



THE GAME OF GIVE & TAKE!

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Conflicts Between Deer, Farmers and Hunters in Michigan.

Deer crop damage has been creeping into the lives of Michigan's farmers since the 1940's.

Initially, it existed primarily as an isolated problem in southwestern Michigan for producers of corn, beans, hay and later fruit trees. But like a harmless campfire that goes unattended, this pesky problem spread northward, burning holes in the pockets of more and more farmers. The problem even leaped across Lake Michigan to the Upper Peninsula to wreak havoc in the region's central counties. Wherever the biological and agricultural ingredients were just right, farmers were forced into continuous battle with depredating deer.

Like a forest fire, deer crop damage has a patchy distribution; not all areas are affected with the same intensity. That is but one of the curious aspects of a problem that has significant implications for the hunters and others who enjoy deer, for the farmers whose livelihoods are affected, and for the wildlife managers who are caught in the middle. How can science be of help in this messy situation? In this article, we relate how multi-disciplinary research at Michigan State University is improving our understanding of the problem from both a biological and social perspective. As well, we describe how that knowledge is being put to work to reduce conflicts between deer, farmers, and hunters in Michigan.

WHY ALL THE RUCKUS?

Many hunters are unaware of the devastation and crop damage wrought by deer. Consider the following scenario. It is a sultry day in central Michigan, and more than 3 weeks since the last significant rainfall. Although the beech-maple forest we are hiking through has a full, green canopy, the understory beneath is wilted and languishing in the sweltering heat. The shrubs and lower branches of saplings are bare—evidence of heavy foraging by deer. We enter a cedar swamp to discover a ground surface hardened

With their movements no longer hampered by deeply packed snow, ten deer are scouring the field for nourishment to help them regain weight after a harsh winter.



THE GAME OF GIVE & TAKE

by drought, and absence of the cedar's fern-like needles below a height of 5 feet. We pause to ask: whatever can deer possibly be eating to prepare for the impending rut and inevitable winter season?

The heavily browsed forest borders the edge of a dry bean field. Here we observe a farmer tending to his chores while a doe trails behind his tractor and forages on the succulent leaves of young bean plants. We sit along the field's edge, across from the woods, and wait until sunset. Within 40 minutes, 20 more deer enter the field to feed on the beans.

This scenario illustrates how the conflict between white-tailed deer and Michigan farmers arose nearly 60 years ago, and why the Michigan Department of Natural Resource (MDNR) initiated its first special permit program for deer hunters. Under this system, only agricultural landowners in Allegan County could bypass the lottery system and receive preferential treatment for any deer permit if, and only

if, they could document significant levels of crop damage. In 1961, the MDNR extended this landowner preference system to other regions in Michigan where deer crop damage emerged as a problem.

The problem persisted, however, and farmers became increasingly intolerant of economic losses attributable to deer damage. In response, the MDNR adopted a summer shooting permit program in 1976. Participating farmers are required to document serious crop yield losses; the extent of damage determines how many permits a farmer can receive. The use of shooting permits outside the regular hunting season necessitated measures to minimize potential conflicts between participating farmers and local hunters. For example, a conservation officer must approve all designated shooters for issued permits, and harvested deer must be donated to a soup kitchen.

Forty-two summer shooting permits were distributed among eligible landowners in 1976. But by 1989, the MDNR estimated that the Michigan deer population had reached 2 million (4 times its 1971 size) despite the issuance of 1,406 summer shooting permits. Moreover, the reported number of deer-vehicle collisions in 1989 (46,784) was 4 times the number of accidents (11,696) reported in 1971.

With the problem continuing to escalate, the MDNR tried out a Block Permit Program in 1989. To qualify, agricultural landowners must have experienced (and documented) 2 years of significant crop damage during the previous 5 years. The level of damage determined how many antlerless permits the landowner could obtain. Valid during all deer seasons, the block permits provided additional hunting opportu-

nities in the fall. They differed from the summer shooting permit program in that participating landowners could select designated shooters, on condition that all shooters were identified upon issuance of the permits. In 1989, the MDNR sold approximately 5,300 permits, of which nearly 4,000 were filled.

The following year, the Michigan Natural Resource Commission extended the Block Permit Program as a 3-year experimental study to evaluate its effectiveness for reducing crop damage problems and improving hunter access to private lands. Year one data revealed that the block permit program accounted for 8% of the state's antlerless deer harvested in 1990 (Nelson and Reis 1992). Compared to 1988 figures, an average of 33% more hunters used participating farms during the regular season, whereas non-participating farms had only 11% more hunters. As well, harvest of antlerless deer had increased 138% over 1988 levels on participating farms, compared to only 75% on non-participating farms. Judged a success, the Block Permit Program was continued following the study's termination in 1993.

LESSONS LEARNED, INSIGHTS GAINED.

There are several curious aspects to the deer damage problem in Michigan. Why are deer locally abundant in some regions, resulting in economic losses for some farmers but not others? What is it about habitat quality in certain places that entices deer to forage on agricultural crops? How do farmers and hunters perceive the state's deer damage issue? Might differing perceptions explain why these groups do not cooperate to the extent that wildlife biologists suggest is necessary?



