and wildlife agency, USDA-APHIS-Wildlife Services employees, or Cooperative Extension Service agents (San Julian 1987). Frequently there is an informal division of responsibilities among these agencies within a state to reduce the potential overlap in services. For example in New York, most migratory bird and coyote (Canis latrans) problems are handled by USDA-APHIS-Wildlife Services biologists, due to federal jurisdiction and past experience, respectively. Assistance with deer (Odocoileus virginianus) and beaver (Castor canadensis) complaints is generally provided by the New York State Department of Environmental Conservation, Bureau of Wildlife (DEC), due to permit requirements for lethal control or transport of these species under the State's Environmental Conservation Law. Technical advice and educational materials concerning other potential vertebrate pest species is often provided by Cornell 49Cooperative Extension agents. More than 80% of CES county agents (n = 47) who responded to a recent survey indicated that Cornell University staff and DEC biologists were their primary sources of wildlife damage management information (Curtis and Decker 1990).

The demand for wildlife damage management services in New York has increased, however, government support for on-site assistance has not kept pace. Consequently, the commercial pest control industry is filling this void. In New York, commercial

Nuisance Wildlife Control Operators (NWCOs) are licensed by the DEC if they wish to capture and transport wildlife, and must report their annual activity on Nuisance Wildlife Logs (NWLs) in order to renew their licenses. Thus, we had access to most individuals who handled wildlife problems on a commercial basis in the state, either on a full- or part-time basis. A review of the permits issued indicates that the private nuisance wildlife control industry has rapidly expanded in New York during the past 5 years (Fig. 1). Now more than 900 NWCOs handle wildlife complaints statewide.

To gain additional insight concerning this rapidly growing industry, we reviewed the 1989-90 annual logs submitted by NWCOs to the DEC. The specific objectives of this study were to determine: (1) the number and species of different wildlife responsible for damage incidents, (2) the cause of damage complaints, (3) the disposition of animals handled, (4) the location of damage events (i.e., urban, suburban, rural), and (5) an estimate of the economic impact of the nuisance wildlife industry in New York.

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METHODS

Information was compiled from the 1989-90 NWLs obtained from DEC. The logs were developed by DEC in an attempt to standardize information collected, and serve as a record of the complaints handled by each NWCO during the permit year. The 1989-90 license year for NWCOs ran from September 1 to August 31, and during this time period, 490 NWCOs were licensed in DEC Regions 3 through 9 (Upstate New York). Data recorded in the NWLs include: (1) nuisance species involved, (2) complaint type, (3) abatement method, (4) area of complaint, and (5) method of disposition of the animal.

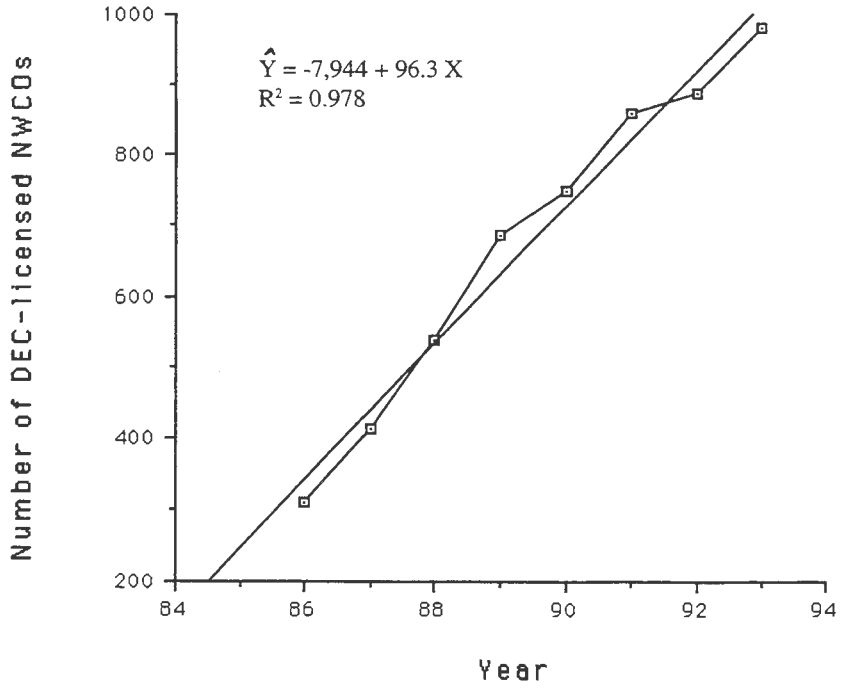

Fig. 1. Trends in the number of Nuisance Wildlife Control Operators licensed by the New York State Department of Environmental Conservation (DEC), 1986-93.

