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## Urban Nuisance Wildlife Problems in Arizona

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# Urban Nuisance Wildlife Problems in Arizona'

Rebecca L. Wright<sup>2</sup> and Leonard L. Ordway

Abstract.-- Arizona has experienced an increase in urbanization of wildlife habitat, which has led to an urban nuisance wildlife problem. The Arizona Game and Fish Department is working to lessen the problem through public education, information packets and use of private pest control companies to remove wildlife for a fee.

## INTRODUCTION

Wildlife has historically caused depredation and nuisance problems in rural areas nationwide. Typically, man controlled these problems through animal removal or exclusion. Over the last three decades, development of wildlife habitat and rural areas into metropolitan sites has increased, and population distribution has shifted from rural to urban. Nuisance wildlife problems have also shifted from agricultural damage to urban wildlife issues, ranging from a simple misunderstanding by citizens of wildlife habits to actual property damage by wildlife.

Arizona encompasses approximately 114,000 square miles. The state's population (3.5 million) increases each year by 3.5-4.5%, with most settling in urban areas (Arizona Department of Economic Security, 1988). Nuisance wildlife situations have also increased. According to Animal Damage Control's Arizona Annual Report (USDA, FY 1988), javelins (*Tayassu tajacu*) (fig

1) caused almost \$112,000 damage to crops, turf (golf courses), pets and gardens. Coyotes (*Canis latrans*) (fig. 2) caused \$69,000 damage to livestock and crops. Beavers (*Castor canadensis*), black bears (*Ursus americana*), skunks and ground squirrels caused a total of \$20,600 damage to private and commercial property.

Rather than being isolated or unrelated incidences, these nuisance wildlife situations are an expanding problem that the Arizona Game and Fish Department (AGED) is striving to solve or lessen through education of the public, mail-out information packets to affected citizens, and licensing of private pest control companies enabling them to remove wildlife at a cost to the affected citizen.

## URBAN NUISANCE WILDLIFE - CAUSES

The factors contributing to urban nuisance wildlife problems in Arizona are similar to factors seen nationwide. These four factors are: habitat transference, habitat destruction, human population expansion and wildlife population expansion/adaptation.

Ownership or status of land in Arizona has changed as areas became more urbanized. First, land became private property or State and Federal lands; then the latter was either annexed by cities or developed into unincorporated towns becoming private property. This change in land ownership resulted in a change in habitat management and manipulation. Once annexed into cities or towns, property was developed into residential, commercial or industrial sites.

<sup>1</sup>Paper presented at the Ninth Great Plains of Wildlife Damage Control Workshop, Fort Collins, Colorado, April 18-19, 1989.

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Figure 1.--Javelina (*Tayassu tajacu*) or collared peccary, frequently cause nuisance problems in metropolitan Phoenix and Tucson. These individuals were removed with tranquilizing dart gun.



Figure 2.--Coyotes (*Canis latrans*) are occasionally found in towns allowing horse properties or where washes and native vegetation remain.

Two modes of development have been used: 1) removal of native habitat, with evenly spaced residential or commercial communities, and 2) widely-spaced or clustered communities with corridors of native habitat left intact (this mode has become more popular as consumers and developers became more ecologically conscious). These two methods of development have created pockets of untouched or minimally impacted habitat surrounded by developed sites.

Newcomers to Arizona often relocate from more urbanized states. These new Arizonans often have had little experience with wildlife such as javelina, black bears, coyotes, skunks, raccoons (Pr n lotor), mountain lions (*Felis concolor*), raptors, rattlesnakes and Gila Monsters (*Heloderma suspectum*). Long-time residents in once lightly populated towns who have not seen much wildlife in the past are seeing more wild life as habitat is destroyed and these animals are forced to seek out other food and cover resources.

Wildlife species have adapted to new food, water, and cover resources in urbanized areas, resulting in an increase of frequency of wildlife sightings. Some species, such as the javelins have increased in numbers and are also adapting to new habitats, such as ponderosa pine.

#### PROBLEMS CAUSED BY URBAN WILD LIFE

Despite development of wildlife habitat, often wildlife is not displaced. Instead, wildlife takes advantage of the new food, water, and cover resources presented to them. Landscaped yards, gardens, ornamental cactus, decorative ponds, drip irrigation systems, garbage cans, pet food, food set out for wildlife, and, occasionally, pets, replace traditional food and water resources. Sheds, garages, crawl spaces under house trailers, rafters, and attics are utilized as cover. Wildlife continue traveling on traditional movement corridors, despite development along these pathways.

