Human Dimensions of Contraception in Wildlife Management

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Introduction

Wildlife damage management was so much simpler in the good old days. If deer *(Odocoileus viginianus),* beaver *(Castor canadensis),* or other animals were a problem in a particular situation, people simply had them shot, trapped, or poisoned. Not many years ago, most people would go along with this approach, and those who didn't like it were marginalized as the "radical fringe." Not so today. Greater and more diverse segments of the public want a say in what professionals decide to do with *their* wildlife. The public wants to participate in setting objectives for management and in approving the methods for accomplishing those objectives. Kania and Conover (1991) emphasized that wildlife agencies should respond to these societal changes rather than resist them, thereby enhancing the value of the wildlife resource for *all* people. Changes in sociopolitical values have resulted in more stakeholder groups who want to be included in wildlife management decisions today than at any other time since the advent of applied wildlife management in North America (Curtis and Richmond 1992).

Although public attitudes and beliefs regarding wildlife have always been dynamic, public interest in wildlife and desire for input into management of wildlife have increased since the early 1970's. In response to this phenomenon, an area of social science inquiry and application to management has developed within the wildlife management profession—the human dimensions of wildlife management. Basically, human dimensions efforts focus on identifying what people think and do regarding wildlife, understanding why, and applying that understanding to the wildlife management decisionmaking process.

Some wildlife management professionals operating in the human dimensions arena have advocated the notion that we are now working within a new paradigm for management, one that strives to integrate the biological and human dimensions of wildlife management for improved decisionmaking and objective accomplishment (Decker et al. 1992). This represents a philosophical and pragmatic shift from an approach where biological science was the primary source of information for decisionmaking and the pervasive public sentiment of the time was in line with management professionals' values (Decker et al. 1991). However as a diversity of stakeholders emerged, wildlife managers were confronted with conflicting points of view. Under the new paradigm, social and biological information, as well as management experience, are part of the information base used in decisionmaking (Decker et al. 1992). This contemporary paradigm for wildlife management recognizes that decisionmaking occurs in an environment having sociocultural, economic, physical, legal, and administrative aspects, as well as biological components (Decker et al. 1992, Slate et al., 1992).

The new paradigm also includes consideration of the human dimensions when determining goals and objectives for management and in measuring outcomes of specific actions (Knuth and Nielsen 1989, Decker et al. 1992). In contemporary wildlife management, we recognize that many people representing a variety of views are legitimate stakeholders in management. Some of these people have no particular "use" for wildlife (i.e., food, recreation, or other utility). They may simply value wildlife for esthetic attributes or other nonconsumptive values. Thus, several different human values, beliefs, and attitudes (Kellert 1980) are playing an increasing role in establishment of wildlife management goals and objectives. Such human attributes are also playing greater roles in determining the social acceptability of management decisions and actions, including selecting and applying population control methods. In fact, Schmidt (1992) argues that natural resource management decisions, previously thought to be defined by science and economics, are driven by human values.

Knowledge concerning various stakeholders' reactions to conventional management approaches in nontraditional situations (i.e., wildlife management in

urban and suburban environments) is imperfect. Recent, accumulating experiences indicate that these nontraditional wildlife management settings call for innovative approaches, including the development and application of new technologies. However, new technologies need to be developed and applied on a limited trial basis, with an eye toward anticipating and evaluating social acceptability. As new technologies are being considered, one needs to ask whether the innovation hoped for is consistent with the beliefs and values of affected stakeholders. Although minority opinions can be problematic to management programs, these viewpoints can provide important balance to a decisionmaking or planning process.

The purpose of this paper is to begin discussion of the human dimensions of contraception in wildlife management that developers of this emerging technology should consider as biological research proceeds. We draw limited inference from literature about human values toward wildlife, and human use and management of wildlife, to the use of contraception in management. We also identify issues that managers and other decisionmakers who formulate wildlife policy should consider as they contemplate applying contraception as a wildlife management tool. Because no studies have focused on identification and explanation of people's beliefs and attitudes about this new technology, we caution that this discussion is exploratory, not definitive. We also identify additional research needs in the area of human dimensions that could provide valuable insight concerning wildlife contraception issues.

