

Volunteer Participation with Non-Lethal Alternatives in US Wildlife Management

*Participant perspective on suburban deer population management*

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## Abstract

Today's suburban environments are evolving into densely populated urban fringe landscapes, with a decrease in both recreational and subsistence hunting. This change in demographics, from that of the early 1900s and even from that of the early 2000s, has introduced a challenging conversation between state run wildlife management and the ethical considerations of affected communities. Community participation with wildlife management has become a popular solution proposed for conflict resolution and garnering stakeholder approval. This study offers an in-depth look into the experiences of volunteer participants from the Hastings-on-Hudson deer birth control program. The program has completed the 1st year of its proposed 5-year duration. This program is permitted as a research procedure using the Porcine Zona Pellucida vaccine on the resident deer population. Derived from semi-structured interviews of 17 resident volunteers, the data collected describes the range of opinions and perspectives towards wildlife and wildlife management in the community. The data indicates a possible shift in volunteer perspectives on wildlife as a result of experiential learning. Most notably, individuals who discussed having had a positive volunteer experience described an increase in understanding of suburban wildlife and an increase in respect for the challenges of wildlife management. Volunteers who had a negative experience volunteering described either an increase in frustration with the deer or an increased frustration with wildlife management. It was also noted that all individuals, regardless of positive or negative volunteer experience, described understanding that wildlife management bureaucracy is a challenge. It is recommended that policies be developed to assist communities like Hastings-on-Hudson with the logistical and bureaucratic implementation of alternative management systems, such that participation-based alternative management systems could be a viable option for all communities regardless of resources, leadership and demographics.

## **INTRODUCTION**

### **Suburban Deer**

The simultaneous increase in suburban residency and deer populations has increased the frequency of human animal conflicts (McCleery, 2008; Curtis & Sullivan, 2001). The most commonly discussed human-deer conflicts are issues of garden, crop, forest, and habitat degradation as well as car accidents and disease (Patterson, Montag & Williams, 2003; Kilpatrick & LaBonte, 2003). These conflicts cost an estimated \$2 billion annually nationwide; this includes \$1 billion in car damages, \$100 million in crop damage, \$750 million to the timber industry, and over \$250 million to individual households (Curtis & Sullivan, 2001).

For some residents, the spontaneous interaction between suburban deer and suburban residents may be seen as a pleasant connection to nature, while for many others it is considered unwanted and damaging (Rutberg, 1997; Raik, Seimer & Decker, 2005). For many communities these unwanted interactions force people to address their own perception of the deer and how to coexist with them. The differences in these fundamental opinions on deer interactions are further exacerbated when communities experience increased conflict with deer. Trying to balance a community's collective desire for decreased conflict with the inherent differences in opinions on how to best manage deer populations, suburban communities have had to look for alternative solutions for wildlife management that could appease the varying ethical needs of the community.

### **History of Deer Management in the U.S.**

Human-wildlife conflict has traditionally been defined as 'when the needs and behavior of wildlife impact negatively on the goals of humans or when the goals of humans negatively

impact the needs of wildlife' (Madden, 2004). By the early 1900s, years of unregulated market hunting left North America with a deer population below 300,000. In response to the rapid decline, policy was established to set limits and regulate the take of deer (Messmer, 2000). Consequently, these regulations allowed the deer to not only repopulate, but to flourish around North America. This management technique, while successful in the repopulation of North American deer, did not anticipate the change in the public's views towards animal use and human wildlife conflict. The relationship between humans and wildlife has evolved since the early 1900s with the emergence of a diversification of belief systems about wildlife (Messmer, 2000; Lindsey, Adams, 2006). For suburban deer populations we are seeing an occurrence of "the tragedy of becoming common" which occurs when a wild animal is no longer seen as wild, but instead as a pest (Leong, 2009). Between the early 1900s and today we have seen an increase not only in deer population, which is believed to be nearing its pre- European settlement numbers, but we have also seen a 300% increase in people living in deer-laden suburban areas (Curtis & Sullivan, 2001). Traditionally, once the deer population had reestablished to a healthy number, this increase in deer population would have been managed by a combination of subsistence hunters, wildlife officials and predators (Olson, 2013). However, predator eradication and a decrease in hunting nationwide have left the responsibility of deer management largely to wildlife agencies and local communities.