The public frequently is uninformed about wildlife habits and legal status; many have unrealistic viewpoints on wildlife management. While many Arizonans enjoy seeing wildlife and, at times, encourage them by supplying food and water, many newcomers are surprised or frightened at the presence of javelina, coyotes, woodpeckers, etc. Just observing wildlife does not mean it is creating a nuisance. Yet, someone unfamiliar with a javelina is sure to have some concern.

When evaluating the situation with the affected citizen, Wildlife Managers try to assess what the problem is and how the citizen is contributing to the problem. Contributing factors include failure to remove wildlife attractants and failure to modify habitat (no fences, improper or inadequate fencing, failure to cover crawl spaces, etc.).

## SOLUTIONS TO INDIVIDUAL CASES

ACED has limited manpower and economic resources and cannot physically respond to all wildlife calls. Therefore, these calls are broken down into three categories: 1) injured or captive wildlife; 2) wildlife situations homeowners can alleviate themselves or by hiring a privately owned wildlife pest control company; and 3) live trapping or tranquilizing enclosed or dangerous wildlife. Wildlife Managers respond to any calls involving a threatened or endangered species, a big game mammal or if the situation is life threatening or politically sensitive.

The first category ("come and get this thing") is cleared by phone instruction. The affected citizen is encouraged to bring the wildlife to the nearest ACED office. If the citizen can't do this, then a volunteer for ACFD's Adobe Mountain Wildlife Center is sent to pick up the animal.

The second category ("we've got a problem and want you to remove it/solve it") is usually handled by phone instruction and mail-out information packets sent to the affected citizen. These packets contain information on removal of attractants, habitat modification, repelling individual animals, and removal of individual animals. In addition, information on Wildlife Service Permitees (WSP) is included in the packet. WSP are State Pest Control Board licensed pest control companies licensed by ACED to handle nuisance wildlife (fig. 3). For a fee, a WSP will remove wildlife, develop plans to prevent wildlife damage or offer advice on how to prevent further damage. Currently, few companies work statewide; the majority work only in the Phoenix metropolitan area. As the number of nuisance wildlife calls increases in the metropolitan areas, these companies provide an invaluable service for ACPD.

The third category (removal of enclosed or dangerous wildlife) warrants response by ACM personnel. Javelina, black bear and mountain lions have posed threats to humans or pets in metropolitan areas in recent years. These wildlife species have been known to become dependent upon food resources presented by humans; the animals then associate food with humans and, subsequently, lose their fear of humans. Occasionally, these animals become trapped on property and can't (or won't) leave. If all other attempts to exclude or deter the nuisance animal fail, then Wildlife Managers will attempt to remove the animal using live traps, tranquilizing dart guns or catch poles (fig. 4). Method utilized is determined by species involved, safety to officers and public, condition of animal, and number of animals involved.

Non-wildlife species such as pigeons and feral pets are handled by WSP or other agencies, such as USDA Animal Damage Control, County Rabies Control or the Humane Society.

## LCNG-TERM SOLUTIONS

Response to individual cases helps the immediate nuisance problem a property owner is experiencing, yet AGFD is working to prevent or



Figure 3.-Wildlife Service Permitees remove wildlife, devise plans, or offer advice on nuisance problems at a cost to the affected citizen.

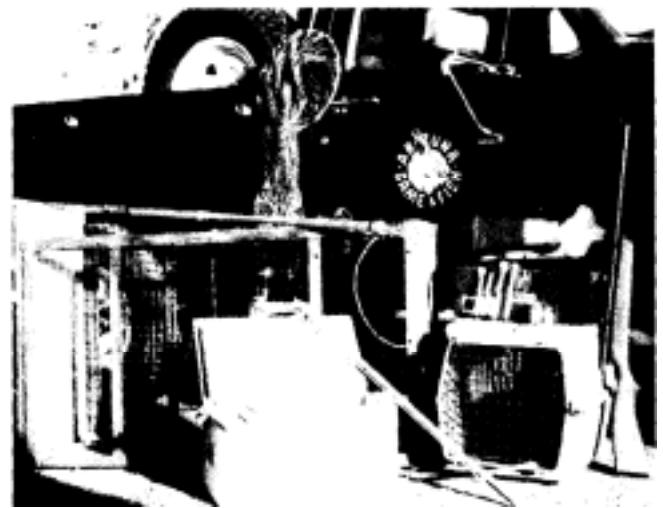


Figure 4.--Wildlife Managers use a variety of equipment for wildlife capture and removal (dart gun, net gun, catch pole, snake tongs, and live traps).

