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Commentary

Human–wildlife conflicts: emerging challenges and opportunities

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Abstract: Wildlife management has been defined as the art and science of applying scientific knowledge and ecological principles to manage wildlife populations for human objectives. Historically, wildlife managers have sought to maintain or increase desirable wildlife species (e.g., game fish, birds, and mammals) to meet human food and recreational needs by directly manipulating their habitats or the populations themselves. However, many contemporary rural and urban environments are inhabited by much larger populations of wildlife than were present a century ago. As local wildlife populations increase, so can the damage caused by them. Additionally, because many rare species inhabit private lands, the potential exists for increased land-use regulatory conflicts. Thus, public concerns regarding negative experiences associated with overabundant and nuisance species of wildlife are increasing. If wildlife management is to grow as a profession, managers may need to change their traditional emphasis from that of managing to sustain or increase populations to one of mitigating conflicts. Increased agency emphasis on managing human–wildlife conflicts may afford wildlife management professionals a new forum to engage the widest range of stakeholders in conservation. To make this transition, wildlife managers will need better information about how and why human–wildlife conflicts occur, the magnitude and type of damage occurring, the techniques to manage challenges posed by locally overabundant or rare wildlife populations, and the communication strategies that can be implemented to more effectively involve the capacity of local governance in seeking viable solutions.

Key words: conservation biology, human–wildlife conflicts, species conservation, wildlife damage management, wildlife management

Rural residents, especially agricultural producers and forest landowners have typically borne the brunt of wildlife damage (Conover 1997*a*). The terms predator control, animal damage control, animal damage management, vertebrate pest control, vertebrate pest management, and wildlife damage management have been used to describe economic losses directly caused by wildlife (Messmer 2000). The phrase human–wildlife conflicts is now commonly used to describe situations that involve any negative interactions between humans and wildlife. These conflicts can be real or perceived, economic or aesthetic, social or political. They include impacts that may result from federal, state, or local wildlife legislation, regulations, or policies that are designed to protect or conserve wildlife, public benefits, and individual property rights (Messmer 2000). For the wildlife manager to better manage contemporary human–wildlife conflicts, an awareness and appreciation of the history and potential breadth of wildlife damage management is crucial. This history provides insights into the organizational structures that emerged to address these conflicts, and more importantly, how governmental actions shaped public perceptions about wildlife and its management (Messmer et al. 2001).

Why human–wildlife conflicts occur

Typically, organisms that naturally occur together in an ecosystem coevolved over long periods of time. Consequently, the plant, animal, and disease assemblages found in an ecosystem exhibit a high degree of intrinsic stability and resilience to climatic and other environmental factors (Odum 1971). Thus, native species are better equipped to coexist with natural predators, forage competitors, and wildlife-transmitted diseases.

When humans entered these systems, they began to alter the environments to achieve specific ends. Humans have modified plant and animal communities by introducing exotics. Many of the introduced species did not have the capability to develop an adaptive coexistence with organisms already present in the system.

The specific effects of such introductions and the management changes that accompany them (e.g., habitat alteration, predator control, disease) on the population dynamics of native flora and fauna were unpredictable; in most cases the balance and stability of the natural community were altered.

Exotic species, such as livestock, pets, and agricultural crops, that have been deliberately introduced by humans may displace native species. Native species may be redefined as biological pests when they compete with or prey upon the beneficial species introduced by humans (Conover 2002). In many cases, domestic animals and introduced plants have not acquired an adequate resistance to native predators, herbivores, and diseases and are unable to sustain themselves at acceptable economic levels without human intervention. For example, cultivated plants developed in the absence of native herbivores may lack the necessary adaptations to survive the herbivory of locally overabundant wildlife populations.

The economic and environmental sustainability of these altered systems depends on achieving and maintaining a balance among human uses, vegetation, and herbivory as modified by predation, disease, and other density-dependent factors (Howard 1985). To cope with the conflicts that may result in altered environments, the density or numbers of offending species are often regulated. The offending species are managed or controlled to protect the other species and reduce the damage to the desired resources. It is ironic that the individual or population of wildlife frequently at the source of these conflicts also may be highly valued by a large segment of human society. In essence, how wildlife is viewed in human–wildlife conflict situations depends largely on how stakeholders are personally affected.

Magnitude of human–wildlife conflicts

There are no national or state summary statistics available on the extent of damage or social and economic losses caused by wildlife in terms of human lives, property, and opportunity costs. Hence, the magnitude of the damage caused in each category by different wildlife species remains speculative (Conover 2002). However, available scientific survey data confirms that human–wildlife conflicts are increasing (Conover and Decker 1991; Conover 1994, 1997*a*, 1998).