However in recent years communities, and in particular suburban areas, have started to demand increased input in choosing wildlife management strategies. Communication between communities and wildlife agencies has historically been contentious due to the challenges of compromising in order to accommodate the needs of a diverse spectrum of opinions from stakeholders, the community residents who are directly impacted by the deer and the community

residents who have ethical concerns about the treatment of deer. The attempt to resolve suburban wildlife conflict poses both social and technical challenges (Lauber, Knuth, Tantillo & Curtis, 2007). Communities are looking for wildlife conflict solutions that address both stakeholder and community needs (Raik, Siemer & Decker, 2006).

With the increase in community input and decision-making, many communities have begun to challenge the traditional methods of culling nuisance wildlife out of concerns about efficacy and ethics. As previously mentioned the relationship between suburban residents and wildlife has evolved, and with that communities are looking for a corresponding evolution in management techniques. (Raik, Siemer & Decker, 2006; Lindsey & Adams, 2006)

### **Perspective Shift: lethal vs. non-lethal management**

The decrease in hunting throughout the US since the 1900s is a result of primarily two changes: First, the increase in suburban residency has created densely populated residential neighborhoods, which has resulted in zoning laws prohibiting hunting within certain proximities of homes and schools (Lauber et al, 2007; Lauber & Knuth, 2000). Secondly, demographic shifts in suburban areas have been reflected in a decrease in recreational or subsistence hunting. In general hunting has become culturally less supported in many communities and is often only practiced by a small minority within these communities (Olson, 2013; Lindsey & Adams, 2006).

In response to safety concerns raised by hunting in densely populated suburban areas, communities have increased hunting regulations and zoning laws that decrease viable hunting ranges with both firearms and archery. Aside from safety concerns, many communities have expressed issue over ethical considerations of lethal management. With 5% of deer needing a 2<sup>nd</sup> shot to be put down by firearm, some residents may not feel comfortable with chances of

injuring deer (Wilson, 2003). Even with proficiency testing of hunters, the accuracy of hunters is not guaranteed. According to Kilpatrick & Walter (1997) 30% of 217 applicants for a deer management bow hunt passed a proficiency test, and even those who passed were shown to be 20% less accurate under actual hunting conditions. For communities where hunting with firearm or archery is not a possible solution, net-and-bolt can also be used to circumvent hunting laws or accuracy concerns. However these methods can also present ethical conflicts within communities, about humaneness, again with concerns raised about unnecessary stress and harm to the deer.

Aside from the ethical concerns of deer management, there have been several communities in which years of lethal management have shown to not effectively manage the deer population. According to Porter (1991), for an effective cull to take place 25% - 50% of female deer need to be removed from the population to make a significant impact. However, these results are not long lasting and require continued management yearly. In response to communities wanting longer lasting results of population control, the concept of birth control management is being proposed more frequently.

### **Management Alternatives: Fertility Control**

Rooted in the desire for less invasive, cost effective, long term solutions to wildlife management scientists began looking for less invasive methods of population control (Rutberg, 2013). As communities also started looking for non-lethal and long-term solutions to wildlife management, and with the support of the humane movement, from organizations like The Humane Society of the United States, birth control vaccines called immunocontraceptives gained research momentum in the early '90s. However, in its infancy immunocontraception was not



well trusted and received resistance from state wildlife officials and people who had become accustomed to traditional methods (Lauber & Knuth, 2004; Warren, 1995). With the increase in scientific knowledge and controlled studies, contraception is now considered a more viable alternative for wildlife management. The immunocontraceptive porcine zona pellucida (PZP) has been proposed as a population management tool for urban, suburban or park populations of deer (Rutberg, Naugle, Thiele, & Liu, 2003; Rudolph, Porter, Underwood, 2000; Garrott, 1995). PZP is an immunocontraceptive that can be administered via dart or injection. When administered correctly PZP has shown to decrease deer population at about 6% -10% per year and in one study had even shown an annual decline of 11% (Rutberg et al, 2013). Statistical modeling has suggested that this method can hold deer populations at about 30-70% of their ecological carrying capacity (Rudolph et al, 2000).

Despite its potential for long-term impacts and humane approach, one draw-back is that deer contraception is a time- and resource-intensive program. Encouraging communities to participate in the implementation of a birth control protocol helps provide the human resource needs of this intensive management method, and also engages communities in the issues of wildlife management.