Comparisons were made between an urban and rural county in each of the 7 upstate DEC Regions (Table 1). DEC Regions 1 and 2 (Long Island) were excluded from our sampling due to the high human population density and habitat differences from the remainder of New York State. Rural counties were defined as having a total population of less than 200,000 people, and urban counties had a total population of more than 200,000 people. Upstate New York has a total of 62 counties, 13 of which were classified as urban and 49 rural. The rural counties included in our sample were: Sullivan, Delaware, Hamilton, Lewis, Chenango, Schuyler, and Allegheny (representing 18% of the rural counties in New York State). The urban counties sampled were Westchester, Albany, Saratoga, Oneida, Onondaga, Monroe, and Erie, (29% of the NYS's urban counties). In total, weexamined records from 25.5% of the upstate counties in New York.

Statewide estimates for various types of information (i.e., nuisance species, complaint type, etc.) were calculated with the formula:

$$e = 1.255(\Sigma cr + \Sigma cu),$$

where e is the statewide estimate, cr is the value for the NWL information type being considered in rural counties, and cu refers to the information type in urban counties. Student's T-tests (Steel and Torrie 1980:95) were used to compare the mean number of complaints handled per NWCO for urban and rural counties. Chi-square contingency tables (Steel and Torrie 1980:498) were used to compare frequency distributions for information types between urban and rural counties.

RESULTS

Between 1986 and 1992, the number of DEC-licensed NWCOs increased significantly ($Y = -7{,}944.3 + 96.3\ X$, $R^2 = 0.98$), from 310 to over 957 (Fig. 1). Obviously this industry has rapidly expanded in recent years, and similar trends are anticipated for the future. The growth in number of newly-licensed NWCOs has been remarkably consistent. The number of active NWCOs licensed by DEC varied from 23 to 77 among Regions 3 through 9 (Table 1), however, the percentage of active NWCOs ranged between 75 and 86%. In DEC Regions 1 and 2, only about 60% of licensed NWCOs were active. Overall, 460 of 615 (75%) NWCOs licensed in New York State were active during the 1989-90.

Most NWLs submitted contributed to the detailed analyses for the 7 rural and 7 urban counties. Only 2.3% ($n = 9$) incorrectly completed logs were

Table 1. Total number of Nuisance Wildlife Control Operators licensed by the New York State Department of Environmental Conservation (DEC) in 1989-90.

DEC Region	Total	Active		Inactive	
		No	%	No	%
1	112	67	59.8	45	40.2
2	13	86	1.5	53	8.5
3	72	58	80.6	14	19.4
4	72	54	75.0	18	25.0
5	44	38	86.4	6	13.6
6	29	23	79.3	6	20.7
7	99	77	77.8	22	22.2
8	75	60	80.0	15	20.0
9	99	75	75.8	24	24.2
Total	615	460	x=74.8	155	x=25.2

excluded. In most cases, missing information was restricted to one category (e.g., area of complaint), so the remainder of the data could be tabulated.

Not surprisingly, the majority of complaints in the urban counties sampled (62%, n = 1,577) were from urban areas (Table 2). In the rural counties sampled, 36% (n = 64) of complaints handled were in urban areas, 23% (n = 40) were from suburban sites, and 41% (n = 72) were handled in rural areas. With 2,538 complaints in urban vs. 176 in rural counties, the average number of complaints per NWCO was significantly greater in urban and suburban areas (Table 2). For the upstate New York region, we projected that approximately 10,643 complaints were handled in 1989-90, with 6,435, 3,184, and 1,024 calls coming from urban, suburban, and rural areas, respectively.