In a survey conducted of U.S. agricultural producers, Conover (1998) reported that >89% of those responding experienced conflicts with wildlife. Conflicts occurred despite a mean annual expenditure of >40 hours and $1,000 per farmer trying to solve or prevent wildlife damage. When extrapolated to the nation's 2,088,000 farm operators (U.S. Bureau of the Census 1991), losses exceeded $2 billion, despite the 91 million hours and $2 billion spent on preventive measures. Predatory wildlife annually kills >490,000 sheep and lambs, 83,000 goats, and 106,000 cattle, resulting in economic losses >$73 million (Conover et al. 1995). In addition, wildlife damage to agricultural productivity can cause an increase in food costs for consumers and reduce profit margins for many farmers and ranchers.

Wildlife damage can also alter a landowner's perceptions about wildlife, especially if damages exceed his or her tolerance. For example, farmers who had experienced deer (*Odocoileus* spp.) damage were more likely to believe that deer populations were increasing and to prefer a reduction in the deer population (Decker and Brown 1982). In a national survey of agricultural producers, 53% of respondents reported that the levels of wildlife damage they experienced exceeded their level of tolerance (Conover 1998). Over 40% of all agricultural producers reported that wildlife damage was so severe on their farms or ranches that they would oppose the creation of a wildlife sanctuary near them; 26% said damages reduced their willingness to provide wildlife habitat on their property (Conover 1998).

Agricultural producers in the western region of the United States reported the highest economic losses due to wildlife damage (Conover 2002). Most of the losses are attributed to the patchwork land-ownership patterns of public and private lands. At present, effective long-term strategies to reduce wildlife damage to agriculture are lacking.

Wildlife damage to the timber industry also continues to increase. Beaver (*Castor canadensis*) damage to tree plantations in the southeastern United States is estimated to exceed $22 million

annually. Deer browsing causes an estimated $367 million per year loss for timber producers in the northeast. Wildlife-caused damage to forests in the Northwest results in $378 million per year in losses (Conover et al. 1995).

Wildlife damage traditionally has been thought of as just a rural or agriculture problem (Messmer 2000). More recently, overabundant wildlife populations have been causing a myriad of other problems (e.g., residential damage, deer–vehicle collisions, disease). Over 60% of urban and suburban households in the United States annually experience problems with wildlife (Conover 1997*a*, Messmer et al. 1999). Urban households reported a mean loss of $63 per household, or $1.9 billion total, because of wildlife damage. Urban residents also reported spending >260 million hours trying to solve or prevent these problems (Conover 1997*a*).

Additional human–wildlife conflicts include human illness and fatalities resulting from wildlife-related diseases, wildlife bites, attacks, deer–automobile collisions, and bird–aircraft strikes. Research suggests that in the U.S. each year approximately 5,000 people are injured or become ill, and 415 people die because of wildlife-related incidents (Conover et al.1995, Conover 2002). Conover et al. (1995) estimated the total impact of wildlife-related damage incidents approach $3 billion annually.

Socioeconomic impacts

Any wildlife population can be thought of as a valuable resource that provides a multitude of societal benefits (Conover 1997*a*, *b*), including increased wealth, well-being, or quality-of-life. Other aspects of wildlife are negative and have the opposite effect. For instance, positive values of deer include their recreational value to hunters and wildlife watchers; negative values include the economic and human health problems that result from deer–automobile collisions. When all of the positive and negative effects are tallied for any wildlife species, the benefits provided to society greatly outweigh the costs (Conover 1997*b*). Evidence of this is provided by the fact that most people have a high regard for wildlife and report that their lives would be less satisfying if wildlife were not present (Conover 1997*a*, 1998). This is especially true for rural residents, who often cite the opportunity to live close to nature as one of the benefits of a rural lifestyle.

Human attitudes and values about wildlife vary both among and within different sectors of society. Given the increased diversity of people who live in rural areas, the views of rural residents about wildlife may not differ substantially from those of urban residents, except that the latter experience more of the benefits and problems caused by wildlife. Farmers, however, remain the 1 sector of society whose attitudes about wildlife continue to differ from those of other stakeholders (Kellert 1980). Farmers continue to view wildlife in utilitarian terms and tend to be more concerned about how wildlife affects them economically. Given the impact that wildlife damage can have on their farm production, and therefore on their family's income, these differences are not surprising.