### **Current Model: Citizen councils and task forces**

One of the catalysts for the emerging alternative methods of wildlife management was an increased awareness of and demand for community engagement with wildlife management (Raik, Lauber, Decker & Brown, 2005). Research has shown that engaging stakeholders in the decision making process for wildlife management has yielded higher satisfaction within the

community, as well as increased efficacy of management (Raik, Decker, Siemer, 2006; Treves et al, 2006).

Initial collaboration attempts between the state officials and community stakeholders put immense strain on the wildlife management decision-making process. In response, communities established task forces and citizen councils to act as advocates for community needs. Through town hall meetings and collaborative work, communities are able to more clearly articulate stakeholder values to wildlife management officials. Historically community involvement has been limited to key stakeholder opinions as design criteria for wildlife management systems. However, according to Chase, Decker & Lauber (2004) it was found that community's value inclusiveness and equal treatment of residents over stakeholder input. As stated by Chase et al (2004), residents value a decision making process that includes "scientific information, has genuine influence on the decision, treats all citizens equally, and promotes communication and learning".

However, communities seeking immediate results, while wanting alternatives to the traditional hunting methods, have historically been frustrated with the lack of involvement in the process of wildlife conflict management (Schusler & Decker, 2002). Research suggests that access to information, coupled with participatory communication between the community and wildlife officials, is the key to more effective management practices (Raick, Decker & Siemer, 2006; Lauber, Knuth, 2004; Schusler & Decker, 2002).

### **Proposed Model: Community participation with wildlife management**

As more communities are taking charge of the wildlife management strategy decision-making process, we have seen a rise in discussion about communities expanding their input

beyond town hall meetings to directly engage with the implementation of wildlife management (Treves, Wallace, Naughton-Treves & Morales, 2006). Communities are now discussing taking the next step into community-run wildlife management. Common factors that motivate communities to establish community-based wildlife management include a desire for involvement in identifying issues, seeking alternatives, reviewing consequences, identifying choices, implementing the program, and evaluating its effectiveness (Raik, Siemre, Decker, 2006). While authority over wildlife management policy is still held by state officials, we have seen a rise in collaborative work between wildlife officials and community representatives.

This approach has two main requirements; (1) being able to get a community consensus behind a specific idea, and (2) getting a community mobilized to participate in the new system. Researching participant experiences could prove useful in understanding and improving the process of designing and implementing community-based wildlife management systems.

### **Hastings-on-Hudson**

The Village of Hastings-on-Hudson is located in Westchester County, New York in the United States. A suburb of New York City, Hastings-on-Hudson takes up a 2.9 square mile area of land situated directly on the Hudson River. Hastings-on-Hudson is home to approximately 7,947 residents. There are 3,020 registered homes with a median household income \$114,643 (July 1<sup>st</sup> 2013 U.S. Census data). Hastings is located directly north of Yonkers, New York and the Lenoir Nature Preserve. There are approximately 97.6 acres of designated public green space situated in the northeastern corridor of Hastings-on-Hudson, with additional smaller green spaces scattered throughout the Village. The largest public green spaces are known as Hillside Woods and Hillside Park, which hosts over 3 miles of walking and hiking trails frequented by residents

who use trails for recreational and educational activities ([www.hastings.gov](http://www.hastings.gov)). Directly east of Hastings-On-Hudson is state-managed green space and the Saw Mill River Parkway.

### **Hastings-On-Hudson Deer Immunocontraception Study**

Hastings-On-Hudson is home to an estimated 120-140 deer. The community began discussing population management strategies when Peter Swiderski took office as the Mayor of Hastings-On-Hudson in 2007. Swiderski explains that the residents had in fact been seeing an increase in deer starting as early as the 1990s, and during the early 2000s it had become a community wide problem as Lyme disease, garden destruction, loss of forest understory and car accidents increased. In 2007 Mayor Swiderski approached the town about discussing population management strategies to deal with the increasing number of human-wildlife conflicts in the area. According to Swiderski a cull was proposed first, but Westchester county zoning laws prohibit hunting with firearms county-wide. The next option proposed was longbow hunting, which is prohibited within 150 feet of schools or homes; even with approval from residents, getting an area large enough to make an archery hunt effective was too challenging (Swiderski, 2014; [ww.DEC.ny.gov](http://ww.DEC.ny.gov)). As a result, a net-and-bolt cull was proposed and discussed for 6 months until vocal opposition struck down the approach. Swiderski stated that the while the majority of the town approved the net-and-bolt strategy, it would be too divisive a solution and upset a very vocal minority of the town.

