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THE IMPACT OF WILDLIFE DAMAGE ON WILDLIFE MANAGEMENT PROGRAMS IN WISCONSIN

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ABSTRACT: Wildlife damage caused by species normally managed as game animals or furbearers should be of major concern to wildlife managers and various user groups: hunters, trappers, and other outdoor recreationists. Real or potential damage may be used as an important factor in determining population levels, harvest goals, and distribution of white-tailed deer and Canada geese in Wisconsin. In any state where private land and agriculture are important, such a strategy could reduce wildlife populations and associated recreational opportunities. Recent surveys in Wisconsin have quantified the amount and distribution of deer, goose, and turkey damage in Wisconsin. These data allow comparisons between wildlife damage and total agricultural production, other causes of crop loss, and the positive economic impact of these species. Additionally, comparisons are possible between perceived losses and maximum potential losses. A review of the problems caused by each animal provides a framework to discuss the issue of wildlife damage to farm crops and the implications for managers and resource users. The double-crested cormorant provides a special example of a resource management problem with wildlife damage.

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Wildlife damage control has become an increasingly well recognized, important, and organized component of wildlife management. Several major national/international conferences (Vertebrate Pest Conference, Eastern Wildlife Damage Conference, Great Plains Wildlife Damage Conference) are well attended, papers on the subject are well represented in the professional literature, the APHIS-ADC program has been well received, and animal damage problems, or the potential for them, are considered an integral part of wildlife management programs. Examples of the latter include concern over damage to valuable fisheries related to sea otter relocations on the Pacific Coast, potential livestock losses associated with timber wolf restoration in the northern Rocky Mountains, and a reconsideration of white-tailed deer population goals in many agricultural areas of the Midwestern and Eastern United States.

In Wisconsin, wildlife damage control has become a major state program. Legislation created the Wisconsin Wildlife Damage Control Program in 1983 with an annual budget of about \$1 million derived from a \$1 surcharge on hunting licenses (see Hygnstrom and Craven 1985). The Wisconsin Department of Natural Resources (WDNR) has a full-time animal damage coordinator, the APHIS-ADC program has been very successful, and there have been several surveys to document the extent and characteristics of damage caused by key wildlife species. The result is an integrated program to assist farmers with damage problems through direct personal attention, provision of abatement materials, or payment of compensation.

The initiative for the current level of assistance came from intensive pressure from Wisconsin's agricultural community. Wildlife managers were aware of the problems but there was no consensus as to where the financial responsibility

for wildlife damage should be placed, or even if there was a responsibility. In fact, damage caused by species normally managed as game animals or furbearers should be of major concern to wildlife managers and various user groups: hunters, trappers, and other outdoor recreationists. Real or potential damage has become an important factor in the determination of population levels, harvest goals, and distribution of white-tailed deer and Canada geese in Wisconsin. In any state where private land and agriculture are important, such a strategy can lead to a reduction in wildlife populations and associated recreational opportunities.

Recent surveys in Wisconsin quantified the amount and distribution of deer, goose, and wild turkey damage. These data allow comparisons between wildlife damage and total agricultural production, other causes of crop loss, and the positive economic impact of these species. Additionally perceived losses and maximum potential losses can be compared. The "farm crisis" of the 1980s apparently reduced the tolerance for wildlife on agricultural lands and excessive publicity and misconceptions about wildlife damage contributed to a strong negative image for some species.

The status of an animal as a "game" species or an "endangered" species greatly complicates a control program. Unlike rodents and pest birds, such species often provide enormous economic and recreational opportunities. Victims of damage problems must contend with a general lack of lethal control alternatives, permits and other legal restrictions.

I will use a brief review of 4 species in Wisconsin and related survey results to build a case for the current importance of wildlife damage control in wildlife management and the risk it represents to continued wildlife abundance, particularly on agricultural lands. Based on experience in

Wisconsin, I will offer recommendations for assistance programs and education that could help restore a more favorable image for key wildlife species in agricultural habitat. Creative solutions to wildlife damage problems can and must offer alternatives to population reduction.