Differences in attitudes toward wildlife also vary among rural agricultural producers. Utilitarian tendencies increased among farmers with the amount of land owned or as the person's economic dependency on the land increased (Kellert 1981). For example, farmers deriving a greater percentage of income from their farms are less tolerant of deer and deer damage (Tanner and Dimmick 1983). Farmers producing high-value crops that were vulnerable to wildlife damage (e.g., apples, nursery plants) are less tolerant of wildlife than are other farmers (Decker and Brown 1982).

Still, many rural landowners appreciate wildlife. Fifty-one percent of U.S. agricultural producers reported that they deliberately took steps to manage their property for the benefit of wildlife (Conover 1998). Agricultural producers reported spending a mean of $223 and 14 hours annually to help wildlife on their property. When extrapolated to the nation's 2,088,000 occupational farmers, those expenditures equaled 29 million hours and >$350 million (Conover 1998).

Wildlife as beneficial to society

Damage caused by native wildlife can be substantial, but so are the associated benefits. Although a majority of urban households experienced problems with wildlife, even more (69%) indicate that they actively try to manage wildlife (Conover 1997*a*, Messmer et al. 1999). Urban residents spent an average of $60 and 22 hours annually trying to enhance neighborhood

wildlife populations. This amounts to $3.6 billion and 1.3 billion hours when extrapolated to the nation's 60 million households in the 100 largest metropolitan areas (Conover 1997*b*).

There also are substantial economic and social benefits associated with wildlife-related recreation. For example, in 1984, white-tailed deer (*Odocoileus virginianus*; a species that can cause extensive damage) provided $19.7 billion in benefits: $2.4 billion for hunter expenditures, $236 million value as meat, $4.3 billion for hunting recreation, and $12.8 billion for nonhunting recreation (Conover 1997*b*). Much of the high quality wildlife-related recreation is associated with privately-owned lands. In the U.S., 2.1 million farmers and ranchers control >60% of the land. As such, public wildlife inhabits and is dependent upon the habitat resources found on private land.

Unfortunately, most landowners have had little economic incentive to manage their land to benefit wildlife. Public and private wildlife management agencies and organizations have implemented programs to encourage landowners and other stakeholders to manage for wildlife and to allow public hunting or recreational access. Lack of coordination, however, between management agencies and stakeholders, who are concerned about damage caused by wildlife and wildlife users, has resulted in reduced overall program effectiveness (Wigley and Melchiors 1987, Gerard 1995, Conover and Messmer 2001).

Where are the new opportunities?

As the number of outdoor recreationists continues to increase, the value of private and public lands as recreational areas will grow, as will the problems associated with increasing human use (Brown et al. 2001). There is a need for research, education, and extension programs to identify, design, communicate, and evaluate alternative strategies that can be implemented to meet public demands for wildlife-related recreation. In addition, new strategies and approaches must be developed to address landowner, homeowner, and other stakeholder concerns regarding wildlife damage.

Unfortunately, our knowledge about the magnitude of damage or problems caused by wildlife is inadequate to develop accurate conclusions about the extent of social and economic losses caused by wildlife (Conover 2002). Specific deficiencies in our knowledge include little or no data on: (1) actual versus perceived economic losses for agricultural producers, (2) forestry losses, (3) the incidence of human diseases for which wildlife may play a role in transmission, (4) the magnitude and socioeconomic consequences of deer–vehicle collisions, (5) the prevalence and consequences of bird–aircraft strikes, (6) damage to rural and urban households, (7) social and economic damage associated with wildlife protection measures that restrict personal property rights, (8) social and economic costs associated with the elimination or restrictions placed on traditional wildlife management strategies of hunting or trapping or the loss of a registered control technique (i.e., toxicants and repellents), (9) increased wildlife damage associated with limitations or restrictions placed on the use of traditional harvest management strategies to control overabundant and nuisance wildlife populations, (10) impacts of overabundant wildlife populations on other natural resource and the environment, and (11) social and economic costs associated with lost opportunities for stakeholders to benefit from native flora and fauna, once these resources have been extirpated.

This information is needed by resource management and conservation agencies and organizations to develop proactive programs addressing human–wildlife conflicts. With this information, federal, state, and local governments would be able to develop a system to efficiently allocate resources to address human–wildlife conflicts (Conover and Decker 1991, Conover et al. 1995).