Wildlife Management Stakeholders

Researchers who are developing wildlife contraception technologies need to understand the views that stakeholder groups hold concerning the application of new contraception methods and why differences exist. Beliefs and values that underlie various perspectives and the acceptability of wildlife contraception should be considered during research and development, before too much time and money are invested in approaches that may later prove to be morally or ethically unacceptable.

For example, Turner et al. (1992) noted that female white-tailed deer treated with a porcine zona pellucida (PZP) vaccine continued to cycle after not becoming pregnant. It is possible that PZP treatment could affect long-term patterns of deer behavior and social organization. Deer that expend extra energy for breeding activities may not survive a harsh winter.

Moen (1976) noted that seasonal physiological changes occur, and deer conserve energy in winter by reducing their general level of activity. Consequently, deer should remain as undisturbed as possible during winter, and increasing the length of the breeding season will likely have serious impacts on seasonal changes in deer physiology.

These changes in deer reproductive biology raise serious ethical and management questions, and they may influence stakeholders' perceptions of this contraceptive technique. Stakeholders must understand the full range of effects that different contraceptive methods may have on deer populations before making decisions to accept or reject their use. Also, sensitivity to key stakeholders' values and beliefs during the development stages, prior to widespread field applications, are extremely important. The wildlife profession may spend millions of dollars developing and registering new contraceptive technologies yet still face public controversy if the interests and concerns of all stakeholder groups are not carefully considered and addressed in advance of implementation.

Who are key stakeholders in the wildlife contraception arena, and what can managers conjecture about stakeholders' opinions on contraceptive applications? Identification of stakeholders is an essential human dimensions component when considering various management options. Key stakeholders would be similar in population management situations whether wildlife contraception or other direct management methods (i.e., shooting, trapping, etc.) are being considered or used. The claims made by stakeholders may seem different, but the fundamental values that lead to their expressed views likely will be consis-

tent with those observed in past studies unless contraception technology taps into different values and beliefs. Stakeholders include wildlife management professionals, researchers developing the technology, industry representatives hoping to produce and market the technology, potential regulating agencies (e.g., the Department of Health and Human Services' Food and Drug Administration, the Environmental Protection Agency, State health departments, etc.), Federal and State land-management agencies, wildlife damage/nuisance control operators, people experiencing damage or wildlife-related health and safety risks, extension wildlife specialists, people concerned about animal welfare, animal rights advocates, elected public officials, hunters concerned about a competing management tool, environmentalists, taxpayers concerned about costs, media representatives, and religious leaders in communities. Depending upon the site-specific situation, this list of stakeholders could be expanded or condensed.

Anticipating Issues Regarding Contraception Technology

Animal Rights and Animal Welfare Concerns

Schmidt (1990) proposed a distinction between animal rights and animal welfare advocates that has great bearing on how we think different stakeholders will view wildlife contraception. Animal rightists fundamentally believe that animals should be extended rights similar to humans, because to do otherwise would constitute speciesism (Singer 1980). This belief differs from that of animal welfare supporters, who focus primarily on the humane treatment of animals, though these people may not believe that animals and humans have equal rights. Although most of the animal rights confrontations with wildlife management have focused on hunting and trapping, there are few indications that animal rights advocates would find contraceptive use in wildlife management much more acceptable philosophically. We speculate that denying animals the right to procreation, giving them no "say" in the decision, or manipulating individual animals to further human needs, seems to be as great a violation of the animals' rights (thinking of the human analogy) as taking their lives through hunting. Thus, we forecast no significant improvement in relations between wildlife managers and animal rights advocates because of contraception technology.