Such questions were the focus of a 1993–96 study (summarized in Campa et al. 1997) by a multi-disciplinary team of researchers at Michigan State University (MSU). The biologists on the team found that several factors and interactions contributed to localized crop damage problems. These included: crop field characteristics (e.g., cropping techniques, field size), composition and quality of deer habitat in areas adjoining agricultural fields, and the movements and habitat use patterns of deer. Team member Katherine Braun noted a correlation between crop loss and the proximity of deer habitat to agricultural fields, influenced by specific attributes relating to deer habitat quality. For example, relatively high levels of deer damage occurred on crop fields that were surrounded mostly by woodlots—especially those offering preferred forage and cover conditions. Another graduate student, Kristie Sitar, found that agricultural areas served as year-round home range for up to half of 73 radio-collared deer, and as summer range for 44% of the collared migratory deer. Compared to migratory deer, non-migratory individuals used croplands and openings more frequently as did females (among migratory and non-migratory deer) when compared to males.

The social researchers on the team, in a study of farmers and hunters in selected counties throughout Michigan, found attitudinal differences between and within the 2 groups with respect to the crop damage issue and the effectiveness of deer management techniques. Farmers affirmed the localized nature of deer damage problems. For instance, most farmers experiencing deer damage regarded 1994 as their worst year; however, there were always a few farmers who reported other years as the most severe.

Moreover, misperceptions about the summer shooting and block permit programs emerged as a critical factor in the controversy. The social scientists found a burning need for better communications to increase understanding and tolerance for different values and beliefs held by affected farmers, hunters, and the biologists responsible for recommending harvest levels.

TURNING KNOWLEDGE INTO TOOLS: THE DEER CROP DAMAGE PREDICTOR

In 1998, assisted by an award from the Boone & Crockett Club's Grants-in-Aid Program, we began our present work on the deer damage issue. We aimed to build on the previous studies and to evaluate tools and programs for dealing with the problem. Our work has 2 overarching goals. First, it is intended to help farmers understand which characteristics of their farms influence deer-caused crop damage. And second, it is intended to foster col-

Dry beans are particularly vulnerable to deer damage. Whereas minor nibbling on the plant's leaves automatically yield at least a 40% economic loss for the farmer, complete leaf removal from the first shoot will terminate the plant's growth.



THE GAME OF Give & Take

To predict how much deer damage the pictured alfalfa field may sustain, a wildlife biologist could use the DCDP to assess the quantity and quality of food and cover available to deer in the adjoining woodlot. A favorable rating of the forested area would indicate a relatively high abundance of deer and potential problems for the alfalfa fields owner.

laboration between wildlife managers and farmers so that habitat and population management activities will reduce crop damage in the future.

In pursuing our first goal, we have focused on development of the Deer Crop Damage Predictor (DCDP)—a 2-

part tool designed to predict the relative amount of crop damage a field may sustain by evaluating the characteristics of the field and the quality of surrounding deer habitat. The first part of the DCDP is designed to help wildlife managers collect information about farmland and owners. Information includes the location and characteristics of individual crop fields (e.g., their shape and size, soil type, and cropping technique), and practices to minimize crop damage problems. For instance, does the farmer lease his land for deer hunting? Has he tried to curtail deer crop damage through nonlethal means such as fencing, scare tactics, or lure crops? Following DCDP procedures, wildlife managers record the percentage of woodlots, agricultural fields, openings or developed sites adjacent to the crop field and within a 6 square mile radius. Deer in Michigan typically travel 1.5 miles per day to find food. By collecting data on the availability and condition of deer habitat, biologists can link landscape characteristics to a field's potential for crop damage.

The second part of the DCDP is based on the seasonal food and cover needs of deer as determined in earlier studies—such as Katherine Braun's work on the susceptibility of crop fields surrounded by woodlots, fields, and other habitat types. Set up as a matrix, the habitat evaluation component of the DCDP provides a simple and rapid way to evaluate the conditions within an agricultural setting that are likely to influence its susceptibility to use and damage by deer. The procedure begins in the field. Following DCDP protocols, the wildlife manager describes the location and characteristics of cover types surrounding the crop field of interest—including field assessments of deer food and cover quality. The habitat information is fed into the matrix, which includes a weighting feature that relates the importance of each habitat descriptor to the biological needs of deer. The mathematical procedures within the matrix generate 2 products. First, it provides a numerical assessment of the overall quality of deer habitat surrounding the crop field of interest. Second, it provides a prediction of whether the field will receive low, medium, or high levels of deer damage during future growing seasons.

If farmers know one or more of their fields are vulnerable to high levels of deer damage, what can the farmers do with that information? Consider a case in which an alfalfa field's attractiveness is influenced by the proximity (25 m) of a northern white cedar stand that has an understory dominated by grass and ash saplings. The wildlife manager might offer 2 recommendations to the farmer. One option is to harvest some of the cedar to discourage deer from wintering in the area (although hungry deer will probably feed on treetops even as logging is

underway!) Another option is to plant a buffer crop along the field's edge to provide forage for deer. In other situations, results of the DCDP may pose a third management option—to plant a vulnerable field to a different crop type that is of less appeal to deer, such as barley or certain kinds of legumes.