The nature of each nuisance wildlife complaint was classified by the NWCO (Table 3). The distribution of complaint types was significantly different for urban and rural counties (chi-square = 24.0, $p < 0.005$). In urban counties, fewer of the complaints were for animals causing damage, and a greater proportion were for sick or injured wildlife. For each complaint type, the average number of complaints handled per NWCO was significantly greater in urban areas.

The NWCOs listed the method of capture for each animal handled (Table 4). In both urban (n = 1,764) and rural (n = 122) counties, about two-thirds of animals were caught in box traps. Hand or catchpole was an alternative method frequently used in urban counties (23%, n = 600), but not in rural counties (7%, n = 13). Body-gripping or leg-hold traps were more likely to be used in rural areas (Chi-square = 161.6, $p < 0.005$).

In urban counties sampled, 27% (n = 687) of the animals were killed and buried; however, a higher proportion (61%, n = 110) of wildlife was killed and buried in rural counties (chi-square = 99.8, $p < 0.005$). Fifty-eight percent (n = 1,488) of animals were released in urban counties, and 34% (n = 62) were released in rural counties. Two percent (n = 43) of the animals captured in urban counties were transferred to licensed wildlife rehabilitators, while none were given to rehabilitators in rural areas (Table 5).

Animals captured were classified by species, and the distribution was significantly different between urban and rural counties (Table 6, chi-square = 243.4, $p < 0.005$). Within urban counties, 22% of the complaints (n = 585) were for squirrels (Sciuridae) while only 2% (n = 3) of complaints were caused by squirrels in rural counties.

Table 2. Total and mean number of complaints handled by Nuisance Wildlife Control Operators in urban vs. rural counties[a] for 14 Upstate New York counties, 1989-90.

	County Type							
	Urban		Rural		Mean #/NWCO			Est. of total
Land Class	(n=7)	%	(n=7)	%	Urban	Rural	t-value	complaints
Urban	1577	62	64	36	10.73	1.64	2.90*	6435
Suburban	772	30	40	23	5.25	1.03	2.31*	3184
Rural	189	7	72	41	1.29	1.85	-0.24	1024
Total	2538		176					10643[b]

[a]Chi-square=213.0, df=2, $p<0.005$.
[b]Upstate estimate calculated with formula $e=1.225(\Sigma cr+\Sigma cu)$
*Significant at a=0.05

Table 3. Total and mean number of different types of complaints handled by Nuisance Wildlife Control Operators in urban vs. rural counties[a] for 14 Upstate New York counties, 1989-90.

Land Class	County Type: Urban (n=7)	%	Rural (n=7)	%	Mean #/NWCO: Urban	Rural	t-value	Est. of total complaints
Annoyance	1059	41	73	41	8.61	3.04	2.83*	4439
Damage	1102	42	99	55	8.96	4.13	1.85*	4710
Sick/injured wildl.	391	15	5	3	3.18	0.21	2.37*	1553
Menacing pets	49	2	3	2	0.40	0.13	2.55*	204
Total	2601		180					10906[b]

[a]Chi-square=24.0, df=3, $p<0.005$.
[b]Upstate estimate calculated with formula $e=1.225(\Sigma cr+\Sigma cu)$
*Significant at $a=0.05$

Table 4. Total and mean number of complaints handled by Nuisance Wildlife Control Operators classified by animal capture method in urban vs. rural counties[a] for 14 Upstate New York counties, 1989-90.

Method of Capture	County Type: Urban (n=7)	%	Rural (n=7)	%	Mean #/NWCO: Urban	Rural	t-value	Est. of total complaints
Box trap	1764	67	122	67	14.34	5.08	2.92*	7396
Catchpole/hand	600	23	13	7	4.88	0.54	2.56*	2404
Body-grip trap	61	2	17	9	0.50	0.71	-0.70	306
Shooting	67	3	3	2	0.54	0.13	3.19*	275
Leg-hold trap	24	<1	20	11	0.20	0.83	-1.54	173
Other	129	5	7	4	1.05	0.29	1.06	533
Total	2645		182					11086[b]

[a]Chi-square=161.6, df=5, $p<0.005$.
[b]Upstate estimate calculated with formula $e=1.225(\Sigma cr+\Sigma cu)$
*Significant at $a=0.05$

Table 5. Total and mean number of complaints handled by Nuisance Wildlife Control Operators classified by disposition of animals in urban vs. rural counties[a] for 14 Upstate New York counties, 1989-90.