Animal welfare advocates will likely favor contraceptive technology if pain and stress to wildlife, unnecessary animal deaths, or other concerns about humane treatment of animals are minimized. Some momentary stress or pain will be acceptable if, on balance, contracepting wildlife will reduce mortality of animals by starvation, disease, motor vehicle accidents, selective culling, or other factors. However, opposition may mount if contraceptive materials affect animal breeding biology (e.g., late-born fawns, extending the buck rut into midwinter, etc.) or other behaviors that raise serious welfare concerns.

As something of an aside, we do see a new dynamic occurring relative to animal rights advocates and contraceptive technology issues. Unlike most battles between animal rightists and wildlife management advocates, where hunters bear the brunt of public scrutiny, it is likely that hunters may be spectators in many situations where contraception is being considered for application, especially in residential or park landscapes where hunting is less feasible. Values and beliefs of many suburban property owners (i.e., homeowners, motorists, gardeners, etc.) who desire relief from nuisance wildlife and are concerned about wildlife-related health and safety risks to people (e.g., Lyme disease, rabies, deer–vehicle collisions, etc.) will be opposed by groups who espouse the animal rights philosophy. Animal rights advocates may find themselves battling those people who previously have been part of the silent majority concerning wildlife management issues, rather than focusing on hunters and trappers.

Contraception v. Hunting

As the development of contraceptive methods moves forward, we anticipate wildlife contraception will affect public perceptions of the necessity for hunting. For perhaps 50 years, the wildlife profession has told hunters and the public at large that hunting is the most

cost-effective tool for management of overabundant wildlife populations. That statement has become a standard defense for the justification of regulated hunting. Of course, hunting is the primary method used for managing a few wildlife species (e.g., deer and elk *[Cervus elaphus]);* however, it has not been proven that regulated harvests can effectively control other wildlife populations. So what are the consequences for hunting if an effective wildlife contraception method is developed and society is willing to pay for its application? Will wildlife contraception signal the demise of hunting?

The future of hunting was recently discussed at the North American Hunting Heritage Symposium. Decker et al. (1993) asserted that the future of hunting lies in public understanding and acceptance of the sociocultural values related to hunting, not for its value as a form of recreation or a tool for wildlife population management. Thus, some researchers believe that whether or not contraception technology evolves to become economically feasible, the future of hunting is dependent upon other factors, such as maintaining a rural cultural tradition.

Contraception v. Other Direct Lethal Methods

Direct (e.g., shooting, kill-trapping, poisoning, etc.) and indirect (e.g., induced abortion, etc.) methods for lethal management of wildlife populations have been applied or tested experimentally in the past. Public acceptability of these lethal methods depends on the species of wildlife in question and perceived human health and safety risks. Based on a survey of homeowners (n = 391) with nuisance wildlife problems (Braband and Clark 1992), most respondents approved of lethal control for rats and mice (Cricetidae, 95 percent), moles (Talpidae, 79 percent), snakes (Serpentes, 74 percent), bats (Chiroptera, 71 percent), pigeons *(Columba livia,* 60 percent) and skunks *(Mephitis* spp., 57 percent). However, most people disapproved of lethal control for deer (70 percent), geese *(Branta canadensis,* 67 percent), woodpeckers (Picidae, 65 percent), and squirrels (Sciuridae, 59 percent). For many respondents, humaneness was equated with nonlethal control, and nearly 90 percent indicated that humane treatment of nuisance animals was important.

It seems certain that nonlethal methods would be preferred over direct lethal methods by animal welfare and other similar stakeholder groups if the nonlethal approaches are equally effective and carry similar costs. It is also likely that lethal methods which have added benefits would be preferred over lethal methods that have no added value (e.g., recreational hunting would be preferred over poisoning). This idea of relative acceptability has not been adequately investigated and deserves future inquiry. Increasing professionals' understanding of public acceptability of various lethal and nonlethal methods would be useful in management decisionmaking and in developing research agendas to meet future wildlife management needs of society. The findings of such a line of inquiry might also be useful for creating educational programs concerning tradeoffs about which approaches to take in various situations.