How good is the DCDP in predicting levels of deer crop damage? To evaluate its performance, we enlisted the help of 15 alfalfa farmers and 14 dry bean farmers in central Michigan who were experiencing deer problems. We set up exclosures (fences that keep deer out) in randomly selected fields, and measured crop production within and outside of these exclosures. By comparing the 2, we are obtaining actual measures of deer damage that can be used to test the accuracy of our DCDP predictions. The results of these tests are not all in yet. However, there is another important method for evaluating the potential utility of the DCDP, as we describe in the next section.

WHAT DO POTENTIAL USERS THINK?

We went to the farmers and wildlife managers to get the users' perspectives on the DCDP's potential application in deer management. During a focus group meeting in 1998, MDNR district wildlife biologists spoke about the lack of guidelines for consistent assessment of deer damage to crops. They expressed need for a standardized assessment tool that is easy to use, yet encompasses social factors (e.g., farmers' tolerance levels to deer crop damage) as well as farm characteristics and management practices (e.g., soil productivity, distance from fields to deer habitat). We presented the DCDP as a tool that could be implemented in the fall, such that results



could be used by farmers in planning their next year's planting activities. Based on our discussion, the biologists voiced their support for the DCDP's philosophy and design.

Also in 1998, we interviewed 13 of the 16 farmers who were participating in our study to document their experiences with deer crop damage, and to better understand how the farming community perceives the issue. A majority commented that whereas the problem was well understood by the farming community, the non-farming residents either did not understand or were indifferent to the deer problem. Many commented that local hunting clubs, with their strong preference for buck hunting, were not doing their share to bring about the needed reductions. However, a few mentioned a warming up to the idea of harvesting only antlerless deer during the regular hunting season—including one group of recreational landowners who had initiated a no-buck hunting philosophy in that area. We took this as evidence that, in some instances, farmers and hunters are beginning to forge partnerships to deal with the problems of locally abundant deer.

Among the farmers interviewed, half said they would consider implementing the DCDP and managing deer habitat on their property to control deer crop damage. The remaining farmers chose not to support the DCDP's approach, for a variety of reasons. Some feared that they would transfer their deer problem to another landowner. Others held a personal belief that deer harvesting is the only solution for controlling deer crop damage. Others would prefer technological fixes; for example, a cost-effective spray that lasts throughout the growing

season but is non-toxic to foraging animals.

LEARNING TO WORK TOGETHER

As found by the social researchers who have studied the deer damage issue, people are a big part of both the problem itself and the opportunities for dealing with the problem. Having described the DCDP, we will now discuss how our project seeks to foster collaboration between wildlife managers, farmers, and hunters for the shared objectives of reducing deer damage and alleviating conflict.

In April 1999, we conducted 2 interactive workshops in regions of Michigan having a history of deer crop damage. Our purpose was to evaluate the workshop's format as a means to: 1) help wildlife managers identify stakeholder concerns about an emerging or existing issue; 2) inform stakeholders about the biological and ecological principles underlying a management issue; and, 3) help stakeholders understand that wildlife management programs must address diverse interests and values. Financial support was provided by MSU and The Wildlife Society's Wildlife Information Network Program, Michigan Farm Bureau and U.P. Whitetails Association.

Using deer crop damage as our management issue, we organized a full-day program involving 10 wildlife biologists, 20 farmers, and 20 hunters. The morning session featured interactive discussion about factors controlling deer population growth, the role of computer models in management planning, and ecological factors influencing crop damage. The afternoon featured a structured dialogue in which farmers and hunters listed (separately) their deer management concerns, followed by mixed (biologist/farmer/hunter) teams tasked with

developing deer management strategies responsive to the concerns. The point was to achieve consensus on as many viable management options as possible.

In the Upper Peninsula workshop, participants were congenial and talkative but focused their concerns on matters pertaining to high deer densities (e.g., deer crop damage, degraded habitat). In contrast, participants in the northern Lower Peninsula workshop were much more dynamic and opinionated, yet eager to tackle a greater variety of issues such as engaging youth in hunting activities and how to manage deer in lieu of land ownership changes.

In a post-workshop evaluation, 11 participants described the workshop as a valuable learning experience. All respondents expressed that they had opportunities to share personal views on deer management, and that others valued their opinions. They appreciated the chance to express their management concerns and ideas. Furthermore, many of the respondents said the workshop changed how they view deer management issues—either ecologically and/or sociologically.

We conclude that the interactive workshop format can help wildlife managers to bridge communication gaps between all stakeholders, while focusing concern and problem solving on a given wildlife management issue. Such workshops do not produce binding agreements among stakeholders; however, they may lead to volunteer behavioral changes that reflect a desire to find common ground for the sake of wildlife. And if our research proves that the DCDP is useful and accurate, wildlife managers may have at their disposal 2 new tools with which to quell the flames of a burning issue. ▲▲▲

LITERATURE CITED

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