Method of Disposition	County Type: Urban (n=7)	%	Rural (n=7)	%	Mean #/NWCO: Urban	Rural	t-value	Est. of total complaints
Killed/buried	687	27	110	61	3.49	3.38	0.70	3125
Killed/cremated	360	14	8	4	1.97	0.19	2.48*	1443
Released	1488	58	62	34	8.05	1.08	3.03*	6078
Rehabilitated	43	2	0	0	0.27	0.00	3.69*	169
Total	2578		180					10816[b]

[a]Chi-square=99.8, df=3, $p<0.005$.
[b]Upstate estimate calculated with formula $e=1.225(\Sigma cr+\Sigma cu)$
*Significant at a=0.05

Table 6. Total and mean number of complaints handled by species for Nuisance Wildlife Control Operators in urban vs. rural counties[a] for 14 Upstate New York counties, 1989-90.

Species	County Type: Urban (n=7)	%	Rural (n=7)	%	Mean #/NWCO: Urban	Rural	t-value	Est. of total complaints
Raccoon	878	33	53	29	5.97	1.36	2.67*	3651
Skunk	436	16	60	33	2.97	1.54	1.37	1945
Squirrel	585	22	3	2	3.98	0.08	2.61*	2306
Woodchuck	157	6	21	12	1.07	0.54	1.07	698
Bat	126	5	6	3	0.86	0.15	1.44	518
Opossum	98	4	14	8	0.67	0.36	0.58	439
Cat	26	1	0	0	0.18	0.00	2.05*	102
Fox	13	<1	1	<1	0.09	0.03	0.92	55
Beaver	6	<1	13	7	0.04	0.33	-1.76	75
Coyote	0	0	2	1	0.00	0.05	-1.40	8
Other	366	14	9	5	2.49	0.23	1.33	1471
Total	2691		182					11267[b]

[a]Chi-square=243.4, df=10, $p<0.005$.
[b]Upstate estimate calculated with formula $e=1.225(\Sigma cr+\Sigma cu)$
*Significant at a=0.05

Less than 1% (n = 6) of the complaints in the urban counties were for beavers (Castor canadensis), while beaver complaints comprised 7% (n = 13) of the calls in rural counties. We also observed significant differences in the mean number of raccoons (Procyon lotor) and cats handled per NWCO between urban and rural counties.

The number of complaints handled in different land classifications (i.e., urban, suburban, and rural) differed between species (Table 7). There were proportionally more squirrel complaints in urban areas. The proportion of raccoon complaints was greatest in rural areas, decreasing in urban locations. Beavers comprised 6% (n = 14) of the complaints in rural areas, but seldom caused problems in urban or suburban locations. However, the top 6 vertebrate pest species were remarkably consistent between land classification categories. It is important to note that 90% (n = 2,074) of complaints were from urban and suburban locations.

The majority of nuisance wildlife handled were released to the wild (61%, n = 1,441, Table 8). Thirty-eight percent (n = 895) of animals captured were killed and either buried or cremated. Only 1% (n = 23) of animals captured were taken to wildlife rehabilitators for treatment and release. Raccoons, skunks (Mephitis mephitis), and squirrels accounted for 82-92% of the animals handled in each category.

DISCUSSION

The commercial nuisance wildlife control industry in New York State has grown 309% in the last 8 years, and during 1989-90, NWCOs handled an estimated 11,000 complaints. At a conservative figure of $35 per complaint, this would total more than $385,000/year in revenue generated. Since 1989-90, the number of NWCOs licensed by DEC has continued to increase, but it is not known if the number of complaints handled has increased proportionally.

Table 7. Land use classification by species for complaints handled by Nuisance Wildlife Control Operators for 14 Upstate New York counties, 1989-90.

	Land Use Classification					
	Urban		Suburban		Rural	
Species	No.	%	No	%	No.	%
Raccoon	391	29	351	47	128	59
Skunk	278	21	148	20	31	14
Squirrel	438	33	121	16	9	4
Woodchuck	87	7	67	9	20	9
Bat	77	6	24	3	18	8
Opossum	58	4	34	5	12	6
Total	1329		745		218	

Contracting with a NWCO for animal control services may be the only direct contact some people have with either wildlife or the management profession. It would be in the interest of wildlife management professionals to provide inservice training opportunities for NWCOs, and testing to make certain they meet a minimum skill level.