So far in this discussion, we have treated wildlife contraception as a nonlethal management technique. Yet even this assumption may be questioned by some stakeholders in wildlife management decisions. This is both a value-based (Decker et al. 1991) and biologically based judgment. Prevention of conception may be equated with the "unnatural" death or management of an animal by some segments of society. Even when groups of animals such as deer are trapped and transported to another location, some mortality typically occurs during transport. Defining what are lethal *v.* nonlethal techniques may not be as obvious as initially expected. Such thoughts call for additional public retrospection about the value of "wild" in wildlife populations.

Contraception v. Nonmanagement

A segment of society supports the nonmanagement viewpoint. That is, some people believe that humans should simply "leave nature alone" and "learn to live with wildlife." This perspective does not fully recognize the immutable impacts that humans have had, and will continue to have, on the environment for

centuries to come. Certainly, the "leave it alone" perspective is attractive because proponents believe that wildlife populations will take care of themselves; however, the consequences of wildlife extinction or overpopulation may damage both ecosystems and people. Regardless, wildlife contraception would likely be unacceptable to many nonmanagement advocates, as would any other wildlife management tool. Any purposeful intervention by people to manipulate wildlife could be viewed as altering the "naturalness" or "wildness" of animal populations. However, faced with animal overabundance and deterioration of habitat quality, research and management professionals from some areas (e.g., national parks and wildlife refuges, State parks, etc.) that have typically been managed under a natural-systems approach are actively exploring the development and application of contraceptive technologies to control large ungulates (Kirkpatrick et al. 1990, Turner et al. 1992).

Public Beliefs and Values About Wildlife and Wildlife Management Via Contraception

Our literature review uncovered no research concerning public attitudes toward contraception in wildlife. Position papers and other nontechnical writings abound, but we were unable to find a single comprehensive study describing the nature and basis for public attitudes toward either wildlife or human contraception. Similarly, we were unable to find studies of people's attitudes about contraception in companion animals. Thus, we draw entirely on research about human attitudes toward wildlife and various uses of animals when discussing attitudes and beliefs that likely will be pertinent in assessing the degree of public acceptability for contraception in wildlife.

It's important to remember that people's beliefs and attitudes about wildlife are formed, exist, and change in a context of broader attitudes and values concerning several domains of their lives. For example, people's broader world view concerning what constitutes appropriate human interaction with the environment or nature has profound effects on how people view human–wildlife interactions. Wildlife-associated attitudes and values are also related to other major world views, such as religious beliefs, beliefs about safety and security (both physical and financial) of family and community, and beliefs about individual freedom of choice in dealing with problems (i.e., those caused by wildlife).

Studies by the Human Dimensions Research Unit in the Department of Natural Resources at Cornell University have examined the wildlife-related attitudes and values of thousands of people on a variety of subjects during the last 15 years. Based on these studies, a Wildlife Attitudes and Values Scale (Purdy and Decker 1989) was developed and applied in over a dozen studies. Essentially, this work identified the existence of three broad dimensions of public attitudes toward wildlife: wildlife use, wildlife preservation, and wildlife damage/nuisance tolerance.

The wildlife-use category includes a traditional wildlife conservation philosophy that supports use of wildlife for human benefits and management to accomplish such purposes. Attitudes and values associated with hunting, trapping, and similar activities would be reflected in this dimension.

The wildlife-preservation category embodies concerns for individual animals and for their continued existence in nature. Animal rights notions would be on the extreme end of this set of attitudes and values.