In an attempt to find a less divisive and more long-term solution for the community, Mayor Swiderski approached the animal welfare organization In Defense of Animals for advice on non-lethal management alternatives. He was advised to speak with Dr. Allen Rutberg of the Center for Animals and Public Policy about the use of the Porcine Zona Pellucida vaccine for

fertility control.

Through the collaborative effort between Mayor Swiderski, Dr. Rutberg and the Humane Society of the United States, Hastings-on-Hudson designed a fertility control study that uses the immunocontraceptive Porcine Zona Pellucida on the resident deer population of Hastings-On-Hudson over a 5 year period. The Hastings-on-Hudson study required that the deer be sedated, tagged, health checked and vaccinated with the immunocontraceptive. The study proposal was submitted to the New York State Department of Environmental Conservation (NYDEC) in May 2013. In addition to the NYDEC proposal permitting, the town had to also submit a research permit to the New York State Bureau of Narcotic Enforcement (NYSBNE) because of the implications the study would have with the Drug Enforcement Act (A. Rutberg, personal communication). The NYDEC permit allowed for 2 months of deer darting from February 1<sup>st</sup> to March 31<sup>st</sup>. However securing proper storage and establishing handling procedures for the controlled substances as required by the NYSBNE created a logistical challenge that delayed the darting until the end of February. The second challenge was that the deer primarily stayed in people's backyards. This required permission from property owners to dart the deer in the event that the deer were in someone's backyard. As a result the program was delayed further until mid- March, and limited the darting season to only 2 weeks. One deer was darted and treated with PZP in the first week and 7 deer were successfully treated following week.

Volunteers had many different opportunities and ways in which to volunteer with the project. Because the project required an extensive amount of planning and execution, volunteers were encouraged to participate in any way that they could. Some of the most common ways of participating were monitoring damage to Hosta plants in a backyard impact study, getting signed permission from people to dart in yards, riding along with darters, directing traffic during

darting, taking pictures, note taking, reporting deer sighting, and reporting on community discussions.

### **Objective of Study**

The purpose of this study is to examine how community participation with non-lethal wildlife management impacts perspectives and understanding of wildlife, human-wildlife conflict and wildlife management. This work is intended to encourage further research on how community-based wildlife management can help deescalate suburban wildlife conflict and identify policies and procedures that balance both human needs and animal welfare

### **METHODS**

Using a qualitative method of semi-structured interviews and ethnographic analysis, we examined the experiences of community member volunteering with the Hastings-on-Hudson Deer Immunocontraception Study. Participants were identified by Mayor Peter Swiderski and the community volunteer coordinator. We first contacted volunteers who were considered to be active volunteers during the first season of the study, and had maintained communication via the volunteer email list. Additional interviewees were identified using a snowball technique; this was done to include participants who did not fall within the currently active status but who actively participated in the decision and community discussion process. A total of 26 persons were contacted to participate; 20 of the 26 responded, and 17 interviews were completed. The interviews ranged from 20 to 90 minutes long, and were audio recorded with the permission of the participant. Each interview was later transcribed by the interviewer and was then broken down by responses and themes using an open coding technique.

The interviewees were diverse in age, gender, and socio economic background. Each interviewee was asked the same list of questions, but was encouraged to elaborate and discuss other issues important to them at their own will. Each participant was given the opportunity to discuss their own ideas if he or she felt that the topic had not been covered by the interview prompts.

This study was reviewed by the Tufts University Institutional Review Board and was granted exemption status #1406038.

## **RESULTS**

### **Reasons for volunteering**

Volunteers described a strong sense of civic duty, community pride, and giving back to the community as motivators for volunteering. A few individuals also explained that they volunteered because they felt that if they were going to complain about the problem of the deer, then they should help with the solution. It was noted that while the volunteers did reside all over Hastings-on-Hudson, the majority of interviewees lived within close proximity to Hillside Park, where much of the darting took place.

Interviewees gave several supplementary reasons for wanting to participate. Garden destruction, Lyme disease, car accidents, loss of forest understory and starving deer were noted as proof of the over population of deer. Several volunteers showed us the damage done to their gardens and the fencing they put up to protect their property. Participants experiencing deer damage to their gardens often described this damage as a constant source of frustration.