The first 2 species I will review have a long history of problems in Wisconsin. Deer and geese are highly visible, well studied, and the problems associated with them are well publicized. Deer problems are statewide but more acute in central and southwestern Wisconsin. Goose problems are concentrated in east-central Wisconsin around Horicon National Wildlife Refuge. Intense publicity, strong emotions, a weak farm economy, and other unique factors have made deer and goose damage much more complex issues than if they were based only on dollars lost. Turkey and cormorant problems are very recent, more localized, and involve far fewer animals, but are nonetheless complex.

Canada Geese

Horicon Marsh is known throughout North America as a fall concentration point for thousands of migrating Canada geese (*Branta canadensis*). Historically, this phenomenon began as recently as 1950 concurrent with the development of Horicon National Wildlife Refuge. The refuge area provided sanctuary and water and the surrounding agricultural land provided abundant food resources, a situation similar to numerous other waterfowl refuges across the United States. Fall goose population levels did not exceed 100,000 until the 1960s. The large goose "spectacle" attracted thousands of tourists and hunters to the area.

As the goose flock continued to grow throughout the 1960s and early 1970s, farmers became increasingly dissatisfied with the goose management system. Crop depredations increased, changes in goose harvest management deprived farmers of any significant opportunity to charge hunters for hunting opportunity, and the relationship between the agricultural community and natural resource agencies deteriorated. Periodic demands for relief from crop depredation led to major management programs in the mid-1960s and 1970s. For an excellent review of problems and programs around Horicon see Reeves et al. (1968) and Hunt (1984).

The so-called "goose wars" of 1975-1980 led to a dramatic decline in the Horicon area goose population. Less geese resulted in lower harvest quotas and thus a reduced harvest. Area farmers appeared satisfied that their demands had been met and there were a few years of relative peace.

The goose flock rebounded from a 20-year population low in 1981 to near record peak levels by 1986 and 1987 (Table 1). Predictably, agricultural unrest increased with flock size. Between 1985 and 1987 we collected data on the positive and negative impact of the geese in the Horicon area. These data provided managers an opportunity to base decisions on objective criteria.

The geese did in fact cause substantial crop losses. In both 1985 and 1986 farmers reported losses of about \$1.6 million. Within 10-20 km of Horicon refuge, 43% of the farmers felt their losses were unacceptable. Crops most

Table 1. Wisconsin Canada Goose Harvest Statistics, 1980-1987.

Year	Harvest ¹	December population (thousands) ²	Harvest quota
1980	57.6	367	30
1981	39.8	251	20
1982	45.8	304	18
1983	33.5	353	25
1984	39.9	480	25
1985	43.3	619	25
1986	49.9	515	45
1987	----	568	49.5

¹ U.S. Fish and Wildlife Service Survey Data.

² U.S. Fish and Wildlife Service count of Canada geese in Mississippi Valley Population range.

frequently damaged were alfalfa, winter wheat, and corn, and damage took several forms in addition to direct consumption. Data suggested that tolerance for goose damage was much less than that reported for deer damage. In 1985, about half of the area farmers believed that an increase in the goose harvest would lead to a decrease in crop damage. About half of those individuals changed their minds in 1986 after a near doubling of the harvest quota. However, note in Table 1 that the actual harvest did not reflect the increased quota.

On the other side of the ledger, interviews with tourists, car counters, and roadside observations indicated that 160-180 thousand people visited the Horicon area in 1986 and 1987 to see geese and other marsh wildlife. Visitors traveled an average of 102 miles, one-way and collectively spent about \$2 million in the area. A mail-back questionnaire to area businesses suggested total expenditures by goose watchers and hunters of almost \$7 million.

Farmers did not recognize the economic value of the goose flock to the Horicon area; probably because they do not share in the economic benefits.