The wildlife-problem-tolerance set of attitudes and beliefs is interesting conceptually because they discern that people have a wide range of acceptability of various human–wildlife interactions. Other research and observation lends credence to the existence of thresholds of tolerance for wildlife-caused problems depending upon economic or health and safety risks. For example, some people will incur a high level of economic damage from wildlife before they find the tradeoff tips toward wanting relief. Damage tolerance has been documented for both farmers (Decker and Brown 1982, Decker et al. 1984) and homeowners (Sayre et al. 1992). However, when the perceived risk of health and safety problems associated with wildlife (e.g., rabies, Lyme disease, motor vehicle accidents, etc.) reaches even modest levels, tolerance of wildlife

presenting the risks is reduced markedly (Connelly et al. 1987, Stout et al. 1993). A recent survey of Tompkins County, NY, residents indicated the perceived risk of being involved in a deer–vehicle accident, along with attitudes toward deer and the degree of personal involvement with deer–vehicle collisions, predicted the likelihood that a person would support reducing the local deer population (Stout et al. 1993). Results from this New York experiment suggest that people change their attitudinal orientation if perceived risks of economic loss or health and safety impacts exceed certain thresholds of tolerance (which need further assessment for precise estimation).

To learn more about public attitudes toward a variety of deer-management alternatives in a suburban environment, we conducted a survey of property owners in the greater Rochester, NY, metropolitan area. The paucity of scientifically obtained information documenting people's beliefs about contraception in wildlife management, and lack of management experience in this new arena, encouraged us to explore these issues. The survey instrument included several questions concerning contraceptive management of a locally overabundant deer herd. Public attitudes and values related to the acceptability of contraception as a deer management technique are discussed further below.

Identifying Public Acceptance of Contraception: A Pilot Study

Wildlife managers considering the use of contraception for resolving wildlife problems need knowledge of the specific attitudes held by stakeholders in a given management situation. The greater Rochester area was selected as the site for a pilot study because of a long-standing deer-management controversy surrounding Durand Eastman Park and implementation of a public involvement process for setting deer management objectives (Curtis et al. 1993).

To determine the attitudes of suburban residents toward deer management, a questionnaire was sent to 1,590 residents living in the Rochester area during 1992. Questions were developed with input from New York State Department of Environmental Conservation (DEC) staff. The primary objectives of the survey were to assess public attitudes about deer, perceptions about deer-management methods, and the public acceptability of various management options, including contraception.

Approximately 750 residents completed the questionnaire (a 47-percent response rate). A followup phone survey of people who did not respond to the questionnaire indicated that many people were either not interested in deer-management issues or had difficulty understanding the questions and concepts. The majority of respondents selected either contraceptive methods, managed hunting, or trapping and releasing deer to the wild as their preferred deer-management option.

People who supported contraception were more interested in minimizing the suffering of deer than respondents who did not support contraception. Respondents who thought deer contraception was an extremely acceptable management option were also more likely to be dissatisfied with DEC's deer-management program and tended to agree with the statement that "herd size should be guided by nature alone."

Important considerations of those opposed to contraception included maximizing hunting opportunity and minimizing economic costs to society. In addition, people who were satisfied with DEC's deer-management approach were more likely to view contraception as unacceptable.

The credibility of 21 potential sources of deer-management information was associated with the acceptability of deer contraception as a preferred management option. People who selected contraception as their preferred option tended to rate the Humane Society of Rochester, Save Our Deer, and Helmer Nature Center with greater credibility than respondents who preferred other deer-management methods. Conversely, those who did not select contraception ranked the local hunting club and the Irondequoit Deer Action Committee with greater credibility. However, DEC ranked as the single most believable source for deer information among both supporters and opponents of deer contraception.

It is not surprising that respondents who were interested in maximizing deer-hunting opportunities and reducing economic costs were generally opposed to contraception. Because hunting is the primary method used by DEC to manage deer in New York, respondents who were satisfied with DEC's deer-management program were also more likely to view contraception as an unacceptable alternative. However, it's important to note that about 50 percent of respondents selected either minimizing human health and safety risks or maintaining a healthy deer population as the most important deer-management consideration, regardless of whether respondents supported or opposed contraception.