Of the reasons for participating, garden destruction was brought up in all of the interviews as either a personal motivator or a perceived motivator for others. Lyme disease and

forest understory were the second most frequently discussed issues. Car accidents were mentioned in a majority of the interviews as a problem, however only 2 interviewees mentioned having been directly impacted by a deer collision in or around Hastings-on-Hudson.

### **Participant views on deer**

Participants offered a wide spectrum of attitudes towards deer, ranging from hating the deer as a suburban pest to enjoying the deer as welcomed local wildlife. The opinions ranged greatly from person to person; each interviewee had his or her own complicated and nuanced opinions about the deer. The deer were referred to by some as cockroaches, rats or suburban pests. However, for nearly all participants, these opinions were balanced by acknowledgment that the deer were here before people, or that habitat loss was the most likely cause of the increase in conflict. However, one individual stated that the deer do not have a place in the suburban ecosystem anymore, and thus should be kept in designated park areas. Other participants stated that the deer had just as much right to the land as people, and should not have to suffer due to human encroachment.

Several individuals brought up the idea that the deer are more appreciated when they are novel but are redefined as a nuisance after having lost their novelty. This concept segued often into a conversation suggesting that long term residents have a different opinion on the deer than them more recent transplants. One individual stated that from his perspective the deer were not a problem when he was growing up in Hastings-on-Hudson, because there were fewer people and more hunters who kept the balance naturally. He described the demographic shift of the town as the cause for the controversy over increased human wildlife conflict, and not the deer.



When asked about what impact the deer have had on the community, respondents mainly expressed concerns about the increase in Lyme disease, and the use of fences around gardens and properties. There was notable concern about the impact these fences would have on social interaction and neighbor dynamics. On several occasions participants stated that when they moved to Hastings there were barely any fences, which most people said they appreciated. The destruction of the forest understory was also brought up as a community concern, since the green space in Hastings-on-Hudson is for public use.

### **Participant Views of the Immunocontraception Study**

Most participants stated that they felt the community was supportive of the immunocontraception study, and felt that there was community pride in spearheading a new system of wildlife management on such a scale. Participants did however note that they thought that the community would be equally supportive of a cull, but were aware that a small number of people would be very upset about a cull. Several participants described the immunocontraception study as the “democratic” choice, and that even though most people would be ok with a cull they felt better knowing that this solution was less divisive for the community. One interviewee did express that the use of immunocontraception was symptomatic of the shifting demographic and culture of Hastings-on-Hudson. This particular interviewee stated that the use of immunocontraception and non-lethal methods perpetuates negative stereotypes of hunters as “blood thirsty” and does not allow for a fair dialogue on the cultural and environmental value of hunting.

### *Definition of success*

The primary definition of success was less conflict with deer. This goal however was framed in 4 different ways: 1) being able to grow a garden; 2) seeing fewer deer on roads and in yards; 3) decrease in Lyme disease; 4) ability to replicate the study elsewhere. Effectiveness and efficiency were both valued in determining success.

### *Challenges*

Respondents who actively participated in the study brought up a combination of personal issues and institutional problems with the study. Personal challenges included: inclement weather, getting bored sitting in cars and/or feeling as though they did not have a clear understanding of how their participation helped. The institutional concerns included: the bureaucratic challenges associated with the darting and sedation, and the logistical challenges of how many volunteers the project needs. While many of the participants were not directly involved in the administrative obstacles faced by the study, many individuals cited “red tape” as having been a challenge for the community to mobilize the study.

### *Criticism*

The most frequent criticism of the project was that participants felt that the project was logistically challenging, and they had concerns about efficiency. While all of the participants were hopeful that the project would be successful, there were a few criticisms about efficiency in the use of volunteer time or confusion about the “next steps”. One volunteer detailed several concerns about lack of information on deer behavior. This particular participant had several years of hunting experience, and voiced several concerns about the design of the study and lack

of familiarity with the behavior of the resident deer population. This individual did not support the project and stated that he felt that it is not right to manipulate the natural state of the animal, and was concerned that projects like this perpetuate misinformation and bias against hunting practices.

### *Regulations*

We asked participants if they were aware of how current regulations impacted the Hastings-on-Hudson situation with the deer. Most residents do not know much about wildlife regulation, but most people had varying degrees of understanding that hunting is not allowed within proximity of residential neighborhoods. People understood that inability to hunt in Hastings was what initiated the discussion of net-and-bolt that in turn resulted in looking for a non-lethal solution.