lessen future nuisance problems through education of the public, coordination of efforts of the six AGED regions, and licensing and training of private companies to assist in wildlife removal. AGM is designing brochures explaining life histories and habits of javelina, coyotes, small mammals, birds, and reptiles that detail strategies for preventing problems from these species. These brochures will be available at AGED offices and will be sent to Chamber of Commerce offices for inclusion in newcomers' information packets. AGED is also designing slide shows and video tapes detailing nuisance wildlife problems; these will be made available to the public for talks and presentations. In addition, Wildlife managers are working with community leaders, citizen groups, and city planning branches, outlining methods they can use to help educate their communities about urban wildlife. During the peak nuisance wildlife season, late fall to spring, AGED collaborates with local newspapers and television stations reference articles and newsbriefs on urban wildlife problems.

AGFD is upgrading and expanding its Wildlife Service Permittee program. Improved yearly training sessions, revised report forms, and stricter reporting requirements allow AGED to better supervise WSP actions. AGED also expects to license pest control companies in metropolitan areas other than Phoenix; this will provide an invaluable service to the public and AGED.

## SUMMARY

Urban nuisance wildlife problems will continue to increase as wildlife habitat is developed and wildlife is forced to search out new food, water, and cover resources around metropolitan areas. Response to individual cases by Wildlife Managers will help alleviate immediate nuisance wildlife situations, but long-term solutions such as public education, use of private companies to assist in wildlife removal, and coordination with city planners and developers will help alleviate future urban nuisance wildlife problems.

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# Urban Beaver Damage and Control in Dallas-Fort Worth, Texas'

Bob Willging<sup>2</sup> and Rick Sramek<sup>9</sup>

Abstract.--Beaver in metropolitan Dallas-Fort Worth, Texas cause considerable damage annually to trees, shrubs, and other property. USDA-APHIS-ADC reported 158 beaver complaints in the Dallas-Fort Worth area, 1984-1988, with damage totalling \$60,395. Respondents to a beaver damage survey reported \$170,900 in damage. Most incidents occurred at private homes on small creeks or lakes. Respondents used 11 different control methods, and spent \$13,775 on control. Effective and consistent approaches to urban beaver damage control are needed.

## INTRODUCTION

Beaver (*Castor canadensis*) populations have increased tremendously in the southeastern United States during the past 30 years, resulting in extensive damage to timber and agricultural resources primarily from flooding but also from direct cutting (Arner 1964, Toole and Krinard 1967, Godbie and Price 1975, Arner and DuBose 1978, Bullock and Arner 1985). Loven (1986) reported \$391,153 in beaver damage to dikes and impoundments in Texas during a three year period.

In most southern states, beaver populations were probably at a low between 1890-1930 (Wesley 1978, Woodward 1983), but increased legal protection, low fur prices, and transplant efforts since then has caused beaver populations and distribution to greatly expand. Beaver were nearly extinct in Texas by 1900 (Wade 1986). Between 1939 and 1961 numerous beaver transplants by the Texas Parks and Wildlife Department, facilitated by strict protection and increased man-made water sources, led to the resurgence of the Texas beaver population, and damage complaints were common by the **mid-1960's (Wade 1986)**. Presently there are few restrictions on taking beaver for damage control in Texas, but beaver populations remain high and are expanding.

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Paper presented at the Ninth Great Plains Animal Damage Control Workshop. (Fort Collins, Col., April 17-20, 1989).