In 1988 the damage issue remains the key factor in goose management decisions. The trend is toward increased harvest quotas and a decrease in the goose population at Horicon. History suggests that this approach has done little more than contribute to a cyclic outbreak of problems. Fortunately, there are signs that other programs such as the effective response of the new APHIS-ADC abatement program at Horicon, a new APHIS-ADC winter wheat "lure crop" project, a popular hunter/farmer referral system, and the financial resources of the 1983 Wisconsin Wildlife Damage Program

may provide a long-term solution to the problems that have plagued Horicon.

White-tailed Deer

Excellent habitat, especially in areas of mixed woodlands and agricultural lands, a series of mild-to-moderate winters, and conservative harvests led to an increase in the deer herd to about 1 million animals by 1985 (Table 2). Complaints increased as deer caused substantial losses to corn, fruit, alfalfa, and other farm products. During 1983-84 statewide damage was estimated at \$36.7 million (Table 3). Losses represented only 1.4% of total Wisconsin agricultural production for that period. Over half the total damage was to corn and 55% of all Wisconsin farms reported corn damage (average loss \$438 per farm). Despite a variety of abatement and compensation programs, damage continued at intolerable levels for some farmers.

In another context the white-tailed deer is probably the most popular and important wild animal in Wisconsin. During the annual 9-day November gun deer hunting season 650-750 thousand hunters invade Wisconsin's 31,000 square miles of deer range. Recent harvests have ranged from 250-300 thousand deer. Hunter expenditures, meat and hide values, and license sales exceed \$200 million (U.S. Fish and

Table 2. Wisconsin White-tailed Deer Harvest Statistics, 1982-1987.

Year	9-day gun season harvest ¹	Deer herd status	Number of special tags ²
1982	182,700	increasing	126,505
1983	197,600	increasing	165,967
1984	255,900	increasing	194,906
1985	274,300	1 million+	279,890
1986	259,200	950,000	234,425
1987	250,100	1 million	261,280

¹ Wisconsin Department of Natural Resources Statistics.

² "Hunter's Choice" or "antlerless only" tags, basic season is bucks only.

Wildlife Service, 1985 Survey data). The benefits of a long archery hunting season and the aesthetic value of observing deer add unknown amounts to these figures.

In Wisconsin, deer are managed in 96 deer management units averaging about 580 square miles in size. The population goal for each unit is set based on a delicate balance between opposing needs: the need to minimize crop damage and deer-car collisions on the one hand; the need to maximize hunting opportunity and non-consumptive values on the other. Once set, the population goals are achieved by setting harvest quotas for each unit. The number of deer of each sex

Table 3. Wisconsin Deer Damage Compared with 1983 Value of Crops Raised

Crop	1983 Crop Value (in millions) ¹	Value of deer damage ²	Percent damage by deer
All Crops	2540.0	36.7	1.4
Corn	991.6	20.6	2.1
Hay	902.8	7.2	0.8
Soybeans	104.1	1.5	1.4
Oats	81.1	1.7	2.1
Apples	8.7	0.2	2.3
Vegetables	245.0	1.1	0.4

¹ Wisconsin Agriculture Reporting Service.

² October 1983-September 1984 Survey Data.

that need to be harvested is calculated and hunting regulations are set accordingly. For an excellent review of deer management in Wisconsin see Creed et al. (1984).

The system just described has been very successful but the impact of an adjustment in the population goal-setting procedure is obvious. A move toward crop damage reduction by deer population reduction affects recreational opportunity and vice versa. Survey data indicated that in agricultural areas with high deer densities, 34-57% of the farmers favored a decrease in herd size. In the same areas, 9-27% reported substantial-to-severe damage and 9-33% felt damage levels were unreasonable. The result has been a major management effort to reevaluate population goals in predominantly agricultural areas. Herd reduction via increased harvests began about 1982 and 1983 and culminated with record numbers of special tags to take more deer (especially antlerless animals) in 1985-87 (Table 2). As expected, the overall harvest began a slow decline in 1986.