Increasing stakeholder participation in managing human–wildlife conflicts

The dictum that "nothing operates in a vacuum," is especially applicable to the man-agement of human–wildlife conflicts. We live and work in environments that are continually being reshaped by social, cultural, and political forces. Subsequently, the success of programs designed to resolve human–wildlife conflicts in this dynamic environment will rest largely on the ability of the decision makers and wildlife managers to recognize,

embrace, and incorporate differing stakeholder values, attitudes, and beliefs in the policy-making process. The task of managing these conflicts will prove more difficult as the social demographics of our communities continue to diversify (Decker et al. 1996).

Increased diversity of stakeholders creates new management dilemmas regarding the use of traditional approaches to managing wildlife. In some cases, population management techniques, such as hunting, fishing, and trapping, which were once used to manage wildlife populations and to provide recreational opportunities for traditional resource users, may become unacceptable to new constituents (Conover and Messmer 2001). Increased concerns about privacy, property damage, and safety may result in larger areas of land being closed to the use of traditional population management options, thus, further exacerbating the conflicts (Messmer et al. 1997*a*, *b*).

Decisions regarding the management of problem wildlife by their very nature tend to be controversial (Messmer et al. 2001). As stakeholders' values, attitudes, and beliefs change, the conflicts regarding these decisions will exacerbate. If human–wildlife conflicts, however, are viewed as a reflection of societal diversity, they may actually become important positive forces of change if handled constructively (Schafer and Tait 1981). When conflicts are handled improperly, they can be sources of continued public frustration and will reduce the credibility of the agency administering the program and detract from long-term objectives (Hewitt and Messmer 1997, Messmer et al. 1997*b*).

Resource agencies are finding that conflict-management approaches can be used to manage stakeholder disagreements (Bingham 1997). Such approaches are voluntary processes in which stakeholders seek to achieve a mutually beneficial resolution of their differences. Most of these processes are led by a mediator who serves as a neutral third party in a negotiation process and helps the group to establish a framework within which negotiations can be conducted. Elements of a successful conflict management processes include (1) clearly defined objectives, (2) clearly defined authority levels to prevent false expectations, (3) participant agreement on how group decisions will be made prior to dealing with the issues, (4) inclusion of team-building activities, (5) maintenance of continuity by not allowing substitutes, (6) implementation of guidelines and activities that promote active listening, and (7) achievement of success with smaller issues prior to addressing larger concerns (Guynn 1997).

Although public input processes require more time and resources, they provide stakeholders with an increased opportunity to become more knowledgeable about management options and participate in decision making. Increased participation ultimately will result in more vested public interest in the outcome, enhanced program credibility, and realization of long-term wildlife conservation goals (Hewitt and Messmer 1997, Messmer et al. 1997*b*). Lastly, sound scientific and technical data are essential for creating workable solutions. Unfortunately, for most human–wildlife conflicts, the necessary data upon which to base the decisions are lacking (Bingham 1997).

Increasing human tolerance for wildlife damage

Another approach that has been used successfully to manage human–wildlife conflicts involves changing the perceptions of people experiencing the damage, thus, increasing their willingness to tolerate damage (Conover 2002). This can be accomplished by enhancing an individual's appreciation for wildlife and its nontangible benefits. Agricultural producers already are receptive to this argument and appreciate the wildlife on their farms, as indicated by the amount of time and money spent by most farmers to enhance wildlife habitat and their tolerance for some wildlife damage. This tolerance can be enhanced by providing economic incentives.

Sovoda (1980) identified economic, personal, and social incentives that encourage landowners to manage for wildlife. Economic incentives, such as income derived from leasing the hunting rights, increase the monetary value of wildlife for landowners. Personal incentives accentuate personal fulfillment, a sense of well-being, or achievement of a personal goal. Many landowners, for instance, have a sense of pride that their farm contains abundant wildlife. Farmers who hunted deer were more likely to improve wildlife habitat, more likely to favor

an increase in the deer population, and more tolerant of deer damage than those who did not hunt (Tanner and Dimmick 1983). Social incentives would include managing wildlife habitat to achieve peer-group acceptance, community recognition, or leadership status. For instance, Burger and Teer (1981) reported that, in Texas, "to have wildlife [on your land] is a tradition that is respected, and to have fine cattle and trophy deer is a worthy goal of management and a socially desirable activity." Kellert (1981) suggested that the best way to motivate occupational farmers with large operations was by providing practical, economic, and tangible reasons, while hobby farmers may be more motivated by aesthetics.