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Beaver damage to timber and agricultural resources has been documented extensively; however, beaver damage to urban and suburban property has received little attention. Beaver populations within the metropolitan area of Dallas-Fort Worth (DFW), Texas cause considerable damage annually to ornamental shrubs and trees, and other property. Beaver control in urban areas is frequently complicated by safety considerations, local regulations regarding the use of certain control methods, and widely varied public attitudes towards beaver control. The purpose of this study was to 1) Assess the extent of urban beaver damage in the DFW area, 2) Determine damage control and prevention methods used by residents experiencing beaver damage, and 3) Assess urban residents' attitudes towards beaver and control methods.

## STUDY AREA

This study was conducted in Dallas and Tarrant Counties of northcentral Texas. The cities of Dallas and Fort Worth occupy nearly all of Dallas and Tarrant Counties respectively, and the DFW urban areas are referred to as one metropolitan area. The DFW area ranks 10th in population nation- 2 wide with over 3 million people, and covers 4,475 km. Both counties are highly urbanized and little land could be considered rural.

Surface water resources are abundant in the area due to its position in the Upper Trinity River Basin. The West Fork of the Trinity begins northwest of Fort Worth and joins the Clear Fork in Fort Worth and the Elm Fork in Dallas. There are 23 major reservoirs located in this basin, with 6 located in the DFW area. Additionally, hundreds of small creeks, ponds, and canals provide extensive riparian habitat for beaver.

## METHODS

### Management Information System

Data summaries for Dallas and Tarrant Counties from the USDA-APHIS-ADC Management Information System (MIS) between 1983-1988 were used to determine annual number of beaver complaints received by ADC, damage estimates, and types of damage. Texas ADC employees routinely complete a computer card reporting each damage complaint received, showing location, species, and type and value of damage. This information is entered in a central databank located at the state office in San Antonio. The MIS system became operational in 1983.

### Survey

A 15 question survey with 3 sections was developed to obtain additional information about beaver damage situations. Surveys were sent to DFW residents who had been assisted by USDA-APHISADC **with beaver problems between 1984-1988**. An attempt was made to send surveys to as many individuals as possible. However, lack of current addresses limited the number of surveys sent to 87. We were primarily interested in obtaining damage estimates, type of damage, control methods used, and attitudes towards beaver control.

## RESULTS

### Management Information System

Beaver damage from 158 incidents recorded on MIS from 1984-1988 totaled \$60,395 (Table 1). Most damage was to ornamental plants and trees, which included typical nursery stock shade and fruit trees and shrubs, and to standing trees, which included wild, native trees. Other types of damage recorded included damage to lake or tank dams, and property damage such as to boat docks and wooden structures. Yearly totals of beaver complaints received by ADC have steadily increased from 12 in 1984 to 64 in 1988.

### Survey

Sixty-three percent of the 87 surveys sent were returned. Most responses were from private homes (80). The remaining 20% were from schools, churches, golf courses, and real estate developments. Damage occurred on small creeks or streams (55%), small ponds or lakes (40), and reservoirs (2).

Total beaver damage reported by respondents was \$170,900 and ranged from \$50 to \$50,000 per complaint. Six exceedingly high damage estimates accounted for 677 of the total damage cost. Eliminating these high estimates left an average of \$1,807 per incident. The six large damage estimates were reported by a university and private homeowners. Severe damage to pond dams and mature trees accounted for the higher estimates. No attempt was made to verify the accuracy of these estimates.

The most frequent type of damage reported to ornamental plants and trees (55%). Other property damage reported included garden or fruit tree damage (11), dike or dam damage (9), and boat dock damage (1%). Other types of damage reported were flooding, erosion, and damage to wooden gates and fences. One respondent reported damage to a powerline caused by a beaver-felled tree. Some respondents regarded beaver as a nuisance or potential health hazard.

Eleven different damage control methods were used by respondents (Table 2). Most respondents used more than one method. Wrapping trees with hardware cloth or screen was used by 67% of respondents. Other methods frequently used were shooting (33), conibear traps (18), and exclusion fencing (18). Respondents reported spending a total of \$13,775 on control efforts. These costs ranged from buying a box of shotgun shells to spending \$3,000 on labor to control beavers at a real estate development.

Respondents were asked to categorize each method used as successful (stopped damage), partially successful (some relief from damage), or not successful (no relief from damage). Protecting trees with hardware cloth or screen and shooting were consistently considered to be successful methods (Table 2). Most other methods were perceived as being only partially successful or not successful. Forty-five percent of respondents used some type of lethal control with 84% of them killing at least one beaver. Twenty percent reported killing over 5 beaver. The most used lethal method was shooting.