Cormorants

The double-crested cormorant (*Phalacrocorax auritus*) is not a game bird but the species does illustrate another difficult problem for wildlife management. Historically, cormorant populations in the Great Lakes region fluctuated widely. In 1972, with a population of only 66 pairs in 3 colonies, the double-crested cormorant was listed as an endangered species in Wisconsin. In addition to the protection afforded to an endangered species, managers took steps to increase the cormorant population. A total of 794 nesting platforms (see Meier 1981) were erected on islands in Green Bay and at several inland waters colonies during the 1970s. Because of these, and perhaps other reasons, cormorant populations increased rapidly, especially in Green Bay and in the Apostle

Islands on Lake Superior. By 1985 there were at least 2,217 nesting pairs in 22 colonies, 1,127 in Green Bay alone.

As the cormorant populations increased so did complaints from commercial fishermen in both Green Bay and the Apostle Islands. Fishermen claimed substantial losses of yellow perch and whitefish to direct consumption by cormorants and to gilling and scarring of captured fish when cormorants fed freely within the large pound net traps commonly used (Craven and Lev 1987). Practical abatement techniques were not available and the cormorants could not be killed because of their status as an endangered species.

In 1986 the cormorant was delisted. Artificial nesting structures in Green Bay were all lost to weather and high water levels or were removed. The Lower Green Bay Action Plan, a broad environmental plan for Green Bay, suggests that nothing be done to encourage cormorant populations. The U.S. Fish and Wildlife Service has issued permits to commercial fishermen to control (kill) problem birds. To date, no birds have been shot. During the summer of 1987, on Gravelly island not far from the mouth of Green Bay, unidentified intruders destroyed hundreds of cormorant eggs. There is now some indication that the Wisconsin cormorant population may be stabilizing (S. Matteson, WDNR, pers. comm.).

Turkeys

The wild turkey (*Meleagris gallopavo*) was extirpated from Wisconsin during the late 1800s. Repeated attempts to reintroduce turkeys during the mid 1900s met with limited or no success. However, in 1974 the WDNR and Missouri Department of Conservation agreed on a program that would send Wisconsin ruffed grouse (*Bonasa umbellus*) to Missouri in exchange for wild-trapped Missouri turkeys. Wild stock proved to be the key to success. The first release of 45 Missouri turkeys took place in the heavily wooded driftless region of southwestern Wisconsin in 1976. In just over a decade, continued release and relocations, coupled with natural population growth and range expansion, produced a turkey flock estimated at 25-40,000 birds.

The return of wild turkeys was hailed as a tremendous success for wildlife management. Limited hunting began in 1983 and increased to include 11,000 participants during the 1988 spring season. Landowners were very receptive to the presence of turkeys and in many cases were very protective of the initial flocks.

By 1987 there were indications that the positive feeling toward the turkey program had changed. Hunters, woodland owners, and the general public remained enthusiastic but the agricultural community began to react in terms of "too many" turkeys and problems with crop damage. Local DNR offices began to receive complaints about turkey damage in alfalfa, corn, and small grains. The literature and personal communication offered no indication that turkeys caused serious problems anywhere in primary turkey range. Field investigations of complaints were inconclusive.

We conducted a random mail-back questionnaire survey of 508 farmers in the 6 Wisconsin counties with highest

turkey densities in December 1987 and January 1988. A preliminary analysis suggests that about 25% of the area farmers perceive turkeys as a "medium" to "large" problem. Only 3 of 262 respondents reported damage in excess of \$500. Most farmers with damage considered it to be "minor" or "moderate" and less than \$100. These data do not suggest a major financial problem. However, virtually all farmers reported an increasing turkey flock and about half equate more turkeys with more damage. Farmers reported virtually no individual efforts to abate turkey damage.

When offered a choice of solutions to the turkey problem, about 60% of the farmers favored a fall hunting season for turkeys of any sex or age. The implication was clear that farmers wanted a reduction in the turkey flock. The WDNR response was to consider a limited fall season as early as 1989.