The future for management of human–wildlife conflicts

Within the last few decades in the United States, human emigration of rural residents to urban areas has been somewhat offset in many parts of the country by a movement of urban residents into rural areas (Conover and Messmer 2001). Because of these 2-way movements, rural residents are losing some of their distinctiveness, and rural society is becoming more heterogeneous. Yet, rural residents still differ from urban residents by having a greater appreciation for wildlife and a more utilitarian attitude toward wildlife (Storm et al. 2007). This trend will likely continue well into the twenty-first century (Knuth et al. 2001).

During the twentieth century, many wildlife populations recovered largely because of protection from overexploitation, the emergence of science, and the application of wildlife management strategies (Trefethen 1975). History tells us that as human and wildlife populations increase, so will the conflicts (Conover 2002). Yet, despite these conflicts, many stakeholders will continue to express appreciation for wildlife and actively try to improve wildlife habitat on their property (Conover and Messmer 2001).

To succeed in such an environment, wildlife managers must shift their focus from trying to maximize wildlife populations to the more difficult one of trying to optimize wildlife values for society (Minnis and Peyton 1995, Vaske et al. 2001). A major difficulty in trying to achieve this optimization is that benefits and liabilities have not been evenly distributed among different segments of society (Conover 2002). This causes disagreements to erupt over questions about what is the ideal wildlife population and how wildlife should be managed. To better manage these disagreements, wildlife professionals will need better information about the increasing magnitude of the human–wildlife conflicts, their causes, and the strategies that can be used to increase stakeholder participation in the development and implementation of potential solutions (Hewitt and Messmer 1997).

Literature cited

Bingham, G. 1997. Seeking consensus on resource management. Transactions of the North American Wildlife and Natural Resource Conference 62:127–134.

Brown, T. L., T. A. Messmer, and D. J. Decker. 2001. Access for hunting on agricultural and forest lands. Pages 269–288 *in* D. J. Decker, T. L. Brown, and W. F. Siemer, editors. Human dimensions of wildlife management in North America. The Wildlife Society, Bethesda, Maryland, USA.

Burger, G. V., and J. G. Teer. 1981. Economic and socioeconomic issues influencing wildlife management on private lands. Pages 252–278 *in* R. T. Dumke, G. V. Burger, and J. R. March, editors. Wildlife management of private lands. Wisconsin Chapter, The Wildlife Society, Madison, Wisconsin, USA.

Conover, M. R. 1994. Perceptions of grass-roots leaders of the agricultural community about wildlife and wildlife damage on their farms and ranches. Wildlife Society Bulletin 22:94–100.

Conover, M. R. 1997*a*. Wildlife management by metropolitan residents in the United States: practices, perceptions, costs, and values. Wildlife Society Bulletin. 25:306–311.

Conover, M. R. 1997*b*. Monetary and intangible evaluation of deer in the United States. Wildlife Society Bulletin 25:298–305.

Conover, M. R. 1998. Perceptions of American agricultural producers about wildlife on their farms and ranches. Wildlife Society Bulletin 26:597–604.

Conover, M. R. 2002. Resolving human–wildlife conflicts: the science of wildlife damage management. Lewis Publishers, Boca Raton, Florida, USA.

Conover, M. R., and D. J. Decker. 1991. Wildlife

damage to crops: perceptions of agricultural and wildlife professionals in 1957 and 1987. Wildlife Society Bulletin 19:46–52.

Conover, M. R., and T. A. Messmer. 2001. Wildlife and rural landowners. Pages 243–268 *in* D. J. Decker, T. L. Brown, and W. F. Siemer, editors. Human dimensions of wildlife management in North America. The Wildlife Society, Bethesda, Maryland, USA.

Conover, M. R., W. C. Pitt, K. K. Kessler, T. J. DuBow, and W. A. Sanborn. 1995. Review of human injuries, illnesses, and economic losses caused by wildlife in the United States. Wildlife Society Bulletin. 23:407–414.

Decker, D. J., and T. L. Brown. 1982. Fruit growers' vs. other farmers' attitudes toward deer in New York. Wildlife Society Bulletin. 10:150–155.

Decker, D. J., C. C. Krueger, R. A. Baer Jr., B. A. Knuth, and M. E. Richmond. 1996. From clients to stakeholders: a philosophical shift for fish and wildlife management. Human Dimensions in Wildlife 1:70–82.

Gerard, P. W. 1995. Agricultural practices, farm policy, and the conservation of biological diversity. U.S. Department of Interior, Biological Service Report 4. National Biological Service, U.S. Government Printing Office, Washington, D.C., USA.