Sixty-seven percent of respondents were unaware that beavers existed in the DFW area until damage was experienced. Twenty percent had regarded beaver as endangered species before their damage experience. Most respondents (56) were aware that nutria (*Myocastor coypus*) could be found in the area, and many people initially confused beaver damage with nutria damage. Fifty-five percent of respondents felt that assistance with beaver control was easily obtainable. Only 25% of respondents were opposed to lethal control, and of these, 50% would permit lethal control as a last alternative.

## DISCUSSION

### Damage

Damage estimates reported by survey respondents were several times higher per incident than that reported by ADC personnel. ADC figures are likely underestimates as they are usually based on onetime telephone consultations or brief inspections of the damage site. Damage reported by survey respondents varied widely and represent individual perceptions of damage severity. It is difficult for individuals to assign accurate and consistent values to urban beaver damage. For example, a mature shade tree has great sentimental and aesthetic value in addition to a high replacement cost. Realistic damage estimates for the DFW area probably lie between ADC estimates and landowner estimates. Both MIS data and survey results rep

Table 1.--Beaver damage reported to USDA-APHIS-ADC Management Information System, Dallas-Fort Worth, 1984-1988.

Year	n	Damage Classification				Totals
		Ornamental Plants	Standing Trees	Dams	Property	
1988	64	13,620	1,575	900	600	16,695
1987	44	\$ 8,645	\$4,575	\$2,000	0	\$15,220
1986	21	\$10,960	\$6,960	\$ 500	0	\$18,420
1985	17	\$ 510	\$5,363	0	\$1,300	\$ 7,175
1984	12	\$ 1,835	\$ 300	\$ 750	0	\$ 2,885
Totals	158	\$35,570	\$18,775	\$4,150	\$1,900	\$60,395

Table 2.--Number of survey respondents who used control method(s), and degree of success perceived.

Method	Degree of Success				Totals	1
	Successful	Partial Success	No Success	\$		
Wrapped trees	15	20	2	37	67	
Shooting	12	6	0	18	33	
Conibear traps	4	2	4	10	18	
Exclusion fencing	2	4	4	10	18	
Repellents	0	4	5	9	16	
Lights/Noise	0	3	5	8	15	
Live trap	0	1	3	4	7	
Do nothing	0	0	4	4	7	
Leghold trap	0	0	3	3	5	
Electric fence	1	0	1	2	4	
Hired trapper	0	0	2	2	4	
Snares	1	0	1	2	4	

1 Percent of respondents who used method at least once. Many respondents used more than one method.

resent only those landowners that contacted ADC for assistance. Many landowners experiencing damage attempt to solve the problem on their own or find assistance from other sources. It is evident that beaver damage in the DEW area is a real and significant problem.

Calls to ADC about beaver damage in the DFW area were rare prior to 1975, but have increased steadily since then. This increasing trend is continuing, due in part to an expansion of beaver numbers and range. Beaver, at first occurring in the major reservoirs and rivers, are now being found in small ponds, intermittent creeks, canals, and ditches. One beaver was found living in a drain pipe and was travelling through the storm sewer to

feed on neighborhood trees. The increase in calls to ADC may also be due to an increase in suburban growth, and increased awareness of the existence of an ADC agency.

#### Control

Urban beaver damage control can be extremely frustrating for those affected. Few municipalities possess the expertise or motivation to deal with beaver damage, and local ordinances frequently restrict available control methods. When beaver damage begins it is often very noticeable and generally increases quickly, leaving the landowner feeling helpless. Survey respondents reported using



a variety of control methods, some representing desperate attempts to curb the damage. Surprisingly, 45% of respondents used lethal control methods, often shooting, despite local laws prohibiting the discharge of firearms within city limits. One landscaper felt that careful shooting was the only effective method available to him due to the safety risks of trapping and the infeasibility of wrapping hundreds of trees with wire fencing. We also were surprised that 75% of respondents were not opposed to lethal control methods, probably because the survey sample consisted only of those people familiar with beaver damage and the difficulties of control.