I have attempted to present a brief overview of 4 very complicated wildlife damage problems in Wisconsin which involve species not traditionally considered "vertebrate pests." A key reference was provided in each case if the reader desires more detail. In addition, several papers in production will expand on the problems and data related to turkey, geese, and deer. In all 4 cases populations of an animal with important recreational or social value were (or will be) reduced in response to economic loss to one sector of society. Intuitively, reduced populations should reduce damage but this relationship does not appear to be well established. Further, population reductions could reduce opportunities for successful harvest or non-consumptive activities.

There are several important issues to consider:

First, the severity of loss versus the value of the wildlife. As noted for deer and geese the positive economic impact of these species far exceeds the total damage they cause. For deer and geese, sociologists and economists in Wisconsin report that there is substantial additional "surplus value" associated with both species (Heberlein and Bishop 1986). In other words hunters and other user groups would be willing to expend far more for their recreation than they actually do.

Second, the number of farmers affected. There can be no question that some farmers suffer disastrous losses to wildlife. However, repeated surveys suggest that severe losses are restricted to a small percentage of all farmers. In fact, in many cases, farmers report small or no losses, tolerance for minor problems, and enjoyment of the wildlife in question. There is no consensus. Media attention focuses on vocal farmers with severe losses with a resultant public impression of a universal problem.

Third, problems with reported losses. Surveys ultimately lead to a bottom line of total damage caused by a species for area X over time Y. At first glance the figure seems very large (i.e., \$1.6 million for goose damage) and impossible to compensate for. In reality, such a figure represents perceived loss. Real loss could be more or less. With Canada geese at Horicon Marsh a crude model which incorporated the number of geese, length of stay, daily consumption, food habits and a few basic assumptions suggested a maximum real loss of less than half of the \$1.6 million figure. Furthermore, a survey "total" includes many small claims for which

farmers report some tolerance.

The basic problem remains the presence of wildlife, a publicly "owned" resource on private land. The wildlife resource has great value and society expects private landowners, including farmers, to be responsible stewards of the resource. However, there is little or no incentive for landowners to do just that unless their personal interests happen to mesh with those of society. Surveys strongly suggest that if farmers do not share in the economic benefits derived from wildlife they do not even recognize them as valid. In the case of wildlife damage society often expects the private landowner to sustain the damage or take personal steps to abate it. That system has not been successful and the resource ultimately loses ground; society will in turn lose opportunities derived from wildlife.

The answer is neither singular nor simple. I offer the following observations:

(1) The value of key wildlife species suggests that a greater public investment in wildlife management, including damage control, is certainly justified.

(2) In the case of a species restoration program like the double-crested cormorant, potential damage problems must be anticipated. A program for dealing with damage should be in hand before the program proceeds.

(3) The "gut objection" of some managers and resource users to financial compensation for wildlife damage must be overcome. Survey data strongly suggest that farmer tolerance, possible differences between perceived and real damage, and relatively low numbers of farmers with serious problems, all contribute to a substantial reduction in the "total loss" figures often used in discussions of wildlife damage. Thus the burden of compensation is not as staggering as it may appear at first glance. An upturn in the farm economy would undoubtedly help the situation.

(4) The Wisconsin program, which emphasizes cost-shared abatement first and compensation only after abatement fails or is judged impractical, has proven very successful. A one time or periodic investment in effective abatement makes more sense than perennial compensation payments.

(5) Damage problems caused by key wildlife species are very different than traditional pest problems and deserve critical and innovative attention in the pest and wildlife management communities—which in practice should be one

and the same.

(6) In agricultural areas, especially in the Eastern United States where most land is in private ownership, the landowner/farmer must be brought into the economics of wildlife. The production of wildlife on private farmland is no more a free process than the production of beef or pork.

In summary, some hard management decisions will be necessary to maintain wildlife abundance in agricultural areas. The alternative is to reduce populations to levels where there are not problems. Ultimately no wildlife equals no problems, but for wildlife managers and users that equation is intolerable. We need to give compensation a better look, seek out adequate funding, continue development of better abatement tools, and develop a creative way to make farmers a full partner in wildlife management.

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