Guynn, D. E. 1997. Miracle in Montana—managing conflicts over private lands and public wildlife issues. Transactions of the North American Wildlife and Natural Resource Conference 62:146–154.

Hewitt, D. G., and T. A. Messmer. 1997. Responsiveness of agencies and organizations to wildlife damage: policy process implications. Wildlife Society Bulletin 25:418–428.

Howard, W. E. 1985. Vertebrate predators, competitors and disease carriers of livestock—introduction and overview. Pages 389–395 *in* S. M. Gaafar, W. E. Howard, and R. E. Marsh, editors. Parasites, pests, and predators. Elsevier Science Publishers, New York, New York, USA.

Kellert, S. R. 1980. Contemporary values of wildlife in American society. Pages 31–60 *in* W. W. Shaw and E. H. Zube, editors. Wildlife values, instructional service report 1. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, USA..

Kellert, S. R. 1981. Wildlife and the private landowner. Pages 18–34 *in* R. T. Dumke, G. V. Berger, and J. R. March, editors. Wildlife management on private lands. Wisconsin Chapter, The Wildlife Society, Madison, Wisconsin, USA.

Knuth, B. A., W. F. Siemer, M. D. Duda, S. J. Bissell, and D. J. Decker. 2001. Wildlife management in urban environments. Pages 195–217 *in* D. J. Decker, T. L. Brown, and W. F. Siemer, editors. Human dimensions of wildlife management in North America. The Wildlife Society, Bethesda, Maryland, USA.

Messmer, T. A. 2000. Emergence of human–wildlife conflict management: turning challenges into opportunities. International Biodeterioration 45:97–100. Messmer, T. A., S. George, L. Cornicelli. 1997. Legal considerations regarding lethal and nonlethal approaches to managing urban deer. Wildlife Society Bulletin 25:424–429.

Messmer, T. A., M. W. Brunson, D. Reiter, and D. G. Hewitt. 1999. United States public attitudes regarding predators and their management to enhance avian recruitment. Wildlife Society Bulletin 27:75–85. Messmer, T. A., L. Cornicelli, K. J. Deehu, and D. G. Hewitt. 1997. Stakeholder acceptance of urban deer management techniques. Wildlife Society Bulletin 25:360–366.

Messmer, T. A., D. Reiter, and B. C. West. 2001. Enhancing wildlife science's linkage to public policy: lessons from the predator-control pendulum. Wildlife Society Bulletin 29:1253–1259.

Minnis, D. L., and R. B. Peyton. 1995. Cultural carrying capacity, modeling a notion. Pages 19–34 *in* J. B. McAninch, editors. Urban deer: a manageable resource? Proceedings of the 1993 Symposium of the North Central Section, The Wildlife Society, St. Louis, Missouri, USA.

Odum, E. P. 1971. Fundamentals of ecology. W. B. Saunders, Philadelphia, Pennsylvania, USA.

Schafer, R. B., and J. L. Tait. 1981. A guide for understanding attitudes and attitude change. North Central Regional Extension Publication 138. Iowa State University, Ames, Iowa, USA.

Sovoda, F. J. 1980. Professionalism and wildlife management on private lands. Wildlife Society Bulletin 8:96–97.

Storm, D. J., C. K. Nielsen, E. M. Schauber, and A. Woolf. 2007. Deer–human conflict and hunter access in an exurban landscape. Human–Wildlife Conflicts 1:53–59.

Tanner, G., and R. W. Dimmick. 1983. An assess-

ment of farmers' attitudes toward deer and deer damage in west Tennessee. Proceedings of the Eastern Wildlife Damage Control Conference 1:195–199.

Trefethen, J. B. 1975. An American crusade for wildlife. Boone and Crockett Club, Alexandria, Virginia, USA.

U. S. Bureau of the Census. 1991. Statistical abstract of the United States: 1991. 111th edition. U. S. Government Printing Office, Washington, D.C., USA.

Vaske, J. J., D. J. Fulton, and M. J. Manfredo. 2001. Human dimensions considerations in wildlife management planning. Pages 91–108 *in* D. J. Decker, T. L. Brown, and W. F. Siemer, editors. Human Dimensions of Wildlife Management in North America. The Wildlife Society, Bethesda, Maryland, USA.

Wigley, T. B., and M. A. Melchiors. 1987. State wildlife management programs for private land. Wildlife Society Bulletin 15:580–584.

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