#### CONCLUSION

Beaver damage in the DFW area is an increasing problem and the adverse economic impact is likely to increase. However, there is no consistent, effective way in which urban residents can solve damage problems in a legal, safe, and biologically sound manner.

Many barriers to effective urban beaver control programs exist. Among these is a prevalent attitude among urban dwellers that urban beavers are somehow "special," which reflects a general lack of understanding about wildlife population dynamics and beaver biology. Experience has shown that a very few misinformed individuals, along with some negative publicity, can put an end to well intentioned and biologically sound beaver control efforts. Safety considerations and local regulations prohibiting trapping and shooting make effective beaver control difficult for the urban dweller.

The difficulties of urban beaver control may lead urban wildlife managers and animal control personnel to adopt a "do nothing" attitude or to suggest to the affected party that beavers should be enjoyed because they are beneficial and interesting. However, these approaches only make matters worse. While beavers may be beneficial in rural areas, there are few urban situations where benefits outweigh damage. Urban residents experiencing beaver damage will go to great lengths, lawful or unlawful, to control it.

It is clear that innovative, comprehensive approaches to urban beaver control, accompanied by a public education program, are greatly needed.

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# Managing Urban Deer in Illinois: The Role of State Government'<sup>2, 3</sup>

James H. Witham and Jon M. Jones

Abstract.--Decisions by communities to preserve open space within the Chicago Metropolitan Area have resulted in negative deer-human-habitat interactions. These conflicts can be addressed when communities develop consensus on management needs. In November 1988, the Illinois Department of Conservation initiated an urban deer management project to facilitate the needs of residents.

## INTRODUCTION

White-tailed deer (*Odocoileus virginianus*) are abundant and widely distributed in the Chicago Metropolitan Area (CMA). Many urban residents develop an emotional bond with deer; some individuals relate philosophically to deer by passive coexistence or through a perception of mutual interdependence (Heintzelman 1988). Other residents appreciate deer as a natural component of a community, but also demand that coexistence is conditional. Conditional thresholds vary among individuals and are defined by the degree that a person and/or landowner tolerates economic loss (Caslick and Decker 1979, Porter 1983), reduced property aesthetics (Moen 1984, Conover and Kania 1988), increased health risk (Miller 1987, Lastavica et al. 1989), and the ecological impacts (Goldsmith 1982) that are often associated with wild free-ranging deer in urban environments (Decker and Connelly 1989).

Deer management activities in an urban environment are frequently focused on symptoms. In most circumstances, deer-vehicle accidents,

browsing damage to native vegetation and ornamental plantings, and the transmittal of pathogens, are the predictable consequences of deer-human coexistence rather than being causal factors in themselves. These symptoms are common in the CMA (Witham and Jones 1987). Treating symptoms through use of site-specific damage abatement techniques (Craven 1984) is generally accepted by the public without significant issue. However, more comprehensive programs that involve population reduction and control require a broader understanding of conflict and a greater acceptance of responsibility among all participants.

In a region such as the CMA, where deer conflicts are abundant and repetitive, a state wildlife agency is well-advised to clearly define its level of involvement in urban deer management. Failure to formulate a definitive position increases opportunities for misunderstandings that can reflect negatively on state government and contribute to the divisiveness of issues.

In 1983, the Illinois Department of Conservation (IDC) contracted the Illinois Natural History Survey (INNS) to study deer-human-habitat relationships in northeastern Illinois. Research by INHS provided baseline biological data, identified and assessed the distribution of conflicts, evaluated alternative management strategies, and implemented experimental pilot studies that explored issues and established management precedence (Witham and Jones 1987). In November 1988, the IDC initiated a permanent Urban Deer Management Project that overlaps the final 14 months of the INNS research program. During this transition period, the IDC will define its role in urban deer management.

In this paper we describe factors that contribute to the recurrence of deer-human-habitat conflicts in the CMA, identify management needs, and suggest opportunities for IDC participation in urban deer management.

1

Paper presented at the Ninth Great Plains Wildlife Damage Control Workshop, Marriott Hotel, Fort Collins, Colorado. April 17-20 1989. 2

This study is a contribution of Federal Aid in Wildlife Restoration Project W-87-R, the Illinois Department of Conservation, the U.S. Fish and Wildlife Service, and the Illinois Natural History Survey, cooperating. 3

Use of the word "urban" in the text denotes both urban and suburban environs. 4

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## CAUSES OF DEER-HUMAN CONFLICTS IN CHICAGO

Urban environs are incomplete ecosystems lacking a wide complement of natural mechanisms that regulate deer populations. They are highly perturbed systems altered extensively by humans. In this setting, choices made by individuals, communities, and/or society, are the fundamental cause(s) of urban deer conflicts.