Research Needs for Human Dimensions of Wildlife Contraception

This pilot investigation of citizens' attitudes toward deer contraception can contribute to a broader understanding of public beliefs about contraception in wildlife. In similar situations, it's important to identify relevant stakeholder groups along with their size, position on the issue, salience of the issue to them, perceived stake in the issue, power in decisionmaking (political influence), knowledge of the issue, and socioeconomic and demographic characteristics. Inquiry must go beyond description because wildlife managers and policymakers need to know why people hold various beliefs and attitudes and if these attitudes are based on accurate perceptions of wildlife ecology and contraceptive techniques. That information will help professionals identify the extent and nature of educational communications need. Also, it's useful to know how rigid or malleable attitudes are. Obviously, educational programs can influence change only if the public's attitudes are flexible.

One limitation of our pilot study is that we painted contraception for deer management with a very broad brush and did not define specific technologies or delivery systems. For example, delivering contraceptive vaccines via oral baits, dart guns, "bio-bullets," or arthropod vectors may have characteristics that tap into different underlying values held by various stakeholder groups. Also, specific technologies (i.e., using genetically recombinant proteins or genetically altered viruses, etc.) for developing vaccines for reproductive inhibition may be unacceptable to some publics. Mammalian reproductive biology is similar across species, and the chance of mutations in genetically altered viruses may pose substantial risk. Consequently, when examining attitudes and beliefs of people toward contraception in wildlife management, it will be extremely important to identify both the specific material and delivery system that will be used and to be certain that stakeholders understand how they work.

Public Involvement Strategies for Making Management Decisions

In addition to human dimensions research, increasingly the wildlife management profession is finding that public-involvement techniques are helpful in reaching community consensus on controversial wildlife management issues (McMullin and Nielsen 1991, McAninch and Parker 1991, Nelson 1992, Curtis et al. 1993, Stout et al. 1993). Conceived carefully and implemented effectively, citizen participation strategies present educational opportunities, improve agency image as being responsive to stakeholder needs, and lead to more acceptable, if not universally embraced, decisions and actions to solve management problems (Stout et al. 1993). Different public-involvement models have been used in Minnesota (McAninch and Parker 1991) and New York (Curtis et al. 1993), and these can be assessed for suitability and adapted to fit other situations. In New York, the work of citizen task forces was greatly enhanced by the availability of systematically collected human-dimensions data gathered from the community at large or from members of specific stakeholder groups. Results from systematic, ongoing evaluations of citizen participation activities can be used to feed into and improve the process as it is being carried out and are invaluable for effectively managing the process (Stout et al. 1992).

Human dimensions studies and citizen participation strategies take time and money, but there is no indication that these costs are any larger than those incurred when such strategies are not included in the development of management policy. The difference is that proactive efforts are more predictable and manageable than the time and cost of reacting to problems after an unacceptable decision is made and the management agency has to resort to the typical "damage control" mode of operation.

A special group of stakeholders should be the focus of immediate inquiry—wildlife management professionals. Whether it's wildlife contraception or any other innovation or deviation from traditional approaches to wildlife management, members of the profession are extremely important stakeholders. These professionals have the credibility to scuttle innovation or to accelerate its adoption. Some members also have loyalties to the conventions of the profession, and basic beliefs and values are fundamentally difficult to alter (Sanborn et al. 1994). We believe that the advent of contraception in wildlife management may signal a significant change in the way wildlife managers do business. If that prediction is on track, then it is clear that resistance to contraceptive technology will emerge. Thus, we believe it is important to understand the attitudes of members of the wildlife management profession on this topic. Publications such as this facilitate discussion, reveal positions, etc.; however, we also need empirical analyses to help the profession grapple with contraception in wildlife management and related issues looming on the horizon.

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