The nuisance wildlife control industry is concentrated in urban counties within New York State. However, the proportion of active NWCOs was similar in urban and rural parts of the state. We speculate that more full-time commercial NWCOs are associated with major metropolitan areas, and part-time or hobby operators satisfy much of the demand in more rural counties. Also, rural landowners may be more likely deal with problems on their own, rather than pay an outside contractor for animal removal.

There were differences in the proportion of

Table 8. Disposition of animals handled by Nuisance Wildlife Control Operators for 14 Upstate New York counties, 1989-90.

	Disposition							
	Buried		Cremated		Released		Rehabilitated	
Species	No.	%	No.	%	No.	%	No.	%
	224	46	24	5	235	48	3	<1
Skunk								
Raccoon	213	24	122	14	546	61	15	2
Squirrel	114	20	52	9	405	71	2	<1
Woodchuck	70	41	6	3	95	55	1	<1
Bat	36	29	4	3	84	67	1	<1
Opossum	19	18	11	10	76	71	1	<1
Total	676	29%	219	9%	1441	61%	23	1%

complaints for raccoons and skunks in the 3 land use classifications (Table 7). The proportion of raccoon complaints was greatest in rural areas (59%, n = 128), and lower in suburban (47%, n = 351) and urban (29%, n = 391) locations. The opposite was true for squirrels, as the proportion of squirrel complaints was greatest in urban areas (33%, n = 438), and lower in suburban (16%, n = 121) and rural (4%, n = 9) locations. The other 4 nuisance species showed no significant trends.

The method of disposition for various wildlife has important implications regarding the value placed on the lives of different species. For instance, the ratio of raccoons released to killed is much higher than the ratio of skunks released to killed (Table 8). This could indicate a general bias on either the part of the NWCOs or their clients towards releasing raccoons. Raccoons were also the species most often taken to wildlife rehabilitators in urban counties. Braband and Clark (1992) reported that clients had very different views on lethal control for different species of nuisance wildlife.

These data were analyzed on a per complaint handled basis, rather than a per animal handled basis. This provided a very conservative estimate of the industry in New York State because many of the calls involved 2 or more animals (sometimes > 10 animals in the case of calls from larger businesses or municipalities). Because NWCOs may charge on a per animal handled or contract basis, the actual revenue generated by the industry is probably higher than our estimate. Many of the NWCOs did not report how many animals were handled for each complaint, and consequently, it was impossible to reliably estimate the number of animals handled by species. A simplified data form with more explicit directions would be helpful in the future.

These data were tabulated for the year preceding the mid-Atlantic rabies outbreak in New York State. It would be interesting to determine how the industry has been affected by this epidemic, and specifically, if changes in the number of complaints for rabies vector species, as well as the disposition of these animals, has occurred. These results could yield interesting insights concerning not only the response of the nuisance wildlife industry, but also the attitudes of humans towards wildlife, and their perceptions of the health risks associated with wildlife species.

It is important to examine the ecological and human dimensions implications of releasing thousands of nuisance animals that have been captured by NWCOs. If animals are released into unsuitable or saturated habitats their survivorship may be quite low. Capture of nuisance wildlife also may cause excessive stress for individual animals, further reducing their chances of survival. Releasing animals into saturated sites could potentially accelerate the spread of disease by increasing animal density and the probability of contact between individuals. For wildlife that survive relocation, NWCOs may simply be moving a nuisance problem between sites. For example, raccoons that have developed a habit of denning in attics may not change this behavior after relocation.

Braband and Clark (1992) noted that nearly 90% of survey respondents (n = 141) wished to see humane treatment of nuisance wildlife. However, the definition of humaneness and appropriate disposition of animals varied considerably between respondents for the various wildlife species in question. About 95% of respondents approved of lethal control for rats and mice, whereas most disapproved of killing nuisance deer (69.8%), geese (Branta canadensis, 66.7%), and squirrels (59.0%).Consequently,the nuisance wildlife control industry must address several important ethical and philosophical concerns.

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