### Insular Refuges: a Paradox of Preservation and Development

County forest preserves form the nucleus of primary deer habitat in northeastern Illinois. Since 1915, counties have acquired large sections of non-developed and rural landscape for the "purpose of protecting and preserving the flora, fauna, and scenic beauties ...in their natural state and condition, for... the education, pleasure and recreation of the public (Wendling et al. 1981). In concept, forest preserve systems were designed as a network of interconnected refuges (Forest Preserve District of Cook County 1918). Some forest preserves have been developed for educational and recreational uses which include nature centers, zoological facilities, botanical gardens, and an extensive system of maintained picnic and recreation sites. Non-developed properties are a diverse mixture of native hardwood forests, reforestations, riparian systems, old-field succession, and leased agricultural fields.

In 1988, forest preserves totalled 394 km<sup>2</sup> or 8.7% of Cook, DuPage, and Lake counties. The human population of 6.3 million in the 3-county CMA is projected to increase during the next decade (1 July 1986 census, U.S. Census Bureau, published in 1987). Private lands near many forest preserves, because of their aesthetic quality and/or higher economic value, have been extensively developed for residential, commercial and industrial uses. Deer concentrate on preserves but readily cross heavily used highways seeking resources on these adjacent properties. Urban forest preserves will only become more insular over time. This will contribute to the escalation of deer-human conflicts in the CMA.

### Demographic Responses of Deer on Preserves

Demographic responses of deer on quasiinsular preserves are similar to those expected of deer that are artificially protected within expansive enclosures. In the CMA, large predators are absent. Winter weather is harsh but within the normal limits of the northern range of the white-tail. Under such conditions, deer survival and productivity fluctuate predominately under the constraint and relaxation of weather variables and interannual variations in available nutrition. In rural settings temporal increases in deer abundance are more likely to be offset by dispersal and by more liberalized harvest through recreational hunting. However, on relatively small, non-hunted, insular urban sanctuaries the

negative consequences of increased deer abundance' are acutely accentuated. High deer numbers on urban preserves will decline only through catastrophic dieoff triggered by severe weather disease, or both; or a more gradual reduction through protracted malnutrition, accompanied by degradation of plant resources and a higher frequency of negative deer-human-habitat interactions. The latter best characterizes the conditions that exist on many CMA preserves.

### Human Values and Management Efficacy

Moralistic, humanistic, and ecologicistic characteristics are typical among urban publics (Kellert 1980). These prevailing values strongly affect the selection of methods used to control deer populations. In general, urban publics favor non-lethal techniques; however, non-lethal methods have demonstrated only limited effectiveness in reducing and controlling deer abundance. In contrast, lethal methods of deer population control are more effective but less acceptable to urban publics.

The inverse relationship between effectiveness and acceptability of population control methods enhances polarization which is reinforced by different perceptions of the value of wildlife management literature. The wildlife professional is aware of the scope and value of deer management literature (see Wallmo 1981, Halls 1984) and uses this information to improve efficiency without reattempting techniques that have failed previously. Such acceptance is appropriate if it is refined by critical evaluation--a necessity because results presented in literature are at times ambiguous. Failure to provide this distinction perpetuates dogma and reflects poorly on the credibility of the wildlife profession. In contrast, those with opposing viewpoints may have limited knowledge and/or reject the value of wildlife management literature. The latter group frequently demands that all non-lethal alternatives are attempted before lethal control is considered. This syndrome of "reinventing the wheel" at each site is, at times, performed as a compromise to reduce socio-political conflict.

## DEER MANAGEMENT NEEDS IN THE CMA

The resolution of urban deer conflicts requires cooperation between the state wildlife agency, the affected individual(s) or landowner(s), and those publics with special interest. None can resolve deer issues independently. A state wildlife agency regulates use of wildlife resources as defined by legislative mandated laws, whereas, land-use activities that are established by property owners are the principal determinants of wildlife abundance and population quality (Smith and Coggin 1984). Interested citizens can profoundly influence management decisions through sociopolitical processes since deer, and often times deer habitat, are resources held in public trust.