A small number of participants knew that the New York State Department of Environmental Conservation was involved in the project. However most people understood agency involvement only in its administrative function and had little personal interaction with any state agencies during the project.

### *Experiential learning*

Participants had varying degrees and varying types of experiences working with the project. The majority of participants stated that they enjoyed their experience and would like to participate next year. However, a smaller number of participants stated that they did not have a good experience and probably would not participate next year. The volunteers that were able to ride along with the darters described experiences that mainly fell into two categories, either good

or bad. The individuals that rode with the darters and were able to observe darting of deer reported having a good overall experience. In addition to enjoying getting to see a deer up close, these participants described an increased appreciation for the deer as a wild animal, for the challenges of wildlife management and, for a few, the challenge and patience of hunting. However, the participants that did not observe the capture of a deer reported feeling frustrated with the design of the project and feeling as though they had wasted their time. These individuals did not report any significant change in how they viewed the deer, whether positive or negative. However, even the individuals who did not have a good experience did explain that they still supported the project, but felt that they would be better off assisting in other ways. Across the board participants agreed that participating in the project, whether or not they had a good or bad experience, had increased their understanding of the adaptability and resilience of the deer.

#### *Value of non-lethal approaches*

There was a small number of participants who felt very strongly that there must be a non-lethal alternative. However, these participants also explained that they were mostly concerned with humane management and stated that they would be open to the idea of lethal management if it were determined to be more humane than birth control. The majority of the participants stated that they did not oppose a cull ethically and would support it if it were humane and effective. Many participants described conflicting feelings about the animals, with many participants stating that they like the deer and think they are beautiful to look at, but that doesn't necessarily outweigh the problems the deer create. Efficiency and humane treatment were stated as more important concerns than whether management was non-lethal.

The results of these interviewees are not generalizable to the rest of the community, however they are representative of the population of people who were active participants with the Hastings-On-Hudson Deer Immunocontraception Study.

## **Conclusion**

The path to creating substantive conflict resolution should not stand alone without an analysis of how resolution actually functions and what the collateral results may be. In the case of the Hastings-on-Hudson Immunocontraception study, the value lies not only in the efficacy of the solution but also in the impact upon the community itself. Our findings suggest that community participation with wildlife management offers an opportunity for individuals to gain a richer understanding of not only the conflict dynamic, but also the realities of wildlife management. Simply put, the individuals who participated with the Hastings-On-Hudson immunocontraception study generally had an increased understanding for the challenges of wildlife management, deer behavior and adaptability.

It was also noted that aside from all the different value systems used to determine a preference for management techniques, the two most valued qualities were a management system that was efficient and humane. However in this case the concept of humane management did not necessarily imply that all approaches must be non-lethal, but instead was most often described as causing the least amount of suffering or stress to the deer. It is important to note that one of the interviewees, who had several years' experience hunting, articulated a high level of understanding of wildlife behavior and the importance of a balanced ecosystem. While the use of hunting as population management presents an ethical conundrum for some, it is perhaps of importance to acknowledge that the act of participating in the tracking, viewing and interacting

with wildlife and the environment that promotes a richer awareness of wildlife within the suburban ecosystem, regardless of lethal or non-lethal methods. This presents the question as to whether or not volunteers would be willing to participate in a lethal management program, and what type of experiential learning or perspective shift would occur.

The shift in perspective that may take place as a result of participation also appears to relate to the quality of the volunteer experience. That is, volunteers who described having a good experience most often reported having gained a better understanding of how challenging or complex wildlife conflict and management is. On the other hand, the participants who did not enjoy the experience described increased frustration with the deer and the management.

It is suggested that policy be put in place to help communities like Hastings-on-Hudson that are looking for alternative methods, to find logistical assistance from state agencies. The methodology of these alternative systems are often the largest hurdle faced by many of its supporters. Yet it appears that community run wildlife management may have value beyond wildlife management; direct participation in solutions may offer suburban residents greater insight into and understanding of human wildlife interaction. It is also encouraged that state wildlife agencies work with communities looking to run their own wildlife management protocol. Such collaborative efforts may promote successful wildlife management outcomes, de-escalate tension or frustration between community stakeholder and wildlife management officials, while expanding the available methodologies of wildlife management to a diversity of communities.

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