The IDC has no direct control over land-use decisions in the CMA; therefore, landowners must a direct participatory role in urban deer at. State wildlife regulations set the rise from which options can be selected: r, commissioners and officials of local ants are ultimately responsible for making specific decisions. Inherent in this responsibility is the need to balance human values **against** the limitations of management options. **the** role of state government in this process is "informational. Landowners must have unbiased **information** on deer biology, ecology, and deer **management** alternatives with which to develop the **expertise** necessary to design, implement, and evaluate site-specific deer management programs.

## URBAN DEER MANAGEMENT IN THE CMA

### Program Goals

- o To acquire state-of-the-art expertise on urban wildlife management and local deer ecology for the purposes of management decisions and public education.
- o To facilitate cooperative management programs by providing information and training.
- o To increase awareness of urban deer ecology and to promote broader understanding of the consequences of an urban environment shared with wildlife.

### Recommendations for State Involvement

The primary responsibilities of the IDC are to regulate wildlife use and to provide technical expertise. In urban deer management, the IDC must clearly distinguish between technical expertise and value judgement; questions of human values cannot be resolved technically and must be reconciled on a local level (Creighton 1984). In this context, the IDC should facilitate the needs of landowners who experience deer-related conflicts, interact responsively with publics that express special interest, but not arbitrate nor advocate values.

The IDC has approached urban deer issues proactively by establishing the deer specialist position in the CMA. A wealth of technical information exists on deer management strategies and methods to abate damage, but there is no universal panacea that will eliminate deer-human conflicts (Matschke et al. 1984). Control methods often produce ambiguous results. The role the IDC must take is to present this information accurately, and to the best extent possible, predict the consequences of specific decision alternatives. It remains the choice of the landowner whether or not to use the expertise provided by the state.

The urban deer specialist must be able to train landowners, or their representatives, in procedures for handling deer, controlling populations, and abating damage. Some landowners will prefer to contract this work to an outside source; there are many "deer experts" in the CMA. Under these circumstances the IDC must define minimum standards that will qualify an individual or organization to perform deer management services. The qualifying criteria should include possession of a specified level of liability insurance, technical expertise, and a demonstrated ability to use this expertise humanely and **with maximum** consideration for human safety.

Existing IDC policies and regulations on deer management may need to be adapted for application to urban settings. In some cases, new regulations will have to be developed since urban deer management differs substantially from traditional deer management practices in Illinois. For example, during the first six months of the Urban Deer Management Project the IDC established regulations on the translocation and free-release of deer, requirements for handling deer during live-capture, and modified procedures for the charitable donation of venison from animals killed in population reduction programs.

Applications submitted by landowners for deer depredations permits should include a proposal with a problem statement, program objectives, assessment of damage (if assessment is not quantified then the proposal should include quantitative procedures that will be implemented in the future), proposed methods, and an evaluation process that will measure achievement of success. This will encourage landowners to more closely monitor floral and faunal resources that may be negatively affected by deer. Furthermore, these minimal requirements force the landowner to articulate the exact nature of the conflict and how they expect the conflict to be resolved. In doing so, the landowner must address specifics rather than use superfluous terminology such as "overpopulation", "overbrowsing" or "carrying capacity" (Macnab 1985).

We expect the IDC Urban Deer Project to function as the central repository for data collected by local agencies. This will help standardize the collection of data and will promote exchange of information among landowners that are managing deer on their properties.

## DISCUSSION

Currently in the United States there is a general movement from representative government to a participatory democracy. Increased public participation in decision processes is viewed more as a right than as a privilege (Creighton 1984). Urban deer issues provide a forum where this shift in attitude is readily apparent and perhaps, accentuated.

If communities choose to preserve open space and yet promote development, to perturb landscapes in ways that impair or eliminate forms of natural regulation of wildlife populations, to request abatement of deer-related damage but place limitations on the acceptability of techniques, then the communities must also accept a more active role in the management process. The IDC initiated the urban deer management project to help communities resolve deer-human conflicts. Success will depend on the ability of the communities to define their site-specific deer management needs and to select management responses that will effectively meet these needs.

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